

Validating the Remote First Aid Self-Efficacy Scale for Use in Training and Personal  
Development of Remote First Responders

by

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## Abstract

This study was designed to investigate the psychometric properties of the 30-Item Remote First Aid Self-Efficacy Scale (RFA SES), develop a shorter 15-Item RFA-SES, and gain a preliminary understanding of the psychometric properties of the shorter 15-Item version. The original 30-Item RFA SES was developed for two main purposes: (1) evaluation of wilderness first aid and other types of emergency care training designed for remote geographies, communities, and worksites; and (2) reflection by training participants so they can self-assess their beliefs, confidence, and capacity to respond. Students from Laurentian University (LU) and graduates from Wilderness Medical Associates (WMA) training courses were recruited to respond to an online questionnaire at two different time periods (T1 and T2). A total of 1106 students and 448 graduates from WMA responded at T1. These results demonstrated that the RFA SES was a unidimensional scale with an eigenvalue of 18.1 at T1. The mean inter-item correlation was 0.75 at T1. Test-retest reliability (T1 to T2) was high for both the LU group ( $r = .91, p < .01$ ) and the WMA group ( $r = .92, p < .01$ ). Moderate correlations were found between the RFA SES and two other similar scales (included in the questionnaire) measuring different constructs. WMA participants showed higher mean scores than LU students at T1 ( $t(569) = 16.2, p < .01$ , two-tailed). The 30-Item RFA SES is a unidimensional, reliable, and valid scale for assessing remote first aid self-efficacy. To develop the 15-Item RFA SES, three members of the research team completed an iterative process to reduce items based on expert opinion and statistical performance from the inter-item correlations. Preliminary analysis of the 15-item version of the RFA SES, using data from the WMA group ( $n=448$ ), also indicated that the scale was reliable and valid. However, a more rigorous validation study with original data is required.

## Keywords

Remote First Aid, Remote First Aid Self-Efficacy Scale, Scale Validation

## Paper 1 Co-Authorship Statement

Chapter 2 (Paper 1) and Chapter 3 (Paper 2) were prepared as articles for submission for publication respectively.

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Jonah D'Angelo led the conceptualization, data collection, and data analysis of this study, and wrote the first draft.

Dr. Stephen Ritchie assisted with the conceptualization and data analysis of this study and reviewed the first draft and provided feedback.

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## Table of Contents

Abstract.....	iii
Paper 1 Co-Authorship Statement .....	iv
Acknowledgments.....	vi
List of Tables .....	xi
List of Appendices .....	xii
List of Abbreviations .....	xiii
1.1 Introduction.....	1
1.2 FIRST AID.....	2
1.2.1 Urban First Aid and Remote First Aid.....	4
1.2.2 Application of Remote First Aid.....	6
1.2.3 Remote Community First Aid.....	7
1.2.4 Remote Worksite First Aid .....	8
1.2.5 Remote Adventure First Aid.....	9
1.2.6 Evaluation of Remote First Aid Skills .....	11
1.3 Confidence & Self-Efficacy Measures .....	12
1.4 Remote First Aid Self-Efficacy Scale Development .....	14
1.6 Thesis Outline .....	18
1.6 References.....	20
2.1 Abstract.....	30
2.2 Introduction.....	31
2.21 Self-Efficacy Scale Development .....	33
2.22 RFA SES Development.....	34

2.3 Methods.....	36
2.31 Instrumentation .....	36
2.32 Population and Recruitment.....	37
2.33 Data Collection.....	38
2.34 Data Analysis .....	39
2.4 Results.....	39
2.41 Scale Dimensionality .....	40
2.42 Scale Reliability .....	40
2.43 Scale Validity .....	41
2.5 Discussion.....	42
2.6 Conclusion .....	45
2.7 Acknowledgments.....	46
2.8 References.....	47
3.1 Abstract.....	54
3.2 Introduction.....	55
3.3 Methods and Results.....	56
3.31 Data and Population .....	57
3.32 Step 1 – Item Reduction.....	57
3.33 Step 2 – Reliability and Validity Analysis.....	58
3.4 Discussion.....	59
3.5 Conclusions.....	61
3.6 Acknowledgments.....	61
3.7 Reference .....	62
Chapter 4.....	65

4.1 Introduction.....	65
4.2 First Aid Assessments.....	67
4.2.1 Competence and Confidence.....	69
4.3 Self-Efficacy .....	70
4.3.1 Self-Efficacy Assessment.....	70
4.3.2 Self-Efficacy Measures .....	72
4.3.3 Competency and Self Efficacy Assessment Issues .....	73
4.3.4 Confidence Biases & Self-Efficacy .....	76
4.4 Implications and Applications .....	78
4.4.3 Application Contexts.....	81
4.4.4 Knowledge Translation and Mobilization.....	84
4.7 Limitations .....	85
4.7 Conclusion .....	85
4.8 Reference .....	87
Appendices.....	93

## List of Tables

Table 1. Remote First Aid Self-Efficacy Scale Items	37
Table 2. Sample Population Demographics	40
Table 3. Mean Scale Scores	40
Table 4. Scale Reliability Results for Laurentian and WMA Participants (n=571)	41
Table 5. Correlations Between RFA SES, CD-RISC, and GSES (n=1554)	41
Table 6. Mean Scale Scores for the 15- and 30-Item RFA SES at Two Time Periods (n = 448)	58
Table 7. Reliability Performance at T1 for the 15- and 30-item RFA SES (n = 448)	59
Table 8. Correlation Matrix Comparing the 15- and 30-Item RFA SES to CD-RISC and GSES (n = 448)	59

## List of Appendices

Appendix A: RFA SES Validation Study Questionnaire	93
Appendix B: Remote First Aid Self-Efficacy Scale (English & French)	108
Appendix C: Laurentian University Research Ethics Board Approval Certificate	112
Appendix D: 15-Item Remote First Aid Self-Efficacy Scale	113

## List of Abbreviations

AED: Automated External Defibrators

CBEC: Community Based Emergency Care

CD-RISC: Connor Davidson Resilience Scale

CPR: Cardiopulmonary Resuscitation

EMS: Emergency Medical Services

GSES: Generalized Self-Efficacy Scale

IIC: Interitem Correlations

LU: Laurentian University

RFA SES: Remote First Aid Self-Efficacy Scale

SES: Self-Efficacy Scales

SM: Sirius Medx

URL: uniform resource locator

WAFA: Wilderness Advanced First Aid

WEMT: Wilderness Emergency Medical Technician

WFA SES: Wilderness First Aid Self-Efficacy Scale

WFA: Wilderness First Aid

WFR: Wilderness First Responder

WMA: Wilderness Medical Associates

WMS: Wilderness Medical Society

# Chapter 1

## 1.1 Introduction

This thesis project was designed to validate the Remote First Aid Self-Efficacy Scale (RFA SES). Accidents occur every day and continue to be a leading cause of death in North America (Jemal, 2005). Despite significant advances in modern health care, one of the fundamental aspects of saving a life reflects access to immediate care. In sum, the quicker someone accesses emergency care services, the better their chances are of survival (Clark et al., 2013; Sampalis et al., 1993; Weaver et al., 1986). Thus, having access to trained first aiders followed by rapid access to paramedical services is critical. However, despite advances in technology and infrastructure, many remote regions still do not have access to the same care level as people living in urbanized environments (Curran et al., 2018; A. M. Orkin et al., 2016). As a result, first aid in remote regions requires different types of training relevant to the context.

Self-efficacy is a well-developed social cognitive theory that is ascribed to the foundational research of Albert Bandura, and it essentially reflects the beliefs and confidence a person has to act appropriately in a particular domain of life (Bandura, 1997). Thus, self-efficacy related to providing first aid in remote contexts is a relevant construct given the increased reliance on immediate responses to save lives. The RFA SES was initially designed for two primary purposes: (1) evaluation of wilderness first aid and other types of emergency care training designed for remote geographies, communities, and worksites; and (2) reflection by training participants so they can self-assess their beliefs, confidence, and capacity to respond.

The literature review in the following sections is organized to reflect three main areas related to this thesis: (1) First Aid and Remote First Aid, (2) Confidence and Self-Efficacy, (3) Remote First Aid Self-Efficacy Scale Development. The background literature in this first chapter also provides important contextual details before reviewing the two integrated articles in Chapters 2 and 3. A final section provides insight into the intended uses of the RFA SES while exploring the measure of self-efficacy.

## 1.2 First Aid

In the last century, first aid has grown from a survival technique on the battlefield to a standardized set of training protocols for willing participants (Moorehead, 1999)(Metintas et al., 2014). Historically, battlefield surgeons taught first aid which in turn reflected the bare essentials of medical treatment with a primary focus on lifesaving techniques such as suppressing blood loss (Moorehead, 1999; Metintas et al., 2014). First aid techniques for wound care and management were likely first standardized in 1903 by Clara Barton, the president of the Red Cross (Moorehead, 1999; Evans, G. D, 2003). The standardization of first aid was based on the simple premise that accidents and illness occur regularly and that other people in close proximity are likely the first to provide aid. Further, research has demonstrated that the mortality rate is dependent on medical response time (Moorehead, 1999). In sum, the quicker someone begins receiving care, the better their chance of survival (Sampalis et al., 1993; Weaver et al., 1986). Thus, Barton formed a committee to teach citizens basic lifesaving techniques, in turn he believed that the probability of someone with training being available to assist was much higher, helping to ensure that a patient received a higher standard of immediate care (Moorehead, 1999).

One of the most significant advancements in first aid came in the 1960s when cardiopulmonary resuscitation (CPR) techniques were introduced as a primary life support mechanism, with simple steps to follow for bystanders (Eisenburger & Safar, 1999). Before this, the absence of a pulse outside of the hospital almost always meant certain death (Eisenburger & Safar, 1999). As modern medicine evolved, so did first aid. New knowledge emerged pertaining to specific first aid techniques, such as preventing and treating infection and managing injury's psychological effects (Markenson et al., 2010). Over time, research helped develop first aid into a standardized set of training protocols to assist victims of injuries and illnesses with little to no equipment. Today, as defined by Markenson et al. (2010), we know this first aid as 'the assessment and interventions that can be performed by a bystander (or by the victim) with minimal or no medical equipment (Markenson et al. p.1, 2010).

First aid is taught by many different training providers that offer various courses or programs targeting various levels of first aid knowledge and skills, with the vital idea that early quality care provided to an ill or injured victim leads to an increase in the likelihood of survival and stabilizes their condition until they can receive advanced medical care (Tannvik et al., 2012).

There are various reasons why people complete first aid training in society today, ranging from a voluntary willingness to help, to workplace safety or employment requirements. As a result, many different courses are offered to account for different contexts and required training levels. Despite these different training levels there are two main categories in which first aid courses are classified as: standard first aid courses and advanced first aid courses.

Regardless of the training course category, they all focus on preserving life and minimizing victim suffering while preventing further injury and promoting recovery (Markenson et al., 2010). The Red Cross promotes the principle that first aid education should be universal and that

everyone should learn and practice first aid (Markenson et al., 2010). Essentially the goal of first aid is to assist ill or injured victims immediately, and where necessary, increase their likelihood of survival and access to superior emergency medical services or advanced medical treatment. It should be noted that not all circumstances requiring the administration of first aid require higher levels of treatment. More importantly, the environment or context should reflect the type of first aid taught and treatment plan selected.

### 1.2.1 Urban First Aid and Remote First Aid

Although first aid training courses usually range from standard or basic level first aid to advanced level first aid, they also differ from urban to rural and remote contexts. Nonetheless, the fundamental goal of all first aid is the same; it is to help “a sick or injured person until full medical treatment is available” (Schuman et al., 2012, p. 1). The difference between training courses relates to the level (basic or advanced) and is often based on the type (industrial, workplace, public) of training a participant receives. It also reflects the context (or setting) from urban to remote. Many factors differentiate urban and remote first aid. Essentially though, in an urban setting, the victim usually has access to paramedical services within minutes of contacting emergency dispatch services (i.e., 911 in Canada). Further, a patient may either be indoors, or there is usually the option to move a patient indoors out of adverse weather.

For this thesis project, remote first aid occurs in remote communities, remote worksites and other contexts involving wilderness recreation or expeditionary travel. Thus, remote first aid usually presents further challenges for both the victim and first aider compared to urban first aid. First, injuries and illnesses in remote contexts are often affected by adverse weather conditions and

challenging terrain (Backer & Thygerson, 2015). Adverse weather in an urban setting typically does not usually affect a victim's condition; however, in a remote setting heat or cold injuries could be the primary factor being treated, or they could be conditional factors the first aider must manage while administering the first aid. Second, proper medical treatment could be inaccessible for hours or even days based on difficult access (e.g., no road), lack of alternative transportation (e.g., boat or aircraft), and poor communication (Backer & Thygerson, 2015). In an urban setting, first aiders typically have access to paramedical services within minutes. Third, remote contexts or settings often require more advanced first aid care beyond the scope of urban first aid, such as reducing dislocations and managing wounds for an extended period (Backer & Thygerson, 2015). Essentially, in a remote setting, first aiders must do more to take care of a patient and manage them for a more extended period. Alternatively, in urban first aid, trainees are typically taught short-term treatment techniques since patients will have quick access to more advanced care. Fourth, in remote contexts, first aid supplies can be limited or nonexistent (Backer & Thygerson, 2015). There are typically more first aid supplies and lifesaving devices in an urban setting, such as automated external defibrillators (AEDs), because most businesses and organizations must have them by law. Fifth, the first aider must make difficult decisions regarding treatment options, such as whether to start CPR immediately or move a victim (Backer & Thygerson, 2015). Typically, in an urban setting, first aiders do not usually face as many difficult decisions.

In sum, the main difference between urban and remote first aid has to do with time and proximity. Most urban first aid courses are designed to teach people who have close and immediate access to paramedical services (Backer & Thygerson, 2015). However, in a remote setting, a first aider could be hundreds of kilometers away from a hospital emergency department

and therefore they may be tending to a victim for hours or even days before help arrives. Moreover, as a result, remote first aid courses need to include additional training, such as long-term victim management and patient movement and evacuation techniques. Due to the challenges encountered with remote first aid contexts, various training providers have developed specific courses to address the unique challenges and requirements. There is a compelling need for first aiders with relevant training in remote geographical locations and contexts.

### 1.2.2 Application of Remote First Aid

Remote first aid is relevant in many different contexts and builds on the knowledge and skills from standard first aid while focusing on extended life support and care management. Remote first aid is more commonly known as wilderness first aid by many training providers. However, given the inclusion of remote communities and workplaces in this study, the term remote was more applicable when referring to the different contexts. Thus, the term *remote* is intended to infer the same isolation and meaning as the term *wilderness*.

There are various remote geographical contexts or locations; however, from a healthcare perspective, the term remote has been defined as being more than one hour away from paramedical services (Backer & Thygerson, 2015). There are three primary beneficiaries from receipt of remote first aid training: (1) remote communities, (2) remote worksites, and (3) outdoor adventure communities. Although there are differences in terms of typical injuries and illnesses in these three contexts, there are also many similarities, as outlined in the previous section.

Nonetheless, some examples of differences in illnesses and injuries are worth noting. Remote communities may be more susceptible to heart attacks, vehicle accidents, and typical injuries that one experiences in one's daily life (DesMeules & Pong, 2006). In contrast, outdoor adventure first aid may have more injuries related to adventure activities such as hunting or climbing accidents, or they may have more environmental injuries from expeditionary travel such as heat stroke or frostbite (Sholl & Curcio, 2004). More common remote worksite injuries may occur from accidents due to chemical spills or crushing injuries from falling rocks (mining) or trees (forestry) (Shrimpton & Storey, 1996). Regardless of the different injury types that may be more likely to occur in these three contexts, the training approaches are similar since a broad range of possible types of injuries and illnesses must be addressed in remote first aid training courses, regardless of context. Remote first aid plays a critical role in patient survival, and as a result, there is a need for confident and well-trained first responders that are likely to respond to illness and injuries which occur in remote geographical locations as a bridge to advanced medical care.

### 1.2.3 Remote Community First Aid

Remote community first aid reflects people living in regions that do not have immediate access to paramedical services or emergency health care because of their geographical location (Curran et al., 2018). Many remote communities require air travel to access these resources (Curran et al., 2018). In Canada, these remote communities are typically Indigenous and living in their traditional territory where the only available health resource is a small medical clinic or nursing station, made up of nurses or community health workers (A. M. Orkin et al., 2016). In some cases a family physician may visit for 2-3 days each month (A. M. Orkin et al., 2016). In these

contexts, hospital emergency departments are often hundreds of kilometers away and reaching them almost always requires air travel (A. M. Orkin et al., 2016). In place of immediate definitive emergency care within these regions, lay people living in some communities are taught an advanced level of remote first aid, and this allows them to help members of their community in an emergency (A. M. Orkin et al., 2016).

In northern Ontario, Canada, the term Community-Based Emergency Care (CBEC) was first coined in 2013 at a Roundtable with Indigenous community health representatives, provincial and federal government representatives, and a diverse array of health professionals (A. M. Orkin et al., 2016). This new CBEC model of emergency care training for remote communities also led to the creation of the RFA SES, as a tool to evaluate remote first aid training programs in a culturally appropriate way.

#### 1.2.4 Remote Worksite First Aid

Like remote communities, many remote worksites, and related industries (Ex. forestry, fishing, mining) complete work in various remote contexts that have limited access to paramedical services and emergency healthcare within a short period of time (Shrimpton & Storey, 1996). Remote worksites are defined as workplaces where the ambulance response time is more than two hours (Canada Occupational Health and Safety Regulations (SOR/86-304), 2021). Remote industries typically involve dangerous work, determined by the length of travel, the machinery used, or the work itself (Shrimpton & Storey, 1996). Thus, remote industries have a compelling need for appropriately trained first responders. Many remote industries provide employees the basic level of first aid set out by government standards. This typically involves a standard first

aid course if they are within the two-hour window of EMS, but often the course content does not reflect the nature of the environment in which they are in. Remote workplaces in Canada, outside of the two-hour EMS response window, require at least one first aid attendant with a standard first aid certificate and a wilderness first-aid certificate to be present during all working hours (Canada Occupational Health and Safety Regulations (SOR/86-304), 2021).

### 1.2.5 Remote Adventure First Aid

Outdoor professionals, guides and outfitters often complete their work in various remote contexts. Typically, this work involves travel to areas that are not easily accessible and focus on group activities with high risk associated with them (Tilton, 2010). These group activities include but are not limited to, hiking, climbing, paddling, sailing, motorized vehicle activities and other types of outdoor adventures and expeditions in remote wilderness environments. Due to the risk associated with outdoor adventure activities, wilderness first aid courses were developed specifically for these remote contexts. This was due to a compelling need for well-trained guides and leaders on trips and expeditions. This type of first aid training for outdoor leaders and guides usually reflected two main focuses. First, it focused on prevention because many adventure experiences involve risk and thus the necessity of assessing the risk associated with these activities (Tilton, 2010). Second, it focused on delivering wilderness-oriented first aid at a higher first responder level since more time and care was required, especially when an evacuation was necessary (Tilton, 2010). There are a wide range of remote first aid courses available to this population. However, the most recognized is the *Wilderness First Responder* (WFR), which is now required by most outdoor organizations when hiring leaders and instructors (Tilton, 2010).

The Wilderness Medical Society (WMS) was developed to encourage scientific knowledge related to preserving human health during activities in wilderness environments. The WMS has developed an evidence-based curriculum and peer-reviewed principles and practices when practicing RFA. The WMS also publishes a journal (WEM) and offers frequent training, workshops, and an annual conference to support the field's ongoing development. This society is also affiliated with some of the most extensive training providers of WFA in North America; thus, the research and evidence-based curriculum directly influences course offerings for participants. For instance, two of these providers are Wilderness Medical Associates (WMA) and Sirius Medx (SM). Both of these training providers offer the following four similar courses, which are in order of lowest to the highest level of training: Wilderness First Aid (WFA), Wilderness Advanced First Aid (WAFA), Wilderness First Responder (WFR), and Wilderness Emergency Medical Technician (WEMT). Thus, there is a certain standardization of courses offered by wilderness first aid training providers.

Remote communities, worksites and wilderness adventure activities are just three of the primary contexts that differentiate RFA training needs from urban first aid training needs. With curriculum differences such as search protocols, rescue techniques, patient movement and carries, and long-term patient care, RFA courses typically train responders to manage a patient's care for an extended period in an environment that requires an expanded scope of practice compared to urban first aid. This leads to a need for highly trained, competent, and confident trainees.

### 1.2.6 Evaluation of Remote First Aid Skills

To be an effective first aider, one must possess the knowledge and competence to perform life-preserving and saving skills; and, additionally, to retain the confidence to act appropriately.

Currently, most first aid training courses use a knowledge retention exam as a pass/fail assessment upon completion of a first aid course, leading to the subsequent receipt or denial of a certification (Markenson et al., 2010). If trainee scores on the exam are higher than the prescribed minimum required score, they are granted the certification. Alternatively, if they score lower, they are not granted the certification. For example, Sirius MedX, a leader in remote first aid, requires a minimum of 70% grade on the final written exam to pass the course and receive the certification (Sirius, 2015). Additionally, concurrent with a written knowledge retention exam, there is often a practical observational assessment of skills. While evaluators observe and assess, first aiders respond to a mock scenario or simulation to apply their knowledge, skills, and problem-solving ability to a remote first aid situation. Thus, these two evaluation methods assess a first aider's knowledge and skills; however, they do not assess a first aider's: (1) level of confidence in their ability to respond and (2) likelihood to respond or respond in a timely fashion.

Schuman et al. (2012) suggest that confidence is equally important in first aid response compared to knowledge and skill assessments. In other words, someone helping in any way possible is better than someone not helping at all, or as indicated by the Canadian Red Cross Society. (2011), "The most harmful thing you can do is nothing at all" (Canadian Red Cross Society, 2011 P. 3). Additionally, it is also known that the knowledge of first aid skills is quickly

forgotten following a course (Schumann et al., 2012). This further supports the need to assess someone's likelihood to respond and their self-reported confidence in doing so.

### 1.3 Confidence & Self-Efficacy Measures

Confidence is related directly to the concept of self-efficacy. Thus, as a measure of first aid confidence, self-efficacy could provide another assessment dimension related to wilderness first aid training. It could also provide a potential pedagogical tool for self and group reflection.

Albert Bandura initially introduced Self-efficacy theory in 1977, and since then, it has gained traction as a self-assessment technique (Bandura, 2006, 2010). Bandura defined self-efficacy as a belief in one's ability to execute the actions and behaviors to accomplish specific performance attainment (Bandura, 1977, 1997). There are numerous reasons why one would like to understand their self-efficacy better, primarily because it is related directly to performance-indicators. For instance, there is evidence that self-efficacy is an accurate predictor of performance in work (Sadri & Robertson, 1993), academia (Moritz et al., 2000), and sports (Multon et al., 1991). Thus, self-efficacy in the context of first aid performance could likely predict performance in responding to injuries and illnesses, in part, because they often involve rapidly assessing and gaining an understanding of complex processes. (Sadri & Robertson, 1993; Moritz et al., 2000; Multon et al., 1991).

Over the last decade, self-efficacy measures have become increasingly popular as they provide information not captured by other assessments. Self-efficacy allows for a closer look into one's belief and thought processes, and therefore it can be used as a prediction tool for future

situations. Recently, three new first aid self-efficacy scales have been developed in addition to the original Schuman et al. 2012 Wilderness First Aid Self-Efficacy Scale (WFA SES).

However, none of them are designed for the remote populations and training contexts targeted by the RFA SES. Although the WFA SES inspired the development of the RFA SES, the RFA SES is vastly different. Its initial development was focused on assessing the outcomes of a CBEC training course in a remote indigenous community. Furthermore, its development was multifaceted and elicited expertise from a variety of domains under the health spectrum. Thus, the RFA SES creation was designed around a unique scale that could measure the primary constructs of self-efficacy in the first aid domain. The scale was also designed to have two main purposes: evaluation of first aiders' self-efficacy and reflection on their abilities.

Self-efficacy scales as a whole offer insight into someone's areas of strength and weaknesses related to competency. As described by Bandura, one cannot be a master of all areas of their self-efficacy; they may thrive in some areas yet have lower self-efficacy in others (Bandura, 1977). Thus, although practical, applying a general self-efficacy scale is not necessarily a strong predictor of specific domain performance (Bandura, 2006). One of the strengths of a self-efficacy scale is that it allows for reflection and growth through knowledge of self (Bandura, 2006). Bandura emphasizes that the power of self-efficacy scales is not by their explanatory and predictive power but by their operational power related to motivation and change (Bandura, 2006). In sum, learning about oneself in terms of self-efficacy in a specific domain or construct allows for a meaningful change in performance within that domain or construct. Thus, Bandura recommends that a wide variety of items related to the primary construct should be included in a scale in order to measure self-efficacy effectively (Bandura, 2006).

## 1.4 Remote First Aid Self-Efficacy Scale Development

Published in 2006, Bandura (2006) provided a systematic guide for the construction of self-efficacy scales, and it provided several recommendations and examples of different types of self-efficacy scales (Bandura, 2006). For instance, he recommended including a diversity of items ranging from easy to difficult to avoid a ceiling effect and include items that reflected cognitive, affective, and psychomotor domains. Each item should be scored using a 100-point analog scale from “Cannot do at all” to “Highly certain can do” (Bandura, 2006). The initial development of the RFA SES followed the guidelines outlined by Bandura and expanded on the constructs within the remote first aid domain to create a well-balanced 30-item scale.

The RFA SES development was originally designed to address the inequities of remote Indigenous communities’ emergency healthcare needs using the CBEC system (A. Orkin et al., 2012; A. M. Orkin et al., 2016). The essence of the CBEC system is that lay members of a community are given the appropriate first aid and emergency care training that reflects the remote context where definitive care from trained healthcare professionals is often many hours or days away (Curran et al., 2018; A. M. Orkin et al., 2016). Thus, CBEC and other remote first aid training providers must provide appropriate and relevant training that increases the likelihood of timely emergency care within minutes of a health emergency. In this context, the RFA SES development was designed to address the gap in first aid training and evaluation that does not consider self-efficacy.

It is evident that the Indigenous population in Canada has less than optimal health when compared to the general Canadian population (H. L. MacMillan et al., 1996; Harriet L. MacMillan et al., 2003; A. Orkin et al., 2012). The Indigenous population in Canada tends to

have the highest rates of diabetes, hypertension, obesity, addiction, infectious disease, and suicide when compared to any other ethnic groups in Canada (H. L. MacMillan et al., 1996; Harriet L. MacMillan et al., 2003). All these factors are related to a life expectancy up to 8.1 years less than the Canadian population average (Statistics Canada; Health Canada, 2002). The increased prevalence of people with medical conditions in many remote Indigenous communities' results in increased health care needs, including immediate care in the event of an emergency. Many people living in remote Indigenous communities engage in subsistence activities such as hunting, fishing, and trapping, which often require even more remote wilderness travel outside their communities. This leads to an additional risk of accidents and illness that occur further from definitive care. As a result, Indigenous communities are faced with higher mortality rates from accidents related to the same incident in an urban population (A. Auer & Andersson, 2001; A. M. Auer & Andersson, 2001).

There is compelling evidence that the quicker someone starts receiving emergency care, the more likely their chance of survival (Clark et al., 2013; Sampalis et al., 1993). However, an environmental scan by Mew et al. (2017) exposed that the existing emergency response support for 24,000 Ontarians living in remote Indigenous communities was inadequate for their unique geographical, epidemiological, and cultural needs (Mew et al., 2017). The CBEC system of training courses was designed to address that gap, and the RFA SES was initially designed as a culturally appropriate evaluation tool for use in the CBEC training course. A CBEC training course was a community-based training and learning process that would also involve a culturally appropriate evaluation process utilizing the RFA SES.

The RFA SES was also intentionally designed to be used in many contexts beyond CBEC training courses. In other words, it was designed in such a way that diverse geographical and

population contexts would not hinder its performance and usability. Specific first aid items were included on the scale with the expectation that the scale could be used in a wide variety of remote first aid training contexts, and items were not too specific to avoid irrelevancy when used in particular contexts or regions of the world. For instance, there were no items related to heat or cold-related illnesses, such as heat stroke or hypothermia because these may not be relevant in different regions that do not experience these types of illnesses.

The primary purposes of the RFA SES are evaluation and reflection. As an evaluation tool, summary scores from the 30-Item RFA SES can help detect varying levels of RFA self-efficacy over different time periods (e.g., before and after a training course) and between different populations. As a reflection tool, the 30 items on the scale reflect diverse aspects of a training course structure, allowing for an individual or collective reflection on competencies and the overall course experience.

The RFA SES was developed using principles of community-based participatory research (Israel et al., 2010; Ritchie et al., 2013); thus, its creation was based on empirical knowledge, first aid course research, and self-efficacy psychological constructs. However, its development and finalization involved the expertise of many, including emergency room physicians, paramedics, health-based researchers, indigenous community members, and a wide assortment of remote first aid providers and students. The development process also adhered to health scale development guidelines (Boateng, Neilands, Frongillo, Melgar-Quinonez, & Young, 2018) and specific recommendations for self-efficacy scale development Bandura (2006). The final 30-Item self-report scale was capable of assessing perceived remote first aid self-efficacy.

## 1.5 Rationale

In remote wilderness regions, paramedical services are often not available, and even in some remote communities and worksites, emergency transportation via helicopter or plane is required to access the nearest medical center or hospital. As a result, there is a compelling need for practical first aid training that reflects the remote context. First aid is defined as "help given to a sick or injured person until full medical treatment is available" (Markenson et al., 2010), and this care may span hours and days in remote settings compared to minutes in urban settings. This highlights the need for well-trained, competent responders who are not only likely to respond but confident in their ability to respond successfully. However, most remote first aid training courses rely on knowledge retention and skill assessment as tools for evaluation, and this does not necessarily predict confidence and likeliness to respond. This gap led us to identify the need for an effective way to evaluate first aid self-efficacy in remote settings.

Thus, the RFA SES was rigorously developed as an evaluation and reflection tool for first aid training in remote contexts. However, before being useful for first aid training providers, evaluators and researchers, a validity study was required. This RFA SES tool has the potential to help save lives by helping to improve training and participant confidence through reflection. Since accidents are one of the top three leading causes of death in North America, there is a compelling need for citizens outside urban areas to have not only the first aid knowledge and skills to assist others in a time of need but also the self-efficacy and confidence with which they are more likely to respond (Jemal, 2005). The RFA SES was a tool designed to meet this need, however, the psychometric properties must reflect a reliable and valid tool.

## 1.6 Thesis Outline

There are many ways of accessing health care today; however, in the unfortunate event that people do not have immediate access to healthcare, they rely on trained first responders. These responders have some level of first aid training, and they are usually trained to help the victim access a higher level of care when required. However, first aiders' training needs in remote contexts are more complex given the added pressure to respond appropriately due to the higher level of care being hours or even days away. In this context, the RFA SES was developed because remote first aid self-efficacy is a relevant construct that would help predict responder confidence and likeliness to respond.

This study was primarily focused on understanding the psychometric properties of the RFA SES in terms of a comprehensive analysis of the dimensionality, reliability, and validity of the scale. Dimensionality reflects an understanding of how many dimensions (or factors) the scale contains. Reliability refers to the consistency of scale scores in similar circumstances or across different time periods. Validity refers to the accuracy of the scale in terms of measuring what it was designed to measure. A secondary purpose was to identify any missing items or whether there were too many items (i.e., redundant items).

This thesis follows an integrated article style that includes two subsequent papers (chapters two and three), followed by a fourth chapter focused on integrating and applying the two articles' findings. The data presented, analyzed, and discussed in this thesis was collected using an online questionnaire distributed to Laurentian University students and WMA alumni. The online questionnaire included: (1) demographic questions, (2) the RFA SES, (3) two other validated

scales for assessing construct validity, and (4) an open-ended reflective question asking if any items were missing from the RFA SES.

Chapter 2 includes the first article entitled “Validating the Remote First Aid Self-Efficacy Scale for Use in Evaluation and Training of First Responders in Remote Contexts”. This chapter focuses on assessing the dimensionality, reliability, and validity of the 30-Item RFA SES.

Chapter 3 includes the second article entitled: “Development and Preliminary Validation of the 15-Item Remote First Aid Self-Efficacy Scale”. This chapter followed recommendations from the RFA SES validation study in Chapter 2 and presents preliminary dimensionality, reliability, and validation results for a 15-item version of the RFA SES. It is important to note that the article in Chapter 3 was prepared in a Short Report format to prepare for a Wilderness and Environmental Medicine journal submission. Hence, the length of the article was restricted by the journal requirements. Chapter 4 focuses on discussing and integrating the two articles' results (Chapter 2 and 3). This final chapter also addresses study limitations, implications, and future research opportunities.

The implications of this thesis project relate to providing additional research, evaluation, and reflection tool for use in remote first aid situations concerning training or providing first aid. The immediate goal of this research study was to establish the psychometric properties of the existing RFA SES and identify how the scale may need to be modified to be more effective in the future. The long-term goal was to develop a tool that would help improve remote first aid training programs and increase the confidence of first aiders.

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## Chapter 2

### Validating the Remote First Aid Self-Efficacy Scale for Use in Evaluation and Training of First Responders in Remote Contexts

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Note: The target journal of submission is subject to change. However, this paper has been oriented towards the Journal of Environmental & Wilderness Medicine as this is the journal of choice currently.

#### 2.1 Abstract

**Objective:** The purpose of this study was to investigate the psychometric properties of the Remote First Aid Self-Efficacy Scale (RFA SES). The RFA SES is a 30-item scale that has been rigorously developed in response to emerging evidence showing that self-efficacy is predictive of performance.

**Methods:** Trained alumni from Wilderness Medical Associates (WMA) and students from Laurentian University (LU) were recruited via email to complete an online questionnaire at two different periods (T1 & T2). The questionnaire included demographic questions, the 30-Item RFA SES, the 10-Item Connor Davidson Resilience Scale (CD-RISC), and the 10-Item Generalized Self-Efficacy Scale (GSES). The analysis involved an assessment of the dimensionality, reliability, and validity of the RFA SES.

**Results:** There were 448 alumni from WMA and 1106 students from LU who participated. The RFA SES demonstrated a clear unidimensional structure. The mean inter-item correlation was 0.75 at T1. Test-retest reliability (T1 to T2) was high for both the LU group ( $r = .91, p < .01$ ) and the WMA group ( $r = .92, p < .01$ ). Moderate correlations were found between the RFA SES and the CD-RISC ( $r = 0.45, p < .01$ ) and GSES ( $r = 0.48, p < .01$ ). WMA participants showed higher mean scores than LU students at T1 ( $t(569) = 16.2, p < .01$ , two-tailed).

Conclusions: Results suggest that the RFA SES is a unidimensional, reliable, and valid scale for assessing remote first aid self-efficacy. Further research should focus on item reduction, followed by re-validation.

*Keywords: Remote First Aid, Self-Efficacy, Scale Development, Scale Validation*

## 2.2 Introduction

Geographically remote regions include communities, outdoor adventure pursuits, and resource extraction enterprises. However, in the event of an accident, many of these remote populations lack close and direct access to emergency medical services (EMS) (Mew et al., 2017; Curran et al., 2018; Desmeules & Pong, 2006). In place of this essential health service, many contexts rely on trained first aiders; members of the population who have taken a relevant first aid training course outside of the classic urban scope (Curran et al., 2018; Orkin, Vanderburgh, Ritchie, Curran and Beardy., 2016). First aid is defined as “the assessments and interventions that can be performed by a bystander (or by the victim) with minimal or no medical equipment” (Markenson et al., 2010, p. 17). This first aid care may span hours and days in remote settings compared to minutes in an urban setting (Backer & Thygeson, 2015). This highlights the need for well-trained, competent, and confident responders.

Most remote first aid training courses rely on knowledge retention and skill competency for student assessment. However, these assessment forms do not necessarily predict self-efficacy and likeliness to respond (Bandura, 1997). It is also well-known that first aid training improves one’s competence and helping behaviors (Van de Velde et al., 2009). Recently, it has been shown that self-efficacy in a non-layperson group of first aiders is predictive of overall success, suggesting that this variable may be necessary beyond knowledge retention (Schumann, Schimelpfenig, Sibthorp and Collins., 2012). In other words, helping in any way possible is better than not helping at all (Canadian Red Cross Society, 2011). As the Red Cross states conclusively, “the most harmful thing you can do is nothing at all” (Canadian Red Cross Society, 2011 P. 3). Additionally, it is known that first aid knowledge and skills diminish over time after a course is finished (Schumann et al., 2012); thus, diminished knowledge and skills may also impact confidence and likeliness to respond over time.

Confidence is related to the construct of self-efficacy. Self-efficacy is a construct rooted in deeper theoretical underpinnings (Bandura, 1997). Self-efficacy is both the affirmation of one's ability and the strength of their belief. Thus, a measure of first aid self-efficacy could add another assessment dimension related to wilderness first aid training and other types of first aid training in remote contexts, such as community-based emergency care (Orkin et al., 2016). It could also be used as a pedagogical tool for self and group reflection. Bandura defined self-efficacy as "an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments" (Bandura, 1997 p. 3).

According to Bandura, most behaviors are initially shaped in our thought, in that our belief about our efficacy influences our decision before we even begin the behavior (Bandura, 1997). People who visualize success in scenarios tend to create a positive prediction of performance while doing so. In contrast, people who visualize failure in a scenario tend to dwell on their deficiencies and focus on what could go wrong, leading to further failure or simply an inability to act (Bandura, 1997). This simple cognitive process is one of the four ways self-efficacy is believed to be regulated by human functioning (Bandura, 2010). The second way it is regulated is through motivation (Bandura, 2010). Human motivation is generated through forethought (Bandura, 2010). The process causes people to form beliefs about their capabilities, drives them to plan their course of action through their perceived capacity to act, and creates their cognitive motivation (Bandura, 2010). The third way it is regulated is through affective processes, and this is where people's beliefs and understanding of their capabilities influence their emotional states (Bandura, 1997). Thus, those who believe they can exercise control over threats are more relaxed and less stressed (Bandura, 1997). However, those who believe they cannot manage these threats face high arousal levels, leading to further stress and other negative emotions such as fear or anxiety (Bandura, 2010). The final way self-efficacy is regulated through the coping process (Bandura, 2010). People tend to avoid activities or situations that overwhelm their coping capabilities (Bandura, 1997). As a result, they tend to take on challenging activities and select social environments they think they are capable of handling (Bandura, 2010).

Self-efficacy can be applied to many different realms of peoples' lives. In other words, people can have more self-efficacy in some areas of their lives and less self-efficacy in other areas. Thus, it is not unrealistic to expect that people will have varying self-efficacy levels related to

providing wilderness first aid in remote contexts. Schumann et al. (2012, p.1) defined wilderness first aid self-efficacy as “the collection of beliefs that people have about their knowledge, skills, and capacity to provide first aid in remote wilderness areas.” Schumann et al. develop an 8-item Wilderness First Aid Self-Efficacy Scale to assess the self-efficacy beliefs and skills of wilderness first aiders in addition to a regular knowledge retention assessment. The self-efficacy scale used an 11-point range, with "0" indicating "Cannot do it at all" and "11" indicating "Highly certain can do it" (Schumann et al., 2012). The authors of the study referred to Bandura's (2006) development guidelines; however, their process was not documented, and there was no indication that it was or was not validated (Schumann et al., 2012). Despite this, the Schuman et al. scale has been used in at least one other study evaluating first aid self-efficacy (Karima, Nuraeni, and Mirwanti, 2019). Beyond Schuman et al. (2012), two different scales assess first aid self-efficacy in remote contexts. The first is the Extreme Conditions First Aid Confidence Scale (EC-FACS) (Wallace, Harris, Stankovich, Syton, and Bettiol, 2020). The EC-FACS was developed and validated to assess Australian Antarctic expeditioner's readiness to prevent future mortality and morbidity (Wallace et al., 2020). This scale remains very specific to expeditioners in harsh Antarctic environments. The second scale is the First Aid Self-Efficacy Scale, which was created to measure pre-service teachers' beliefs in their first aid skills (Gulmez-Dag & Capa-Aydin, 2015). It followed Bandura's initial recommendations for scale development (Bandura, 1997), including a 9-point scale ranging from incompetent to quite competent. However, this scale did not undergo a validation process. It referred to Bandura's earlier suggestions for self-efficacy scale development and not his more recent guide for constructing self-efficacy scales (Bandura, 2006). Additionally, the scale was developed for urban first aid contexts, primarily to help promote appropriate first aid response by teachers to help them respond to and prevent accidents within schoolyards (Gulmez-Dag & Capa-Aydin, 2015).

## 2.21 Self-Efficacy Scale Development

In his 2006 publication, Bandura provided comprehensive guidelines for developing self-efficacy scales and then provided 13 examples of scales in an appendix (e.g., Perceived Collective Family Efficacy Scale and Driving Self-Efficacy Scale). Bandura provided six key recommendations for

self-efficacy scale development in terms of identifying appropriate items to include. First, he suggested that items related to the domain's various activities should be considered, including rather diverse aspects. Second, items related to behavioral factors which people have some control over should be included (Bandura, 2006). Third, consideration should include items that reflect how self-efficacy may change over time as a person performs or acts (Bandura, 2006). Fourth, impediments should also be considered for some items when self-efficacy is more challenging; this is to avoid any ceiling effects (Bandura, 2006). Fifth, the scale should have various items that reflect different situations and social contexts (Bandura, 2006). Sixth, the scale should include items that reflect a person's holistic behavioral, cognitive, and affective capabilities (Bandura, 1997). According to Bandura, consideration of these six recommendations could lead to diverse items that reflect an effective self-efficacy scale.

## 2.22 RFA SES Development

The current RFA SES contains thirty items developed over several iterations with expertise and feedback from many sources. The initial scale was created by health-based researchers with expertise in rural and remote contexts, emergency physicians, paramedics, and expert feedback from several wilderness first aid instructors and students. The RFA SES was initially developed to evaluate Community Based Emergency Care (CBEC) training programs (Orkin et al., 2016). CBEC is a program designed for remote Indigenous communities where lay providers are trained in culturally appropriate first aid tools and relevant techniques for the community (A. Orkin et al., 2012). Many Indigenous communities in northern Canada do not have close or immediate access to emergency medical services, so alternative emergency response models were required (A. Orkin et al., 2012). The CBEC system's goal is to train lay residents to build the skills, knowledge, and confidence to respond and help during an emergency in their community (Born, Orkin, VanderBurgh, and Beardy, 2012). Thus, the RFA SES was initially conceived, designed, and developed as a culturally appropriate evaluation tool to support CBEC training programs' implementation. It was first used effectively in a collaborative project with the Government of Northwest Territories and a remote Indigenous community. It was recently pilot tested by one of

the co-authors (JL) as an assessment and reflection tool in a university course related to wilderness emergency management.

The RFA SES was initially developed and designed for two primary purposes: (1) evaluation of wilderness first aid and other types of emergency care training designed for remote geographies, communities, and worksites; and (2) reflection by training participants so they can self-assess their beliefs, confidence, and capacity to respond. Thus, the RFA SES is a tool designed so that first aid training providers can evaluate their training programs and, as a trainee, a self-assessment tool to identify their areas of strength and weakness.

Beyond adhering to Bandura's (2006) recommendations, the second priority was to adhere to relevant scale development guidelines. Boateng, Neilands, Frongillo, Melgar-Quinonez, and Young (2018) outlined nine steps across three phases that health, social and behavioral scale developers should follow (Boateng et al., 2018). The first phase consists of item development and includes two steps: (1) identifying provisional domains and generating items and (2) validating content (Boateng et al., 2018). The second phase consists of four steps: (3) pre-testing items or questions, (4) sampling and pilot testing, (5) unnecessary item reduction, and (6) extracting any factors (domains) that may exist (Boateng et al., 2018). Thus, the RFA SES development process reflected both Bandura's guidelines and the most relevant recommendations in the first two phases for scale development, according to Boateng et al. (2018). The third and final phase is known as the scale validation and is the purpose of this paper. As outlined by Boateng et al., the last three steps are to assess the scale for (7) dimensionality, (8) reliability, and (9) validity (Boateng et al., 2018).

This study was designed to address two related research questions: (1) What are the psychometric properties of the RFA SES? and (2) Is the RFA SES a valid and reliable tool for use in remote first aid training contexts?

## 2.3 Methods

This study was designed to test the dimensionality, reliability, and validity of the RFA SES (Boateng et al., 2018). The dimensionality test investigated the latent structure of scale items in addition to their underlying relationships (Boateng et al., 2018). The reliability test investigated the internal consistency of scale items and the consistency of total scores over time (Boateng et al., 2018). Finally, the validity test ensured that the scale measures the intended construct (Boateng et al., 2018).

### 2.31 Instrumentation

The instrument used in this study was an online questionnaire that included: (1) demographic questions, (2) the 30-item Remote first aid Self-Efficacy Scale (RFA SES), (3) the 10-item Generalized Self-Efficacy Scale (Schwarzer & Jerusalem, 1995), and (4) the 10-item Connor-Davidson Resilience scale (Campbell-Sills & Stein, 2007). The complete questionnaire was available in both French and English, and can be found in Appendix A. The rigorous forward and backward translation process of the demographic questions and the RFA SES adhered to the principles laid out by Geisinger (1994). The 10-item CD-RISC had both a validated French (Hébert, Parent, Simard, Laverdière, 2018) and English (Campbell-Sills & Stein, 2007) version; Additionally, the 10-item GSES also had a validated French (Saleh, Romo and Camart, 2016) and English (Schwarzer & Jerusalem, 1995) version. Thus, no translation of these two scales was required.

The RFA SES was constructed because an essential aspect of first aid training is the confidence to respond in various situations as well as to a wide variety of injuries and illnesses. The items reflect relevant remote first aid contexts; however, they are not too specific to eliminate any particular contexts or geographical locations. In other words, the RFA SES was designed for use globally in different countries and diverse contexts such as wilderness guiding in remote Indigenous communities and worksites. The RFA SES contains 30 items which each have a 100-point range of responses using an analog scale starting with “cannot do at all” at one end,

“moderately certain can do” in the middle, and “highly certain can do” at the other end. In responding to each item, participants are asked to indicate where they believe their first aid confidence is as of "right now." Thus, higher scores reflect greater self-efficacy in performing first aid in remote contexts. Both the English and French versions of the RFA SES can be found in Appendix B. Table 1 contains five sample items from the 30-item RFA SES in both French and English.

**Table 1. Remote First Aid Self-Efficacy Scale Items**

Item no.	English Item	French Item
1	Treat a person with a mild injury or illness	Soigner une personne ayant une blessure mineure ou une maladie légère
7	Rapidly assess if a person has a life-threatening condition	Déterminer rapidement si une personne a une condition potentiellement mortelle
15	Manage and manipulate a person with a spinal injury	Gérer et manipuler une personne atteinte d'une blessure à la colonne vertébrale
20	Recognize and treat a person with a mental health emergency	Reconnaître et soigner une personne atteinte d'une crise en santé mentale
29	Provide care for self and other responders after an emergency incident are over	Prendre soin de soi et des autres intervenants suite à un événement critique

\*Note: The RFA SES is available for use through a Creative Commons License (CCL), and the most up-to-date version can be accessed at <https://sites.google.com/laurentian.ca/rfa-ses/home>.

The CD-RISC and GSES scale were selected for validity analysis because of relevant construct similarities to the RFA SES. The CD-RISC measures individual resilience, and the GSEs measures generalized self-efficacy. Each of these constructs was expected to be positively and moderately correlated with the RFA SES. The CD-RISC scale used for this project was the 10-item version. It measured characteristics of resilience through the rating of each item using four response categories ranging from “Not at all true” to “Exactly true” (Connor & Davidson, 2003). The GSEs was also a 10-item version, and it is used to measure challenging demands and optimistic self-beliefs through the rating of each item using five response categories ranging from “Not at all true” to “True nearly all of the time” (Schwarzer & Jerusalem, 1995).

## 2.32 Population and Recruitment

This study's desired population was from two groups: (1) trained participants, currently holding a training certification in remote first aid; and (2) untrained participants, who are mostly untrained

in remote first aid. Participants of this group were allowed to have prior first aid training; however, a sample was sought that would have a small amount of remote training. Convenience and purposive sampling techniques were used to obtain relevant samples from each population (Etikan, 2016). Based on scale development recommendations (Boateng et al., 2018), the target sample size was a minimum of 200 observations in each of the two respective groups with a combined total minimum of 400. Participants for the trained group were alumni from Wilderness Medical Associates (WMA) first aid training programs in North America, and a total of 39 348 alumni from WMA were invited to participate. The total WMA population included WMA USA and WMA Canada; the Canadian group included French and English populations. In order to qualify for inclusion in the trained group, participants had to have earned a certification in one of four programs offered by WMA: (1) Wilderness First Aid (WFA) (16 hours), (2) Wilderness Advanced First Aid (WAFA) (40 hours), (3) Wilderness First Responder (WFR) (70 hours), and (4) Wilderness Emergency Technician (WEMT/WEMS) (181 hours). Participants for the untrained group were current students enrolled at Laurentian University (LU) in Sudbury, Ontario Canada. LU is a bilingual university (English and French), and it had 9091 active students at the time of data collection, all of whom were invited to participate. This population was chosen because many of the participants would be relatively untrained in remote first aid. Recruitment occurred through email invitations and one reminder invitation sent to all participants in each group from March to May 2020.

### 2.33 Data Collection

Data collection involved the distribution of an email encompassing a link to informed consent and then access to an online questionnaire using the secure RedCap Server at LU. The questionnaire was available in French and English versions, and responses were collected separately through distinct Uniform Resource Locator (URL) links. Data was also collected at two different periods, referred to as Time 1 (T1) and Time 2 (T2). The periods were separated by approximately one month to facilitate test-retest reliability analysis. For a reliability test of this nature, it is vital to have at least two weeks between test and re-test to ensure participants do not recall their initial answers, and a period between 15-30 days is adequate for most studies

(Frost et al., 2007; Paiva et al., 2014). To ensure that participants' data remained anonymous, a unique identifier was created by each participant responding to personal questions that only the participant would know, such as "first three letters of mother's first name." The unique identifier allowed our research team to match the participant responses at T1 and T2 while respecting their anonymity. This study was approved by the LU Research Ethics Board (#6020617), please see Appendix C.

### 2.34 Data Analysis

Before analysis, the RFA SES total scale scores were standardized (i.e., range of 0 to 100) for ease of interpretation. The data analysis then consisted of three steps: (1) analysis of dimensionality, (2) analysis of reliability, and (3) analysis of validity as recommended by Bandura (1997) and Boateng et al. (2018). The dimensionality step involved using Horn's parallel analysis to determine the unidimensional, dimensionality, or multidimensionality of the 30-item RFA SES (Horn, 1965). The reliability step consisted of analyzing inter-item correlations and test-retest reliability using correlation to determine the stability of total scale scores over time from T1 to T2 (Weir, 2005). Concurrent validity was analyzed using correlations between the mean scale scores of the RFA SES and both the GSEs and CD-RISC. This analysis was used to assess the strength and direction of the relationship between the scores. Finally, mean scale scores for the untrained (LU) and trained (WMA) groups were compared using an independent sample t-test.

## 2.4 Results

In total, 1554 responses were received at T1, 1106 were from LU students (untrained group) representing a 12% response rate, and the remaining 448 were from WMA alumni (trained group), representing a 1% response rate. One month later, the participants from T1 were invited to complete the scale again, and nearly half responded again at T2. The sample population characteristics are displayed in Table 2, and the standardized mean scale scores are displayed in Table 3.

**Table 2. Sample Population Demographics**

	Combined	LU	WMA
Participants at T1	1554	1106	448
Participants at T2	727 (47%)	508 (46%)	219 (49%)
Sex – Male	547 (35%)	328 (29%)	219 (49%)
Sex -Female	994 (64%)	774 (70%)	220 (49%)
Sex -Other	13 (<2%)	4 (<1%)	9 (<2%)
Mean Age	31 years	27 years	40 years
Trained in Urban First Aid	1008 (65%)	696 (63%)	312 (70%)
Trained in Remote First Aid	546 (35%)	98 (9%)	448 (100%)

**Table 3. Mean Scale Scores**

Scale	LU & WMA		LU		WMA	
	T1 (n = 1554)	T2 (n = 727)	T1 (n = 1106)	T2 (n = 508)	T1 (n = 448)	T2 (n = 219)
RFA SES M(SD)	63.1 (22.3)	65.2 (21.4)	57.8 (22.4)	60.1 (21.7)	75.9 (15.1)	77.1 (15.2)
CD-RISC M(SD)	80.1 (11.0)	80.3 (11.1)	78.9 (11.1)	79.6 (12.2)	82.8 (9.4)	83.2 (9.2)
GSES Score M(SD)	65.6 (9.8)	66.0 (9.5)	64.9 (9.7)	65.8 (9.8)	67.3 (8.8)	67.3 (8.8)

## 2.41 Scale Dimensionality

Scale dimensionality was assessed using Horns Parallel analysis on data from T1 for both groups combined and the two groups independently. The two groups combined showed a clear unidimensional structure, with the first factor having an Eigenvalue of 18.10. This structure was similar for both the LU group with an Eigenvalue of 18.1 and the WMA group with an Eigenvalue of 17.78. The Eigenvalue for a second dimension was 1.17 for both groups combined, and for a third dimension, it was 0.89.

## 2.42 Scale Reliability

The inter-item correlations (IIC) for the RFA SES were moderate to high; the mean IIC was 0.75, and the range was 0.53 to 0.84. Before reliability analysis, participants who practiced first aid or completed a training course between T1 and T2 were removed from the analysis. Test-

retest reliability of the RFA SES was assessed using correlation of mean scale scores at T1 and T2. The correlations were high for both the LU group ( $r = .91, p < .01$ ) and the WMA group ( $r = .92, p < .01$ ). There was a statistically significant increase in mean scale scores from T1 to T2 for the LU and WMA groups combined, however, it was only 1.4 points ( $n = 571, p < .01$ ). This change was driven by the LU population ( $p < .01$ ) and not by the WMA population ( $p < .30$ ). Scale reliability results are summarized in Table 4.

**Table 4. Scale Reliability Results for Laurentian and WMA Participants (n=571)**

Variable	Mean	Standard Error	Standard Deviation	95% Conf. Interval	
RFA T1	64.10	0.95	22.70	62.26	65.00
RFA T2	65.50	0.90	21.39	63.70	67.22
Difference*	1.40	0.39	9.20	-2.09	-0.58

\*All correlations were significant ( $p < .01$ )

### 2.43 Scale Validity

To investigate the concurrent validity of the RFA SES, total scores were correlated with the CD-RISC and GSES. The RFA SES was positively and moderately correlated with both other scales, as indicated in Table 5. The correlations were slightly higher for the WMA group. Mean RFA SES scores are presented in Table 3, and at T1, they were 18.1 points higher for the WMA participants than the LU participants. An independent sample t-test confirmed that the difference was statistically significant ( $t(569) = 16.2, p < .01$ , two-tailed).

**Table 5. Correlations Between RFA SES, CD-RISC, and GSES (n=1554)**

	RFA	GSES	CD-RISC
RFA	1.00		
GSES	0.48	1.00	
CD-RISC	0.42	0.70	1.00
LU Correlation Between RFA SES, CD-RISC, and GSES (n=1106)			
RFA	1.00		
GSES	0.45	1.00	
CD-RISC	0.37	0.69	1.00
WMA Correlation Between RFA SES, CD-RISC, and GSES (n=448)			
RFA	1.00		
GSES	0.58	1.00	
CD-RISC	0.46	0.68	1.00

\*All correlations were statistically significant ( $p < .01$ )

## 2.5 Discussion

The purpose of this study was to test the dimensionality, reliability, and validity of the 30-item RFA SES following scale development guidelines and validation principles from Bandura (2010), and it reflected scale development recommendations from Boateng et al. (2018).

According to Brown (2015), it is crucial to assess the dimensionality of a scale to ensure that there is evidence of a unidimensional or multidimensional structure, and Horn's parallel analysis was used because it corrects for chance when principal components analysis (PCA) is used (Horn, 1995). The analysis for a one-factor dimension resulted in an eigenvalue of 18.1 on the total sample ( $n= 1554$ ), and for two factors, it was 1.2, and for three factors, it was less than 1. This implied a unidimensional structure (Hayton, Allen, and Scarpello, 2004; Çokluk & Koçak, 2016). In some ways, this was surprising since the scale items were very diverse, and yet they could also be grouped in categories such as diagnosis and treatment. However, other self-efficacy scales such as the GSEs have reported varying dimensionality results for the same scale in different populations. It was reported as having a unidimensional structure (Bosscher & Smit, 1998) but also reported being two dimensional (Scholz, Gutiérrez, Sud and Schwarzer, 2002) and even three dimensional (Zeng, Fung, Li, Hussain, and Yu, 2020). It should also be noted that the RFA SES did identify a bi-dimensional structure with an eigenvalue marginally above 1.0. However, this was not deemed significant given the strength of the first factor. Thus, there is potential that in a different population, the RFA SES could demonstrate a two-dimensional structure that is significant. Thus, as the RFA SES is used in various first aid populations and future research studies, the analysis may reveal more than one dimension.

The reliability of the RFA SES was assessed by using IIC and test-retest analyses. The very high IIC of 0.75 suggests that there was very high internal consistency and that all items were measuring the same construct; however, it also suggests that there may be considerable redundancy (Boateng et al., 2018). When items possess an IIC of .40 or higher, they are considered less specific measures of a construct and therefore an indicator of item redundancy (Piedmont, 2014). The redundancy of the RFA SES was not surprising for two reasons. First, it

was deemed appropriate to develop a scale with more items before any validity testing since it would be easier to eliminate items than add items. Second, one of the reasons for the development of the scale was for it to be used as a participant reflection tool. It was anticipated that more items from diverse perspectives would stimulate more nuanced reflection about self-efficacy in respondents as a reflection tool. Nonetheless, future studies could explore the validity of a shorter version with fewer items.

Another critical indicator of scale reliability is understanding how it performs under similar circumstances and conditions with minimal variability (Porta, 2008). Test-retest reliability measures the degree to which scale scores are stable and repeatable over time (Raykov & Marcoulides, 2011). Ideally, given that there was no planned intervention between T1 and T2 when participants completed the scale, it was expected that responses would remain relatively consistent across the one-month-long intervening time period. However, it was possible that other intervening factors between the time periods could have influenced a participant's responses or total score. To better control for this, two additional questions were asked during the second data collection period at T2. The first conditional question asked if participants practiced first aid during the one-month intervening period and then asked them to provide a quantitative number of times (if any) that they did. The second question asked them to indicate if they received any first aid training since they completed the questionnaire at T1. Approximately 2% of respondents at T2 indicated that they had either received first aid training or applied first aid during this intervening time period. Their data was excluded from the analysis to control any influence this would have on scale scores at T2. There was a slight positive drift in mean RFA SES scores (1.4 pts) between T1 and T2 in both groups combined (LU and WMA). However, there were no statistically significant difference in mean scores in the group with relevant training (WMA). Interestingly, although no inferential testing was completed, Table 3 shows a slight positive drift between T1 and T2 for the untrained group (LU) for both the CD-RISC and the GSEs mean scores as well.

We attribute the drift, and the relatively high scores of LU students to two factors: (1) psychological factors related to age; and (2) lack of relevant training and understanding of remote first aid training and contexts. The mean age of the LU group was 26, and the WMA group's mean age was 40. Thus, it appears that the younger LU group of university students

seemed to have increased confidence over time. This increase may be explained by two similar psychological constructs: overestimation and over placement (Moore & Schatz, 2017).

Overestimation is the construct of believing that you are better than you are, and similarly over placement is the belief that you are better than others (Moore & Schatz, 2017). In addition, there is substantive evidence suggesting that overconfidence is pervasive in university students (Miller & Geraci, 2011; Moore & Schatz, 2017; Dunlosky & Rawson, 2012). Additionally, the possible variability in confidence in the LU student group between T1 and T2 could have been based on a lack of or inaccurate beliefs about knowledge, skills, and experience related to RFA self-efficacy. A study by Miller & Geraci (2011) suggested that people with more insufficient abilities, who lack knowledge of the material and awareness of the skills they do not have (i.e., their deficits or capabilities), results in greater overconfidence (Miller & Geraci, 2011).

However, it should be noted that 70% of the LU population were trained in some level of urban first aid; thus, the group was not untrained in first aid, just untrained in *remote* first aid. This could have also contributed to increased confidence levels since the participants knew some similar skills and felt confident in performing them in more challenging environments and situations.

Validity was assessed using a correlation matrix and an independent sample t-test (two-way). The correlation analysis was used to assess the concurrent validity of the RFA SES by comparing the RFA SES scores with two other similar scale scores (10-item CD-RISC and 10-item GSES). As expected, all correlations between the RFA SES and the two other scale scores were positive, moderate, and ranged from 0.37 to 0.58, regardless of which group (LU, WMA, and LU and WMA combined). This supports the contention that the RFA SES is a construct-specific measure similar to, but does not overlap too strongly with the more generalized constructs of resilience and self-efficacy. A correlation of 0.50 to 1.0 indicates a strong correlation between the measures; however, as long as the correlation is closer to 0.5, it indicates an association between constructs that are not identical (Mukaka, 2012). Interestingly, the correlations between the CD-RISC and the GSEs were higher, ranging between 0.68 and 0.70 across the three groups (LU, WMA, and WMA combined). These higher correlations could be explained by the nature of the CD-RISC and GSES as generalized measures of similar constructs (resilience and self-efficacy) rather than the more specific construct measured by the RFA SES.

As expected, the WMA group had substantially higher mean RFA SES scores than the LU group. The independent sample t-test (two-tailed) comparing the scores at T1 confirmed that the 18.1-point difference was statistically significant. Additionally, the WMA group's higher scores were observed at both T1 and T2 compared to the LU group. Comparing the scores in these two groups functioned as a form of sensitivity analysis since it was hypothesized that remote first aid self-efficacy would be higher in a trained group (WMA). The magnitude of the difference now provides a benchmark for what may be expected in future studies. However, the two groups were different populations, and as noted earlier, the LU student group was not completely untrained and may have been overconfident in their responses. Thus, the difference in RFA SES scores between the untrained student group (LU) and the WMA trained group at T1 may underestimate the difference in RFA self-efficacy between untrained and trained participants with similar ages.

Interestingly, as indicated in Table 3, there were slightly higher scale scores for the WMA group at T1 and T2 for both the CD-RISC and GSES. However, a t-test was not performed to determine if the difference was statistically significant. In a North American population, the CD-RISC's mean score was 80.2 (Connor & Davidson, 2003), while the mean score reported for the GSEs was 72.5 (Schwarzer & Jerusalem, 1995). In comparing these norms to the mean scale scores from our study in Table 3, the CD-RISC scores were comparable, ranging from 78.9 to 83.2. However, the GSEs scores were noticeably lower, ranging from 64.9 to 74.3.

Nonetheless, besides the training level, there were other differences between the two groups (WMA and LU) that could also help explain the consistently higher scale scores for the WMA group. For instance, the mean age of the WMA group was 40, and the LU group's mean age was 26. Thus, it is possible that the older WMA group was more mature, and this influenced the higher scale scores (Albion et al., 2005).

## 2.6 Conclusion

The RFA SES was rigorously developed over several iterations with feedback from several expert sources. The results from this study confirm that the 30-Item RFA SES is unidimensional, reliable, and valid. The scale's internal consistency was very high, suggesting that the items

measured the same construct; however, future development of a short form of the RFA SES may be sufficient for some purposes. Test-retest reliability confirmed the stability of the scale over time. Concurrent validity of the scale was confirmed through positive and moderate correlations with two similar scales measuring related but different constructs. Finally, there were substantially higher scores in a trained group than an untrained group, suggesting that the RFA SES can differentiate between different levels of remote first aid training. Future studies should explore additional validation and utility within the context of wilderness first aid training courses, and a time series design would be appropriate to identify changes in remote first aid self-efficacy before and after a training course and then into the future at regular periods (i.e., every six months or a year). A study design like this may provide valuable information to training providers in recommended re-training periods for various programs and/or sub-populations.

Further research should further explore how the RFA SES could be used as an evaluation and reflection tool within relevant training programs and consider innovative research designs to explore the role of remote first aid self-efficacy as it relates to the ability to deliver first aid when it is needed. Finally, future research should analyze and compare the use of the RFA SES alongside other competence assessment approaches used in first aid training courses, such as knowledge retention tests and skill assessment.

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## Chapter 3

### Development of the 15-Item Remote First Aid Self-Efficacy Scale

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### 3.1 Abstract

**Objective:** Development and preliminary reliability and validity testing of a short-form 15-Item version of the Remote First Aid Self-Efficacy Scale (RFA SES).

**Methods:** The short-form RFA SES was developed with a two-step process. The first step addressed redundancies in the 30-item version of the RFA SES through an iterative and consensual approach using inter-item correlations and expert knowledge. Items were organized into six categories to maintain the integrity of the scale and uphold the variety of domains existing within the remote first aid context during the reduction process. The second step involved preliminary analysis of the reliability and validity of the short-form version using data from the original 30-Item RFA SES validation study, which included 448 trained Wilderness Medical Associates (WMA).

**Results:** Item reduction led to the development of a 15-item RFA SES, which performed exceptionally well, displaying an identical mean score at time 1 to the original ( $M = 75.9$ ). The 15-item RFA SES had a high-reliability coefficient of 0.94 when participant scores at time one were compared to their scores one month later at time 2, while also maintaining a very high correlation with the 30-Item RFA SES ( $r = 0.98$ ). Concurrent validity analysis of the 15-item RFA SES indicated a positive, moderate, and significant correlation between the 10-item Connor-Davidson Resilience Scale ( $r = 0.43$ ) and the 10-item Generalized Self-Efficacy Scale ( $r = 0.53$ ).

**Conclusions:** Preliminary analysis of the 15-item version of the RFA SES indicates that the scale is reliable and valid. However, a more rigorous validation study with original data is required.

*Keywords:* Remote First Aid, Wilderness First Aid, Training, Evaluation, Self-Efficacy, Scale Development, Short-Form

## 3.2 Introduction

Bandura (1997) asserted that most behaviors are initially shaped in the mind. Thus, beliefs about one's self-efficacy influence decisions before one acts; potentially, this can mean that those who visualize success may outperform those who dwell on deficiencies (Bandura, 1997). According to Bandura, understanding self-efficacy is crucial since it applies to nearly every aspect of peoples' lives, including remote first aid. Thus, self-efficacy may be important in helping people take the necessary steps to apply their first aid skills. Informed by this rationale, the 30-item Remote First Aid Self-Efficacy Scale (RFA SES) was developed for use in remote first aid training contexts to be used as a research, evaluation, and reflection tool. The term *remote* was used to be inclusive of many diverse contexts such as wilderness areas, Indigenous communities with no permanent road access, and fly-in worksites in the far north.

Currently, there are many providers of remote first aid training. In this training domain, knowledge retention and skill assessment are the preferred form of student assessment (Isaac, 2008; Morissey & Johnson, 2017; Sirius, 2015). However, it should be noted that these assessments do not assess self-efficacy and likeliness to respond. Measuring one's self-efficacy is important in other contexts, such as academic performance, sports performance, and work effectiveness (Moritz et al., 2000; Multon et al., 1991; Sadri & Robertson, 1993). It may be an essential addition to the remote first aid context.

The original 30-item RFA SES was recently validated by D'Angelo et al. (2021) through a rigorous process following steps outlined by Boateng et al. (2018) and principles outlined by Bandura (2006). Data was collected through an online questionnaire at two different periods (T1 and T2), approximately one month apart, from 448 trained alumni from Wilderness Medical Associates (WMA) and 1106 untrained students from Laurentian University (LU) in Canada (D'Angelo et al., 2021). The structure of the 30-Item RFA SES was unidimensional, and the high

mean inter-item correlation (IIC) of 0.75 indicated measurement of the same construct. However, it also inferred the likelihood of item redundancies (D'Angelo et al., 2021). Test re-test reliability analysis of the 30-Item RFA SES indicated a reliable scale when comparing participant scores from the two time periods (T1 and T2) with a correlation of 0.91 in the untrained (LU) group and 0.92 in the trained (WMA) group (D'Angelo et al., 2021). Concurrent validity analysis was confirmed through a positive, moderate, and significant correlation that existed between two similar yet distinct constructs: (1) the 10-item Connor-Davidson Resilience Scale ( $r = 0.43$ ); and (2) the 10-item Generalized Self-Efficacy Scale ( $r = 0.53$ ) (D'Angelo et al., 2021). Finally, an independent sample t-test ( $t(569) = 16.2, p < .01$ , two-tailed) confirmed a statistically significant 18.1 difference in mean scale scores between the untrained (LU) group ( $M = 57.8$ ) and the trained (WMA) group ( $M = 75.9$ ) (D'Angelo et al., 2021). Based primarily on the unidimensional structure and the relatively high inter-item correlations, developing a shorter version of the scale was the recommended next step (D'Angelo et al., 2021).

This current study presents the development and preliminary assessment of the reliability and validity of a short-form version of the RFA SES. Although short-form scales tend to be less reliable than full-length versions (Widaman, 2011), they benefit from reducing the response burden for participants and increasing utility and versatility since they can be administered in less time and in a broader variety of situations. For instance, they can be easily added to questionnaires that include other scales and questions. The validity of short-form scales tends to remain intact, provided that the content (i.e., items included) in the short-form version mirrors the long-form version (Clark & Watson, 2019). If these criteria are not met, the scale may measure a narrower scope of the original scale construct (Widaman, 2011). Thus, this study set out to develop and test the psychometric parameters of a short form RFA SES while maintaining the integrity of the original scale.

### 3.3 Methods and Results

There were two steps in the method to develop a short-form of the 30-Item RFA SES. The first step focused on reducing scale items. The second step involved assessing the reliability and

validity of the short form using the existing data set from the original validity study (D'Angelo, 2021).

### 3.31 Data and Population

The original data was collected via an online questionnaire in May 2020 using the secure RedCap server. Data was collected at two time periods, approximately one month apart, to facilitate reliability testing. The questionnaire included: (1) demographic questions; (2) the 30-item Remote first aid Self-Efficacy Scale (D'Angelo et al., 2021), (3) the 10-item Generalized Self-Efficacy Scale (Vartanian, 2011); and (4) the 10-item Connor-Davidson Resilience scale (Campbell-Sills & Stein, 2007). The questionnaire was completed by 448 trained WMA alumni who completed at least one course at the Wilderness First Aid (WFA) level or higher. Untrained students from Laurentian University also completed the questionnaire; however, it was unnecessary to use this data for our study. This study was approved by the Laurentian University Research Ethics Board (#6020617), please see Appendix B.

### 3.32 Step 1 – Item Reduction

The item reduction process utilized two concurrent processes: (1) identifying items with higher mean inter-item correlations since these items were more likely to be redundant; and (2) an iterative process of individual and consensual opinion across the research team related to which items should remain and which items should be eliminated.

The process began with three research team members (JD, SR, JL) independently selecting five items on the 30-item RFA SES that they believed were redundant through the use of both the mean IIC for each item and their expert opinion. Each research team member also provided a succinct reason for eliminating each item selected. In total, 11 unique items were suggested to be eliminated across the research team; items were then organized into a table and discussed during a research team meeting. At the end of the meeting, a consensus was achieved on eliminating six items. The remaining 24 items were then organized into categories that reflected the structure

and themes of many remote first aid courses: (1) Prevention/Preparation, (2) Scene Management (3) Patient Assessment (4) Patient Treatment (5) Accessing Help and Patient Evacuation and (6) Other (Isaac, 2008; Morissey & Johnson, 2017; Sirius, 2015). The organization of items by category helped orient the research team towards ensuring a balanced scale was created that reflected the structure of first aid training courses and ensured adherence to Bandura's (2006) scale development recommendations. The research team then individually selected the top 12 items that they each believed should remain in a short form of the RFA SES and five additional redundant items. The selection process involved assessing mean IIC scores for each item and ensuring an appropriate balance of items across the six categories using individual discretion of how many items per category were suitable. Individual researcher selections and reasons were compiled into another table and discussed at a second meeting where consensus was achieved. The final short-form version of the RFA SES contained 15 items and can be found in Appendix D.

### 3.33 Step 2 – Reliability and Validity Analysis

The preliminary reliability and validity analysis of the 15-Item compared to the 30-Item RFA SES was completed using secondary data from trained WMA alumni (n = 448) collected at two different periods (T1 and T2), approximately one month apart. Reliability was assessed by comparing mean scores, internal consistency using Cronbach's alpha, and correlation between the two versions. Concurrent validity was evaluated using a correlation matrix comparing the 15- and 30-Item RFA SES to the 10-Item CD-RISC and the 10-item GSES.

The mean scores between the 15- and 30-Item versions of the RFA SES were identical at T1 (M = 75.9) and only 0.03 points different at T2. Results are displayed in Table 6.

**Table 6. Mean Scale Scores for the 15- and 30-Item RFA SES at Two Time Periods (n = 448)**

RFA SES Version	T1	SD	T2	SD
Mean 30-Item Score	75.9	15.0	77.1	15.1
Mean 15-item Score	75.9	15.6	76.8	15.6

Reliability performance is summarized in Table 7. It was assessed at T1 and T2 using Cronbach's alpha, and the difference was .03 points. The correlation between the 15- and 30-Item RFA SES was ( $r = .98, p < .01$ ) at T1.

**Table 7. Reliability Performance at T1 for the 15- and 30-item RFA SES (n = 448)**

	30-Item RFA SES	15-Item RFA SES
Mean Inter-Item Covariance	222.00	222.24
Cronbach's Alpha Coefficient	0.97	0.94
Correlation to 30-Item RFA SES	-	0.98

Concurrent validity analyses of the 15- and 30-Item RFA SES were compared through correlation with the 10-Item GSES and 10-Item CD-RISC. Results are displayed in Table 8, and there was a correlation difference of .05 for the GSES and .03 for the CD-RISC when comparing the 15- and 30-Item versions respectively.

**Table 8. Correlation Matrix Comparing the 15- and 30-Item RFA SES to CD-RISC and GSES (n = 448)**

	15-RFA	GSES	CD-RISC
15-RFA	1.00		
GSES	0.53	1.00	
CD-RISC	0.43	0.69	1.00
	30-RFA	GSES	CD-RISC
30-RFA	1.00		
GSES	0.58	1.00	
CD-RISC	0.46	0.69	1.00

\*All correlations were significant ( $p < .01$ )

### 3.4 Discussion

The 30-Item RFA SES was a recently developed and validated self-report scale capable of assessing one's remote first aid self-efficacy (D'Angelo et al., 2021). However, the original

validation study results suggested that there were likely item redundancies, and a shorter version of the scale could potentially be created with similar psychometric properties as the original. In the context of remote first aid training, a short-form version could be beneficial for both research and evaluation purposes. Using existing data from the original validation study (D'Angelo et al., 2021) involving WMA alumni ( $n = 448$ ), the purpose of the current study was to develop a short-form of the RFA SES and then complete preliminary reliability and validity analysis to compare it to the original 30-Item version.

The original RFA SES validation study demonstrated some redundancy in the scale given the relatively high IIC of 0.75. As recommended by Boateng et al. (2018) and others (Bandura, 2006; Piedmont, 2015; Allen & Yen, 2002), redundant scales can be improved by reducing the number of items. Accordingly, the first step of the present study was the identification and removal of 15 items yielding a short-form 15-item version of the RFA SES.

The second step in this study focused on completing a preliminary analysis of the psychometric properties of the 15-Item compared to the original 30-Item RFA SES-15. For this purpose, the data from the original validation study was used (D'Angelo et al., 2021). The difference in mean scale scores at T1 compared to T2 was 1.2 for the 30-Item and 0.9 for the 15-Item RFA SES, so drift overtime was negligible. The two versions of the scales were highly correlated ( $r = 0.98$ ), and the difference in Cronbach's alpha was negligible; this further confirms the reliability and internal consistency of the 15-Item RFA SES. The scores from the two versions were effectively interchangeable.

In the original study, concurrent validity was established by comparing the RFA SES to two validated scales that measured similar yet distinct constructs. The positive and moderate correlations between the 15- and 30-Items RFA SES versions and the CD-RISC and GSES were very similar. This suggests that the short-form version retains similar concurrent validity to the full version. In sum, the preliminary analysis in this study indicates that the strong dimensionality, reliability, and validity of the original 30-item RFA SES apply to the 15-Item version. However, it will be essential to complete a more robust validation study with original data from a new population to demonstrate this fully.

The original RFA SES was developed for both evaluation and reflection purposes. Thus, since the 30-Item version has more items, it may be preferred for participant reflection since there are more themes/topics. However, it should be noted that the two versions were highly correlated ( $r = 0.98$ ), suggesting that the 15-Item version may be adequate for some applications. The rationale for the importance of participant reflection is anchored in experiential learning theory (ELT), and principles of ELT are reflected in most first aid training courses that involve hands-on skill practice, staged simulations, and other applied scenario-type teaching approaches (Priest & Gass, 2018). Experiential learning can be defined simply as “learning by doing with reflection” (Priest & Gass, 2017, p.29). Various reflection approaches range from debriefing, journaling, or using intentionally designed reflection tools such as the RFA SES. Nevertheless, using the RFA SES as a participant reflection tool has yet to be evaluated, which is an opportunity for future research.

### 3.5 Conclusions

This study aimed to create a short-form version of the 30-Item RFA SES for use in remote first aid training contexts involving research, evaluation, and participant reflection. The 15-Item RFA SES developed in this study appears reliable and valid, and it has similar psychometric properties to the 30-Item RFA SES. However, an independent validation study of the 15-Item RFA SES with original data is required. Additionally, this study does not imply any problems with the original 30-Item RFA SES, and both versions are available for use under a Creative Commons License. They are accessible from the RFA SES website (<https://sites.google.com/laurentian.ca/rfa-ses/home>).

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## Chapter 4

### 4.1 Introduction

This thesis project was designed to validate and assess the dimensionality of the Remote First Aid Self-Efficacy Scale. The RFA SES was rigorously designed and developed by our team members as a culturally appropriate form of assessment for Community Based Emergency Care (CBEC) courses. The RFA SES performs a different type of assessment that most remote first aid courses were not utilizing. Bandura (1997) & Schwarzer (2014) have shown self-efficacy to provide a substantial amount of information about one's motivation and ability to succeed and fail (Bandura, 1997; Ralf Schwarzer, 2014). Thus, a validated form of this assessment could act as a tool for reflection about capacity to engage in first aid. The RFA SES contains 30-items which are scored on a 100-point analog scale; allowing users to indicate their perceived confidence on each item ranging from “Cannot do at all” (0) to “Highly certain can do” (100). Items range in difficulty and focus on a variety of domains within the construct of remote first aid. The RFA SES was developed following Banduras’ (2006) self-efficacy scale development guidelines, and the principles of scale development suggested by Boateng et al. (2018).

This thesis follows an integrated paper design describing the validation and reform of the RFA SES. The first paper outlined the validation of the 30-Item RFA SES, and the second paper defined a shorter 15-Item RFA SES; in addition to a preliminary validation analysis. In total, 448 trained alumni from WMA and 1106 students from LU participated. The results from the first paper indicated that the 30-Item RFA SES is a unidimensional, reliable, and valid scale for assessing remote first aid self-efficacy. The data did, however, indicate high average interitem

correlations between items (mean 0.75). This implies redundancy, which was addressed in the second paper. That work describes how the scale was reduced through a combination of expert assessment and analysis of inter-item correlations. As a result, a 15-item scale emerged, which was assessed for validity and reliability using data from the original validation study. The 15-item scale performed exceptionally well: the mean scale scores at time 1 (T1) were identical to the original 30-Item version ( $M = 75.9$ ). The 15-Item RFA SES has a Cronbach's Alpha Coefficient of 0.94 while maintaining a correlation to the original scale of  $r = 0.98$ . Concurrent validity analysis of the 15-item RFA SES indicated a positive, moderate, and significant correlation with the 10-Item Connor-Davidson Resilience Scale ( $r = 0.43$ ) and the 10-item Generalized Self-Efficacy Scale ( $r = 0.53$ ).

The Boateng (2018) primer paper for developing and validating scales was used as an essential guide for this validation project. In the primer paper, both the creation of scales and validation of scales was outlined clearly. Boateng outlined the three essential tests for the validation of scales which were strictly adhered to by the research team beginning with a test of dimensionality. The test of the RFA SES dimensionality indicated a clear single dimension; in other words, the scale measures one specific domain of interest; an acceptable and desired result (Boateng et al., 2018; Brown, 2015). Similar dimensionality results were seen in the analysis of the CD-RISC scale, however the GSES has undergone many tests of dimensionality and has shown varying results for a unidimensional, bidimensional and even tridimensional scale in different populations (Arias González et al., 2015; Zhou, 2016). It is worth noting that the RFA SES could have different dimensions and further work should explore this through analysis in different populations. For the test of reliability, a slight drift (1.4 points) was seen for the LU group and was believed to be caused by the lack of remote first trained participants in this group. Despite this, the reliability

scores as measured by test-retest reliability group ( $r = .91, p < .01$ ) and the WMA group ( $r = .92, p < .01$ ) indicate an accurate and reliable scale exists (Ursachi et al., 2015; Weir, 2005). A Cronbach's alpha for the 15-item version indicated a score of 0.94. The results for the RFA SES indicated a stronger reliability than the GSES and very close but still slightly higher results when compared to the CD-RISC (Connor & Davidson, 2003; R Schwarzer & Jerusalem, 1995). The IIC of the RFA SES was overall very high and higher in the RFA SES in comparison to the GSES and CD-RISC, however paper two identified this redundancy and addressed it by reducing scale items as advised by Boateng (2018) (Boateng et al., 2018; Connor & Davidson, 2003; R Schwarzer & Jerusalem, 1995). Validity analysis explored the correlations between the RFA SES, GSES and CD-RISC, all correlations were significant and demonstrated a positive moderate correlation. This indicated that the RFA SES is a specific onstruct measure that is similar to other generalized constructs and resilience measures of self-efficacy, these results suggest that the RFA SES is a valid measure (Boateng et al., 2018; Mukaka, 2012).

The following sections of the discussion will focus on first aid assessments, judgement guidance when using self-efficacy as a measure, and the use of the RFA SES in specific contexts. The final sections of the discussion will address limitations, implications, and future research opportunities related to the RFA SES.

## 4.2 First Aid Assessments

First aid courses are delivered and developed in many different ways, some courses focus on basic first aid with minimal training hours required, and others focus on training higher-level

first responders involving many more training hours. Despite these variations, the majority of remote first aid courses in North America can be organized into four main categories (1) Wilderness First Aid (WFA) (2) Wilderness Advanced First Aid (WAFA), (3) Wilderness First Responder (WFR) and Wilderness Emergency Medical Technician (WEMT) (Sholl & Curcio, 2004). These courses retain the same objectives of preventing injuries and responding well in emergencies. However, the main difference is the detail of the curriculum, as evidenced by the contact hours. A typical WFA course is 16-20 hours in length, and a typical WAFA course is 40 hours in length. A typical WFR is 80 hours in length, and a typical WEMT is 180 -200 hours in length or longer (depending on the jurisdiction training provider). Regardless of the type or length of these courses, training providers usually use the same form of assessment as pass/fail markers for participants. These assessments fall into two categories: (1) knowledge retention, and (2) skill assessments. However, knowledge and skills are susceptible to being forgotten following a first aid training program (Brennan et al., 1996; Eisenburger & Safar, 1999; Mahony et al., 2008). Additionally, it should be noted that written knowledge usually outlasts practical skills, even in medical professionals who are required to use their skills daily (Gass & Curry, 1983; O'Steen et al., 1996). In a study examining undergraduate medical students' knowledge and skill retention of first aid and basic life support techniques, after one year, 68% of students failed both assessments, and only 2% passed both assessments (Mahony et al., 2008). This is a strong example of why different forms of assessment should be utilized to ensure immediate success in first aid and long-term success. Different assessment tools may also shed light on different areas of strength and weakness, and this was one of the motivations for developing the RFA SES. It was developed in order to introduce a third assessment tool to help participants and

training providers understand remote first aid self-efficacy in terms of competence and confidence to respond.

#### 4.2.1 Competence and Confidence

First aid courses using competency assessment, such as skill assessment observed by a training instructor, are only measuring how good an individual is at providing first aid at the moment they were assessed. This form of assessment does not measure confidence, which is how good the individual thinks they are at something. Confidence is encompassed within the construct of self-efficacy. However, the difference between confidence and self-efficacy is that self-efficacy is both the affirmation of ability (confidence) and the strength of that belief (Bandura, 1997). Thus, according to Schwarzer (2014), self-efficacy plays a crucial role in the success of many everyday actions and regulated behaviors. There is evidence that those who believe in themselves, and their abilities are more successful than those who choose to dwell on their inabilities (Ralf Schwarzer, 2014). Schwarzer (2014) describes self-efficacy as a personal action control agency and infers it is highly regulated by thought of self and belief practices. More precisely, indicating that just because someone has the competence to respond does not mean they will actually respond, or respond appropriately if they lack self-efficacy (Ralf Schwarzer, 2014).

A lack of self-efficacy could lead to mistakes, second-guessing, immobility, or the inability to make critical decisions even when that individual has the knowledge to perform and make sound decisions (Bandura, 1997). As indicated in paper 1, those who were well trained in first aid (WMA alumni) displayed much higher RFA SES scores than those with less training (LU students) in remote first aid. In other words, this suggests that the strength of the confidence of

the WMA alumni was higher compared to the LU student respondents, and this would be expected since WMA Alumni were more highly trained in remote first aid. When used in a remote first aid training context, the RFA SES could then be used to assess strengths and weaknesses, and this could reveal insights related to participants' reflective perspective, course material, or instructor performance.

## 4.3 Self-Efficacy

### 4.3.1 Self-Efficacy Assessment

Albert Bandura is the recognized expert in self-efficacy theory. He has defined self-efficacy as, "an individual's belief in his or her capacity to execute behaviors necessary to provide specific performance attainments" (Bandura, 1997 p. 3). Self-efficacy is a unique aspect of human behavior because it is both the affirmation of one's ability and the strength of their belief. As a conceptual example, the RFA SES item #15 asks the individual to indicate their confidence in managing and manipulating a person with a spinal injury; in doing so, this question first places reliance on their physical ability to do it but also their belief to do it successfully with the proper knowledge and correct maneuvers. Self-efficacy thus becomes a very relevant and vibrant tool in understanding human behavior and beliefs. This is primarily because most behaviors are initially shaped in our thought, meaning that our beliefs surrounding our efficacy influences our decision before the behavior is initiated (Bandura, 1997).

Self-efficacy can be applied to many different realms of peoples' lives. In other words, people can have more self-efficacy in some areas of their lives and less self-efficacy in other areas (Bandura, 1997). Self-efficacy has been proven to be an effective tool in assessing academic work and sports performance, hence the interest in developing and validating the RFA SES in

this student (Moritz et al., 2000; Sadri & Robertson, 1993; Stajkovic & Luthans, 1998). A meta-analysis performed by Sadri & Robertson (1993) promising correlations between analyzing ones reported self-efficacy and their actual work-related performance, using Bandura's initial principle of self-efficacy and new literature surrounding the relationship between self-efficacy and work behavior (Sadri & Robertson, 1993). These results were supported in a later meta-analysis completed by Stajkovic & Luthans (1998) who found that significant correlation existed between one's self-efficacy and work performance. In addition to a significant but individually diverse within group correlation. In a different context, Moritz, Feltz, Fahrbach, and Mack (2013) presented strong evidence supporting the positive relationship between self-efficacy measures and predictive sports performance (Moritz et al., 2000). Additionally, in a separate meta-analysis by Multon, Bown, and Lent (1991), self-efficacy beliefs had a positive and statistically significant relationship with academic performance (Multon et al., 1991). Overall, the measure of self-efficacy beliefs with respect to actual performance shows strong results in many different areas of people's lives. Thus, it is likely that the strength of respondents' self-efficacy beliefs could predict their competence or effectiveness at providing remote first aid. Future studies should investigate whether this hypothesis is in fact true. Now that the RFA SES has been validated future work should focus on investigating its ability to measure confidence in remote first aid courses.

The RFA SES showed a significant test re-test reliability correlation of 0.92 for the WMA group, and 0.94 for the 15-Item version. This suggests that it is relatively stable in assessing one's first aid self-efficacy over time. The WMA population contained members who were all trained in remote first aid; they had a mean scale score of 75.9 compared to the LU population, where only 9% of the population had remote training, and the mean scale score of 57.8 was observed. This

indicated that measuring self-efficacy shows promise in assessing different levels of training in first aid contexts. As observed in academic work and sports performance, using self-efficacy showed considerable promise as a predictor of that performance (Moritz et al., 2000; Multon et al., 1991; Sadri & Robertson, 1993; Stajkovic & Luthans, 1998). Thus, the use of the RFA SES in first aid training programs could help predict performance in scenarios before they happen outside of training.

#### 4.3.2 Self-Efficacy Measures

This thesis project focused on remote first aid self-efficacy, one's belief in their ability to be successful in providing first aid in remote or wilderness contexts. This suggests that self-efficacy may directly correlate with behavior, and this could be valuable information for course participants, providers, and the broader society. For course participants, this information could provide a way to reflect on their capacity, competence, and confidence to provide first aid. For course training providers, this information could provide a way for them to assess or evaluate their curriculum, instructors, or approach to delivering course material (e.g. didactic, practical, or simulation). For the broader society, this information could lead to improved training courses, more confident first aiders, more immediate and effective first aid, and a resulting reduction in morbidity and mortality. Each of these assertions should be explored in future research.

In particular, incorporating a measure of self-efficacy in remote first aid training programs would provide further insight into first responders' confidence level and perhaps highlight areas for improvement both in-course and in-self. The aim of using this tool would be to train an informed first aider who is both competent and confident in their abilities to perform. Although not

assessed in Paper 1 or 2, it is possible that remote first aid self-efficacy could also predict one's likelihood to respond to an emergency after training. The link between self-efficacy and probability to respond could be explored in future studies. Nonetheless, the RFA SES was created and validated to provide a self-reported evaluation and reflection tool to help build first aiders' capabilities through knowledge of self, and it is this self-knowledge that could lead to potential issues with this type of assessment.

#### 4.3.3 Competency and Self Efficacy Assessment Issues

Perhaps the most significant challenge with the use of self-efficacy as a measure of potential performance has to do with the accuracy of someone self-reporting or self-assessing. In other words, the accuracy of measurement has to do with how well one can accurately measure their self-ability or inability (Kruger & Dunning, 1999). For a self-reported measure like the RFA SES to hold the merit and be a precise tool, it must be completed with total honesty such that accurate answers will reflect a person's reality (Kruger & Dunning, 1999). However, the degree of accuracy is mitigated somewhat in situations where it is included along with more common assessment tools such as knowledge retention exams or practical skill observations. However, there is still potential for it to be used as a stand-alone assessment tool, such as in the evaluation of CBEC courses. In either circumstance, there is the possibility of confidence estimation errors as they relate to one's perception of their level of competence. For instance, Burch (1970) identified four types of competencies: (1) unconscious incompetence, (2) conscious incompetence, (3) conscious competence, (4) unconscious competence.

Unconscious incompetence occurs when a participant does not know how to do something, and they cannot acknowledge or recognize their inability (Burch, 1970). This could result in someone scoring their confidence higher on the RFA SES assessment because they unconsciously overestimate their ability (Burch, 1970). The second stage is conscious incompetence, and this occurs when an individual does not know how to do something, but they can understand and recognize this inability (Burch, 1970). This would likely result in someone scoring their abilities or confidence accurately on a RFA SES assessment because they know their inability. The third stage is conscious competence, and this occurs when an individual knows how to do something. They can understand and recognize their ability; however, performing the task may require a high level of consciousness and focus (Burch, 1970). Similarly, to the second stage, this would likely result in someone scoring their abilities or confidence accurately on a RFA SES self-assessment because they know their ability. The final stage is unconscious competence, and this represents task mastery and occurs when an individual knows how to do something extremely well and very competently. They can understand and recognize their ability almost without thinking or conscious effort (Burch, 1970). A person at this stage of competence would likely result in a very accurate scoring of their abilities or confidence on the RFA SES.

Thus, knowing where a performer falls in the competency hierarchy may affect the precision of their score when using self-assessment techniques, especially self-efficacy scales. In particular, it appears that untrained, inexperienced or incompetent remote first aiders may be the most at risk of incorrectly assessing their remote first aid self-efficacy. These phenomena may help explain why there was a small but statistically significant increase in mean RFA SES scale score for LU students from T1 to T2. Since LU students had less remote first aid training than the WMA alumni, some of the respondents may have been unconsciously incompetent and overestimated

their confidence at T2. Belief in competency is a fundamental aspect of self-efficacy, and as discussed by Bandura (1997), it is also directly related to self-determination. Self-determination is one's ability to manage every aspect of their life, make decisions and regulate actions (Bandura, 1997). Understanding one's competency helps a person understand their overall self-efficacy and self-determination; however, this may be mitigated by the level of competency.

The WMA alumni, who were all trained in remote first aid, showed more accurate results when looking at their participation at T1 and T2 compared to the LU population, where a 1.6-point increase in mean scale scores was observed. It should be reiterated that there was no intervention between the two time periods and the analysis controlled for anyone who practiced first aid or took a course during the intervening one-month period (between T1 and T2) to ensure accuracy during the reliability testing. Thus, there is potential that given the low competency level of some of the LU participants at the time of testing and the high percentage (91%) that were untrained in remote first aid, this could have interfered with their ability to accurately assess the confidence in their ability to do something they did not know (Burch, 1970). It should also be noted that the WMA group was also more mature with a mean age of 40 compared to the LU population of a mean of 26 years. Thus, as indicated by Burch (1970), they may also have more general competency awareness; hence, more aware of capability regardless of remote first aid knowledge (Burch, 1970; Moore & Schatz, 2017). The accuracy of self-efficacy assessment could be explored in future studies that compare RFA SES scores with assessment scores such as knowledge retention exam scores and skill assessment scores for first aiders of different age groups and with varying levels of training and/or competence.

#### 4.3.4 Confidence Biases & Self-Efficacy

Overconfidence can have effects in many different realms of our lives, and it is described as the internal bias in which an individual's confidence in their abilities is more significant than what is seen or capable of (Moore & Schatz, 2017). Thus, viewing through the lens of a self-reported self-efficacy measure like the RFA SES, overconfidence could impact accuracy of results.

Overconfidence is attributed to three psychological constructs: overestimation, over placement, and over precision (Miller & Geraci, 2011). Overestimation is the construct of believing that you are better than you are (Moore & Schatz, 2017). Over placement is the belief that you are better than others (Moore & Schatz, 2017). Over precision is a prediction that an individual thinks they are correct to a high extent without practical reason (Miller & Geraci, 2011). All three of these factors could result in an untrue score on a self-assessment item, and this is more likely with low performers and those with a lower age (Miller & Geraci, 2011). It should be noted that the LU population had a mean age of 26 years and the research team determined that they presented a relatively high level of confidence compared to the relatively low level of remote first aid training they had (Miller & Geraci, 2011). Thus, it is possible that the LU group was overconfident due to their lower mean age and lower relative level of training compared to the WMA group.

A study by Miller & Geraci (2011) suggested that people with less abilities, who lack knowledge of the material and awareness of the skills they do not have (i.e., their deficits or incapability's), leads to greater overconfidence (Miller & Geraci, 2011). Miller & Geraci (2011) also noted that participants who complete self-assessments are generally overconfident in their abilities.

Finally, it should be noted that when errors are made on self-assessments, the errors tend to be

related to overconfidence (Kruger & Dunning, 1999; Miller & Geraci, 2011). Thus, our research team hypothesized that the perceived overconfidence observed in the LU population had to do with their lower age, lack of knowledge and experience related to remote first aid and the general overconfidence when assessing oneself on a questionnaire (Miller & Geraci, 2011). This consideration is important when considering future applications of the RFA SES because theoretically all participants at the start of a remote first aid course would have less training in remote first aid and they may be overconfident in their ability. As suggested by Miller & Geraci (2011), it may be better to expose them to a sample first aid situation, in order to ensure each participant is more aware of the complications as well as knowledgeable of the practice of remote first aid before completing the questionnaire. This may alleviate some of the overconfidence related to lack of knowledge. Future study designs should explore the degree of overconfidence which may impact the accuracy of scale scores.

Although it was not evident in the data from the RFA SES validation study, participants could have also been underconfident. Under confidence would affect results similarly to overconfidence; however, in this theory it would lead participants affected by it, to score themselves lower than what their true ability might be (Sheldrake, 2016). Data from the study did not indicate that the well-trained participants were giving themselves lower confidence scores than what would have been expected. However, in order to accurately pinpoint an underconfident individual it would be helpful to understand their competency performance in association with their self-efficacy performance (Sheldrake, 2016). Thus, it would be out of the scope of this research study to conclude on under confident individuals. Future studies should investigate both the implications of under confident and overconfident individuals partaking in self-efficacy questionnaires and the potential issues it may cause.

## 4.4 Implications and Applications

Both the 30-Item and 15-Item RFA SES have strong psychometric properties supporting their use as a measure of remote first aid self-efficacy. The validation of the RFA SES will lead to its ability to be used in various contexts and for two distinct purposes. The first purpose is to evaluate wilderness first aid and other types of emergency care training designed for remote geographies, communities, and worksites. The second purpose is as a reflection tool for training participants to self-assess their beliefs, confidence, and capacity to respond.

In a training course or program evaluation, the RFA SES scores from participants in one or several courses could be collected and used to evaluate the course or program. Compiling and analyzing the data would allow the instructor or training provider to make reforms to their course or program curriculum respectively to ensure training effectiveness. The RFA SES could also be used for evaluation of instructor effectiveness since there is likely a strong relationship between instructor effectiveness and participant confidence.

Self-efficacy scales have already been used in several different contexts to help evaluate courses or training programs (Bloomfield & Kendall, 2007; Fletcher, 2005; Lorenz et al., 2000). For example, a brief self-efficacy scale was used to evaluate a clinical training program of 119 dietitians (Lorenz et al., 2000). The self-efficacy scale was utilized to understand the development of the learners prior to the training program and then after the program (Lorenz et al., 2000). Data from this study indicated a significant correlation of the objectives of the course and additionally inferred that self-efficacy could help create strong training courses and provided meaningful results (Lorenz et al., 2000). In this study, low self-efficacy scores following the

course would indicate the need for modifications of future courses to ensure a strong comprehensive training program existed (Lorenz et al., 2000).

In designing the RFA SES, it was expected that as participants responded to each successive item on the scale, they would be engaging in an iterative reflection process where they would be contemplating their own competence and confidence in various remote first aid situations. This reflection process is an integral part of the experiential learning process. Experiential learning or experiential education has a rich academic history, starting with the seminal work of John Dewey (1938). In more recent times, experiential learning theory was defined simply by Priest and Gass (2017) as "learning by doing, with reflection" (p. 29).

More recently experiential learning has become more widely utilized in high level academic institutions due to its ability to engage students in hands on experience-based learning; this learning allows for more substantial development of critical skills (A. Y. Kolb & Kolb, 2005; D. A. Kolb, 2015; Lewis & Williams, 1994). It should be noted that experiential learning theory has existed for a long time now and was practiced in academic institutions through the form of laboratory work or practicum placements; however, a large increase is now being seen to use this model of learning in all levels of academia (Lewis & Williams, 1994). This process not only engages the student more than traditional theory-based learning, but it additionally allows them to be put in the driver seat of their education (Lewis & Williams, 1994). As Kolb (1984) describes it, experiential learning is the connection of theory-based learning where knowledge is created through the practice of experience's (D. A. Kolb, 1984). Experiential learning allows the learner to grow throughout the process; failure in traditional theory education was seen as unacceptable (Lewis & Williams, 1994). Failure through the experiential learning process is used as a teachable moment as well as a stepping stone to advance to the next stage of the process

(Lewis & Williams, 1994). It also allows for the participant to reflect upon their failure and see where they went wrong in order to adapt their thinking and skills to address this obstacle at the next opportunity (D. A. Kolb, 2015; Lewis & Williams, 1994). In the lens of the RFA SES, scores would be able to help a learner grow throughout the process. The RFA SES would allow for a promotion of reflection and help the student identify where they fall along their path of experiential education (D. A. Kolb, 2015; Priest & Gass, 2018). Low scores on some items could indicate areas for future reflection and growth; whereas high scores could indicate areas of mastery and pinpoint alternative areas to focus on. Put simply by Lewis (1994), experiential learning is learning from experience and later reflecting upon that experience to develop more mindsets, skills and mentalities (Lewis & Williams, 1994). The RFA SES would help remote first aid learners throughout their experiential learning process and provide them with a tool for concise and practical reflection.

The RFA SES, as a reflection tool, was deemed to complement the format of many remote first aid training courses, which have some in-class theory but most of the learning is hands-on *doing* through skill practice, scenarios, and simulations. Thus, after each period of hands-on learning instructors usually debrief the exercise and provide feedback and ask questions of course participants so they can *reflect* on their performance. Thus, most remote first aid training courses and programs embody the experiential learning process. When participants complete the RFA SES, they are presented with a variety of relevant and important first aid topics and when providing their self-efficacy score for each item they also reflect on these important topics within the course. This allows users of the scale to fully reflect on what they may have just done in a course and identify areas where they have more or less confidence and self-efficacy. Thus, the

RFA SES may complement the experiential learning process by providing an additional reflection tool for first aid instructors and training providers.

One option for using the RFA SES as a reflection tool is to have participants complete it before starting a course and at the end of a course. This design would allow first aid participants to assess their self-efficacy before and after a course, and then compare their scores as a reflection exercise. Interestingly, completing a validated scale like the RFA SES, before and after an intervention (i.e., training course), is also one of the most common approaches to program evaluation. Thus, there is the possibility that the two purposes of the RFA SES (evaluation and reflection) could be used synergistically. However, despite the theory and rationale for developing the RFA SES, more research is needed to confirm or refute whether the RFA SES is indeed a useful tool for evaluation and reflection processes.

#### 4.4.3 Application Contexts

The RFA SES was initially designed as a culturally appropriate evaluation tool for CBEC courses. CBEC courses were designed to teach untrained members of remote Indigenous communities in Canada an advanced first aid level (Orkin et al., 2012). The CBEC system was designed to help support remote communities that lacked paramedical services (Orkin et al., 2012), since emergency supports in many of these communities requires travel by helicopter or plane to the nearest emergency department. CBEC courses aimed to provide a culturally appropriate holistic course to community members, and the RFA SES was deemed to be a culturally appropriate evaluation tool. The RFA SES was used effectively in the evaluation of a CBEC course in the Northwest Territories, however, details related to this evaluation are in a

confidential report submitted to the government of NWT that is not publicly available. Since the RFA SES was developed for use in CBEC courses and there is now evidence that it is a valid and reliable tool, it is recommended to continue using it in these contexts.

The research team deemed that the RFA SES provided another assessment tool to remote first aid courses in other contexts such as wilderness first aid training for guides and outdoor recreationalists and first aid training for workers in remote locations. In sum, the main areas where the RFA SES was proposed to be used was for remote first aid training programs and courses in the following contexts: (1) Remote worksites, (2) Remote communities and (3) Wilderness recreation and adventure. It is also possible that the RFA SES could be used as an assessment tool to provide a data informed approach to determine when someone needs re-training and re-certification. Future research could explore this further through a time series design where course participants complete the RFA SES at a set frequency over time (i.e., every 6 months) to assess changes in self-efficacy.

Remote worksites can take many different forms, such as mining, forestry, fishing. Often they involve physical work that can be more dangerous. In Canada, it is the law that any remote workplace that has two or more employees working at a time have at least one first aid attendant on hand (Canada Occupational Health and Safety Regulations (SOR/86-304), 2021, p. 890). If a workplace is within 20 minutes to 2 hours from an emergency department, the minimum requirement is a standard first-aid certificate (Canada Occupational Health and Safety Regulation SOR/86-304, p. 890, 2021). However, if the worksite is over two hours away the minimum requirement is both a standard and wilderness first aid certification (Canada Occupational Health and Safety Regulation SOR/86-304, p. 890, 2021). The course must also be relevant to the type of work and hazards at the remote worksite.

Wilderness adventure and outdoor recreation is popular all around the world and involves the exploration of vast untouched and remote wilderness areas. Outfitters and adventure guides primarily organize wilderness adventure experiences. Their work often involves travel to areas that are not easily accessible and often focus on activities with high risk associated with them (Tilton, 2010). There is a wide variety in this sector that includes but is not limited to: guiding and rafting companies, outdoor outfitters, environmental and geology groups, parks and tourism groups and educational group expeditions in remote wilderness environments. Implicit in these types of activities are many challenges and associated risks. As a result of these significant risks and remote context, specific wilderness first aid courses were designed to focus on prevention and providing a higher level of care. Since many outdoor activities and excursions involve challenge and risk, the course curriculum focuses more on prevention than more traditional first aid courses. Second, since first aid responders often must provide care for a longer period of time, more training is provided in areas such as long-term patient management, wound cleaning and dressing, and evacuation. (Tilton, 2010).

Wilderness Medical Associates is an international leader in providing a variety of courses focused on various levels of wilderness first aid training. They have been around for over 40 years and their willingness to help our research team validate the RFA SES indicates their interest in developing a self-efficacy assessment tool for wilderness first aid training contexts. More recently, Sirius Medx, one of the largest Canadian-based wilderness first aid training organizations based in Quebec. It is another example of the type of training provider that may benefit from using the RFA SES. Sirius Medx has been providing various levels of wilderness first aid training and risk management services for 26 years, primarily in Canada. Recently, Sirius Medx expressed interest in the validation of the RFA SES, and they contributed to the

translation of the RFA SES into French. Further, they have recently agreed to collaborate on a validation study for the 15-Item RFA SES, in both French and English, by providing access to over 5000 Sirius Medx alumni from their wilderness first aid training courses.

#### 4.4.4 Knowledge Translation and Mobilization

The knowledge translation and mobilization (KTM) from this thesis project involves academic and applied components. Academically, the plan is to present results at academic conferences and submission of article 1 (Chapter 2) and two (Chapter 3) to the Journal of Wilderness and Environmental Medicine, likely the highest impact journal in this area of research. This journal was also chosen because of its relevant readership and affiliation with the Wilderness Medical Society, which provides affiliation and support for wilderness first aid training providers worldwide.

To ensure that the validated version of the RFA SES is available and accessible as widely as possible, a website was developed. This website defines the development and validation process and other relevant information such as practical uses of the RFA SES and optimal use of the scale in first aid groups. It additionally provides up-to-date PDF formats of the RFA SES, which are governed under a Creative Commons License (CCL) for usability at no cost by anyone. The CCL allows for easy access to the scale by any interested party with full usability of the scale. Permission only needs to be sought for modifications to the scale. The website can be accessed at: <https://sites.google.com/laurentian.ca/rfa-ses/home>

## 4.7 Limitations

There were several limitations to this validation study. First, the LU population was chosen because it was assumed that they would likely not have a high level of first aid training and even less likely to have wilderness first aid training. However, over 60% of the participants had first aid training, and 9% were trained in remote first aid. This means that when comparing the WMA group to the LU group, it was a comparison between a trained (WMA) and less trained group (LU students). A second limitation was that the RFA SES was not assessed as an evaluation or reflection tool. In other words, it is yet unknown to what extent the RFA SES is indeed an effective evaluation and/or reflection tool despite the fact that evaluation and reflection were the main reasons for creating the tool in the first place. Another limitation is related to the item reduction and validation of the 15-Item RFA SES. The reduction process only involved three members of the research team, and only two were involved in the original scale development process. However, to mitigate this limitation, the team of three followed a two-stage rigorous process to ensure that the final 15-item scale included relevant items. For the reliability and validity analysis of the 15-Item RFA SES in article two (Chapter 3), existing data was used, and this limits rigour of these results. A further validation study of the 15-Item is still required. Finally, the French version of the RFA SES 30 was rigorously translated during this study. However, due to minimal French participants, this version was not validated.

## 4.7 Conclusion

Through this study, the 30-Item RFA SES was developed and validated with the goal of being available as an informative pedagogical tool in preparing first responders for emergencies in

remote contexts and geographies. Further, the 15-Item RFA SES was created, and preliminary analysis indicated that it is also likely a reliable and valid scale.

Unintentional injuries are the leading cause of death in Canada and the United States. It is known that the earlier care is accessed the more likely it is that treatment is effective (Sampalis et al., 1993). An assumption undergirding this research project, suggested that having both the competency and confidence to respond is integral to effective treatment especially in remote wilderness contexts. Currently, most remote first aid training courses rely on knowledge retention and skill assessments as the only form of assessment. The RFA SES adds a third assessment option to complement these other approaches.

The 30-item RFA SES demonstrated exemplary results in both a trained population of wilderness first responders and a less trained group of university students. These results indicated a robust unidimensional scale that is both reliable and valid. A slight drift was seen in the test re-test scores in the LU population, who were primarily untrained in remote first aid. However, it was of negligible difference, and an overall demonstration of a reliable and valid scale was seen.

Through a rigorous item reduction process, a 15-item version of the RFA SES was created. The 15-Item version contained all of the original constructs of the original version, with less repetition. The 15-Item showed strong preliminary results with very similar reliability and validity results compared with the original version.

The RFA SES 30-item is now a valid and reliable tool that will help remote first aid training instructors and providers as an evaluation and reflection tool.

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## Appendices

### Appendix A: RFA SES Validation Study Questionnaire

#### Informed Consent First Aid Self-Efficacy Questionnaire

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**Information Letter for Research Participants: First Aid Self-Efficacy Validation Study**

**TO:** Research Participant [and/or Ontario mine rescue and/or remote first aid trainers]

**TITLE OF STUDY:** Validating the Remote First Aid Self-Efficacy scale for use in Remote Contexts

**PRINCIPLE INVESTIGATORS:** Jonah D'Angelo (Graduate Student), Stephen Ritchie PhD, Bruce Oddson, PhD, Jim Little BEng

**THE PURPOSE:** The purpose of this research is to assess the dimensionality, reliability, and validity of the Remote First Aid Self-Efficacy Scale (RFA SES). This is the last step in scale development. This study is designed to lead to the validation of the RFA SES, so it can be used for: (1) evaluation of wilderness first aid and other types of emergency care training designed for remote geographies, communities, and worksites; and (2) reflection by training participants so they can self-assess their beliefs, confidence, and capacity to respond.

**NATURE OF PARTICIPATION:** You are invited to complete an online questionnaire related to first aid and self-efficacy. There are no right or wrong answers, and your completion of this questionnaire is very valuable to us. The survey should take approximately 10-15 minutes to complete, and it can be completed online using the link provided. We are also hoping you would be willing to complete the questionnaire [at the end of the first aid course / or in a few weeks after if not involved in a course] Please know that your participation or non-participation in the study will not, in any way, affect your status in the course or in the organization you may work for. In the event that you wish to participate in this survey, you will be provided with the option to enter a draw for a \$100 Amazon gift card.

**RISKS:** There are no expected physical, social, or economic risks to participating in this study. However, the questions asked on this scale do involve reflections on providing first aid and these could elicit traumatic past memories in providing first aid.

In the unlikely event that you feel any emotional distress after completing the survey, you may access the following resources: (1) Sudbury Crisis Intervention Services toll-free at 1-877-841-1101; (2) the Ontario Mental Health Helpline toll-free at 1-866-531-2600; and (3) Crisis Services Canada call anywhere in Canada to access crisis support by phone, in French or English toll-free at 1-833-456-4566. All these resources are available 24 hours per day, seven days per week. There is no cost for these services.

**BENEFITS:** Participation in this study will help researchers validate the RFA SES. A validated tool will help evaluate first aid training programs and will help participants to reflect on their self-efficacy. Effectively this will hopefully lead to better first aid training and more confident first aiders.

**CONFIDENTIALITY:** Your name and email will be requested at the end of this Information Letter, however, it will remain confidential. Additionally, your responses to the questionnaire will be kept anonymous and unassociated with the email you provide. We encourage you to be as honest and open as you can when you respond to the questions. The research team employs the following procedures to maximize anonymity and confidentiality for research participants:

- Only the research team will have access to the online data. The secure REDCAP server and Laurentian University's Google Drive will hold all digital data;
- Your name and email will be stored separately and remain unassociated with your responses to the questionnaire;
- Online responses to the questionnaire will not require any personal identifying information;
- Your data will be retained indefinitely for use in future validity studies of the RFA SES.

**YOUR RIGHTS:** Your participation in this study is entirely voluntary. Your decision to participate will in no way affect your relationship with [Employer] or with your affiliated program. However, since your responses will be submitted anonymously, it will not be possible to delete your responses after submission.

**RESULTS:** Results from this study will be shared with you by our research team on the RFA SES website at: <https://sites.google.com/laurentian.ca/rfa-ses/home>. These results can also be requested by contacting Jonah D'Angelo or Dr. Stephen Ritchie (contact information below).

**QUESTIONS AND STUDY CONTACT INFORMATION:** For all questions about the questionnaire or the overall study, please contact Jonah D'Angelo - Email: [jdangelo@laurentian.ca](mailto:jdangelo@laurentian.ca); or Dr. Stephen Ritchie - Tel: 705-675-1151 ext. 1046; Email: [sritchie@laurentian.ca](mailto:sritchie@laurentian.ca)

The Laurentian University Research Ethics Board (REB) has approved this study; the REB is responsible for ensuring that the rights of human subjects are protected through the study design.

**CONCERNS:** If you have any questions regarding your rights or concerns as a participant, you may contact someone who is not attached to the research team:

**Research Ethics Officer**  
**Laurentian University Research Office**  
 705-675-1151 ext. 3213, 2436 or toll-free at 1-800-461-4030 Email: [ethics@laurentian.ca](mailto:ethics@laurentian.ca)

Attachment:  [Informed Consent.pdf](#) (0.39 MB)

If you Consent to participate, please fill out your First name an email and press "submit". Please note that your name and email will not be attached to your responses and are only for follow up purposes.

1) **First Name**

\* must provide value

2) **Please provide your email address**

\* must provide value

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Displayed below is a read-only copy of your survey responses. Please review it and the options at the bottom.

I certify that all the information in the document above is correct. I understand that clicking 'Submit' will electronically sign the form and that signing this form electronically is the equivalent of signing a physical document.

if any information above is not correct, you may click the 'Previous Page' button to go back and correct it.



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## First Aid Self-Efficacy Questionnaire (RTW)

### Instructions:

The following statements list different activities related to providing first aid and emergency care in remote communities, worksites, or other outdoor and wilderness settings. In the column Confidence, rate how confident you are that you can do them as of now.

Each question will provide you with a scale from 0 to 100, please use the slider and place it at the level that best represents your confidence to respond. An example can be found below.

Please note the survey will take 15 minutes to complete.

Please fill out the following questions. They will create your unique identifier which will allow our team to match your answers up at a later date without the use of your identity.

1)1)	What is the first initial of your moms maiden name?	<input type="text"/>
2)2)	What day of the month were your born (Ex.01)?	<input type="text"/>
3)3)	What is the first letter of the city you were born in?	<input type="text"/>
4)4)	When did you last receive any first aid training? <small>* must provide value</small>	<input type="text" value="In the last year"/>

		<input type="radio"/> 6 To 10 years ago <input type="radio"/> More than 10 years ago <input type="radio"/> I have had first aid training but don't remember when I last had it <input type="radio"/> Never
3)3)	<b>What type or level of first aid training did you receive? (Only check the highest level achieved)</b> <i>* must provide value</i>	<input type="radio"/> Wilderness First Responder (~80 hrs training) <input type="radio"/> Advanced Wilderness First Aid (~40 hrs training) <input type="radio"/> Wilderness First Aid (~16-20 hrs training) <input type="radio"/> Standard First Aid (~16-20 hrs training) with focus on urban context <input type="radio"/> Never
4)4)	<b>When did you last receive mental health first aid training?</b> <i>* must provide value</i>	<input type="radio"/> In the last year <input type="radio"/> 1 to 5 years ago <input type="radio"/> 6 to 10 years ago <input type="radio"/> More than 10 years ago <input type="radio"/> I have had mental health first aid training before but don't remember when I had it last <input type="radio"/> Never
5)5)	<b>Approximately, how many times have you used your first aid training since your last course?</b>	<input type="radio"/> 0 times <input type="radio"/> 1 or 2 times <input type="radio"/> 3 to 5 times <input type="radio"/> 6 times or more

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### First Aid Self-Efficacy Questionnaire (RTW)

Please rate your degree of confidence by recording a number from 0 to 100 using the scale given below.

<p>6)6) <b>Treat a person with a mild injury or illness</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <a href="#">reset</a>
<p>7)7) <b>Respond alone to a person with a severe injury or illness</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <a href="#">reset</a>
<p>8)8) <b>Make decisions and solve problems about a person's emergency care</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <a href="#">reset</a>

<p>9)9) <b>Treat a close friend, colleague, or family member with a life-threatening injury</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>10)10) <b>Assess a scene to ensure it is safe and secure</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>11)11) <b>Determine a scene is not safe enough to provide care</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>12)12) <b>Rapidly assess a person for a life-threatening condition</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>13)13) <b>Care for a person with life-threatening injuries for more than two hours</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>14)14) <b>Perform high quality CPR</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>15)15) <b>Treat a person with a severe allergic reaction</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>16)16) <b>Treat a person with severe bleeding</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>

		<a href="#">reset</a>
<b>17)17) Move an unconscious person alone a short distance</b> * must provide value	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p>	<input type="checkbox"/> <a href="#">reset</a>
<b>18)18) Complete a physical exam of a person</b> * must provide value	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p>	<input type="checkbox"/> <a href="#">reset</a>
<b>19)19) Treat a patient with a fracture using improvised equipment</b> * must provide value	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p>	<input type="checkbox"/> <a href="#">reset</a>
<b>20)20) Manage a person with a spinal injury</b> * must provide value	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p>	<input type="checkbox"/> <a href="#">reset</a>
<b>21)21) Monitor a person's condition, heart rate, respiratory rate, temperature, and level of consciousness</b> * must provide value	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p>	<input type="checkbox"/> <a href="#">reset</a>
<b>22)22) Obtain a relevant medical history from a person</b> * must provide value	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p>	<input type="checkbox"/> <a href="#">reset</a>
<b>23)23) Know if a person requires medications</b> * must provide value	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p>	<input type="checkbox"/> <a href="#">reset</a>
<b>24)24) Help someone who has a diabetic emergency and another chronic illness</b>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>	

	<p>* must provide value</p>	
25)25)	<p><b>Recognize and treat a person with a mental health emergency</b></p> <p>* must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p> 
26)26)	<p><b>Help a close friend who has suicidal thoughts</b></p> <p>* must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p> 
27)27)	<p><b>Treat a person outside in difficult terrain and any weather conditions</b></p> <p>* must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p> 
28)28)	<p><b>Manage an injured or ill person in a remote wilderness area while out on the land or water</b></p> <p>* must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p> 
29)29)	<p><b>Recognize signs of infection</b></p> <p>* must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p> 
30)30)	<p><b>Know who and how to call for help from any remote location</b></p> <p>* must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p> 
31)31)	<p><b>Lead the evacuation of an unconscious person with help from untrained people</b></p> <p>* must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p> 

<p>32)32) <b>Respond to a situation involving a fatality</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>33)33) <b>Help respond to a scene that involves more victims than responders</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>34)34) <b>Provide care for self and others after an emergency incident is over</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>35)35) <b>Know how to take steps to prevent common injuries and illnesses</b> * must provide value</p>	<p>Cannot do at all      Moderately certain can do      Highly certain can do</p>  <p>Change the slider above to set a response</p> <input type="checkbox"/> <p>reset</p>
<p>36)36) <b>How would you describe a competent wilderness first responder?</b> * must provide value</p>	<div data-bbox="950 1087 1385 1228" style="border: 1px solid gray; height: 67px;"></div> <p style="text-align: right;">Expand</p>
<div data-bbox="716 1306 966 1352" style="border: 1px solid gray; padding: 2px 10px; margin-bottom: 5px;">&lt;&lt; Previous Page</div> <div data-bbox="716 1360 966 1407" style="border: 1px solid gray; padding: 2px 10px;">Next Page &gt;&gt;</div>	



## First Aid Self-Efficacy Questionnaire (RTW)

Please indicate how much you agree with the following statements as they apply to you right now.

<p>37)37) I can always manage to solve difficult problems if I try hard enough.</p>	<p>Not at all true</p> <p>Hardly true</p> <p>Moderately True</p> <p>Exactly True</p> <p><a href="#">reset</a></p>
<p>38)38) If someone opposes me, I can find the means and ways to get what I want. * must provide value</p>	<p>Not at all true</p> <p>Hardly True</p> <p>Moderately True</p> <p>Exactly True</p> <p><a href="#">reset</a></p>
<p>39)39) It is easy for me to stick to my aims and accomplish</p>	<p><a href="#">reset</a></p>

	<p><b>my goals.</b></p> <p>* must provide value</p>	<p>Not at all true</p> <p>Hardly True</p> <p>Moderately True</p> <p>Exactly True</p>
40)40)	<p><b>I am confident that I could deal efficiently with unexpected events.</b></p> <p>* must provide value</p>	<p>Not true at all</p> <p>Hardly true</p> <p>Moderately true</p> <p>Exactly true</p> <p>reset</p>
41)41)	<p><b>Thanks to my resourcefulness, I know how to handle unforeseen situations.</b></p> <p>* must provide value</p>	<p>Not at all true</p> <p>Hardly True</p> <p>Moderately True</p> <p>Exactly True</p> <p>reset</p>
42)42)	<p><b>I can solve most problems if I invest the necessary effort.</b></p> <p>* must provide value</p>	<p>Not at all true</p> <p>Hardly True</p> <p>Moderately True</p> <p>Exactly True</p> <p>reset</p>
43)43)	<p><b>I can remain calm when facing difficulties because I can rely on my coping abilities.</b></p> <p>* must provide value</p>	<p>Not at all True</p> <p>Hardly True</p> <p>Moderately True</p> <p>Exactly True</p> <p>reset</p>
44)44)	<p><b>When I am confronted with a problem, I can usually find several solutions.</b></p> <p>* must provide value</p>	<p>Not at all True</p> <p>Hardly True</p>

		<input type="button" value="Moderately True"/> <input type="button" value="Exactly True"/> <a href="#">reset</a>
45)45)	<b>If I am in trouble, I can usually think of a solution.</b> <i>* must provide value</i>	<input type="button" value="Not at all true"/> <input type="button" value="Hardly True"/> <input type="button" value="Moderately True"/> <input type="button" value="Exactly True"/> <a href="#">reset</a>
46)46)	<b>I can usually handle whatever comes my way.</b> <i>* must provide value</i>	<input type="button" value="Not at all true"/> <input type="button" value="Hardly True"/> <input type="button" value="Moderately True"/> <input type="button" value="Exactly True"/> <a href="#">reset</a>



Resize font:

## First Aid Self-Efficacy Questionnaire (RTW)

Please indicate how much you agree with the following statements as they apply to you over the last week. If a particular situation has not occurred recently, answer according to how you think you would have felt.

47)47) I am able to adapt when changes occur.

\* must provide value

Not at all True

Rarely True

Sometimes True

Often True

True Nearly all of the time

[reset](#)

48)48) I can deal with whatever comes my way.

\* must provide value

Not at all True

Rarely True

Sometimes True

Often True

		<input type="radio"/> True Nearly all of the time	<a href="#">reset</a>
49)49)	<b>I try to see the humorous side of things when I am faced with problems.</b> <i>* must provide value</i>	<input type="radio"/> Not at all True <input type="radio"/> Rarely True <input type="radio"/> Sometimes True <input type="radio"/> Often True <input type="radio"/> True Nearly all of the time	<a href="#">reset</a>
50)50)	<b>Having to cope with stress can make me stronger.</b> <i>* must provide value</i>	<input type="radio"/> Not at all true <input type="radio"/> Rarely True <input type="radio"/> Sometimes True <input type="radio"/> Often True <input type="radio"/> True Nearly all of the time	<a href="#">reset</a>
51)51)	<b>I tend to bounce back after illness, injury, or other hardships.</b> <i>* must provide value</i>	<input type="radio"/> Not at all true <input type="radio"/> Rarely True <input type="radio"/> Sometimes True <input type="radio"/> Often True <input type="radio"/> True Nearly all of the time	<a href="#">reset</a>
52)52)	<b>I believe I can achieve my goals, even if there are obstacles.</b> <i>* must provide value</i>	<input type="radio"/> Not at all true <input type="radio"/> Rarely True <input type="radio"/> Sometimes True <input type="radio"/> Often True <input type="radio"/> True Nearly all of the time	<a href="#">reset</a>

53)53) Under pressure, I stay focused and think clearly.

\* must provide value

Not at all true

Rarely True

Sometimes True

Often True

True Nearly all of the time

reset

54)54) I am not easily discouraged by failure.

\* must provide value

Not at all true

Rarely True

Sometimes True

Often True

True Nearly all of the time

reset

55)55) I think of myself as a strong person when dealing with life's challenges and difficulties.

\* must provide value

Not at all true

Rarely True

Sometimes True

Often True

True Nearly all of the time

reset

56)56) I am able to handle unpleasant or painful feelings like sadness, fear, and anger.

\* must provide value

Not at all true

Rarely True

Sometimes True

Often True

True Nearly all of the time

reset

<< Previous Page

Submit

## Appendix B: Remote First Aid Self-Efficacy Scale (English & French)

### REMOTE FIRST AID SELF-EFFICACY SCALE

V2.0 English – February 2021

The following statements list different activities related to providing first aid and emergency care in isolated communities, remote work sites, or in the wilderness. In the column Confidence, rate how confident you are that you can do them as of now.

Please rate your degree of confidence by recording a number from 0 to 100 using the scale given below.

0	10	20	30	40	50	60	70	80	90	100
<i>Cannot</i>				<i>Moderately</i>				<i>Highly certain</i>		
<i>do at all</i>				<i>certain can do</i>				<i>can do</i>		

	Confidence (0-100)
1. Treat a person with a mild injury or illness	_____
2. Respond alone to a person with a severe injury or illness	_____
3. Make decisions and solve problems about a person's emergency care	_____
4. Treat a close friend, colleague, or family member with a life-threatening injury	_____
5. Assess a scene to ensure it is safe and secure	_____
6. Decide that an accident scene is not safe enough to provide care	_____
7. Rapidly assess if a person has a life-threatening condition	_____
8. Care for a person with life-threatening injuries for more than two hours	_____
9. Perform high quality CPR	_____
10. Treat a person with a severe allergic reaction	_____
11. Treat a person with severe bleeding	_____
12. Move an unconscious person alone over a short distance	_____
13. Complete the physical exam of a person	_____
14. Treat a patient with a fracture using improvised equipment	_____
15. Manage a person with a spinal injury	_____
16. Monitor a person's condition, heart rate, respiratory rate, temperature, and level of consciousness	_____

17. Obtain a relevant medical history from a person
18. Recognize if a person requires medications
19. Help someone who has a diabetic emergency as well as another chronic illness
20. Recognize and treat a person with a mental health emergency
21. Help a close friend who has suicidal thoughts
22. Treat a person outdoors in difficult terrain and any weather conditions
23. Manage an injured or ill person in a remote wilderness area
24. Recognize signs of infection
25. Know who and how to call for help from any remote location
26. Lead the evacuation of an unconscious person with help from untrained people
27. Respond to a situation involving a fatality
28. Help respond to a scene that involves more victims than responders
29. Provide care for self and other responders after an emergency incident is over
30. Know how to take steps to prevent common injuries and illnesses



REMOTE FIRST AID SELF-EFFICACY SCALE  
V2.0 French – 2021

Les éléments suivants énumèrent différentes activités liées à fournir des premiers soins et des soins d'urgence dans des communautés isolées, des sites de travail éloignés ou dans une région sauvage. Dans la colonne Confiance, évaluez votre degré de confiance de fournir ces soins au moment présent.

Veuillez évaluer votre degré de confiance en inscrivant un nombre de 0 à 100 selon l'échelle ci-dessous

0	10	20	30	40	50	60	70	80	90	100
<i>Ne peux pas le faire du tout</i>				<i>Pourrais peut-être le faire</i>			<i>Peux très certainement le faire</i>			

- |   | Confiance<br>(0-100) |
|---|----------------------|
| 1. Soigner une personne ayant une blessure mineure ou une maladie légère  | _____                |
| 2. Réagir seul à une personne gravement blessée ou malade   | _____                |
| 3. Prendre des décisions et résoudre les problèmes liés aux soins d'urgence à fournir à une personne              | _____                |
| 4. Soigner un ami proche, un collègue ou un membre de sa famille atteinte d'une blessure potentiellement mortelle | _____                |
| 5. Évaluer le lieu d'un accident pour s'assurer qu'il est sécuritaire   | _____                |
| 6. Déterminer si le lieu d'un accident n'est pas assez sécuritaire pour prodiguer des soins                       | _____                |
| 7. Déterminer rapidement si une personne a une condition potentiellement mortelle                                 | _____                |
| 8. Fournir des soins pendant plus de deux heures à une personne avec des blessures potentiellement mortelles      | _____                |
| 9. Effectuer une RCR d'excellente qualité   | _____                |
| 10. Soigner une personne avec une réaction allergique sévère  | _____                |
| 11. Soigner une personne avec un saignement abondant (une hémorragie sévère)                                      | _____                |
| 12. Déplacer par vous-même une personne inconsciente sur une courte distance                                      | _____                |
| 13. Effectuer l'examen physique d'une personne  | _____                |
| 14. Soigner une personne souffrant d'une fracture à l'aide d'équipement improvisé                                 | _____                |
| 15. Gérer et manipuler une personne atteinte d'une blessure à la colonne vertébrale                               | _____                |

16. Surveiller l'état général, la fréquence cardiaque, la fréquence respiratoire, la température et le niveau de conscience d'une personne

17. Obtenir les antécédents médicaux pertinents d'une personne

18. Reconnaître si une personne a besoin de médicaments

19. Aider quelqu'un qui a une urgence diabétique en plus d'une autre maladie chronique

20. Reconnaître et soigner une personne atteinte d'une crise en santé mentale

21. Aider un ami proche qui a des pensées suicidaires

22. Soigner une personne en plein air, en terrain difficile et dans différentes conditions météorologiques

23. Gérer et soigner une personne blessée ou malade en milieu sauvage et éloigné

24. Reconnaître les signes d'infection

25. Savoir qui et comment appeler à l'aide à partir d'un endroit éloigné ou isolé

26. Gérer l'évacuation d'une personne inconsciente avec l'aide de personnes non formées en premiers soins

27. Répondre à une situation impliquant un décès

28. Intervenir en cas d'accident qui comprend plus de victimes que d'intervenants

29. Prendre soin de soi et des autres intervenants suite à un événement critique

30. Savoir prendre des mesures pour prévenir les blessures et les maladies courantes

## Appendix C: Laurentian University Research Ethics Board Approval Certificate



### APPROVAL FOR CONDUCTING RESEARCH INVOLVING HUMAN SUBJECTS Research Ethics Board – Laurentian University

This letter confirms that the research project identified below has successfully passed the ethics review by the Laurentian University Research Ethics Board (REB). Your ethics approval date, other milestone dates, and any special conditions for your project are indicated below.

TYPE OF APPROVAL / New X /	Modifications to project /	Time extension
<b>Name of Principal Investigator and school/department</b>	Jonah D'Angelo, Human Kinetics, supervisor Stephen Ritchie, co-PI's Bruce Oddson, Jim English, Human Kinetics	
<b>Title of Project</b>	Validating the Remote First Aid Self-Efficacy scale for use in Remote Contexts	
<b>REB file number</b>	6020617	
<b>Date of original approval of project</b>	April 03, 2020	
<b>Date of approval of project modifications or extension (if applicable)</b>		
<b>Final/Interim report due on: (You may request an extension)</b>	April 03, 2021	
<b>Conditions placed on project</b>		

During the course of your research, no deviations from, or changes to, the protocol, recruitment or consent forms may be initiated without prior written approval from the REB. If you wish to modify your research project, please refer to the Research Ethics website to complete the appropriate REB form.

All projects must submit a report to REB at least once per year. If involvement with human participants continues for longer than one year (e.g. you have not completed the objectives of the study and have not yet terminated contact with the participants, except for feedback of final results to participants), you must request an extension using the appropriate LU REB form. In all cases, please ensure that your research complies with Tri-Council Policy Statement (TCPS). Also please quote your REB file number on all future correspondence with the REB office.

Congratulations and best wishes in conducting your research.

Rosanna Langer, PHD, Chair, *Laurentian University Research Ethics Board*

## Appendix D: 15-Item Remote First Aid Self-Efficacy Scale

### REMOTE FIRST AID SELF-EFFICACY SCALE - 15

V1 – January 28<sup>th</sup>, 2021

The following statements list different activities related to providing first aid and emergency care in isolated communities, remote work sites, or in the wilderness. In the column Confidence, rate how confident you are that you can do them as of now.

Please rate your degree of confidence by recording a number from 0 to 100 using the scale given below.

0	10	20	30	40	50	60	70	80	90	100
<i>Cannot do at all</i>				<i>Moderately certain can do</i>				<i>Highly certain can do</i>		

	Confidence (0-100)
1. Make decisions and solve problems about a person's emergency care	_____
2. Assess a scene to ensure it is safe and secure	_____
3. Rapidly assess if a person has a life-threatening condition	_____
4. Care for a person with life-threatening injuries for more than two hours	_____
5. Perform high quality CPR	_____
6. Treat a person with severe bleeding	_____
7. Manage a person with a spinal injury	_____
8. Monitor a person's condition, heart rate, respiratory rate, temperature, and level of consciousness	_____
9. Help someone who has a diabetic emergency as well as another chronic illness	_____
10. Recognize and treat a person with a mental health emergency	_____
11. Lead the evacuation of an unconscious person with help from untrained people	_____
12. Help respond to a scene that involves more victims than responders	_____
13. Provide care for self and other responders after an emergency incident is over	_____
14. Know how to take steps to prevent common injuries and illnesses	_____
15. Treat a person outdoors in difficult terrain and any weather conditions	_____