University of New Mexico
UNM Digital Repository

Nursing ETDs | Electronic Theses and Dissertations

Fall 12-20-2018

ADAPTATIONS MADE TO EVIDENCE-BASED PUBLIC HEALTH PROGRAMS IN LOW- TO MIDDLE- INCOME COUNTRIES: A CONCEPT MAPPING ANALYSIS

Elizabeth Holguin

Follow this and additional works at: https://digitalrepository.unm.edu/nurs_etds

 Part of the International Public Health Commons, and the Nursing Commons

Recommended Citation
Holguin, Elizabeth. "ADAPTATIONS MADE TO EVIDENCE-BASED PUBLIC HEALTH PROGRAMS IN LOW- TO MIDDLE-INCOME COUNTRIES: A CONCEPT MAPPING ANALYSIS." (2018). https://digitalrepository.unm.edu/nurs_etds/42

This Dissertation is brought to you for free and open access by the Electronic Theses and Dissertations at UNM Digital Repository. It has been accepted for inclusion in Nursing ETDs by an authorized administrator of UNM Digital Repository. For more information, please contact disc@unm.edu.

Elizabeth Holguin
Candidate

College of Nursing
Department

This dissertation is approved, and it is acceptable in quality and form for publication:

Approved by the Dissertation Committee:

Beth Tigges, Ph.D., PNP, RN, Chairperson

Nancy Ridenour, Ph.D., APRN, BC, FAAN

Kim J. Cox, Ph.D., RN, CNM, FACNM

Stephanie Smith, Ph.D.

ADAPTATIONS MADE TO EVIDENCE-BASED PUBLIC HEALTH PROGRAMS IN LOW- TO MIDDLE- INCOME COUNTRIES: A CONCEPT MAPPING ANALYSIS

BY

ELIZABETH HOLGUIN

B.S., Nursing, Edinboro University, 2005
M.P.H., Tulane University, 2008
M.S.N., Duke University, 2010

DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy

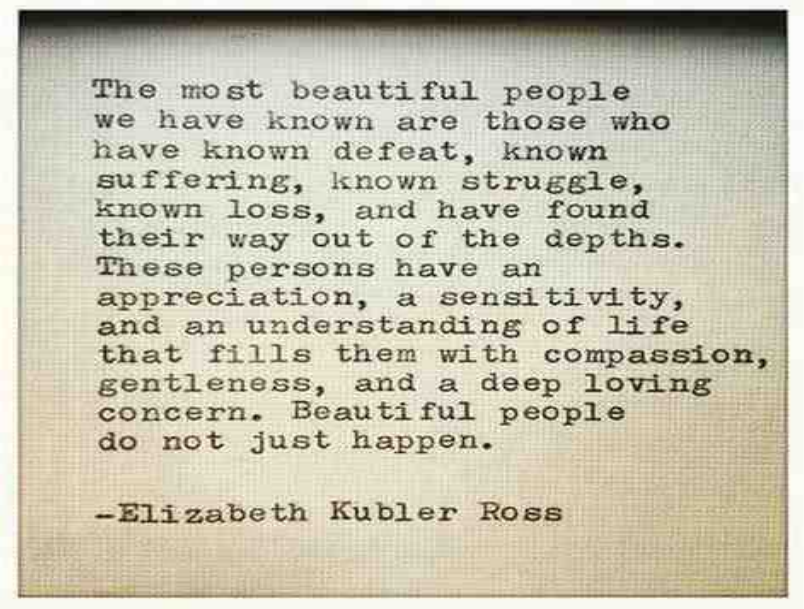
Nursing

The University of New Mexico
Albuquerque, New Mexico

December, 2018

DEDICATION

This dissertation is dedicated to my mother, Kate Strosser y mi suegra, Patricia Holguin. I am forever grateful for all the support and encouragement they provided me during this process and will miss them both tremendously.



ACKNOWLEDGMENTS

I have had so much support throughout this process, the number of people that I should thank are countless. I would especially like to acknowledge my gratitude for my entire dissertation committee, Nancy Ridenour, Kim Cox, and Stephanie Smith and could not have produced a dissertation of this quality without the constant feedback, advice, and encouragement of my chair, Beth Tigges. This opportunity would not have been possible without the RWJF Nursing & Health Policy Collaborative Fellowship and those that have guided the fellows, including Susan Hassmiller, Alexia Green, Shana Judge, and Sally Cohen as well as all the assistance provided by Antoinette Sabedra, Bryan Jackson and the College of Nursing staff. A special thank you to my cohort for allowing me to lean on you in the hard times and providing me with amazing friendships that will last a lifetime. To my children, I owe you many bedtime stories, walks with the dogs, and trips to the park and pool. Finally, I owe an enormous thank you to my husband, Gabriel for your immense amount of love, support, and encouragement throughout this process.

ADAPTATIONS MADE TO EVIDENCE-BASED PUBLIC HEALTH PROGRAMS IN LOW- TO MIDDLE-INCOME COUNTRIES: A CONCEPT MAPPING ANALYSIS

by

Elizabeth Holguin

B.S., Nursing, Edinboro University, 2001
M.P.H., Tulane University, 2008
M.S.N., Duke University, 2010

Ph.D., Nursing, University of New Mexico, December 2018

ABSTRACT

One of the most challenging barriers to implementing successful and sustainable evidence-based programs in public health is the ability to remain faithful to original protocols grounded in scientific evidence while adapting programmatic components to reflect the reality of the communities they are meant to benefit. It is generally accepted that some degree of adaptation should occur in order to achieve positive, sustainable outcomes in public health programs. A concept mapping methodology was used to explore types of adaptation that occur during implementation of evidence-based global health programs in low- to middle-income countries (LMICs). Purposive and snowball sampling produced a sample (N=24) of those who have implemented evidence-based public health programs in LMICs. CS Global MAX™ software was used for participant phases and for data analysis. A 10-cluster solution was chosen by the researcher based

on participant groupings and includes the following adaptation categories: (1) Culturally Appropriate Communication, (2) Monitoring & Evaluation, (3) Human Resources, (4) Capacity Building, (5) Community Input, (6) Local Expertise, (7) Evidence Transition to Local Context, (8) Technology and Incentives, (9) Transparency, and (10) Cultural Considerations. Pattern matching displays and bivariate plots, "go-zones," were used to evaluate the clusters in terms of importance and ease. Clusters such as Culturally Appropriate Communication and Monitoring & Evaluation were considered both important and relatively easy to complete whereas the Human Resources cluster was considered to be both unimportant and difficult to achieve. This study produced a unique conceptualization of adaptation categories by using a unique mixed methods analysis to conceptualize adaptation categories, was one of only four studies to interview actual implementers, the only study that included implementers from a variety of LMICs that drew from several types of public health program, and has uniquely assessed the relative importance and ease of adaptations from the viewpoint of program implementers.

TABLE OF CONTENTS

LIST OF FIGURES……..x

LIST OF TABLES……xii

CHAPTER 1 INTRODUCTION……..1

Introduction……..….....1

Background…….….4

Fidelity and Adaptation……....7

Adaptation……....10

Problem Statement…….....16

Study Purpose……...…17

Research Questions……...……...…17

Proposed Conceptual Framework…….17

Concept Mapping Overview…….19

Overview of Study Methods.…….……...20

Limitations……22

Assumptions…….....24

Study Significance……24

Summary……...…….……...…26

CHAPTER 2 REVIEW OF THE LITERATURE……28

Introduction……..……..28

Implementation & Translational Research for Evidence-Based

Public Health Programs……..……..…….30

Fidelity of Implementation…….……...…….34

Fidelity and Adaptation as Complementary Constructs…….……..…….39

Adaptation……...…..…..…47

Systematic Classification of Adaptation…….……...50

Types of Adaptation…….……...……...55

Remaining Gap in the Literature…….....…….77
Summary……...…….78

CHAPTER 3 METHODOLOGY……...……80

Introduction……...…….....80
Mixed Methods……..……80
Research Design……..…….…..81
Concept Mapping…….……..……81
Sample……..……..83
Methods……..……85
Data Analysis……..…...……94
Data Interpretation…….…..…….107
Human Subjects…….……..108

CHAPTER 4 RESULTS…….……...110

Introduction…….…….……110
Participant Demographics…….……...111
Major Adaptation Categories That Occur During Implementation….……114
Importance and Ease …….....125
Correlation between Importance and Ease…….……135
Summary…….…….……...…144

CHAPTER 5 DISCUSSION…….……..……..145

Study Purpose and Objectives…….……....145
Research Questions…….……....146
Conceptual Model…….……..146
Review of the Methods…….……..147
Research Gaps…….……....147
Summary of Findings…….…….149
Limitations…….…….154
Policy Implications…….……155

Contribution to Implementation Science……..……...156

Implications for Future Research…….…….……..157
Conclusion…….……158

APPENDICES…….…….159

APPENDIX A DEFINITION OF TERMS……..161

APPENDIX B LIST OF ACRONYMS……164

APPENDIX C CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR)……165

APPENDIX D RECRUITMENT LETTER……..166

APPENDIX E SURVEY MONKEY ELIGIBILITY SURVEY QUESTIONS…..167

APPENDIX F ENROLLMENT LETTER……169

APPENDIX G BRAINSTORMING EMAIL SCRIPT……170

APPENDIX H CS GLOBAL MAX™ PARTICIPANT DIRECTIONS……172

APPENDIX I CS GLOBAL MAX™ SECURITY AND PRIVACY STATEMENT…….…….174

APPENDIX J ON-SITE PARTICIPANT SCRIPT…….……176

REFERENCES……..……..179

LIST OF FIGURES

Figure 1. Perez et al.'s modified theoretical framework to assess implementation fidelity of adaptive public health programs……9

Figure 2. Stirman and colleagues' system of classifying modifications to evidence-based programs or programs……19

Figure 3. Concept Mapping Process Overview……22

Figure 4. Stirman and colleagues' system of classifying modifications to evidence-based programs or programs……57

Figure 5. Organizational overview of adaptation types……58

Figure 6. Concept Mapping Process Overview……87

Figure 7. Flowchart of the Analysis Process……95

Figure 8. Similarity Matrix……..……..97

Figure 9. Basic Point Map Example…….……99

Figure 10. Cluster Map Example…….…….……100

Figure 11. Point Rating Map Example.…….……102

Figure 12. Cluster Rating Map Example….…….…….103

Figure 13. Pattern Matching Display Example…..……...…….……105

Figure 14. Go-Zone Plot Example……106

Figure 15. Number of Participants by WHO region…….……112

Figure 16. Types of Programs from which Participant Experience was Drawn…...….114

Figure 17. Basic Point Map……...116

Figure 18. Final 10-Cluster Solution with Statement Points and

Statement Numbers……..…118

Figure 19. Final 10-Cluster Solution with Adaptation Category Labels……...……..…119

Figure 20. Point Rating Map, Level of Importance……..128

Figure 21. Cluster Rating Map, Level of Importance…….…..…128

Figure 22. Point Rating Map, Level of Ease……...……..…132

Figure 23. Cluster Rating Map, Level of Ease……...……...133

Figure 24. Pattern Matching Display, Levels of Importance and Ease…….137

Figure 25. Go-zone Plots by Cluster…….…141

LIST OF TABLES

Table 1. Proposed Study Schedule……...… 88

Table 2. Rating Statement Verbal Anchors…….……..91

Table 3. Individual Countries within WHO Regions……..…….113

Table 4. Education, Implementation Experience, and Primary Professional Organization……. 114

Table 5. Cluster Replay Solutions……...117

Table 6. Final Cluster Solution with Statements by Cluster and Bridging Values…….120

Table 7. Average Ratings for Importance by Statement and Cluster…….128

Table 8. Average Ratings for Ease by Statement and Cluster……133

Table 9. Individual Statements Rated Most Important and Easy versus Most Unimportant and Difficult by Category…..…….139

Table 10. Adaptation Categories Produced by Concept Mapping Mapped to Stirman et al.'s Model (2013) and Literature Review Comparison……...…….…….150

Chapter 1

Introduction

One of the most challenging barriers to implementing successful and sustainable evidence-based programs in public health is the ability to remain faithful to original protocols grounded in scientific evidence while adapting programmatic components to reflect the reality of the communities they are meant to benefit. Despite the longstanding debate between fidelity and adaptation, it is generally accepted that some degree of adaptation should occur in order to achieve positive, sustainable outcomes in public health programs. Therefore, the types of adaptation must be better defined and understood in order to lay the groundwork for future research surrounding sustainable programmatic impact that works for the populations in which they were meant. By studying adaptation, we can measure its effects on outcomes and better understand how to adapt programs without changing their outcomes. To study the effects of adaptation, we need to have a clear conceptual and practical understanding of the construct. The purpose of this study was to describe, categorize, and conceptualize adaptations made by program implementers during implementation of evidence-based public health interventions to demonstrate what adaptations occur, how important adaptations are perceived to be, and how easy or difficult it is to make modifications determined to be necessary by the program implementers. Some degree of adaptation is usually crucial to the success of a program.

There are many examples of effective interventions that have not been adapted to fit local context and, as a result, have been ineffective. In the United States, family

planning methods use condoms, birth spacing, and other chemical or barrier contraceptive methods; but in certain African countries, condom use in married couples can carry an extremely negative connotation. Furthermore, many modern contraceptive methods are just not available or accessible in resource-poor communities. In regard to malaria prevention, it was stated many years ago that local perception on causation and treatment, patterns of treatment-seeking behavior, and the behavior of individuals and groups determine how or whether malaria prevention and control efforts are to be successful (Oaks et al., 1991). For example, in some communities, bed nets that were supplied for protection from mosquitos are still being used as fishing nets today. Adaptations must occur and we need to understand what they are in order to understand their future impact. Adaptation is usually studied within the context of implementation research; implementation research attempts to understand and function within real world conditions versus controlling or influencing variables and contextual factors, such as social, cultural, economic, political, legal, environmental, and epidemiological conditions (Peters et al., 2013).

Implementation research is defined as the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, hence improving the quality and effectiveness of health services (Eccles & Mittman, 2006). An evidence-based program (EBP) or intervention is a "collection of practices that are done within known parameters (philosophy, values, service delivery structure, and treatment components) and with accountability to the consumers and funders of those practices" (Fixsen et al., 2005, p.26) that demonstrate the highest level of evidence of effectiveness, and if implemented with fidelity, these programs are expected

to produce positive outcomes (EPISCenter, 2015). Programs to be included in this study have been proven effective and demonstrate prior successful outcomes.[1]

Implementation scientists often rely on the widely used Consolidated Framework for Implementation Research (CFIR) (Damschroder et al., 2009) (Appendix C). Building on Proctor et al.'s (2015) robust efforts to identify the contextual factors that relate to sustainability of evidence-based healthcare in a broad sense, this study examined adaptability, one of the key features under the domain of program characteristics within CFIR. Adaptation is the "degree to which an evidence-based program is changed or modified by a user during adoption and implementation to suit the needs of the setting or to improve the fit characteristics, attitudes, and behaviors of individuals within an adopting organization" (Rabin et al., 2008). Adaptations can either be intentional or accidental and include (1) additions of new components; (2) deletion or major modification to a component so much so that it does not resemble the original component; and (3) minor or major modifications to an existing program component (Backer, 2001; Rebchook et al., 2006; Perez et al., 2016), such as changes in the nature of the programmatic components, in the manner or intensity of program administration, or required cultural modifications (Backer, 2001; Perez et al., 2016).

While some adaptation may occur naturally or accidentally, generally adaptation has been characterized as deliberate, in order to customize an EBP to unique cultures, settings, target populations, or circumstances (Carvalho et al., 2013; Cohen, 2008; Garbers et al., 2014; Griffin et al., 2010; Harshberger et al., 2006; Hatch-Maillette et al., 2013; Jones et al., 2008; Lara et al., 2011; McKleroy et al., 2006; Perez et al., 2016;

[1] See Overview of Study Methods section for further detail regarding program characteristics

Tomioka & Braun, 2013). Deliberate, or planned adaptation is the focus of this study and can be defined as "planned or purposeful changes to the design or delivery of a program" (Sundell et al., 2015, p. 786).

A concept mapping methodology was used to explore types of adaptation in under-resourced (see Appendix A) global health settings by those who have taken part in implementation of evidence-based public health programs in low- to middle-income countries (LMICs). Concept mapping, a participatory mixed-methods approach that combines qualitative data collection with multivariate statistical analyses, was the most appropriate mixed method because it was able to capture the experience of professionals while validating their proposed ideas and concept correlation through multivariate statistics (Burke et al., 2005), culminating in verbal, pictorial, and mathematical concordance (Kane & Trochim, 2007). Concept mapping software incorporates all statements made by participants and analyzes them using hierarchical cluster analysis and multidimensional scaling described in detail in Chapter 3 to form categories of like statements. The results of this study will lay the groundwork for appropriate adaptation guideline development by determining different types of adaptation, how important they are perceived to be by implementers, and the ease with which modifications can be made.

Background

Despite major public health gains due to successful population-based programs — such as provision of safe water and food, proper sewage practices and waste removal, tobacco use prevention and cessation, injury prevention, and control of infectious diseases (Brownson, 2009) — there are still a number of areas that could use improvement (Brownson et al., 2009) as evidenced by the recently developed and widely adopted Sustainable Development Goals (United Nations, 2015). Sustainability is a key

outcome and priority within implementation science (Proctor et al., 2011; Glasgow & Chambers, 2012; Proctor et al., 2015) and sustained delivery of EBPs is crucial to positive public health impact (Spoth et al., 2011; Proctor et al., 2015). Within the field of public health, sustainability refers to "the capacity to maintain program services at a level that will provide ongoing prevention and treatment for a health problem after termination of major financial, managerial, and technical assistance from an external donor" (LaPelle et al., 2006, p. 1363). Much of the focus in public health continues to remain on the initial implementation process without regard to what occurs beyond beginning phases. The longstanding debate between maintaining fidelity of implementation versus appropriate adaptation has not been completely resolved. How well or under what conditions health innovations are sustained and maintained over time once they have been implemented remain largely unknown (Proctor et al., 2015).

There are multiple interconnected reasons that health research is not translated into practice, including historical, political, social, economic, scientific, cultural, and organizational factors (Glasgow & Emmons, 2007). Some of the most aggressive public health challenges today are deep-seated and complex and require joint collaboration from academic researchers in partnership with clinical and public health practitioners to identify and implement sustainable solutions that will serve real-world populations (Ammerman et al., 2014). Implementation is the often-missing link between scientific research and dissemination (Fixsen & Blase, 2008).

Implementation of Evidence-Based Public Health Programs

Jenicek (1997) first described the concept of evidence-based public health as "…the conscientious, explicit, and judicious use of current best evidence in making

decisions about the care of communities and populations in the domain of health protection, disease prevention, health maintenance and improvement (health promotion)" (p. 190). It is also "…the process of systematically finding, appraising, and using contemporaneous research findings as the basis for decisions in public health" (p. 190). Public health researchers and implementers are confronted with the task of underpinning public health decisions with the best available evidence when scientific evidence is not yet available, of poor quality, or not applicable to a specific context (van Bon-Martens et al., 2017). Drawing on Sackett et al.'s (1996) concept of evidence-based medicine where concepts such as clinicians' expertise and patients' preferences are given equal value to scientific evidence, van Bon-Martens and colleagues demonstrate that in public health, scientific evidence needs to be integrated with evidence derived from diverse public health professionals and include contextual knowledge of the communities served (van Bon-Martens et al., 2017) as well as local historical and contextual evidence (Glasgow & Emmons, 2007).

The translation of evidence-based health programs in a public health setting has highlighted the critical tension that exists between fidelity and adaptation (Brownson et al., 2006). Fidelity is never straightforward within the context of complex programs (Hawe et al., 2004; Craig, 2013). Fidelity is commonly defined as the degree to which a program is implemented as intended (Dusenbury et al., 2003); adaptation indicates the process of implementers to change the original design of a program or prescribed program (Rabin et al., 2008). When the objective is to identify the active ingredients of a complex public health program, strict standardization is often required to limit

implementation variation; in contrast, some programs are designed to be adapted to local circumstances (Craig et al., 2013).

Fidelity and Adaptation: A Delicate Balance Between Internal and External Validity

The longstanding debate between maintaining fidelity and adaptation boils down to the preservation of internal versus external validity. Historically, a divergent and polarizing view of fidelity and adaptation was prevalent in the research community (Rabin, 2016); fidelity was viewed as the gold standard and adaptation or modification was viewed as a serious threat. There remains to this day a constant struggle to maintain both internal validity (fidelity) while achieving external validity (adaptation). Cook & Campbell (1979) refer to internal validity as "the approximate validity with which we infer that a relationship between two variables is causal or that the absence of a relationship implies the absence of cause" (p.37) and external validity as "the approximate validity with which we can infer that the presumed causal relationship can be generalized to and across alternate measures of the cause and effect and across different types of persons, settings, and times" (p. 37). The intense focus in internal validity, particularly in efficacy studies (randomized controlled trials), may be discordant with programs that succeed in real-world settings with potential to positively impact their intended population (Bopp et al., 2016; Glasgow et al., 2003). The majority of health care guidelines have been based on studies with rigorous experimental control, which translates to strong internal validity (Green & Glasgow, 2006). These studies tend to be quite weak on external validity, compromising application to varied circumstances (Green & Glasgow, 2006); hence the need to increase attention to external validity and achieve a proper balance between the two.

Can Fidelity and Adaptation Coexist?

Established conceptual frameworks addressing implementation fidelity have neglected to address the issue of program or program adaptation while maintaining effectiveness. Carroll et al.'s (2007) conceptual framework for implementation fidelity was one of the first to specifically demonstrate significant elements of fidelity and their relationship to one another during the implementation process. Perez et al. (2016) have skillfully adapted Carroll et al.'s framework to assess implementation of adaptive public health programs (Figure 1). Perez and colleagues support the idea that fidelity and adaptation coexist; typical fidelity dimensions do not allow for assessment of adapted programs and cannot explain how an adequate fidelity-adaptation balance may be reached (Perez et al., 2016). While Carroll et al.'s framework proposed that adherence is the one core measurement of implementation fidelity, Perez et al. (2016) argue that "the nature of adaptations needs to be consciously captured in relation to their effect on effectiveness" (Perez et al., 2016, p.7).

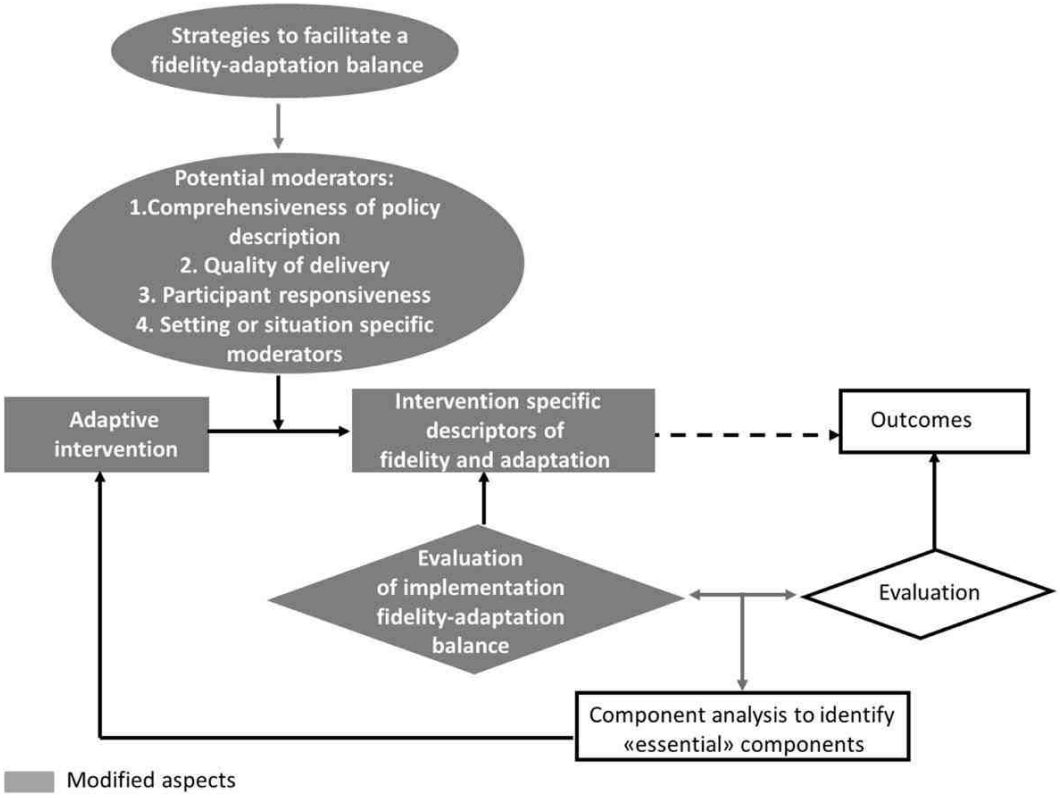


Figure 1. Perez et al.'s modified theoretical framework to assess implementation fidelity of adaptive public health programs. (Perez et al., 2016, p. 7).

The difficulty lies in finding the appropriate methodology that can accommodate a proper balance of both fidelity and adaptation. In order for health professionals to gain access to consistent evidence-based practice, it will be necessary to find ways to generate practice-based evidence that can address external validity and reflect local realities (Green & Ottoson, 2004; Green & Glasgow, 2006). Therefore, the proposed study is needed to provide a greater understanding of types of changes, or adaptations, made during the implementation process to guide the efforts of implementation researchers and scientists to better address components affecting both internal and external validity.

Adaptation

Common types of adaptation include changes to educational materials, changes to the intended audience, changes to program delivery, addition of new program elements, or deletion of core elements (Carvalho et al., 2013; Rabin, 2016). There have been many attempts at defining a clear adaptation model. Glasgow & Chambers (2012) deliberate between a traditional health research paradigm that promotes the "best" science and a model that allows a degree of flexibility. When flexibility is constrained, very little progress is achieved in primary care, public health, science, policy, or health disparity reduction (Glasgow et al., 2003; Glasgow & Chambers, 2012), as adaptation "ensures maximum implementation, potential sustainability, and long-term health impact" (Bopp et al., 2016, p. 195). Greenhalgh and colleagues (2004) discuss the concept of reinvention. They contend that the easier an innovation is to adapt, refine, or modify, the more likely it will be adopted (Greenhalgh et al., 2004). However, at times adaptation comes at the cost of maintaining program effectiveness, quality, and comprehensiveness; failure often results if program goals are in contrast to the host organizations' (Stirman et al., 2012).

How much adaptation is acceptable during implementation of an evidence-based program? Almost 40 years ago, it was argued that adaptation or reinvention was "acceptable up to a 'zone of drastic mutation', beyond which continued dilution compromised the program's integrity and effectiveness" (Hall & Loucks, 1978 in Blakely et al., 1987, p. 255). Around the same time, a pro-adaptation stance existed as well. Berman & McLaughlin (1978) call for a decentralized perspective due to "differing

organizational contexts and practitioner needs that demand on-site modification of disseminated program models" (Blakely et al., 1987, p.255). The adaptive stance contends that the more a program was able to modify the original model to fit local context, the greater the likelihood that positive outcomes would be achieved. In addition, increased flexibility would contribute to implementers' sense of program ownership, resulting in program sustainability (Blakely et al., 1987). In 1991, Bauman et al. suggest that fidelity should be maintained to the "program's mechanism of operation" and "reinvention should be permitted as long as the causal mechanism is preserved" (p. 619). Irrespective of stance, all research suggests that when programs are enacted, they change due to operating in different settings with different contexts (Century et al., 2010) by different implementers and for different populations.

Currently, the concept of adaptation is not clear and the rationale for modification is not clearly explained or understood. Although some attempts at classifying the concept of adaptation have been attempted (Backer, 2001; Rebchook et al., 2006; Stirman et al., 2013 in Perez et al., 2016), there is still not a general consensus in the literature on one definition, making operationalization somewhat difficult (Perez et al., 2016; Sundell et al., 2015; Stirman et al., 2013). Current definitions of adaptation that exist in the literature include: "planned or purposeful changes to the design or delivery of a program" (Sundell et al., 2015, p. 786); the "deliberate or accidental modification of the program" (Backer, 2001, p. 7); and the modification, addition, or deletion of program components (Rebchook et al., 2007). Planned or unplanned changes that are deliberate were captured in this study.

Perez et al. (2016) note that Dusenbury and colleagues' (2003) comprehensive literature review regarding fidelity of implementation research over a 25-year period concludes that while there is tension between fidelity and the need for adaptation, it has not yet been determined when and under what conditions adaptation can enhance program outcomes versus jeopardizing effectiveness. Adaptation can encompass anything from small changes in language to addition, deletion, or major modification of essential program components (Sundell et al., 2015). Stirman et al. (2012) found through their comprehensive review of sustainability research literature that "virtually no studies revealed the nature of the changes made, the reasons for the changes, or the process by which adaptations or decisions to discontinue elements of the program were made" (p. 9). In addition, the most promising way toward effective program construction remains obscure (Sundell et al., 2015).

While it is generally accepted that adaptations indicate changes from the original program protocol, there is debate surrounding whether adaptation should only refer to planned or purposeful program changes or if the terms should also encompass any unintentional deviations, sometimes referred to as drift (Sundell et al., 2013). Craig et al. (2013) state that a key solution is to elucidate how much modification or adaptation is permissible and record any variations in implementation so that fidelity can be assessed "in relation to the degree of standardization required by the study protocol" (p. 591). It is often difficult for users to determine whether a previously successful, evidence-based program will fit into their setting and context, what changes may be needed, and whether program effectiveness may be compromised. If we cannot better understand the nature and impact of certain modifications and the levels of fidelity needed to achieve desired

outcomes, it will be difficult to discern how to proceed with complex program implementation in different settings and contexts (Stirman et al., 2013). Carvalho et al. (2013) state that "only through an accumulation of studies of different types of programs implemented in a range of settings and focusing on a variety of audiences will the guidance on adaptation itself become evidence-based" (p. 355); this study drew on the experiences of implementers from a broad array of public health programs in various settings to satisfy this requirement.

By understanding what categories of adaptations or modifications actually occur, determining what adaptations are acceptable while preventing those that compromise fidelity will be much easier (Stirman et al., 2013). This study does not attempt to understand the effect of adaptation on outcomes. Instead, the goal was to further our understanding of adaptation by beginning to better define categories applicable to a variety of EBPs by reaching consensus among implementers. Because of the relatively small number of study participants, their statements were augmented by adaptation types derived from the literature to ensure broad inclusion of adaptation types for group analysis.

Systematic classification is necessary to guide implementers' decision-making process to adapt. Detailed classification can provide adaptation specification to implementation science researchers, which will aid them to determine the effects of adaptations on program outcomes. Prior attempts to do so fall short due their program specificity, sole focus on process (Aarons et al., 2012; Bauman et al., 1991; Harrison et al., 2010), and not using a systematic categorization. Process models lack attention to specific types of adaptation that are crucial to identify in order to determine which types

can directly link to sustainable outcomes. Few attempts have been made to systematically categorize adaptation types.

Systematic Classification of Types of Adaptation

Several authors have proposed categories of adaptation similar to this study, but all have limitations, including Hill et al. (2007), Kevany et al. (2012), Moore et al. (2013), and Stirman et al. (2013)[2]. Thus far, Stirman et al.'s (2013) classification system (refer to Figure 2 in Proposed Conceptual Framework section) is the most comprehensive and generalizable within the context of evidence-based program adaptation, exemplified by their ability to reliably apply their coding system across various studies (Cooper et al., 2016). Their work is instrumental in characterizing adaptations to EBPs in novel settings or contexts and provides a means to examine how types of modifications may affect certain outcomes (Stirman et al., 2013). Although Cooper and colleagues' work focused on testing Hill et al.'s (2007) and Moore et al.'s (2013) models, they acknowledged that Stirman et al.'s system "highlights the importance of considering multiple dimensions of adaptations within and across different studies, and intervention types and settings" (Cooper et al., 2016, p. 35). However, three major gaps remain: (1) their work, although stemming from a variety of programs, is focused on programs that take place in routine service settings primarily in the United States, limiting generalizability to circumstances that may arise in LMICs, (2) their classification system is based solely on a review of the literature versus data gathered from implementers with actual experience and insight; and (3) while this classification system is the most broad, about half of the articles reviewed to construct the literature address mental or behavioral health issues, and about one-third

[2] Explained in detail in Chapter 2

specifically stem from the HIV prevention/sexual risk prevention literature. Although their system is quite comprehensive, it is possible that some categories may be unaccounted for that could be identified after examining the real-life experience of implementers across the global health domain. In addition, Stirman and colleagues' model, while developed from various disciplines, has only been tested by Stirman and colleagues in a mental health setting (Stirman et al., 2013b).

Additional work regarding categories of adaptations is needed that can be used by various implementers and researchers for a broader range of EBP implementation efforts and applied to local contexts. Discussing adaptation within a highly specific context does not allow for a consensus among implementation science researchers or program implementers as to whether or not we can apply findings from one program to another. In addition, the majority of fidelity and adaptation work within the implementation sciences is derived from the work of mental health researchers (Aarons et al., 2012; Baumann et al., 1991; Goldstein et al., 2012; Kaysen et al., 2013; Lau, 2006; Salermo et al., 2011; Stirman et al., 2013; Stirman et al., 2013b; Sundell et al., 2015). By limiting the majority of what we know about adaptation research to mental health, we hinder generalizability to other fields. For example, there is a distinct possibility that other aspects of adaptation are ignored that may occur within the nuances of other evidence-based public health programs that require increased physical examination of patients, distribution of supplies such as bed nets, or unique issues that occur in maternal and infant/child mortality prevention programs, where we must consider family and community dynamics beyond a single patient or community member.

In summary, current research is lacking in systematic, comprehensive descriptions of possible adaptations that are broadly applicable to all evidence-based public health programs. A systematic assessment of adaptations within a global community context could provide fundamental knowledge about what adaptations occur and could streamline further program planning and implementation efforts by planning and preparing for known adaptations to occur without compromising fidelity. In addition, this study contributes to implementation research by providing distinct and broadly applicable categories that can be linked to sustainable outcomes in the future. A more general and developed analysis will further our efforts to understand the nature of different adaptations of EBPs (Stirman et al., 2013). Because it would be advantageous to do so (Stirman et al., 2013), this study built upon prior work by drawing on the experiences of program implementers to determine if the similar adaptation categories exist that may accurately reflect real-world adaptation across the public health spectrum. In particular, due to a gap in international data-driven adaptation research, my study provides data that is complementary to Stirman et al.'s model that enhances our understanding of the adaptation of evidence-based programs in LMICs.

Statement of the Problem

The majority of literature that discusses adaptation to public health programs is mainly derived from United States-based mental health examples and recommendations are often highly specific and tailored to a single program. There are not any studies that have determined if a consensus on adaptation categories can be reached by implementers across the public health spectrum, especially within the context of under-resourced populations in LMICs, nor are there widely accepted models based on input from implementers regarding the nature of adaptations made. In addition, there are not studies

that have taken into account the degree of importance and the degree of simplicity or difficulty with which certain types of adaptations are made.

Study Purpose

The purpose of this study was to describe, categorize, and conceptualize adaptations made during implementation of evidence-based public health programs to demonstrate what adaptations occur, how important adaptations are perceived to be, and how easy or difficult it is to make modifications determined to be necessary by the program implementers. The perspectives of those that implement these programs in LMICs was the primary data source; implementers also had a key role in the analysis phase.

Research Questions

1. What are the major categories of adaptation that occur during implementation of an EBP in a LMIC?
2. Which categories of adaptation do implementers perceive to be relatively more important to achieve?
3. Which categories of adaptation do implementers perceive to be relatively less important to achieve?
4. Which categories of adaptation do implementers perceive can be completed with relative ease?
5. Which categories of adaptation do implementers perceive to be more difficult to achieve?
6. What is the correlation between importance and ease for each type of adaptation?

Conceptual Framework

Stirman et al.'s (2013) comprehensive review of the literature resulted in the identification of modifications to program context or program delivery; to program

content; and modifications made during implementation efforts, training, or evaluation processes. They find that decisions to modify are made by the provider or facilitator, a team or multiple providers, an administrator or supervisor, researchers, or program developers and that decisions occur on a variety of levels (Stirman et al., 2013). In their literature search, they found that most modifications were made proactively or deliberately in response to notable differences between the implementation setting and original program; deliberate adaptation is also the focus of my proposed study. Stirman et al. (2013) designed the framework to be applicable to three distinct types of EBP or programs: those implemented by individual providers; those requiring increased coordination between multiple staff; and novel programs that target individual behaviors or behavioral health conditions. This study is guided by Stirman et al.'s (2013) system of classifying modifications to evidence-based programs (p. 6). Their modification classification system (Figure 2) guided this study during the analysis phase to determine if the predetermined categories delineated by Stirman and colleagues are similar to categories reached by a consensus of implementers of varying public health programs using concept mapping methodology.

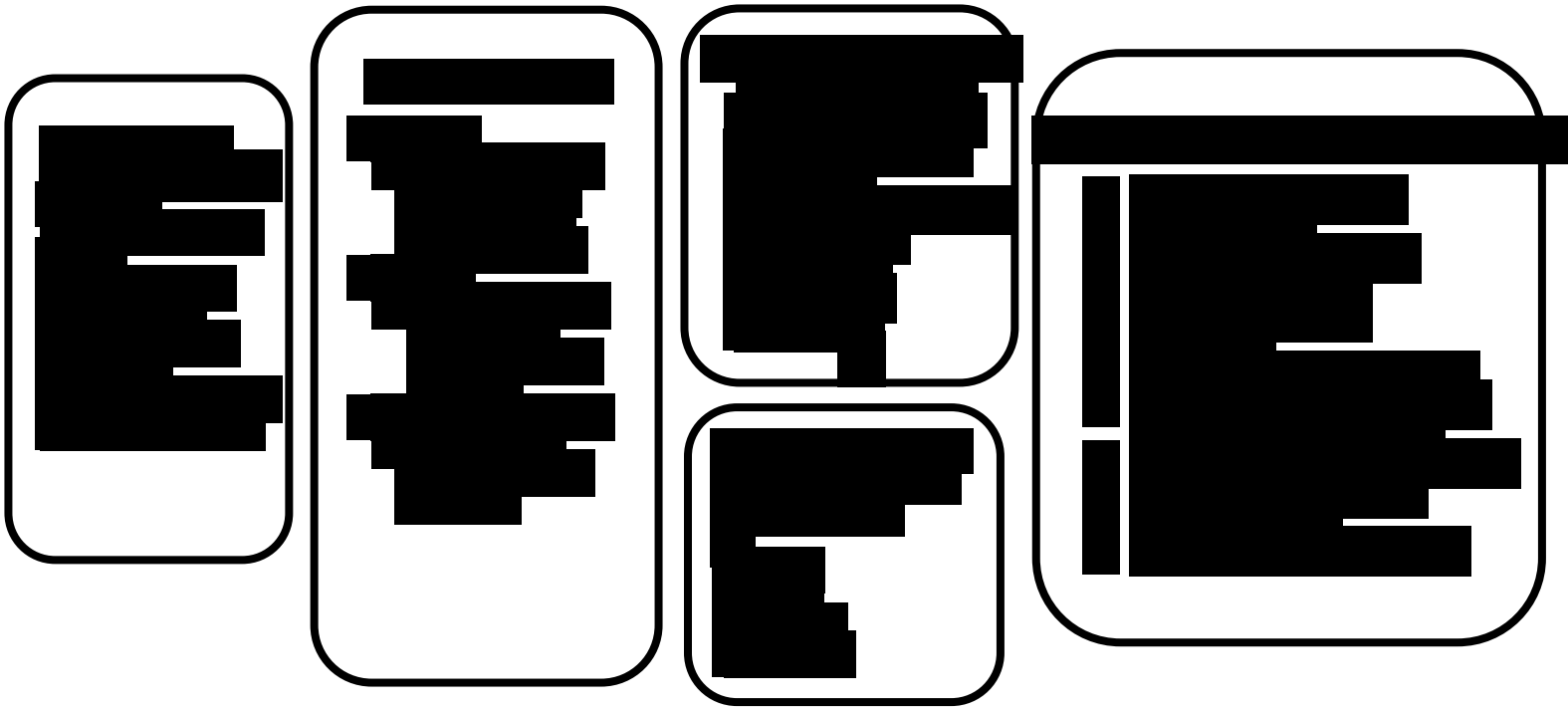


Figure 2. Stirman and colleagues' system of classifying modifications to evidence-based programs (Stirman et al., 2013, p. 6).

Concept Mapping Overview

Concept mapping is a form of structured conceptualization that has been designed for the purpose of organizing and representing ideas from an identified group (Rosas & Kane, 2012). It is considered a participatory mixed-methods approach that combines qualitative data collection with multivariate statistical analyses of the qualitative statements to represent thoughts and ideas surrounding a certain topic in a visually

"complementary and additive manner" (Rosas & Kane, 2012, p. 237). The stakeholders themselves, rather than the facilitator, drive the content for the entire conceptualization and results interpretation process (Trochim & Kane, 2007). Because concept mapping incorporates various data collection and analysis methods within a structured process (Figure 3), very complex ideas can be explored in a relatively short period of time (Burke et al., 2005).

A notable strength of concept mapping is participant involvement in the interpretation and analysis of the constructed maps. This method is methodologically superior to focus groups or in-depth interviews, where the researcher conducts all activities related to analysis, in that the participants contribute directly to data analysis and interpretation, thus ensuring that the results directly reflect the perceptions of the participants (Burke et al., 2005). Some qualitative methods may only allow for identification and exploration of themes related to a certain phenomenon, where concept mapping allows for analysis of how these themes relate to each other and also allows for the exploration of multiple themes at the same time (versus group consensus on a single theme) (Burke et al., 2005).

Overview of Study Methods

This concept mapping study used a participatory exploratory sequential (QUAL→ QUAN) design (Andrew & Halcomb, 2007). It is exploratory in the sense that this study aimed to capture as many adaptation types as possible, but I acknowledge that the results were not likely all-inclusive. Participants were a purposive sample of at least 1015 individuals who have implemented evidence-based public health programs in LMICs. Program implementers were chosen from programs that were implemented at the country,

regional, or local level but may be part of a much larger multi-country initiative such as the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) that has been implemented in over 60 countries to control the spread of HIV/AIDS (usa.gov, 2017), or the Access to Clinical and Community Maternal, Neonatal and Women's Health Services (ACCESS) Program that took place in over 25 countries (Jhpiego, 2017). Smaller EBPs that take place on a regional or local level pertaining to HIV/AIDS; malaria or tuberculosis prevention and treatment; maternal, newborn, or child health; reproductive health and family planning; capacity building programs in regard to Human Resources for Health; and tobacco and alcohol prevention were also sought after for study inclusion.

Participants participated in three asynchronous online sessions using CS Global MAX™ that cover the first three major phases of concept mapping after the initial preparation phase. These include: generation of statements, structuring of statements, and representation of statements. The final two steps, interpretation and utilization of maps, were performed by the principal researcher.

In the preparation phase, the session focus was developed, participants were selected, and a session schedule was developed. In the generation phase, the focus prompt was given to the group and a large set of statements (n >100) was produced through participant brainstorming. The brainstorming statements were augmented by statements derived from the literature regarding various types of adaptation. In the structuring phase, participants were asked to group the previously generated statements into logical groupings, assign substantive labels to each cluster, and rate each grouping on importance and ease of completion. In the representation phase, software analyses (hierarchical cluster analysis and multidimensional scaling) were conducted and data

were converted into concept maps for participant review. In the interpretation phase, I, the principal researcher, collectively processed and qualitatively analyzed the produced maps by assessing cluster domains, evaluating the items that comprise each cluster, and analyzing the content of the clusters (Burke et al., 2005). The utilization phase is used to determine how the findings best inform the research questions but was not performed in this study.

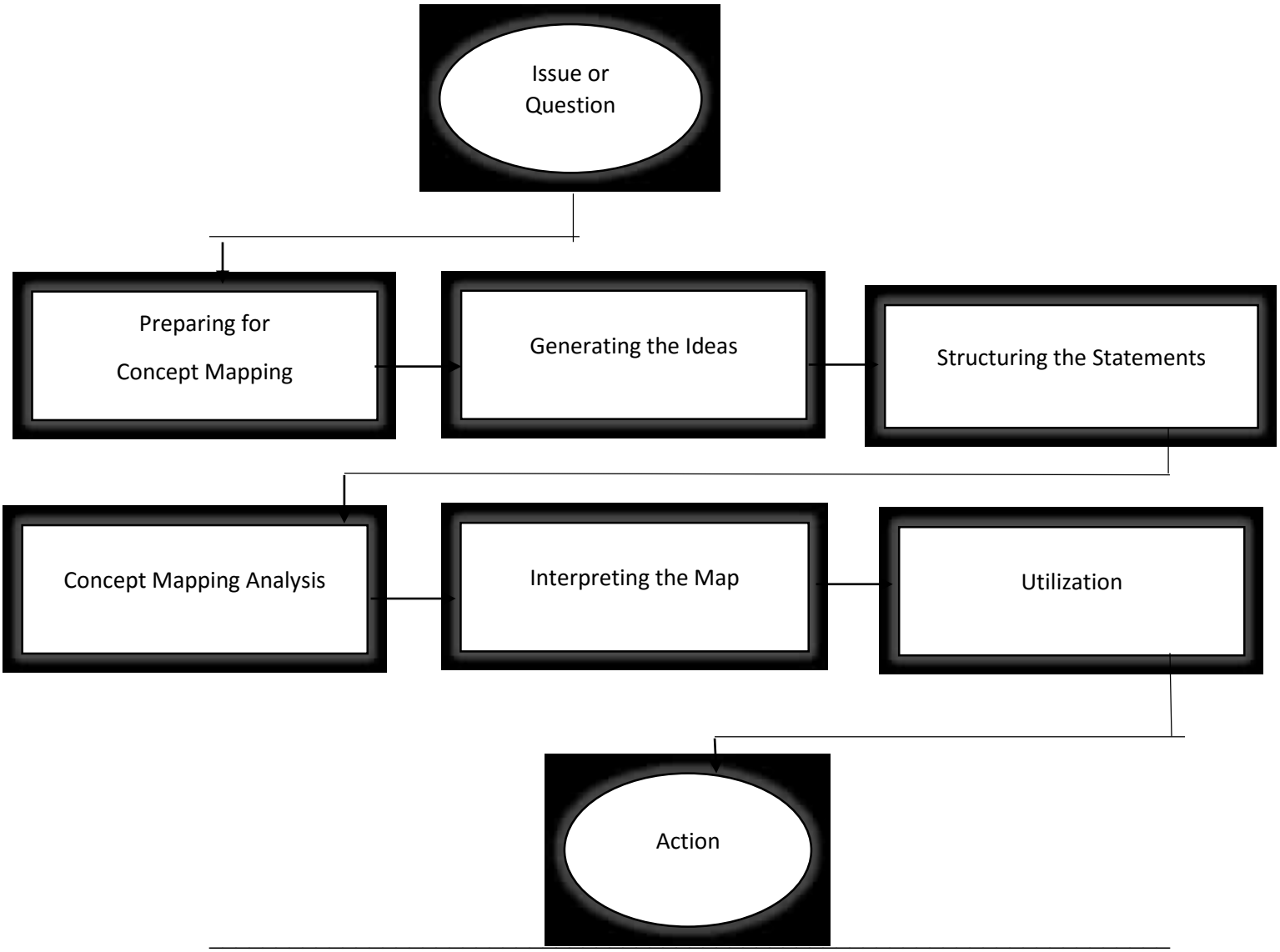


Figure 3. Concept Mapping Process Overview (Trochim & Kane, 2005, p.8)

Limitations

Although there are many proposed approaches to assessing validity of concept mapping, to date there is not a "single or universally accepted measure of validity for concept mapping" (Orsi, 2017, p. 278). In addition, Orsi (2017) recalls Jackson & Trochim's similarities to Krippendorf's work that states that because concept mapping deals with social constructions, "there is really no way to establish a standard by which to judge the degree of error" in the expression of participants' perceptions (Jackson & Trochim, 2002, p. 330; Krippendorf, 1980). Another limitation known as resource restriction, or "sorter burden," can occur if the data set is comprised of more than 200 statements (Jackson & Trochim, 2012) or "participant fatigue" (Orsi, 2017). In addition, because all participants did not participate in sorting, the validity of results was threatened. Increased participation is also positively correlated to the reliability of sort solutions in concept mapping studies (Rosas & Kane, 2012; Orsi, 2017). Maintaining construct validity in concept mapping is of utmost importance. Construct validity denotes validity of the inference about higher-order constructs that represent the particulars of the study. When performing construct analysis, two types of construct validity exist: semantical validity, "the degree to which a method is sensitive to the symbolic meanings that are relevant within a given context" (p. 157); and sampling validity, which "assesses the degree to which available data are either an unbiased sample from a universe of interest or sufficiently similar to another sample from the sample universe so that data can be taken as statistically representative of that universe" (Krippendorff, 1980, p. 157).

The sample for this study was derived from various organizations. By providing a clear definition and examples of adaptation, inadequate preoperational explication of constructs was avoided (Cook & Campbell, 1979). Researcher expectancies may cause the researcher to reveal the desired outcome of the study, which may cause participants to respond in a certain way (Cook & Campbell, 1979). By only having one prompt question, participants were free to respond as they desired, especially through web interface versus constant face-to-face contact with the researcher, thereby reducing social threats to construct validity.

Additional limitations to this method lie within the interpretation of results. Although results emphasize the similarities between and clustering of statements, the approach is limited in its ability to describe or explore the relationship between clusters. In addition, when reviewing quantitative results, researchers must use caution when assigning values to the quantitative data because the item score relevant to the other item ratings is important, not the absolute number (Burke et al., 2005).

Assumptions

I made the assumption that participants were able to retrospectively, consciously, and accurately remember and describe the process that they had undergone to make deliberate adaptations during the implementation of an evidence-based public health program or programs. In addition, I assumed that all participants would have followed through on their agreement to participate in all required phases of the concept mapping process.

Significance and Potential Impact on Health Policy and Implementation Research

There is an increasing worldwide focus on ensuring that evidence-based, or evidence-informed, policy making is employed to improve health systems performance (El Jardali et al., 2014; Langlois et al., 2016). This study offers a conceptual evaluation of the types of adaptation that may occur when implementing EBPs in LMICs, which has important implications for implementation scientists.

Policy Implications

Low- and middle-income countries have attempted to strengthen both research and program efforts in collaboration with both governmental and other development partners to support the UN Millennium Development Goals (MDGs) and currently, the Sustainable Development Goals (SDGs) (Perez et al., 2016). The results of this study may lay a foundation toward increasingly effective global health program implementation by providing a conceptual analysis of adaptations, thereby systemizing adaptation of evidence-based programs to support sustainable development efforts.

Policy makers are increasingly reliant on results derived from the best evidence on public health programs in order to improve health and development outcomes in LMICs, especially when frequently faced with substantial financial restraints (Perez et al., 2016). The evidence to practice gap is a crucial policy issue for policy makers, health care systems, researchers, and funding sources because it negatively impacts patients' health, social, and economic outcomes by limiting the reach of clinical research (Willis et al., 2016; Cooksey, 2006). Service delivery can be improved by using evidence in health system capacity building and policy making (Langlois et al., 2016). Furthermore, if we are able to understand how much we can adapt programs to local context without

changing effectiveness, we are more likely to have sustained positive public health impact.

Contribution to Implementation Science

Providing a more diverse and comprehensive systematic categorization of adaptation types will further the field of implementation science by broadening our understanding of which adaptations occur. Comprehension of adaptation types, their importance, and the ease at which they can be completed are important for future work surrounding improved program planning efforts to account for such changes before active implementation has begun. Furthermore, increased adaptation description will aid implementation researchers and program implementers to understand adaptation within the context of EBP implementation while better articulating and examining issues related to the tension between fidelity and adaptation. Since sustainability is a key outcome and priority within implementation science (Proctor et al., 2011; Glasgow & Chambers, 2012; Proctor et al., 2015) and sustained delivery of evidence-based programs is crucial to positive public health impact (Spoth et al., 2011; Proctor et al., 2015), clearly defined adaptation categories derived from LMIC exemplars can be tested in future studies to determine their relationship or importance to sustainability of EBPs.

In addition, knowledge will be gained regarding relative importance of changes made during implementation as well as the ease at which certain adaptations are made. Therefore, we will have a further understanding as to which adaptations that are deemed the most important or crucial to implementers are the easiest or most difficult to actually achieve.

Summary

In summary, adaptation is a multifaceted issue within the field of implementation sciences that warrants further explanation and analysis. Additional investigation into the fidelity–adaptation balance by discerning types of adaptation made by implementers will further our understanding of the implementation processes performed in a global health context. As the literature suggests, implementing adaptive techniques grounded with core program components may promote and contribute to the sustainability of evidence-based public health programs. This concept will best be understood through a concept mapping methodology and results may lay the foundation for future studies to discern increasingly effective and sustainable program implementation.

Chapter 2

Review of the Literature

Introduction

With the objective of achieving the Millennium Development Goals (MDGs) and now, the Sustainable Development Goals (SDGs), there has been an increasing interest in the international community regarding the effective use of research evidence (Lavis et al., 2008) and emphasis on strengthening global health research to meet health and development goals (Maher et al., 2010). A commitment to apply evidence to support effective and efficient health interventions is essential, especially in the contexts of resource scarcity and high disease burdens in low- and middle-income countries (LMICs) (Daire et al., 2014; de Savigny et al., 2009 in Langlois et al., 2016). Kuruvilla and colleagues (2014) cite adaptation as a necessary component "to address change and sustain progress" (p. 538). It is recognized that implementation of programs or interventions that are evidence-based is crucial to achieving positive and sustainable outcomes for their intended populations. Furthermore, types of adaptation are central to understanding what changes are occurring during implementation of a global health program so that, with proper identification, we can then determine if certain types of adaptation have a positive or negative effect on the program and its target population and whether certain types of adaptation can be linked to sustainable outcomes.

In order to sustain innovative public health interventions, health systems must be conceptualized as many interrelated factors. Interventions are delivered in and surrounded by a multilevel context (Glasgow & Chambers, 2012). Recognizing and accounting for these characteristics, such as policy environment, organization, history, and the community involved, is just as significant as individual participant characteristics, but often ignored (Glasgow & Chambers, 2012). Interventions do not often continue as originally intended, even after successful initial implementation has occurred (Stirman et al., 2012); although proven effective in clinical trials, programs must be scaled up to fit real-world settings (Black et al., 2015). It is well recognized among translational researchers that balancing fidelity of an evidence-based intervention with necessary community-based adaptations is necessary for successful implementation (Black et al., 2015; Castro et al., 2004; Green & Glasgow, 2006; Kilbourne et al., 2007; Lara et al., 2011; van Daele et al., 2012); furthermore, very few community-based interventions can remain aligned with the original protocol (Fixsen et al., 2005; Lara et al., 2011; Moore et al., 2013).

This chapter begins with a brief overview of implementation research, the field in which adaptation research is situated. The importance of adaptation will also be described within the context of post-clinical translational research. Background information is then provided on the tenets of evidence-based public health, translational research, and intervention adoption, which are all important concepts that contribute to the significance of the rationale for adaptation. Because of the longstanding debate between implementation fidelity and adaptation, the next section is devoted to a comprehensive synthesis of the literature surrounding fidelity within the context of implementation

research. The next sections explore the body of literature surrounding the possible balance that can exist between fidelity and adaptation. The main topic of this review, adaptation, is then described in detail, including an in-depth analysis of types of adaptation, which are the main focus of the proposed study. The chapter is summarized by describing how this study contributed to the current knowledge gap regarding types of adaptation that occur during the implementation of global health programs in LMICs.

Implementation & Translational Research for Evidence-Based Public Health Programs

Implementation is the means by which evidence-based clinical research is translated into practice (Dusenbury et al., 2003; Cohen et al., 2008) and requires a concerted effort (Bauer et al., 2015). Program implementation is described as a "multidimensional construct consisting of program delivery, program facilitators, and program participants" (Moore et al., 2013, p. 148). Evidence-based innovations are vital to achieve public health improvements and to maximize the value of health care (Bauer et al., 2015).

Evidence-based public health ensures that decisions about public health programs and policies are derived from scientific evidence, available resources, and local context (Wahabi et al., 2015). Evidence-based public health has the potential to strengthen health care systems, support effective interventions, and increase dissemination of resources and health care workforce (Wahabi et al., 2015). When an evidence-based program has been deemed successful, it is essential that we have the capacity to ensure its success in a different context for a new population. Evidence-based innovations that are viewed as effective or cost-effective, compatible with local values, norms, and perceived needs,

low-risk, and simplistic in nature are more likely to be successfully adopted by intended targets of the innovation (Greenhalgh et al., 2004). In addition, innovations that lend themselves to experimentation on a limited basis lead to easier assimilation; those with clearly visible benefits are also adopted quickly and easily (Greenhalgh et al., 2004). A limitation to widespread dissemination of evidence-based practices is a lack of knowledge and experience regarding the implementation process (McHugo et al., 2007). Therefore, a greater emphasis should be placed on the importance of implementation research.

Implementation research is encompassed within the larger domain of translational research, which is "the process of applying ideas, insights, and discoveries generated through basic scientific inquiry to the treatment or prevention of human disease" (National Institutes of Health (NIH), 2005). The need for more rigorous processes to support clinical decision making is recognized in many fields such as health policy, health systems management, and public policy making (Lavis et al., 2008). Experts in these fields agree that there are often discrepancies between available evidence and expert opinion, insufficient use of available research to inform evidence, and inadequate development of guidelines and recommendations (Lavis et al., 2008). The concept of knowledge translation is integral to public health. It surpasses simple dissemination of research and provides a platform for application of knowledge in practice (Salter & Kothari, 2014).

The central purpose of translational research is to deliver evidence that can improve population health (Sampson et al., 2015). Translational research can be conceptually divided into a two-phase process (basic to clinical science, then clinical

science to public health) (Drolet & Lorenzi, 2011); a three-phase model: (T1) basic science to clinical efficacy; (T2) efficacy to clinical effectiveness; and (T3) effectiveness to health care delivery, where implementation lies within the third translational phase (Drolet & Lorenzi, 2011); and a four step (T1-T4) construct where T1 and T2 comprise pre-clinical translational research, and T3 and T4 represent clinical and post-clinical translational research (Gannon, 2014; Institute of Translational Health Sciences, 2017; Khoury et al., 2007). Post-clinical (T4) research denotes the necessary partnerships and collaborations between clinicians, patients, and communities that occur in social, ecologic, economic, public health policy, and geopolitical frameworks (Sampson et al., 2015). Some models also use a fifth phase, T0, to denote basic scientific discovery, all activities performed prior to clinical research, including the identification of opportunities or approaches to health problems (Gannon, 2014; Institute of Translational Health Sciences, 2017).

Research produced during the last two phases (T3 and T4) emphasizes external validity, dissemination, and the contextual elements of implementation (Sampson et al., 2015) and T4 is used to evaluate actual health outcomes of population health practice (Institute of Translational Health Sciences, 2017). It is within this space that adaptation plays a fundamental and pivotal role. Sampson and colleagues (2015) caution that evidence-based recommendations alone are not sufficient for low-resource settings; a multifaceted approach to prevention and treatment should be embedded within an economic and human development agenda, innovative models, and health care delivery and financing (Burroughs Pena & Bloomfield, 2015). Adaptation has a key role in the evolution of translational research. To successfully mitigate the myriad of challenges

encountered in low-resource settings, translational research agendas must embrace the significance and key roles of networks and partnerships both locally and internationally, and both governmental and nongovernmental institutions and organizations (Miranda et al., 2015; Johnson et al., 2015; Bloomfield et al., 2015). Adaptation of programs that are not evidence-based will not be successful in the long term. It is unlikely that a program could be adapted to a new setting or context when it was originally deemed unsuccessful.

There has been increasing global support for knowledge translation at both national and international levels because of the tremendous opportunity to improve health inequities by developing, adapting, and applying the evidence through collaboration with stakeholders (Welch et al., 2009). What works, for whom, in what circumstances…and why are important questions to consider in the pre-implementation phase, especially when planning for deliberate adaptation. The circumstances and rationales that cause a certain group or population to accept, or adopt, an intervention that is novel to them are detailed by those who closely analyze the adoption of interventions.

Adoption of an intervention indicates that there is an agreement by an organization to implement the program, and it is typically conceptualized as a decision across many organizational levels (Bopp et al., 2013). Despite the numerous quantity of evidence-based programs, there is a substantial gap in communities' likelihood of adopting and effectively replicating these innovations (Fagan et al., 2008). In order for an intended audience to fully accept and integrate a novel intervention, certain characteristics of both the intervention itself as well as of the adopters must be considered and addressed. During implementation, the implemented intervention and the organizations and stakeholders must accommodate the parameters of both the

intervention as well as the knowledge, attitudes, social norms, and practices that are present throughout the implementation process (Cabassa & Baumann, 2013; Damschroder et al., 2009; Aarons et al., 2011; Palinkas et al., 2012). To increase speed and extent of an intervention's adoption, the intervention should demonstrate (1) relative advantage, or an effectiveness and cost-efficiency relative to an alternative option; (2) compatibility; (3) observable outcomes; (4) trialability, or the extent to which adopters must commit to full adoption; and (5) complexity (Dearing, 2008; Rogers, 2003; Rabin, 2008), with relative advantage and compatibility particularly important to successful adoption (Rabin, 2008; Rogers, 2003).

With widespread adoption of a program, questions arise surrounding its implementation. Implementing a program as program developers intended will affect how well evidence-based programs are transferred to real-world settings (Ennett et al., 2011) and demonstrate desired outcomes (Korda, 2013). Historically and today, many researchers consider fidelity of implementation to be the measure of "how well" a program has been implemented.

Fidelity of Implementation

The majority of implementation research surrounds fidelity's five domains, maintaining core program components, and the resulting reliability and validity (Bishop et al., 2014; Ennett et al., 2011; Bellg et al., 2004; Dane & Schneider, 1998; Frank et al., 2008; Korda, 2013; Rabin et al., 2008; Rohrbach et al., 2006). Determination of the validity of intervention studies and the true effectiveness of interventions is not possible without adequate fidelity (Bellg et al., 2004; Byrnes et al., 2010). While fidelity is integral to the implementation process, it is chronically underreported in research

literature (Borrelli et al., 2005; Dusenbury et al., 2003 Moncher & Prinz, 1991) and there is little consensus on terminology.

In 2003, Dusenbury and colleagues called for adoption of a universal definition for fidelity, but to this day multiple definitions and terminology proliferate. Implementation fidelity is frequently used interchangeably with intervention fidelity, treatment fidelity, integrity, procedural fidelity, program fidelity, or model fidelity (Bellg et al., 2004; Breitenstein et al., 2012; Carroll et al., 2007; Esbensen et al., 2011; Hill et al., 2007; McHugo et al., 2007; Novick et al., 2013; Sanetti et al., 2014; Schoenwald et al., 2011). It has been defined as "adherence or faithfulness to the procedures that compose an intervention" (Santacroce et al., 2004, in Frank et al., 2008, p.5); or "the degree to which the adapted core elements adhere to the original evidence-based intervention" (Black et al., 2015; Century et al., 2010; Gearing et al., 2011; Lara et al., 2011, p. 69S; Nelson et al., 2012) but is more commonly defined as the degree to which an intervention has been implemented or delivered as designed or as intended (Bellg et al., 2004; Bleijenberg et al., 2016; Breitenstein et al., 2012; Byrnes et al., 2010; Carvalho et al., 2013; Dusenbury et al., 2003; Korda, 2013; Leeuw et al., 2009; Mowbray et al., 2003; Schoenwald et al., 2011; Sussman et al., 2006).

The definition used for this dissertation is "the degree to which a program is implemented as it was intended in the original program model or protocol" (Slaughter et al., 2015, p. 2). Implementation fidelity is defined by five measurable dimensions: (1) adherence — whether a program was delivered or implemented as designed; (2) dose or exposure — frequency and duration of the exposure to the program or amount of an intervention received by participants; (3) quality of delivery – manner in which the

program is delivered, (4) participant responsiveness — the degree to which participants are engaged by an intervention; and (5) program differentiation — critically unique features, often referred to as essential elements or core components, that distinguish the program, without which the program will not have its intended effect (Carroll et al., 2007; Dane & Schneider, 1998; Perez et al., 2016). In addition, core components are predominantly theoretical and do not easily translate to practice, do not capture essential program aspects, and lack specificity regarding program delivery guidance (Galbraith et al., 2011; Ingram et al., 2008 in Owczarzak et al., 2014). However, the major body of implementation science literature commonly relies on core components to differentiate high fidelity and low fidelity and to describe proper or appropriate adaptation versus maladaptation. Therefore, core components will be mentioned frequently in this context throughout the chapter.

Core components are defined as essential program components thought to make an evidence-based program effective and must be kept intact to ensure intervention effectiveness (Carvalho et al., 2013; Eke et al., 2006; Rabin, 2016) and greater outcomes for participants (Fagan et al., 2008). Identifying the core components, or "active ingredients," of an intervention requires an understanding of their relationships to program outcomes (Abry et al., 2015). Several fidelity evaluation frameworks communicate the importance of being aware of, and maintaining, fidelity to the core components of an intervention (Abry et al., 2015; Century et al., 2010; Mowbray et al., 2003; Nelson et al., 2012).

Bopp et al. (2016) suggest that within core components, there should be options from which implementers can select to allow for flexibility while maintaining fidelity

during the implementation process. An additional concept in the literature, known as "retrofitting," describes the reality of how some evidence-based interventions are adapted and may contribute to successful program maintenance and sustainability (Janevic et al., 2015). Retrofitting occurs when evidence-based interventions are implemented and current program components happen to overlap with the new intervention components. Janevic et al. (2015) note that implementers and personnel valued keeping components of a current program that are successful, while enhancing services with the evidence-based components.

However, Aarons et al. (2012) warn against maladaptation, referred to as "drift." Drift is a misapplication or mistaken application of the model that usually occurs due to technical error, elimination of core components, or addition of novel, counterproductive elements (Aarons et al., 2012). Drift often occurs during field implementations among organizations or individual implementers and practitioners that have not fully integrated themselves with the new model and are not in consultation with model experts or program developers (Miller et al., 2006 in Aarons et al., 2012). If drift does occur, there is often a loss of downstream population benefits (Schoenwald et al., 2005; Elliott & Mihalic, 2004 in Aarons et al., 2012).

Fidelity and Program Success

Fidelity of implementation is critical in real-world settings; if implemented poorly, program outcomes will not reach their fully intended potential and will have diminished impact or effect (Breitenstein et al., 2012; Dusenbury et al., 2003; Ennett et al., 2011; Kilbourne et al., 2007). It is considered essential to the translation of research to practice (Breitenstein et al., 2012); without it, interpretable results cannot be obtained

(Campbell, 2011). Ennett et al. (2011) acknowledged that little is known regarding fidelity of implementation outside of the realm of research, and the majority of work done surrounding fidelity has been during program evaluations. The measurement and understanding of implementation fidelity are considered critical to understanding how programs are implemented during efficacy studies (i.e., randomized controlled trials) and when programs are translated to real-world settings (Domitrovich & Greenberg, 2000; Durlak & DuPre, 2008; Dusenbury, et al., 2003; Harachi et al., 1999; JBA, 2009).

Fidelity assessments strengthen the internal validity surrounding conclusions regarding program effectiveness because they allow researchers or implementers to differentiate between intervention versus implementation failure (Dobson & Cook, 1980; Abry et al., 2015). When robust implementation fidelity is lacking, program effects may be diminished and sustainability of the program reduced (Ennett et al., 2011). Programs using evidence-based interventions with high implementation fidelity have better outcomes than those with lower fidelity (Hasson et al., 2012), and programs with very little change to the original intervention maintain higher fidelity than those with many modifications (Perez et al., 2016). Without careful empirical examination of how interventionists adapt EBPs while maintaining program fidelity, it is not possible to determine whether lack of impact is due to inadequate implementation of the intervention or results from adapting the EBP to a certain population (Carroll et al., 2007). This concept is also discussed in Bellg et al.'s (2004) landmark publication surrounding treatment fidelity. Research that improves comprehension of implementation fidelity processes will be critical to sustain successful interventions (Breitenstein et al., 2012).

Fidelity also needs to be comprehended and quantified by practitioners (Carroll et al., 2007). Factors that reduce the internal and external validity of the evaluation of the EBP make it difficult, if not impossible, to draw accurate conclusions about study efficacy or replication. If significant results were found after a novel intervention was evaluated, but fidelity was not monitored, conclusions cannot be drawn as to whether the outcome was due to an effective treatment or due to unknown factors that may have either been unintentionally added or removed from the treatment or intervention (Cook & Campbell, 1979 in Bellg et al., 2004). Conversely, if nonsignificant results were found and the level of fidelity is unknown, it cannot be concluded whether the outcome was due to an ineffective intervention or because of lack of fidelity (Moncher & Prinz, 1991 in Bellg et al., 2004) because internal validity and effect size are highly correlated (Smith et al., 1980 in Bellg et al., 2004). Therefore, potentially effective interventions may be cast off because they were considered to be ineffective, as opposed to the implementation and dissemination of unsuccessful interventions in public health settings at high costs to patients, providers, and organizations (Bellg et al., 2004).

When replicating evidence-based interventions, fidelity monitoring allows for earlier detection of errors, which will prevent protocol deviations, or drift, from becoming widespread and permanent (Borrelli, 2011). While it is critical to achieving the intended results (Borrelli, 2011; Korda, 2013), fidelity monitoring is often difficult to accomplish in real-world settings (Korda, 2013). As Bauman et al. (1991) note, extremely successful programs are often developed under unusual conditions, with adequate funding, skillful staff, and high motivation; these very unrealistic parameters make

translation challenging to the average setting. In these instances, some form of adaptation is often necessary.

Fidelity and Adaptation as Complementary Constructs

Breitenstein et al. (2012) argue that the conflict between adaptation and fidelity is not whether adaptations or modifications occur, but what changes can be made to allow for flexibility to meet the needs of a population aligned with local context without compromising the core effective components of an evidence-based intervention or program. Furthermore, results seen in EBPs that have been implemented with fidelity are rarely reproducible without some degree of adaptation (Perez et al., 2016; Sundell et al., 2015); fidelity is often compromised by malalignment between setting and proposed intervention (Dane & Schneider, 1998). Rabin (2016) suggests that fidelity and adaptation should be seen as complementary concepts that, with proper maintenance of balance, can equally contribute to effective and successfully implemented and sustained programs. Program implementation should be visualized as a process rather than a standardized set of prescribed actions, and guidelines should be developed to address necessary adaptations (Bopp et al., 2016).

Frameworks to Assess Fidelity of Adaptive Public Health Interventions

Carroll et al. (2007) recognize that interventions cannot always be fully implemented as planned or intended. While they acknowledge that the identification of essential components provides opportunity for adaptation, Perez et al. (2016) note that *how* to identify what is essential is not addressed. Perez and colleagues (2016) have skillfully adapted Carroll et al.'s framework to assess implementation of adaptive public health programs (See Chapter 1, Figure 1). Perez and colleagues support the idea that

fidelity and adaptation coexist; typical fidelity dimensions do not allow for assessment of adapted programs and cannot explain how an adequate fidelity-adaptation balance may be reached (Perez et al., 2016). While Carroll et al.'s framework proposed that adherence is the one core measurement of implementation fidelity, Perez et al. (2016) argue that "the nature of adaptations needs to be consciously captured in relation to their effect on effectiveness" (Perez et al., 2016, p.7).

Perez and colleagues (2016) empirically developed their modified framework within the context of a fidelity of implementation assessment of an evidence-based empowerment strategy regarding dengue vector control activities in Cuba. The strategy was comprised of components related to capacity building, organization and management, community work, and surveillance and was implemented in 16 communities over three years (2016). In addition to quantitative data consisting of frequencies and tabulations of adaptations, semi-structured interviews were conducted to explore rationale for observed variations in implementation strategy (2016). They determined that implementation can be improved by carefully analyzing the adaptations made to an intervention; when a positive adaptation is identified, a new cycle of design, implementation, and testing can take place for the intervention (Perez et al., 2016). As of yet, this modified framework has not been tested by other implementation science or public health researchers but is beginning to gain traction in the literature.

To fully make use of this adapted framework, Perez et al. (2016) propose that users have a clear idea of the expected outcome(s), explicitly delineate the functioning principles or theory of change, state the outcomes as specific descriptors of fidelity, and establish questions to identify adaptations based on the intervention's description (Perez

et al., 2016). Developers and implementers must also be prepared to determine to what extent the identified adaptations will affect the functioning principles of either the particular component or the entire intervention (Perez et al., 2016). To do so, additional design strategies (Bopp et al., 2013; Castro et al., 2004; Van Daele et al., 2012) can be considered to maintain the fidelity–adaptation balance and support positive and sustainable program outcomes with the greatest potential health impact for intended populations.

Adaptation is as much about the process — engagement and capacity building — as it is about the product (Harrison et al., 2013). Rabin (2016) identified certain design strategies that incorporate both fidelity and adaptation. They include flexible adaptive program development (Bopp et al., 2013), hybrid program development and adaptation guidelines (Castro et al., 2004), and empowerment implementation (Van Daele et al., 2012).

The flexible adaptive approach is grounded in a detailed understanding of the shifting aspects of fidelity and adaptation through an intervention's life cycle**.** Programs designed with adaptation in mind are more likely to have a greater, sustained public health impact (Bopp et al., 2013). A conceptual understanding of a certain program is integral when developing a flexible approach to implementation (Bopp et al., 2013). Subsequently, the core components of a program within a certain context are elucidated so that adjustments can be made based on situational factors rather than by uninformed decision processes (Bopp et al., 2013). Ideally, adaptations to the program should be thought out during the planning and development stage in order to increase the likelihood that the program will be appropriate in diverse settings and populations, while ensuring

that adaptations do indeed maintain the underlying causal mechanisms of the program (Bopp et al., 2013). Considering a program as a standardized process instead of a set of procedures will allow for adaptation to occur while maintaining high fidelity (Bopp et al., 2013; Hawe et al., 2004).

Backer (2001) attempted to provide recommendations to intersect adaptation and fidelity during the implementation process. A successful intervention implementation requires (1) program theory identification and comprehension; (2) an analysis of core components; (3) an assessment of fidelity/adaptation concerns for each implementation site; (4) program developer consultation; (5) organizational and/or community consultation; and (6) development of an overarching implementation plan based on information gained from the first five steps (van Daele et al., 2012). Building on Backer's concept, a hybrid program was offered as a superior design approach, because it would build adaptation into the implementation to enhance program fit, while simultaneously ensuring fidelity and effectiveness (Castro et al., 2004 in van Daele et al., 2012). Hybrid designs offer adjustable programs to join the model of the program with the local culture and context of the community (Castro et al., 2004). Castro and colleagues rely on Backer's (2001) 12-step model to ensure cultural adaptation of programs with continued community input. Similar to Bopp and colleagues, Castro et al. (2004) recommend that adaptation be considered and monitored throughout the entire implementation process to ensure that the adapted program is indeed as effective as the original program. Castro and colleagues (2004) have been very heavily cited for their theoretical contribution to the cultural adaptation literature but have not produced an empirical model to be tested.

An additional design strategy that recommends community involvement was put forth by van Daele and colleagues (2012), who argue that fidelity and adaptation are equally essential to interventions and are both best addressed by a deliberately planned and structured approach.

Empowerment evaluation is both a process and an outcome and offers an opportunity to gain control over democratic participation at community, organizational, or individual levels (van Daele et al., 2012). The researcher should be seen as a collaborator and facilitator rather than an expert and counselor (Zimmerman, 2000 in van Daele et al., 2012). In the past, when these principles were examined within the context of evaluation, they were found to align closely with capacity building; stakeholders themselves assess the planning, implementation, and self-evaluation of their program, likely increasing the probability of program success (Wandersman et al., 2005; van Daele et al., 2012). Van Daele et al. (2012) sought to apply these guidelines to program implementation to merge fidelity and adaptation approaches.

Through their empowerment implementation framework, they use a community-based participatory research inspiration to provide a community with the resources necessary to identify the core intervention components, adapt the intervention to their context and culture, and monitor and maintain the quality of the implementation process (van Daele et al., 2012). This framework adds to the work of both Backer (2001) and Castro et al. (2004) by attempting to provide the guidelines missing in previous work surrounding program development, validation, and evaluation. The steps involved in empowerment implementation include: (1) developing a core component; (2) selecting partners; (3) assessing the fidelity/adaptation concerns with partners or stakeholders; and

(4) developing an overall implementation plan. Empowerment evaluation is linked closely to capacity building (van Daele et al., 2012) and the following steps can aid communities to evaluate their own programs: "(1) determining where the program stands (including strengths and weaknesses); (2) focusing on establishing goals with an explicit emphasis on program improvement; (3) helping participants determine their own strategies to accomplish program goals and objectives; and (4) helping program participants determine the type of evidence required to document progress credibly toward their goals" (Fetterman et al., 1996, in van Daele et al., 2012, p. 214).

Van Daele and colleagues (2014) were able to demonstrate their empowerment implementation strategy by applying the framework during implementation of a psycho-social group intervention. By receiving continual feedback with local stakeholders via interviews and concept mapping techniques, they demonstrated the possibility of implementing core components with high fidelity while allowing for adaptation to fit local context and meet the stakeholders' needs, which ultimately increases their sense of ownership (van Daele et al., 2014). They found that instead of viewing adaptations made by stakeholders as flaws, this strategy allows for redefinition of adaptions that are considered "useful additions with a high ecological validity and relevance" and do not interfere with the intervention's core components (van Daele et al., 2014, p. 219). In a recent study, researchers (Biro et al., 2017) acknowledged that their implementation was very similar to that recommended by van Daele and colleagues, although their study focused solely on the intervention and participants' psychological outcomes; no mention was made of program adaptation or actual application of van Daele et al.'s model.

Along a similar vein, Aarons et al. (2012) propose a dynamic adaptation process which allows the user to identify and extricate core components and adaptable characteristics while supporting implementation of the adapted model. Their framework also provides guidance to identify both systemic and organizational characteristics requiring adaptation for effective implementation (Aarons et al., 2012). They posit that their approach may also be valuable during the scaling up of public health intervention to ensure successful outcomes.

Aarons et al. (2012) applied their proposed Dynamic Adaptation Process (DAP) model to a child welfare program designed to prevent child neglect. Their study aimed to use the DAP to support adaptation; to qualitatively examine process, feasibility, acceptability, and utility of the DAP through direct observation, interviews, and focus groups; and explore organizational and provider factors that may impact both adaptation and implementation outcomes. To determine if adaptation has occurred, Aarons and colleagues chose to monitor fidelity with a fidelity checklist and through direct observation and client report, aiming to "examine patterns of change in fidelity over time" (p. 6). They used equivalence testing to determine whether the DAP model resulted in fidelity of implementation equal to standard program implementation. Although Aarons and colleagues published several articles related to this initiative, a direct follow-up article describing the proposed study results related to DAP could not be located through multiple literature searches.

All of these models, like that of Perez and colleagues, view implementation as a process versus tasks or procedures that need to be accomplished. Castro et al. (2004), van Daele et al. (2012), and Perez et al. (2016) in particular put an emphasis on empowerment

and community participation, drawing from the principles of community-based participatory research (Minkler & Wallerstein, 2003). The foundational tenets of each of the suggested models are that fidelity and adaptation can coexist and should be thoughtfully considered throughout the entire implementation process. Each model maintains that fidelity stems from a top-down, or expert, approach whereas adaptation is viewed as a bottom-up or grassroots approach. All models also agree that adaptation should be deliberately planned for and considered throughout the entire implementation process, from planning and program development through evaluation. However, none of these models attempt to discern types of adaptation that occur during the program implementation process. In summary, fidelity and adaptation are inextricably linked, and community input is essential to providing the correct type of adaptations to allow for the program to fit and be successful within the local context. In summary, the fidelity-adaptation debate is still largely theoretical in nature and adaptation is commonly viewed through the lens of deviation from fidelity. Studies like the proposed study, that specifically focus on adaptation types in an empirical sense, are needed.

Adaptation

Adaptation is the "degree to which an evidence-based intervention is changed or modified by a user during adoption and implementation to suit the needs of the setting or to improve the fit characteristics, attitudes, and behaviors of individuals within an adopting organization" (Rabin et al., 2008). Adaptations may occur due to discovery of more efficient or effective practices, or due to changes in priorities or resource availability (Stirman et al., 2012). Breitenstein et al. (2012) argue that the conflict between adaptation and fidelity is not whether adaptations or modifications occur, but

what changes can be made to allow for flexibility to meet the needs of a population aligned with local context without compromising the core components of an evidence-based intervention or program.

Sundell et al. (2015) highlight Chambers and colleagues' work regarding replication of programs and note that replication of a previous program is not always possible or warranted (2013). They also draw upon Bauman, Stein, and Irey's (1991) "principle of program uniqueness" (Sundell et al., 2015, p. 785), which indicates that the majority of programs are developed and tested under unique circumstances that are most likely dissimilar to those in which the program will later be implemented (Sundell et al., 2015). Furthermore, despite successes and gains associated with the traditional randomized trials, there is diminished capacity to assess benefits from complex public health interventions due to individual preferences, differential adherence, attrition, varying dosage, or tailoring an intervention to individual needs (Brown, 2009).

Green & Glasgow (2006) examined the neglect of external validity and its consequences for the relevance, generalizability, and applicability of research in various medical and public health contexts. They stress that while well-controlled efficacy studies are integral to determining causation, these studies dominate the current evidence base and little is known regarding effectiveness research (Green & Glasgow, 2006), which attempts to study programs under typical, instead of optimal, conditions (Glasgow et al.., 2003) through a pragmatic lens. Therefore, by offering an enhanced and broader description of adaptation categories, the proposed study could potentially strengthen effectiveness research capabilities in the future.

Glasgow & Chambers (2012) deliberate between a traditional health research paradigm that promotes the "best" science and degree of flexibility. When flexibility is constrained, very little progress is achieved in primary care, public health, science, policy, or health disparity reduction (Glasgow et al., 2003; Glasgow & Chambers, 2012), as adaptation "ensures maximum implementation, potential sustainability, and long-term health impact" (Bopp et al., 2016, p. 195). Greenhalgh and colleagues (2004) discuss the concept of reinvention. They contend that the easier an innovation is to adapt, refine, or modify, the more likely it will be adopted (Greenhalgh et al., 2004). Common types of adaptation include changes to educational materials, changes to the intended audience, changes to program delivery, addition of new program elements, or deletion of core elements (Carvalho et al., 2013; Rabin, 2016).

Brownson (2015) posits that scientific evidence should be thought of as a starting point only, because all programs will need some level of adaptation or reinvention. Moreover, scientific evidence is limited in terms of context (cultural, local norms, history), concepts of applicability and transferability, and lifestyle changes that are consistent with history or culture (Brownson, 2015). While the majority of research supports interventions that improve quality of care, there is little understanding regarding effective and efficient methods to guide implementation of these interventions in diverse care settings that serve vulnerable populations (Gold et al., 2015).

For example, to make the transition from malaria control to disease elimination, Gosling et al. (2015) cite that, among other important components, effective program management will require adaptation to local circumstances and flexible human resource practices that sustain continuity of the effort. Hansen et al. (2013) state that while

maintaining fidelity during implementation of research-based programs is critical to their success, they do recognize that adaptation can occur within the context of high fidelity and contribute to positive outcomes. They contend that it is not whether an adaptation has occurred that is important but "how that adaptation aligns with the program's goals" (Hansen et al., 2013, p. 347).

How much adaptation can occur before maladaptation occurs is not well defined. For this reason, it is essential to clearly delineate the types of adaptation that do occur in order to begin to understand their effects on program outcomes. Several authors have proposed frameworks to categorize and encompass these different types of adaptation and their rationale, but all have limitations (Hill et al., 2007; Kevany et al., 2012; Moore et al., 2013; Stirman et al., 2013).

Systematic Classification of Adaptation

Similar to this study, Hill et al. (2007), Kevany et al. (2012), Moore et al. (2013), and Stirman et al. (2013) have all attempted to systematically classify adaptation types. Hill and colleagues and Kevany and colleagues focused on a specific intervention. Moore and colleagues state that their results were derived from various programs, but all fall under one umbrella initiative in the state of Pennsylvania. Stirman and colleagues have the most program variety, however their system is derived solely from the literature. My proposed study will draw information from those that actually implement programs similar to the work of Hill, Moore, and Kevany and colleagues, but focus on several different aspects of public health in a broader sense than the work of Stirman et al. In addition, the proposed study is the only study to use concept mapping for this purpose in place of semi-structured interviews or questionnaires.

Hill et al. (2007) focused on a specific youth program that took place exclusively in classrooms, with teachers as the facilitators and implementers and aimed to describe types of, and rationale for, adaptations that occur in a school-based program in the context of fidelity deviation. Hill and colleagues used interviews with 52 trained program facilitators consisting of parent volunteers, teachers, school personnel and administrators, state and local social service agency representatives, and prevention specialists (Hill et al., 2007). A grounded theory analytical approach was then used to code the interview data to identify emergent themes and categories. Hill and colleagues identified 13 categories or types of adaptations (games, activities, videos, time, group process, specific content, random content, changes due to personal experience or personality, resources, translation issues, additional sessions, rewards or prizes, and "other" (Hill et al., 2007, p. 29), in addition to 15 categories of reasons for adaptation. While this work was very comprehensive, the identified adaptation types were specific to only the program under evaluation, such as changes to games, activities, or videos (Hill et al., 2007). Similar to my proposed study, they did derive the adaptations that had occurred from actual program implementer inquiry. However, they did not attempt to develop a broad model of types of adaptations made across multiple programs. They compare their results to those of other *school-based* programs, further limiting generalizability to other evidence-based public health programs. Their results are presented through a lens of fidelity of implementation as the gold standard with adaptation viewed as a negative; facilitators acknowledged that they should not adapt evidence-based programs, but almost always do. Furthermore, Hill and colleagues do not focus on the fact that the identified adaptations may increase fit and program success within each implementation site.

Kevany et al. (2012) focus specifically on global health program adaptation. Project Accept, an HIV prevention program implemented in sub-Saharan Africa and Thailand, was the source of data for their work. Throughout the implementation, community involvement at all levels (district, regional, and national leadership) was key. Community working groups were formed at each intervention site to develop and modify educational and other program information materials. Adaptations mainly occurred during the intervention on a "site-by-site 'learning by doing' basis" (p. 4), making community feedback essential to the process. All suggested adaptations were then pilot tested in the corresponding site before implementing the proposed change. After this process played out at all sites, Kevany and colleagues were able to classify several types of adaptations, based upon interview data from project directors and program staff. They include (1) intervention delivery adaptations, (2) religious adaptations, (3) social, political, and cultural adaptations, (4) epidemiological adaptations, and (5) environmental and infrastructure adaptations. Kevany and colleagues' work is a valuable contribution to the adaptation literature and they incorporate and stress the importance of diplomacy when involved with global health work. However, this study helps to determine if these adaptations are applicable to other global health programs outside of the HIV prevention program setting.

Moore et al. (2013) also proposed a systematic categorization by creating a taxonomy of adaptations that are made in natural settings or local context in order to approach the fidelity-adaptation debate in a more empirical manner, because they recognized that much of the prior discussion has been theoretical. They aimed to describe adaptation types, rationale for adaptations, timing, and effect on program

outcomes. Moore and colleagues gathered data derived from an evidence-based program initiative focused on crime and delinquency prevention in Pennsylvania. Therefore, their sample consisted of one particular initiative disseminated in various EBPs (school-based, community-based, family-focused, or family treatment) (Moore et al., 2013). Two hundred and forty program implementers were asked to complete a web-based survey titled the Annual Survey of Evidence-based Programs; of those, 104 admitted to making adaptations and were subsequently asked to select the type of adaptation that they made and then provide further qualitative description. The survey was designed to collect information on several broad constructs that include sustainability, coalition involvement, implementation, training, fidelity, and local evaluation (Moore et al., 2013). Each qualitative description was coded according to philosophical versus logistical fit, made proactively or reactively, and whether the valence of the adaptation had a positive, neutral, or negative effect on program outcomes (-1; 0; +1) or program effectiveness (Moore et al., 2013). About half (44%) of the respondents did report making at least one adaptation. Their classification scheme consisted of procedures, dosage, content, cultural, and target population categories. Approximately 40% made changes to procedures, dosage, and content; 22% made cultural adaptations, and 12% changed the target population (Moore et al., 2013). Their analysis did not allow for conclusions to be drawn regarding the effect of these adaptations on program effectiveness. However, they did conclude that reactive adaptations may contribute to poor implementation outcomes; therefore, adaptations should be proactively planned. This study focused on any category listed above or new categories that may arise based on what participating implementers feel is relevant to their program.

Thus far, Stirman et al.'s (2013) classification system (Figure 4) is the most comprehensive and generalizable within the context of evidence-based program adaptation exemplified by their ability to reliably apply their coding system across various studies (Cooper et al., 2016). Stirman and colleagues performed a literature search with a snowballing strategy based on modifications that took place to interventions implemented in routine service settings (2013). They included both planned and reactive adaptations. A grounded theory technique was used to code the article data. An iterative process was used to identify emergent themes until theoretical saturation was achieved (Stirman et al., 2013). Their coding process identified changes made to program context, content, and training or evaluation processes; they were also able to identify *who* made the decision to modify a program.

Their work is instrumental in characterizing adaptations to EBPs in novel settings or contexts and provides a means to examine how types of modifications may affect certain outcomes (Stirman et al., 2013). However, three major gaps remain: (1) their work, although stemming from a variety of programs, is focused on programs that take place in routine service settings primarily in the United States, limiting generalizability to circumstances that may arise in LMICs, (2) their classification system is based solely on a review of the literature versus data gathered from implementers with actual experience and insight; and (3) while this classification system is the most broad, about half of the articles reviewed to construct the literature address mental or behavioral health issues, and about one-third specifically stem from the HIV prevention/sexual risk prevention literature. Although their classification is quite comprehensive, it is possible that some

categories may be unaccounted for that could be identified after examining the real-life experience of implementers across the global health program domain.

Classification System Application. Though Hill et al. (2007) and Moore et al.'s (2013) work has been cited quite frequently, 100 and 53 times, respectively, according to Google Scholar, their classification systems have not been applied elsewhere. Kevany and colleagues used a similar method to Hill, Moore and colleagues to identify adaptation types and applied the technique to malaria prevention programs in Afghanistan (Kevany et al., 2014). Again, community involvement was key and data was collected through document review, interviews, staff correspondence, and site visits. This time, adaptations were grouped into three broad types (intervention specific, logistical, and environmental) with several subcategories aligned with their prior work in HIV prevention (2012). The Afghanistan study in particular stressed the importance of allowing for adaptations to occur to enable successful service delivery (Kevany et al., 2014).

While Stirman et al.'s model was developed from literature spanning various disciplines, it has only been tested by Stirman and colleagues in a mental health setting (Stirman et al., 2013b) to identify modifications to an evidence-based cognitive therapy training program. Twenty-seven clinicians were interviewed, and the coding system (Stirman et al., 2013) was applied to the interview responses. Of 27 interviews, 175 modifications were identified, with all clinicians reporting at least one modification (Stirman, 2013b). While contextual modifications were rare in this sample, the most common content modification found was tailoring the intervention to meet the needs of the client by making changes to language, terminology, or structure (Stirman et al., 2013b). Because the proposed study is based on a general consensus of implementers

from varied fields, the results may be useful for broad application and may provide global health program implementation guidance in the future.

Types of Adaptation

There are numerous circumstances in which adaptations may occur. The proposed study will focus on adaptations to content and the nature of those changes, context, and training modifications made to better accommodate local staff (Figure 1). Stirman and colleagues' classification system will be used as the framework for this study; however, who makes the adaptations and at what level of delivery are not particularly pertinent to this study as the study sample is derived from local implementers. The highlighted areas in the figure below are the pieces of the framework that will be the focus of the proposed study. In addition to the categories outlined by Stirman et al. (2013), several other forms of adaptation (e.g., diplomatic (Kevany et al. 2012a; Kevany et al., 2012b; Kevany et al., 2014), economic (Sussman et al., 2008b; Kaltman et al., 2011; Kevany et al., 2012b), and social, historical and epidemiological variables (Sussman et al., 2008b)) are suggested in the literature as well as various types of cultural adaptation (surface structure and deep structure), which have all been incorporated into the guiding framework for this study (Figure 4). Figure 5 provides an organizational overview of the following review of adaptation types found in the literature. Although Stirman et al.'s model is used here as a guide, it is important to note that the proposed study is a concept analysis that is exploratory in nature. Therefore, the study results were derived from the experiences of participants and data was not necessarily constrained by a particular model or framework.

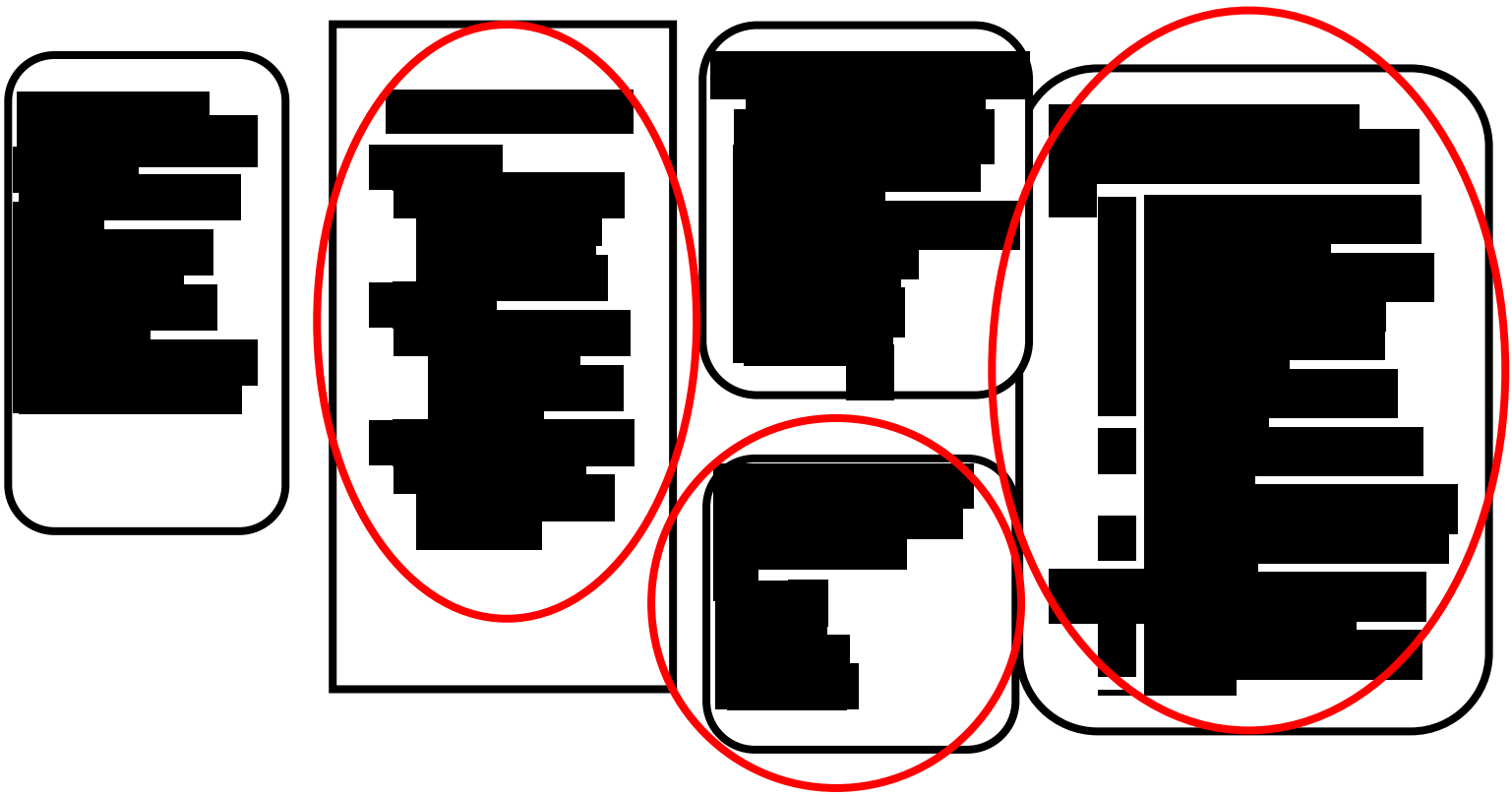


Figure 4. Stirman and colleagues' system of classifying modifications to evidence-based programs (Stirman et al., 2013, p. 6): areas of focus for this study

The three main categories in Figure 5 (content, context, and training methods) are derived from Stirman and colleagues' "what" is modified framework category (Figure 4). The nature of content modifications and subsequent subcategories stem from their "nature of content modifications" piece of the framework. Context modifications are taken directly from their context modifications category, which states that modifications are made to format, setting, and personnel and population. Other subcategories included in Figure 5

are described in the literature below and have been incorporated into Stirman and colleagues' broader classification system.

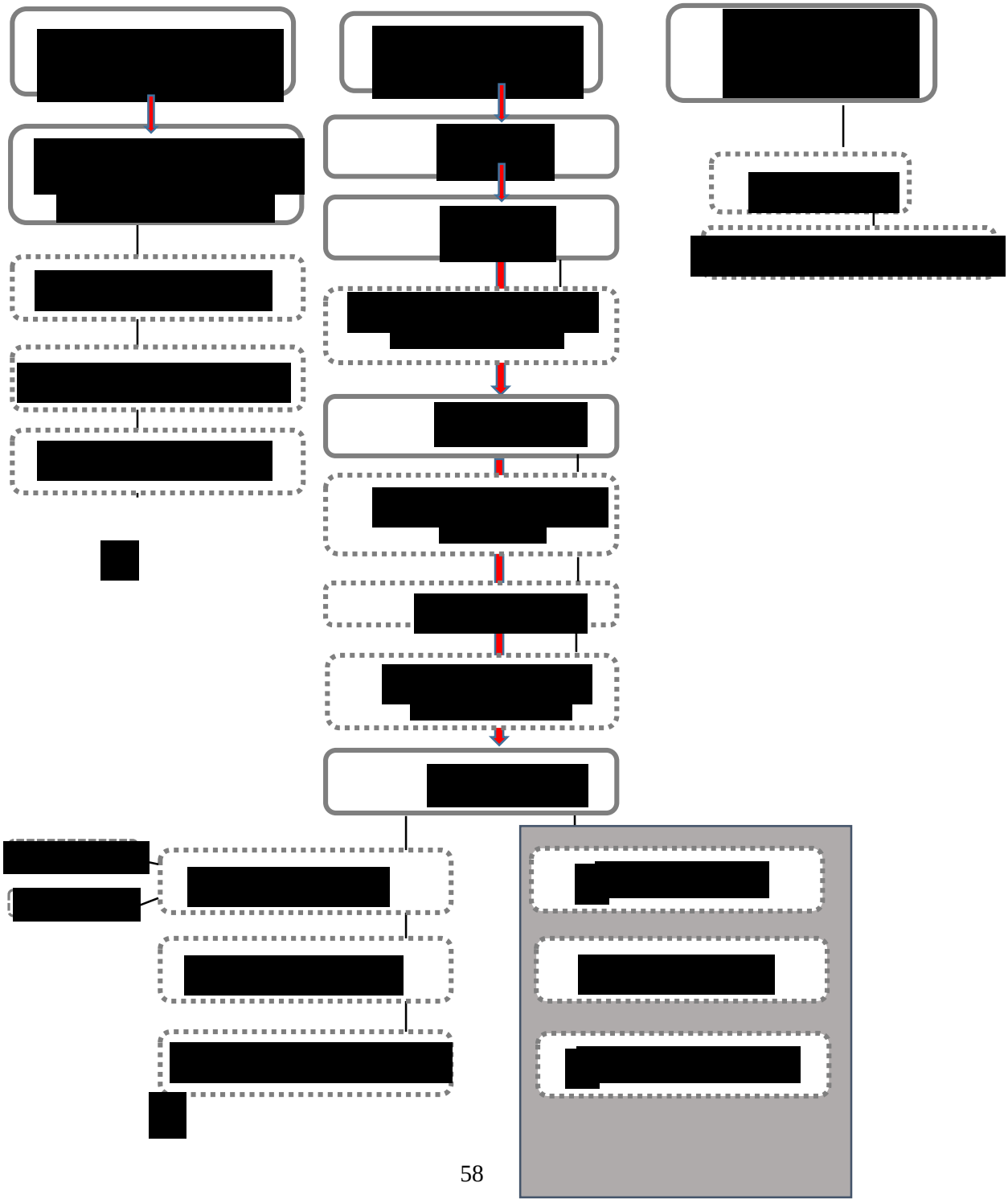


Figure 5. Organizational overview of adaptation types

Content

Content refers to the actual program itself or changes that will impact delivery of the program material (Stirman et al., 2013). It is anticipated that information about content will be gathered in this study as program implementers will be asked to describe changes that they have seen made that have increased the success of their respective program(s).

Nature of Content Modifications. The nature of content modifications encompasses many potential adaptations (refer to Figure 4 for the full list). They include adding or deleting elements, or modifying existing program components (Stirman et al., 2013). For example, while evidence-based infection prevention and control practices are widely accepted, more streamlined approaches are needed for successful implementation in LMICs due to limited resources and inadequate infrastructure (Sastry et al., 2017). Therefore, the 17th International Congress on Infectious Disease workshop (Sastry et al., 2017) developed an implementation strategy applicable to many LMICs. Adaptations include simplification of educational resources that are available free of charge. In addition, an infection control guide that is published every four years will make the following adaptations in the next iteration: pictorial representation of concepts in the infection control guide; content will be simplified to convey recommendations more

clearly; assessments and checklists have been added; and the guide will be translated into regional languages (Sastry et al., 2017).

Addition of components. During a teen pregnancy prevention program, course material covering other sexually transmitted infections and reproductive anatomy was added to existing coursework focused primarily on HIV prevention; this was found to support and strengthen participant learning and broaden the population served (Kelsey & Layzer, 2014). In Botswana, national guidelines for non-communicable disease (NCD) treatment was lacking components suggested in the literature. Therefore, breast cancer screening, other NCD screening, and screening and educational components for motor vehicle accident-associated death and injury, alcohol and tobacco use, and intimate partner violence were added to the guidelines (Davis et al., 2013). No conclusive evidence was described in relation to how these adaptations affected program outcome, but the authors believe that the addition of several components will allow health systems to rely on existing HIV infrastructure for NCD management in resource-limited areas. In a school-based substance abuse program, various steps, questions, examples and stories, normative or motivational messages, and new concepts were added to the curriculum by the program implementers (Hansen et al., 2013); those who made a few positive adaptations and were consistent with the types of adaptations made demonstrated a higher percentage of students who remained non-drug users, in contrast to teachers who made many adaptations (rated as positive, negative, or neutral), who had more students fail to remain non-drug users. In a diabetes and obesity program in Mexico, participants were given additional supplies, such as a culturally appropriate recipe book and personalized weight chart (Ruggiero et al., 2011). Their study demonstrated improved anthropometric

and behavioral outcomes in relation to baseline measurements; in Argentina, participants were provided an at-home blood pressure monitor to prevent cardiovascular disease (Rubinstein et al., 2015). Through their cluster randomized control trial, Rubinstein and colleagues demonstrated that these component additions, along with other adaptations such as task shifting, to simplify service delivery can decrease organizational and structural barriers, improve patient outcomes, and increase cost-effectiveness. Other components such as the addition of information, resources, rewards, and prizes are also frequently cited (Cohen et al., 2008; Cooper et al., 2016; Lara et al., 2011; Miller-Day et al., 2013; Moore et al., 2013; Stirman et al., 2013; Veniegas et al., 2009).

Component modification. Modification of program elements can include change in delivery styles to incorporate a format or process that is perceived to be better (Cooper et al., 2016); methodological changes (Hansen et al., 2013); or changes to the content (Hansen et al., 2013). For example, in Botswana, the majority of the population already has access to clean water, so diarrheal disease prevention methodology shifted instead to safe water storage (Davis et al., 2013). In a school-based substance use prevention program, teachers made changes to the message content, program structure and method, and instructions (Hansen et al., 2013).

In the Thinking Healthy Programme, a mother-to-mother program in India and Pakistan, Atif et al. (2017) cited several content modifications including: emphasis on behavior activation versus cognitive restructuring; standardization of health messages (to be integrated with messages already delivered by lay health workers); use of culturally appropriate illustrations; and simplification of structure and language (Atif et al., 2017), like replacing written forms with feedback discussions (Kevany et al., 2012b). This

collaborative qualitative study demonstrated that peers can be successfully used to treat perinatal depression and have potential to help treat other mental health conditions (Atif et al., 2017). Content changes made in Mexico and South Africa during a parenting intervention include modifications to metaphors, program goals, and program methods (Mejia et al., 2017) demonstrated through the authors' presentation of three case examples. They found that cultural adaptation approaches can lead to more effective parenting methods that are well received by diverse populations (2017).

Deletion of components. Deletion of components can occur due to timing or scheduling (Atif et al., 2017), which often occurs with curriculum-based programs (Hansen et al., 2013). Content should also be eliminated that could be perceived to be "inflammatory, ideological, or propagandist" (Kevany et al., 2014, p.42); components that conflict with community, cultural, behavioral, or religious norms may also be deleted (Kevany et al., 2014). For example, midweek calls put in place during a parenting intervention were later deleted because they were seen as intrusive (Mejia et al., 2017); this type of deletion can help to retain participants. Additionally, modification or deletion of components may occur in a contextual way; examples are presented throughout the following sections. At times adaptation comes at the cost of maintaining program effectiveness, quality, and comprehensiveness; failure often results if program goals are in contrast to the host organizations' (Stirman et al., 2012).

Context

Context refers to the overall way that the treatment is delivered and includes program format, the implementation setting, the personnel employed to implement or deliver the program material, and the population for which the program is intended

(Stirman et al., 2013). Program success is "dependent on expert and intimate knowledge of the communities themselves in both the design and implementation phases" (Abrahams-Gessel et al., 2015, p. 53). Program context is often adapted to fit the local context, such as changing an American baseball player to a rugby player or netball player in New Zealand or Denmark (Sussman et al., 2008); removing program incentives that may seem inappropriate in some countries (Schoenwald et al., 2008; Sussman et al., 2008); adding songs or prayers to the beginning of training and educational sessions (Sussman et al., 2008); or incorporating local cultural values or metaphors (Mejia et al., 2017). Changes to program format, modifications to fit the local setting, and changes to program personnel are often performed to adapt to local context.

Format. Format changes may include, but are not limited to, religious adaptations, social, political, and cultural adaptations, technological adaptations, or program delivery methods. In some locations, it is especially important to be mindful of content delivery in a religious context (Kevany et al., 2014). Religious adaptations include the involvement of religious leaders to gain support and promote participation, divide program activities by gender if warranted, and suspension of services or program sessions during religious holidays (Kevany et al., 2012b).

Social, political, and cultural adaptations include using pubs and community centers that are highly frequented as targeted intervention sites, ensuring that health and project terminology are congruent with local dialects, and incorporating local or tribal rituals that can be performed during project events (Kevany et al., 2012b). For instance, Tanzanian women are normally discouraged from utilizing services due to cultural norms; therefore, campaigns were targeted at female gathering places like water

boreholes; projects were sometimes renamed; and a "bring a friend" strategy helped increase attendance for those reluctant to participate in services alone (Kevany et al., 2012b). Cultural concessions are sometimes granted, such as small gifts given to conform with cultural norms (Kevany et al., 2012b); certain program sites may require cultural adaptations to accommodate a subpopulation of participants (Kelsey & Layzer, 2014); and appropriate language and appropriate local dialects should be ensured (Kevany et al., 2014). All of these contextual adaptations result in increased participation, retention of participants, and increased acceptance of the program or intervention.

Ippoliti & L'Engle (2017) found that using apps, texts, Facetime®, and Skype options for adolescents helped to increase participation and program reach for HIV, STD, gender-based violence, and sexual and reproductive health interventions in low-resource settings. Through a scoping review of materials and technical briefs from 17 mobile health projects, they found that increasing patient access with technological adaptations helped to improve participant outcomes. One example of improved patient outcomes from their 17 reviewed projects comes from Ethiopia. In Ethiopia, electronic patient vouchers that replaced traditional paper vouchers were sent via mobile phone; 92% of vouchers were redeemed by youths ages 15-29, demonstrating an increase in contraceptive uptake, contraceptive choice, and larger numbers of participants electing to use an intrauterine device as their preferred contraceptive method (Marie Stopes International, 2013 in Ippoliti & L'Engle, 2017). Kelsey & Layzer (2014) also noted that Skype and other technological adaptations were employed to help increase participation during a review of year one data derived from grantee and program documents and reports, and semi-structured telephone interviews during a five-year

federally funded Teen Pregnancy Prevention Replication study. They also noted that program location was modified to give participants the option of sessions at the school versus a community center; duration and number of sessions were changed to fit class schedules; incentives were added to increase participation; and course materials were adapted for younger participants. It is recognized that additional research is needed to adapt adult programs for children and adolescents in LMICs (Murray et al., 2013). During a tripartite randomized control trial to target cardiovascular disease in Argentina, mobile phone use and text communication were used and program messaging was modified to be more clear and consistent (Rubinstein et al., 2015). The evaluation to determine the trial's effect on patient outcomes is currently underway.

Format adaptations made to the Thinking Healthy Program included simplification of the intervention manual content and streamlining delivery processes; usage of materials to display illustrations and key messages which helped facilitate structured sessions; and allowance of looser boundary settings to encourage peers to share their own experiences (Atif et al., 2017).

Format changes can also occur because the existing recommendations are not relevant in LMICs. For example, drowning prevention techniques and safeguards in high-income countries are not usually applicable to LMICs, where young children tend to drown in rural bodies of water versus swimming pools and drownings tend to occur during the peak time of household chores (Hyder et al., 2014). Therefore, drowning interventions were adapted to include the use of playpens or a community daycare during peak chore hours of the day (Hyder et al., 2014); a pre-post, quasi-experimental study is underway to compare drowning rates before and after the proposed interventions.

Sometimes existing local models are used as a starting point to incorporate another evidence-based intervention. An evidence-based primary care program focused on the screening and management of chronic conditions for HIV patients was adapted to fit a local family clinic model in Botswana (Davis et al., 2013). Existing services and their method for non-communicable disease management provided a starting point, as several items were adopted from national country HIV treatment guidelines, including isoniazid prophylaxis for tuberculosis (IPT), cervical cancer screening, and STI management (Davis et al., 2013), which allows patients to gain access to several important services at once.

Additional format changes often occur to fit the logistical or educational needs of a local population during program delivery. In an adapted HIV program, road shows replaced pamphlets due to low levels of literacy (Kevany et al., 2012b), which allows for an increase in community education. In India and Pakistan, local stakeholders were used to explore additional material needed in the intervention content, determine who was best to deliver the intervention, and mitigate logistical issues (Atif et al., 2017). A parenting intervention implemented in Mexico and South Africa also used local facilitators to deliver program material, translate material to Spanish in Mexico, and incorporate the use of culturally relevant metaphors (Mejia et al., 2017). Hall and colleagues (2016) reviewed several manuscripts related to diabetes prevention programs in the United States for different ethnic minority and immigrant groups that made changes due to logistical and cultural purposes. For delivery to African American groups, sessions were conducted in Baptist churches with prayer beginning each session; bilingual facilitators were used for Hispanic sessions as well as traditional diet modifications, reduced written materials, and

increased use of visuals; native Hawaiian and Pacific Islanders required a reduced number of group sessions and additional information demonstrating both the economic benefits of eating healthy and information on effective communication with health care providers; Arab Americans required gender-specific groups, the incorporation of Arab sayings and religious themes, and bilingual facilitators; American Indian and Alaska Native groups incorporated talking circles, indigenous foods, and drumming (Hall et al., 2016). Due to these "ethnic translations" (p. 486), participants attended most sessions, demonstrated a lower incidence of diabetes and large reductions in fasting blood glucose levels, weight, and systolic blood pressure, and reported higher rates of physical activity (2016). Along a similar vein, public education provided during a malaria prevention and treatment intervention was delivered through mosques, local newspaper and radio (Kolaczinski et al., 2005 in Kevany et al., 2014) to increase program exposure.

Setting. Variations to a local setting often necessitate adaptations due to infrastructure, community habit and routine, local norms and customs, or considerations specific to conflict or post-conflict zones. Adaptations are often made in response to local contextual factors such as agency mission, politics, time constraints, funding streams (Collins et al., 2006 in Bowen et al., 2010). In a follow-up study to evaluate the outcomes of the HIV prevention program diffusion by Collins et al., Harshbarger and colleagues (2006) used telephone surveys and semi-structured interviews with those most responsible for implementing the program. Notably, the entire evaluation focuses on fidelity to core components and subsequent adaptations, with no mention of outcomes for the target populations.

Settings are often chosen to be easily accessible to residents, and timing of sessions was determined by group input (Ruggiero et al., 2011), such as schools, community centers, churches, mosques, or places of employment. Logistical adaptations can also include extensive community preparedness, such as meeting with community and religious leaders, gaining support of local health and political stakeholders, and obtaining community input for intervention design and delivery (Kevany et al., 2014) prior to implementation.

An HIV program titled Project Accept was adapted and evaluated in several different countries. In Zimbabwe, the intervention was modified for workplace delivery to increase access, rescheduled for evenings and weekends in Thailand, and scheduled for weekdays only in Vulindlela, South Africa and Tanzania due to scheduling conflicts on weekends (Kevany et al., 2012b). In addition, changes had to be made to an equipment storage location due to the rural setting and long travel times in certain areas (Kevany et al., 2012b). Sussman and colleagues (2008) note that cultural changes may need to be enforced by more formalized social control, such as limiting negative consequences of alcohol use by closing bars and dance clubs earlier in Spain, where such establishments are commonly open all night.

In some instances, evidence-based programs are adapted to meet the needs of the clinical staff's current workflow (VanDevanter et al., 2017) or to fit within the constructs of the local clinic environment (Kaltman et al., 2011), such as during the adaptation of a tobacco prevention program in Vietnam that was to be delivered by clinic staff (VanDevanter et al., 2017). Through semi-structured qualitative interviews, VanDevanter and colleagues found that adaptations such as these are helpful when translating a

program from a high-income country to LMICs. Programs pertaining to HIV and CVD are adapted to fit current primary health and acute care infrastructure (Burroughs Pena & Bloomfield, 2015).

Davis and colleagues note that generalized HIV care and treatment programs and broadly applicable HIV "packages" still need to be tailored to specific clinical settings or geographical locations due to variations among disease prevalence, screening sensitivity and specificity, specific therapeutic options, and health systems and provider capabilities (2013, p. 329). This was also found to be true in malaria treatment and prevention programs in Afghanistan.

Adaptations to structure, design, selection, content and delivery were examined by Kevany et al. (2014). They found that a broad range of adaptations were required for successful implementation in local settings: (1) modification of educational materials for rural populations; (2) religious awareness in gender groupings for health educational interventions; (3) recruitment of local staff familiar with languages and customs to ensure quality assurance and service delivery; (4) alignment with diplomatic principles; and (5) amendment to program 'branding' procedures (Kevany et al., 2014).

Diplomatic adaptations in conflict settings. Global health programs require extensive adaptation before implementation in both conflict and post-conflict settings to mitigate implementation failure and to sustain international relations while maintaining diplomacy (Kevany et al., 2014). It is important to maintain clear communication and streamlined messaging with nonsectarian terminology; have a keen awareness of cultural and religious differences; incorporate additional planning, coordination, and security for site visits; swiftly adjust programs in response to local political developments; and ensure

that the program contributes to peacekeeping and nation building (Kevany et al., 2012a). In addition to these, Sussman and colleagues note the importance of considering political variables such as nationalism, patriotism, governmental structure and level of centralization or control, attitudes toward corruption, and governmental involvement in the health care system (2008b) when translating an evidence-based program in the international context.

Personnel. An appropriate and competent health workforce is essential to program success. Limited or unskilled workforce is often the driver for adaptation in LMICs. There is often a lack of training and resources as noted by VanDevanter and colleagues (2017). For example, Atif et al. (2017) adapted The Thinking Healthy Program, an evidence-based psychosocial intervention, for peer-delivery because of limited workforce for mental health, priority often being given to infectious diseases in rural India and Pakistan. Intervention can now be delivered by peers to women suffering from perinatal depression. Using bicultural staff, community health workers, or same ethnicity role models can strengthen program delivery methods (Barrera et al., 2013). In some areas, such as conflict or post-conflict zones, it is essential to recruit only local staff, as international staff can carry a negative connotation (Kevany et al., 2014).

Use of local health care workers. Local community members are often employed as community health workers, lay health workers, or village health workers to deliver an intervention in a culturally, religiously, or locally appropriate way and to overcome low health literacy (Rubinstein et al., 2015), while allowing for program scale-up and expansion. For example, distribution teams were needed to expand responsibility beyond just delivery to educate household members on installation of long-lasting insecticide

nets (LLINs) as well as specific uses and benefits of the LLINs in the context of malaria prevention in Afghanistan. Some community members were not unpacking nets, some thought that they simply reduced number of mosquito bites and were not thinking in the context of malaria prevention (Kevany et al., 2014); local health workers were used to establish separate male and female discussion groups and educate community members on appropriate context (Kevany et al., 2014). Kevany and colleagues found that the incorporation of multiple adaptations allowed for successful implementation measured by an increased uptake of services, improved international diplomatic relations, increased access to extremist populations and insecure settings; they speculate that the adaptation process may potentially improve program effectiveness, accessibility, and cost-effectiveness (2014). In Vietnam, VanDevanter et al. (2017) used the Consolidated Framework for Implementation Research (CFIR) (Damschroder et al., 2009) to explore adaptation of evidence-based guidelines to local practice context pertaining specifically to the Vietnamese public health care delivery system and implementation of tobacco use treatment guidelines. They documented the use of village health workers for referrals and positive village influence (VanDevanter et al., 2017).

Cascade training. Cascade training and supervision is often used due to scarcity of specialists (Atif et al., 2017). Cascade training refers to a training model in which specialists supervise local health care worker supervisors from a distance, who subsequently supervise and monitor the local health care workers; in this way, non-specialists are able to deliver specialized interventions (Zafar et al., 2016). In addition, task shifting/sharing was employed in many projects and is discussed in more detail in the 'Adaptations to Staff or Personnel Training Methods' section below.

Additional personnel considerations. In addition to local health workers, traditional healers or local community members can be used as program implementers to increase program effectiveness, especially in rural areas to ensure that program content is delivered in a locally and culturally acceptable and appropriate way. For example, local implementers can best consider family roles and structure; in Nepal, parents and elders do not discuss sex with adolescents (Pokhrel et al., 2008; Schroeder, 2004; Sussman et al.., 2008). Intervention delivery also needs to accommodate the structure and schedule of local workers and field teams (Kevany et al., 2012b). Sometimes eligibility screening and performance incentive systems need to be developed in response to high staff turnover rates (Kevany et al., 2012b).

Population. Changing the target population for any given program is cited quite frequently (Cohen et al., 2008; Cooper et al., 2016; Lara et al., 2011; Miller-Day et al., 2013; Moore et al., 2013; Stirman et al., 2013; Veniegas et al., 2009), as programs are most often adapted to fit a population for which they were not originally implemented. Various populations may require the consideration of many adaptations due to social, educational, or historical variables. For instance, during implementation of a diabetes and obesity program, Ruggiero and colleagues (2011) designed the program to adapt to the local population by foreseeing and mitigating barriers to participation such as education, literacy levels, language, income, transportation, and lack of medical coverage.

Variables affecting adaptations within a given population. There are a number of variables that cause adaptations to occur. Social variables include behavioral elements, customs, and family structure (Sussman et al., 2008b). Behavioral elements are comprised of the degree of personal space, eye contact, and appropriate facial expressions

(Sussman et al., 2008b). Local customs include holidays, festivals, foods, popular stories and proverbs, and traditional clothing (Sussman et al., 2008b). Family structure pertains to the average age of marriage and number of children; emphasis on individual rights versus the collective is also an important consideration (Sussman et al., 2008b). Educational considerations during program adaptation include existing school system structure, literacy level, and languages spoken (Sussman et al., 2008). Other concerns may include gender or income level and education disparities. Historical aspects of a country that should be taken into account include immigration and emigration and primary ethnic groups (Sussman et al., 2008b). Historical trauma is also a very important factor. These variables do lie within the greater context of cultural adaptations.

Cultural adaptations. Several examples of cultural adaptations have been incorporated in the prior sections. The following summarizes and adds to the above examples, but is not meant to be all-inclusive: simplifying language, inclusion of culturally relevant language, reducing medical or psychological jargon, promoting greater family involvement, using local metaphors and examples, avoiding diagnostic labels, employing local health care workers, and increasing the use of pictorial representations (Kevany et al., 2012b; Kevany et al., 2014; Kumpfer et al., 2017; Mejia et al., 2017; Murray et al., 2013; Sussman et al., 2008b; Rubinstein et al., 2015; Ruggiero et al., 2011). Within the context of cultural adaptations, there is some distinction in the literature surrounding surface level versus deep structure adaptations. Cultural relevancy can be achieved by focusing on surface structure, observable social and behavioral characteristics of the target population, and deep structure, which involves incorporating core cultural values of the target group to increase message relevance and program

impact (Borrelli, 2011). Surface-structure adaptations refer to "modifications made to the program material or activities to fit specific characteristic of the target population such as language or music" (Mejia et al., 2017, p.631); additional surface-structure changes may include addition of ethnic elements, intervention delivery in group settings, increased hands-on activities, and addition of activities with culturally familiar formats (Barrera et al., 2013). Deep structure adaptations pertain "to more profound cultural, social, or historical factors that may influence the life experiences of the target population" (Mejia et al., 2017, p. 631). Deep structure changes, or content strategies, integrate cultural values, and involve family and social support networks in the intervention (Meier et al., 2010 in Barrera et al., 2013). Through their presentation of three hypothetical case studies, Mejia and colleagues concluded that culturally sensitive adaptations through different approaches resulted in greater participant satisfaction, increased engagement and retention, and more positive effects on "family well-being" (2017, p. 637). In addition to a population's culture, their economy should also be a central consideration during program implementation.

Economic adaptations. It is important to consider the degree of disparities in the country or region of implementation, the average salary and its buying power, local economic changes, and gross national product (Sussman et al., 2008b). It is often necessary to address poverty, hunger, and malnutrition as reasons for nonattendance (Kaltman et al., 2011; Kevany et al., 2012b). Suggested adaptations include provision of tea or meals, incorporation of income generation or skill development classes, collaboration with local organizations or government officials to provide farming inputs, horticultural equipment and training, provision of income-generating equipment such as

chicken coops or crop seeds, food aid, and legal services (Kevany et al., 2012b). Although Kevany and colleagues deemed most adaptations a success, they were unable to establish a "purely causal link between adaptation implementation and such outcomes" (p.9) because of various potential confounding factors such as the stage of intervention implementation, increased community acceptance over time, and broader changes regarding knowledge and attitudes about HIV testing.

Epidemiological adaptations. Significant epidemiological considerations include the average lifespan or social class of the population, the main causes of premature death, justifications for extended quality of life and longevity, the current state of health research and practice, and current popular practices in mental and physical health, prevention, and cessation (Sussman et al., 2008b). Populations identified as high-risk that also demonstrate low service utilization should be targeted; in addition, activities should be tailored to meet the specific needs of the targeted population (Kevany et al., 2012b). For example, youth-friendly activities and curricula should be incorporated into soccer matches or school activities (Kevany et al., 2012b).

Adaptations to Staff or Personnel Training Methods

Adaptations made to training staff are often made by changing type of training or modifying who to include in program training based on local needs and norms. Adaptations to program evaluation, included in Stirman and colleagues' model, will not be discussed here due to the focus on planning and implementation versus program evaluation. Frequent adaptations made with staff include task shifting, cascade training (described above), and modification of training methods.

Task shifting. A frequently used adaptation in global health program implementation is task shifting. Task shifting is a technique used to rationally redistribute tasks from highly qualified health workers to health workers with shorter training and fewer qualifications in order to make more efficient use of the available human resources for health (World Health Organization, 2008, p. 2). In Argentina, task shifting occurred from the physician to the community health worker to increase access to cardiovascular disease prevention care (Rubinstein et al., 2015). VanDevanter et al. (2017) found that task shifting gave village health workers the increased responsibility of more intensive smoking cessation counseling, which alleviated the burden of those providing clinical care. Murray and colleagues (2013) also report the benefits of employing a task sharing/shifting model in Zambia when implementing evidence-based programs targeting child and adolescent health. In addition to the benefits listed above, task shifting can increase access to equitable and high-quality health services and can contribute to effective and sustainable health care delivery (World Health Organization, 2008).

Modification of Training Methods. When the National Heart and Lung Association trained community health workers to provide noninvasive cardiovascular screening in Mexico, Guatemala, and Bangladesh, they found that it was necessary to provide calculators and additional training to ensure the proper calculation of body mass index; additional homework assignments were added and classroom training had to be increased, possibly due to poor study skills; verbal assessments were used in place of written tests because performance was affected by the language of the written assessments (Abrahams-Gessel et al., 2015). Many others cite the necessity for modification of training processes (Cohen et al., 2008; Cooper et al., 2016; Lara et al.,

2011; Miller-Day et al., 2013; Moore et al., 2013; Stirman et al., 2013; Veniegas et al., 2009) and need for increased staff training beyond what was originally planned, or incorporating village health workers into main training sessions to accommodate views of collective efficacy over the individual (VanDevanter et al., 2017).

In summary, there is a very large and wide-ranging body of work surrounding potential adaptations to evidence-based programs. There are several variations of content modifications, including changes to program format, setting, personnel, and target population. The adaptations made when implementing a program with a new population can be diverse and are based on cultural, economic, social, educational, historical, epidemiological, and political factors. Training methods and task shifting or cascade training also comprise a major body of adaptations made. While adaptations were mainly described as helpful, we also know that some types of adaptations, such as those to core elements, or too many adaptations, may be negative. However, there is much to be learned regarding the effects of certain types of adaptations on outcomes.

Remaining Gap in the Literature

Although numerous adaptations that take place during the implementation of evidence-based global health programs have been catalogued in the literature, they are mainly documented in response to one highly specific intervention. Current research is lacking in systematic, comprehensive descriptions of possible adaptations that are broadly applicable to all evidence-based public health programs. The numerous descriptive, theoretical, and empirical studies that exist describing adaptation types often fall short in describing the adaptations' effect on patient or population outcomes. The results of this exploratory study may lay a foundation toward increasingly effective

global health program implementation by providing a conceptual analysis of adaptation types, thereby systemizing adaptation of evidence-based programs that will promote more effective implementation trials.

A systematic assessment of adaptations within a global community context could provide fundamental knowledge about what adaptations occur and could streamline further program planning and implementation efforts by planning and preparing for known adaptations to occur without compromising fidelity. In addition, this study contributes to implementation research by providing distinct and broadly applicable categories that can be linked to sustainable outcomes in the future. Because it is advantageous to do so (Stirman et al., 2013), this study built on prior work by drawing on the experiences of program implementers to determine if the similar adaptation categories exist that may accurately reflect real-world adaptation across the public health spectrum. Guidelines developed from this analysis may be applicable to implementers and researchers in any area of global health, as consensus was reached regarding adaptation types by implementers in various fields.

There are not any studies that have determined if a consensus on adaptation categories can be reached by implementers across the public health spectrum, especially within the context of low-resource populations in LMICs; nor are there widely accepted models based on input from implementers regarding the nature of adaptations made. In addition, there are not studies that have taken into account the degree of importance and the degree of simplicity or difficulty with which certain types of adaptations are made.

Summary

In essence, the provision of adaptation types that can be generalized to the majority of programs implemented in a global health context may further the field of implementation science by providing a mechanism in which deliberate and planned adaptation can occur. Currently, there is a paucity of literature that successfully links types of adaptations to positive outcomes. Guidelines developed from this work will serve to strengthen and facilitate the work of those who focus on translational research. By coming to a consensus across the global health spectrum on adaptation types, researchers can further their knowledge on the truly essential 'core' components versus the many program elements that can be adapted without compromising program effectiveness, clarifying appropriate adaptation mechanisms. By doing so, this foundational work can be built upon in order to link adaptation types with successful and sustainable outcomes — the ultimate goal for the populations we serve.

Chapter 3

Methodology

Introduction

Prior work focused in adaptation stems mainly from literature reviews or highly specified interventions. The purpose of this study was to describe, categorize, and conceptualize adaptations made during implementation of evidence-based public health interventions to demonstrate what adaptations occur, how important adaptations are perceived to be, and how easy or difficult it is to make modifications determined to be necessary by the program implementers. The perspectives of those who implement these interventions in a global health setting were the primary data source.

The purpose of this chapter is to provide an overview of study methods and to clearly delineate the phases of concept mapping. The chapter opens with a review of the study's mixed method research design, which includes a discussion of how the concept mapping approach aligns with the proposed study design. Second, a detailed explanation of the concept mapping phases is provided. Third, data analysis and interpretation methods are proposed, followed by method limitations and a final section dedicated to human subject concerns.

Mixed Methods Research

A key aspect of implementation research is that it focuses on the *users* of research in contrast to research solely for knowledge production (Peters et al., 2013). Mixed

methods are particularly appropriate for implementation research as they provide a means to understand multiple perspectives, various causal pathways, and multiple outcomes (Peters et al., 2013). Although numerous definitions exist, this study used the definition created by the National Institutes of Health's commissioned report on best practices for mixed methods research in the health sciences (Creswell et al., 2011).

> A research approach or methodology focusing on research questions that call for real-life contextual understandings, multi-level perspectives, and cultural influences; employing rigorous quantitative research assessing magnitude and frequency of constructs and rigorous qualitative research exploring the meaning and understanding of constructs; utilizing multiple methods; intentionally integrating or combining these methods to draw on the strengths of each; and framing the investigation within philosophical and theoretical positions (Creswell et al.., 2011, p. 4).

Research Design

This study used a concept mapping design to describe adaptations made to public health interventions by a minimum of 15 implementers who have worked in low- to middle-income countries (LMICs). Data was collected via three asynchronous (30- to 60-minute) online sessions over a period of eight weeks. Data was analyzed in two additional phases by the investigator only.

Concept Mapping

Concept mapping is a type of structured conceptualization used to guide planning or evaluation efforts (Trochim, 1989; Trochim & Kane, 2007) and was initially

developed to aid in the articulation of concepts used in social research and in their translation into operationalizations (Trochim, 1989b). It is a participatory approach that yields a conceptual framework that aids a group in structuring a certain topic or aspect of a topic (Burke et al., 2005). Concept mapping is considered as an integrated mixed method because both qualitative and quantitative components are intricately linked to enable a diverse group of individuals to articulate their ideas while representing them in various quantitatively derived visual results in the form of concept maps, pattern matches, and value plots (Trochim & Kane, 2007).

The concept mapping methodology has several advantages over some other approaches such as focus groups, including systematic integration of group processes with multivariate statistical methods; a graphic framework of ideas that can be used for planning or evaluation purposes; facilitation of input from a wide variety of individuals in geographically diverse settings; providing a platform for a "collaborative, participatory process" (p. 2); and allowing stakeholders and individuals who are invested in the topic to drive the content for both the conceptualization and interpretation processes (Kane & Trochim, 2007). Because concept mapping incorporates various data collection and analysis methods within a structured process, very complex ideas can be explored in a relatively short period of time (Burke et al., 2005).

Rationale for Equal Priority for Qualitative and Quantitative Designs (QUAL + QUAN)

Concept mapping is included in the fully mixed sequential equal status methods design derived from the typology of Leech & Onwuegbuzie (2009 in Cambraia Windsor, 2013). The qualitative and quantitative components are both equally important in the

concept mapping process, therefore this study employed a participatory exploratory sequential (QUAL→ QUAN) design (Andrew & Halcomb, 2007). The participatory component encourages involvement of the target population to inform the research (Fetters et al., 2013), which occurred by using a concept mapping methodology for this study. Although concept mapping differs from a traditional mixed methods approach, there is an exploratory sequential component in that qualitative data was collected first, and then analyzed through sophisticated software using multivariate statistics. This differs from a traditional exploratory sequential design (Fetters et al., 2013) because a separate quantitative data set does not exist.

Sample

Participants were initially a purposive sample of 24 individuals who implemented evidence-based public health programs[1] in LMICs at a local or regional level with "hands-on" implementation experience. For example, national or global program directors who were not involved with direct implementation were not eligible. Twenty-four participants participated in the brainstorming phase, while 17 to 19 participants participated in the subsequent sorting and rating phases. The initial goal was 30 to 40 participants for the initial brainstorming phase and retention of 15 to 20 for the remaining sessions to participate in sorting and rating (all phases described in detail below). According to Trochim (1989), a group of 10 to 40 participants is typical, with 10 participants being the absolute minimal acceptable number. More participants yield a greater amount of information to be used in the analyses, produce greater resolution, and increase clarity of results (Kane & Trochim, 2007). If the sample size increases beyond

40, diminished returns are likely (Kane & Trochim, 2007). It is common to include a large number of participants, even hundreds, for the brainstorming portion of the study.

The inclusion and exclusion criteria for the study participants were as follows:

Inclusion Criteria

- Has implemented an evidence-based public health program in a low- or middle-income country (LMIC) that has required some modification/adaptation within the past four years
- Able to commit to participate in and provide input to three asynchronous phases to generate ideas/statements, sort statements, and provide ratings of importance and ease. Each phase will be open to participants to access for two weeks and will take approximately 30 to 60 minutes per session.
- English proficient

Exclusion Criteria

- Is involved only in a donor role or high-level administration (beyond regional level) (local management is acceptable; personal communication)
- Has implemented EBPs in only high-income countries
- Has not implemented *evidence-based* programs

Evidence-Based Public Health Program Criteria[3]

- Population or community focus (Fineberg, 1990)
- Emphasis on prevention or health promotion (Fineberg, 1990)

[3] Participants will be asked to list interventions from which they base their brainstorming statements, whether that is their current program or past experience. The type of program/intervention will be captured in preliminary descriptive work.

- Program evaluation demonstrated positive outcomes (Cooney et al., 2007) or significant and sustained effects (EPISCenter, 2015)

The screening checklist for inclusion and exclusion criteria may be found in Appendix E.

Sampling method. Purposive sampling was used due to the specific criteria necessary for participants, with waves of exponential discriminative snowball sampling by emailing global health contacts and relying on the primary contacts to then forward the recruitment letter (Appendix D) on to their professional networks. The recruitment email was also circulated on several public and global health listservs.

Methods

Overview

In concept mapping, ideas are exemplified as a picture or map. In order to generate the map, ideas are first generated, then described, followed by a depiction of their interrelationships (Trochim, 1989). Six major steps were followed during the concept mapping process in this study: preparation, generation of statements, structuring of statements, representation of statements, interpretation of maps, and utilization of maps (Figure 6).

In the preparation phase, the session focus was developed, participants were selected, and a session schedule was developed. In the generation phase, the focus prompt will be given to the group and a large set of statements ($n \approx 100$) will be produced through participant brainstorming. During this phase, brainstorming statements were augmented by adaptation types derived from the literature for group consideration during the next phases. In the structuring phase, participants were asked to sort the previously generated statements into logical groupings, assign substantive labels to each cluster, and

rate each grouping on importance and ease of completion. In the representation phase, software analyses (hierarchical cluster analysis (HCA) and multidimensional scaling (MDS)) were conducted and data was converted into concept maps for researcher review. In the interpretation phase, the researcher collectively processed and analyzed the produced maps by assessing cluster domains, evaluating the statements that comprise each cluster, and analyzing the content of the clusters (Burke et al., 2005). The utilization phase is used to determine how the findings best inform the original focal question (Burke et al., 2005).

The software used for this study throughout each phase was CS Global MAX™ developed by Concept Systems Inc. The software allows for synchronous or asynchronous data entry by each participant. This study relied on asynchronous entry; all participants were able to visualize the statements made by each participant, allowing for a virtual brainstorming session. This software was used for all participant interaction, data collection, and data analysis for the duration of the study, except for a minimal amount of descriptive information which was collected in an additional survey described below in the Descriptive Statistics section.

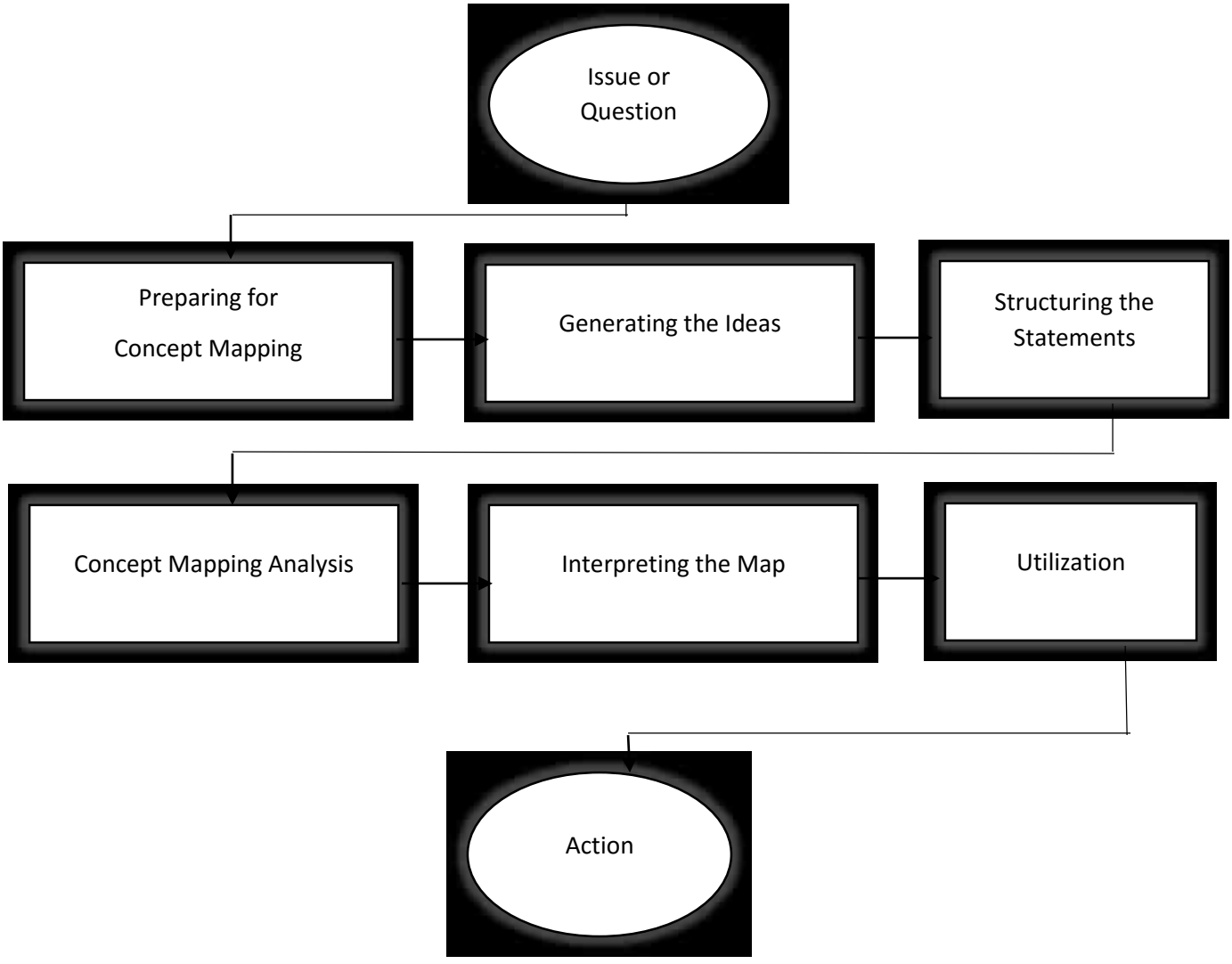


Figure 6. Concept Mapping Process Overview (Trochim & Kane, 2005, p.8)

Phase 1. Preparation

The focus for the concept mapping was operationalized at this phase, participants selected, and a schedule was developed. The proposed schedule is summarized in Table 1. Research protocols, consent forms, and appropriate monetary reimbursement amounts were submitted to and approved by the University of New Mexico's institutional review board prior to commencement of this study.

Table 1

Proposed Study Schedule

Phase	Duration
Phase 1. Preparation *Participant recruitment and selection*	4-12 weeks
Phase 2/Asynchronous Session 1 Generation of idea statements	2 weeks (30-60 minutes/participant)
Phase 3/Asynchronous Session 2 *Structuring of statements: Sorting*	2 weeks (30-60 minutes/participant)
Phase 3/Asynchronous Session 3 *Continued structuring of statements: Rating*	2 weeks (30-60 minutes/participant)
Phases 4 & 5. Analysis & Interpretation	Performed primarily by researcher
Phase 6. Utilization	Not pertinent to this study

Recruitment process. An introductory recruitment letter (Appendix D) was sent to the first wave of identified participants by email. The letter included an overview and purpose of the study, including inclusion and exclusion criteria, and informed the participant of the time required to participate in an asynchronous concept mapping

exercise consisting of three sessions, or the brainstorming session only on a voluntary basis. The letter also requested colleague referrals. Interested participants were then directed to an online survey using Survey Monkey (Appendix E) to verify eligibility based on inclusion/exclusion criteria in a checklist format based on criteria outlined previously. Compensation was offered in the form of a $50 Visa gift card to each participant upon study completion. There was an option for some participants to participate solely in the brainstorming process without commitment to further sessions or monetary compensation. An official enrollment letter informing participants of their eligibility was sent to those who met the inclusion and exclusion criteria (Appendix F). A waiver of written informed consent was sought through and approved by the IRB due to minimal human risk[4].

Phase 2. Generation of Idea Statements

The first asynchronous session took place during this phase and was open for a two--week period. The goal of this step was to produce a large list of statements ($n \approx 125$) pertaining to types of adaptation recalled by participants from their personal experience implementing global health programs. Due to the heterogeneity of programs and inability to know which program each participant is thinking of at a given time (W.M. Trochim, personal communication, July 12, 2017), participants were asked to draw from program adaptation exemplars at any point in their career that have taken place in LMICs versus asking them to isolate only one specific program in their mind. Participants were asked to brainstorm and generate as many statements as possible and contribute any item that they may believe to be relevant to the topic. This stage took each participant approximately 15

[4] Please reference Human Subjects section

minutes to complete. The focus prompt for this study was: *"An example of a type of change I have seen made in order to make a global health program more successful is……."*. The focus prompt was not accompanied by further explanation or definition of "global health program," as the participants will have received previous background material regarding study purpose and participant eligibility. At the end of the first session, **s**tatements were reviewed and edited by the investigator to remove duplicate statements. While statement generation can be limitless, an extremely large number of statements can impose constraints on time spent on data input, unnecessary redundancy, and loss of group energy (Kane & Trochim, 2007). Because more than 100 statements were produced, which is common among remote, large brainstorming sessions, I synthesized and edited similar or redundant statements to reduce the total number of statements to 125, the maximum number allowed by the software. Participant instructions identical to what was displayed on the website for all three asynchronous sessions can be found in Appendix J.

Phase 3. Structuring of Statements

In the asynchronous Session 2 of Phase 3, participants sorted the statements into piles that seem most rational to them, in compliance with instructions (Appendix J) provided to them through the software interface. In Session 3 of Phase 3, participants were asked to rate each statement according to importance and ease (Table 2).

Unstructured pile sorting. The participants from the brainstorming session were asked to cluster the previously generated statements into logical groupings per each individual participant's preference using the software's electronic web-based interface (Appendix J). First, an individual sorting activity captured each participant's organization

and categorization of statements. Each participant received an online version of "index cards" that represented each item that they can move freely into clusters. They were asked to electronically sort each statement into piles that make sense to them. They were directed to place each card into only one pile, refrain from sorting the statements into fewer than three piles, and to avoid placing statements into their own separate piles. These guidelines helped to avoid the issue of several one-item clusters or only a few clusters containing heterogeneous statements. They also assigned their own labels to their own clusters at this point in the process. Sorting was performed in order for participants to demonstrate how they perceived the statements to be related or similar.

Once the statements had been sorted, the participants received instructions for rating (Appendix J). All remaining participants rated each of the generated statements during a third asynchronous session during Phase 3. Sorting and rating comprised the structuring of the conceptual domain (CS Global MAX™, 2017).

Ratings of statements. Participants were asked to rate each statement as described below, with 1 = not important at all, to 5 = essential:

- Please rate on a scale of 1 to 5 how *important* each statement is to making the program more successful for local settings

1 = not achievable/not possible, to 5 = completed with relative ease

- Please rate on a scale of 1 to 5 how easy or difficult each statement would be to complete

Table 2

Rating statement verbal anchors

Importance	Ease
1= not important at all	1= not achievable/not possible

2=slightly important	2= very difficult
3= moderately important	3= somewhat difficult
4=very important	4= little difficulty
5= essential	5= completed with relative ease

Sometimes participants will resist assigning any statement as low priority; therefore, it is recommended to encourage participants to instead make a relative judgment of value (Kane & Trochim, 2007). Therefore, they were directed to scan the list of statements in its entirety to determine which were of highest and lowest priority; then try to use the full range of rating values (e.g., 1-5) when rating the statements (Kane & Trochim, 2007).

Phase 4. Representation of Statements & Concept Mapping Analysis

Phase 2 and Phase 3 comprised all three asynchronous sessions. Once complete, Phase 4 began. During this phase, software analyses (creation of a similarity matrix, MDS and HCA)[5] were conducted and data was converted into concept maps for the investigator's review, analysis, and interpretation. Map production was the primary goal of this step; maps are based on participants' sorting responses, with each data point representing an individual statement (Windsor, 2013). The details of this analysis are presented in the data analysis section.

Additional Measures

These data were used for a general descriptive analysis in order to accurately describe the study sample.

[5] See Data Analysis Section

- What is your highest completed level of education?
    - No schooling completed
    - Primary School
    - Secondary school/High school
    - Trade/technical/vocational training
    - Bachelor's degree
    - Master's degree
    - Professional degree
    - Doctoral degree

- Have you had any formal training (webinars, training institutes, university coursework) in program implementation?
    - Yes
    - No

- Please indicate the primary organization in which you are currently employed or associated:
    - NGO
    - Governmental organization
    - Research firm
    - University
    - Hospital/health care system
    - Other

- Please check all WHO Regions in which you have implemented global health programs in LMICs:
    - African Region
    - Region of the Americas
    - South-East Asia Region
    - European Region
    - Eastern Mediterranean Region
    - Western Pacific Region

- Please list the types of evidence-based programs or interventions that you will be drawing your experiences from regarding adaptation (list as many that apply):

- Please list the WHO region and specific countries (low- to middle-income) in which the above evidence-based programs/interventions were located:[6]

[6] These two questions were used to describe the diversity of the study in general to demonstrate a diverse global health spectrum, to confirm that my sample is not derived entirely of implementers of HIV

Data Analysis

Data Preparation and Entry

CS Global MAX™ software was used in this phase, and all phases, for data entry. Data were entered asynchronously by participants directly into the software interface; ratings were also done directly by participants within the software. The researcher did not need to input any data into the software. Each statement was represented by a number for tracking purposes and each cluster was assigned final labels after the development of the cluster maps.

Descriptive Statistics

CS Global MAX™ does not provide descriptive statistics calculation. I tabulated frequencies based on the descriptive questions. Frequencies were used to determine how many participants were involved in certain types of global health programs and from which countries.

Quantitative Analyses

Figure 7 outlines the data analysis processes. Data entry was not a separate step in this study due to the use of CS Global MAX™ software for all stages. First, a similarity matrix was created from the participant sort data. Second, MDS and HCA was performed. Third, a bridging/anchoring analysis (performed by software) and cluster label analysis led to the selection of final clusters. All maps, go-zone charts, and pattern

---

programs, for example. This information cannot be linked in any way to the CS Global MAX™ responses and will not be used for additional analyses. There is a question regarding WHO region included in the software questions, which was used for further analyses.

matches were prepared for researcher analysis in which interpretation of the data occurred. It is at this point that all research questions were fully answered.

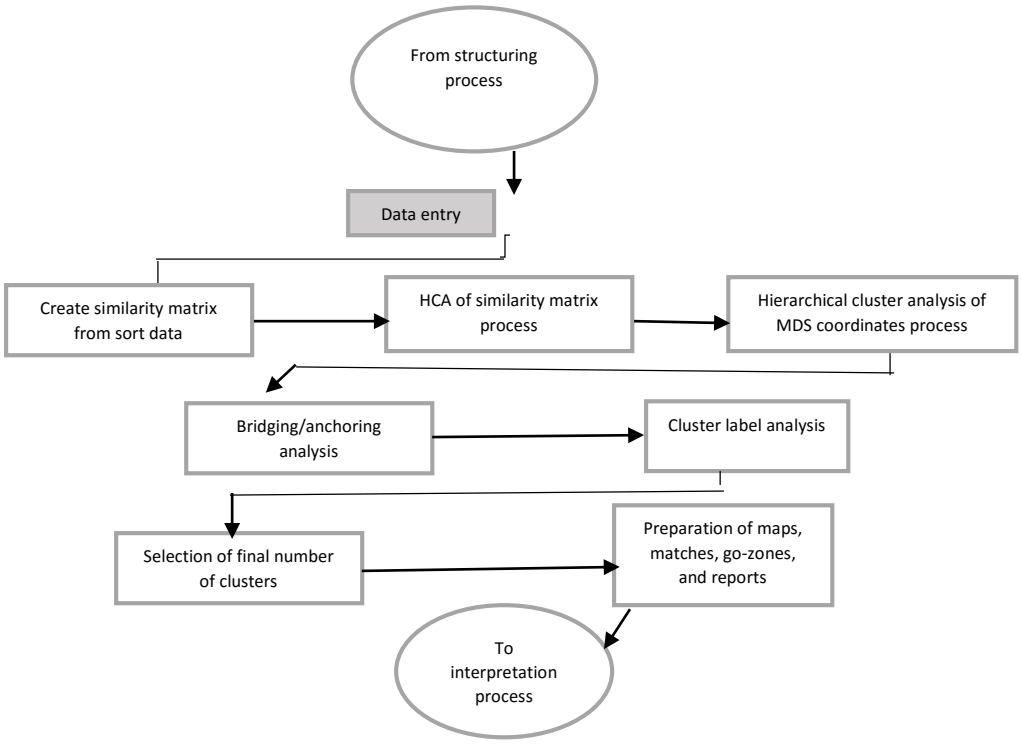


Figure 7. Flowchart of the analysis process (Kane & Trochim, 2007, p. 88)

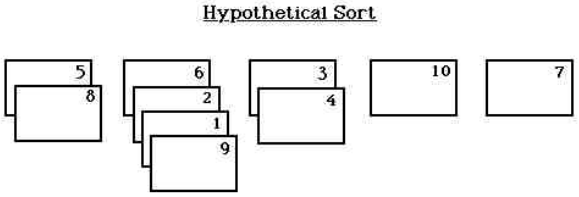
Research Question 1. What are the major categories of adaptation that occur during implementation of an EBP in a LMIC?

This first research question was answered with the formation of the cluster map, which is based on a similarity matrix and point map. To develop the final cluster map, a similarity matrix was created, followed by MDS and HCA. MDS and HCA led to generation of point maps and cluster maps.

Creation of the similarity matrix. At this phase, the investigator had the sort information from each participant that demonstrated their perception of the relationships between statements (Kane & Trochim, 2007). Results were analyzed across participants to estimate the similarity among statements across all participants (Kane & Trochim, 2007). First, the results from each individual sorting was put into a matrix that has as many rows and columns as there are statements (Figure 8). This is a hypothetical example of a participant who grouped 10 statements into 5 piles. The rows and columns are labeled 1-10 to represent each statement. The cells indicate if for any two statements, the sorter put those two statements together, regardless of any other statement relationships (Kane & Trochim, 2007). A "1" indicates that the statements have been sorted together by that particular sorter and a "0" indicates that they were not (Kane & Trochim, 2007).

A stress value is a metric used to determine if the arrangement of ideas in two-dimensional space accurately represents the data in the similarity sort matrix. A lower stress value indicates a better fit between the point map and the similarity matrix, which is the raw sort data (CS Global MAX™, 2017). The recommended stress value for an interpretable map should be less than .39 (Rosas & Kane, 2012), although there is no absolute limit indicating that a map has a low enough stress value to be interpretable (CS

Global MAX™, 2017). Therefore, the stress value was used as descriptive information for this study.



Binary Square Symmetric Similarity Matrix

	1	2	3	4	5	6	7	8	9	10
1	1	1	0	0	0	1	0	0	1	0
2	1	1	0	0	0	1	0	0	1	0
3	0	0	1	1	0	0	0	0	0	0
4	0	0	1	1	0	0	0	0	0	0
5	0	0	0	0	1	0	0	1	0	0
6	1	1	0	0	0	1	0	0	1	0
7	0	0	0	0	0	0	1	0	0	0
8	0	0	0	0	1	0	0	1	0	0
9	1	1	0	0	0	1	0	0	1	0
10	0	0	0	0	0	0	0	0	0	1

Image Source: Trochim, W.M.K. (1989). An introduction to concept mapping for planning and evaluation. *Evaluation and Program Planning, 12* (1), 1-16.

Figure 8. Binary square similarity matrix sort for one participant

Multidimensional scaling & hierarchical cluster analysis. MDS examines similarities of ideas between participants and HCA creates boundaries around statements that share strong degrees of similarity (Burke et al., 2005). Both MDS and HCA were used to answer Research Question 1 through statistical calculations performed by the CS Global MAX™ software without manipulation by the researcher.

MDS was used to identify where each statement falls on the cluster map by reconfiguring numerical data onto a binary matrix as spatial elements (Windsor, 2013). MDS was used to compute a binary (0,1) co-occurrence matrix from the participants' sort

(statement) data. This co-occurrence matrix is large, being comprised of pairings of each statement to every other statement; 1 is entered if the two statements were placed in the same pile, while 0 is entered if the statements were not placed in the same pile. The binary co-occurrence matrices for all participants were summed to yield a similarity matrix, which was constructed based on the number of participants who sorted the same statements into the same piles. The total similarity matrix (T_{NxN}) was analyzed using nonmetric MDS analysis with a two-dimensional solution (Trochim, 1993). The two-dimensional configuration was subsequently used as the input of the hierarchical cluster analysis that relies on Ward's algorithm[7] as the basis for defining a cluster (Trochim, 1993). Using the MDS configuration as input to the cluster analysis forces the cluster analysis to split the MDS configuration into non-overlapping clusters in two-dimensional space. MDS was used to construct the basic point map (Figure 9).

Cluster analysis utilizes data point maps to create cluster maps (Figure 10). HCA is a statistical technique that uses Ward's algorithm to divide the point map into clusters based on the Euclidian distance between points as a result of MDS to group the generated statements into their respective clusters; it is analogous to a pictorial factor analysis (Kane & Trochim, 2007). HCA was used to identify where each cluster falls in relation to other clusters. As is done with exploratory factor analysis, the investigator can either allow the HCA to extract the psychometrically ideal number of clusters or can allow

[7] Ward's hierarchical clustering is the only type of agglomerative ("bottom-up" approach) clustering methods that is based on a classical sum-of-squares criterion, which produce groups that minimize within-group dispersion at each binary fusion. Ward's method also identifies clusters in multivariate Euclidean space, creating a partition in the observation set that is represented by a hierarchy (Murtagh & Legendre, 2014). [See Murtagh & Legendre, 2014, pp. 277-285 for a detailed explanation of Ward's Method].

participants to set or fix the number of clusters. Combination of these methods "provides structure and lends credibility to the data" (Burke et al., 2005, p. 1408).

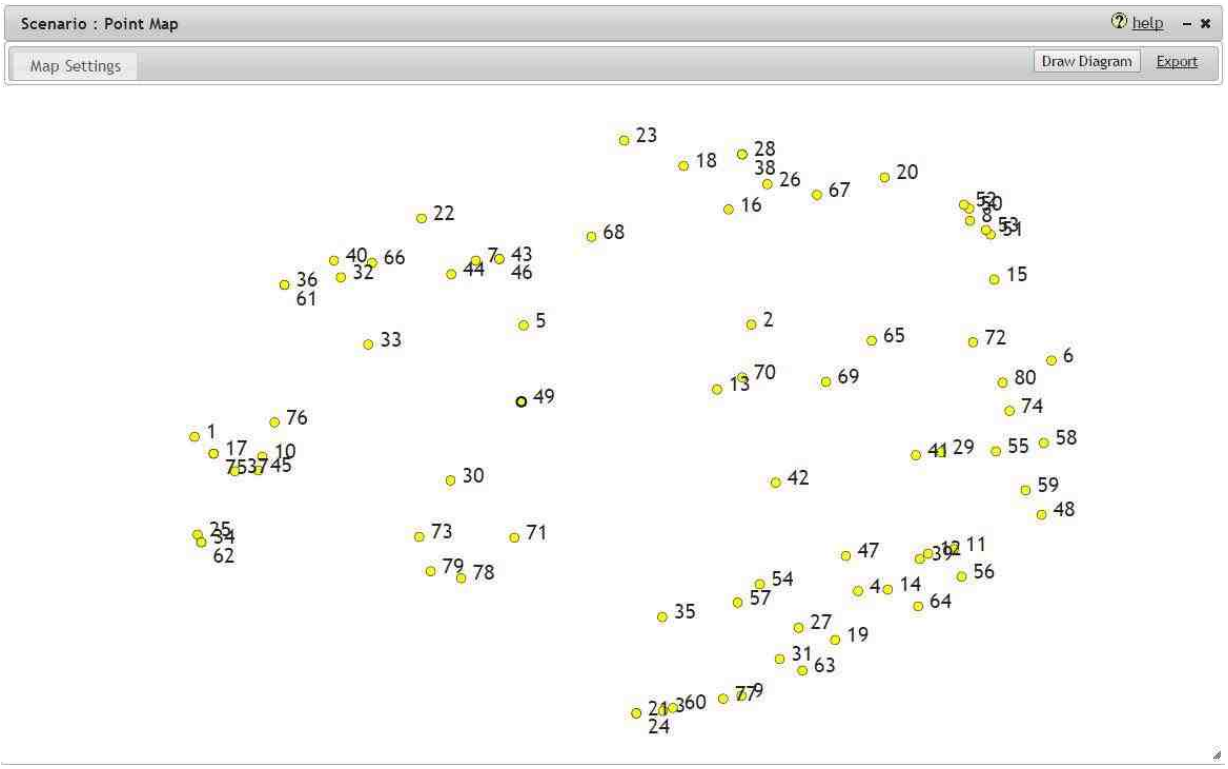


Image Source: CS Global MAX™

Figure 9. Example of a Basic Point Map

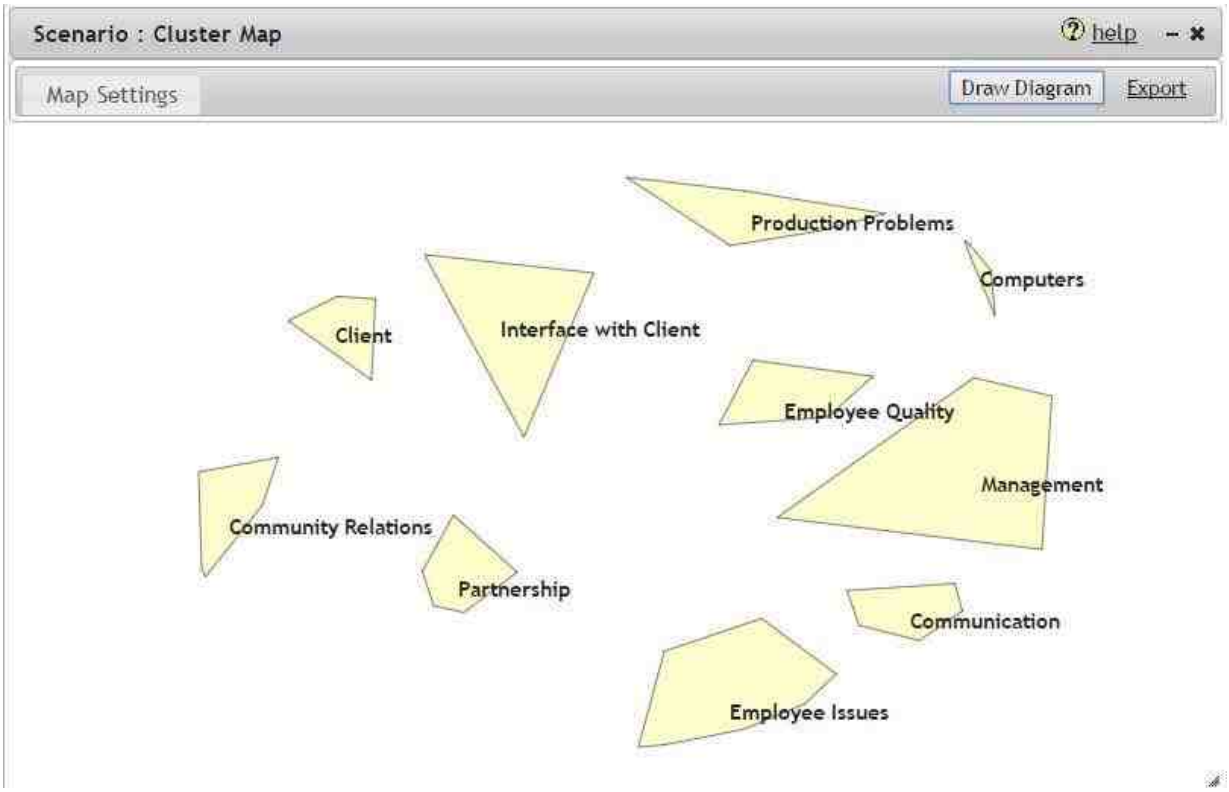


Image Source: CS Global MAX™

Figure10. Example of a Cluster Map

The distances between points have relevant meaning. Statements that are closer together are more similar in meaning, while those that are farther apart are usually more conceptually different (CS Global MAX™, 2017). Each cluster's location on the map also holds meaning. Clusters in the middle of the map may contain ideas that are linked to multiple regions on the map and can act as conceptual bridges (CS Global MAX™, 2017). When participants group some statements together frequently but less often with other statements on the map, clusters will be located toward the edge of the map (CS Global MAX™, 2017).

The analyses used to determine agreement among participants include rating maps, pattern matching (produced by statement rating), and analysis of go-zone plots. Cluster rating maps and pattern matches are averages of averages, each statement average within a cluster is then averaged against individual statement averages within the cluster again to obtain a cluster average; go-zones are statement averages computed by using the individual statement averages within a cluster (CS Global MAX™, 2017). Actual statement and cluster averages were not separately reported; they were calculated and displayed in map format for further analysis. To gauge how implementers viewed the importance of adaptation types and their level of ease or difficulty to achieve in the field, the following four questions were proposed:

Research Question 2. Which categories of adaptation do implementers perceive to be relatively more important to achieve?

Research Question 3. Which categories of adaptation do implementers perceive to be relatively less important to achieve?

Research Question 4. Which categories of adaptation do implementers perceive can be completed with relative ease?

Research Question 5. Which categories of adaptation do implementers perceive to be more difficult to achieve?

Rating Maps. After ratings of importance and ease had been performed by participants, the information produced point rating maps and cluster rating maps. Point *rating* maps display the average ratings for each statement (Figure 11), while cluster *rating* maps show the average ratings for all statements divided by cluster (Kane & Trochim, 2007) (Figure 12).

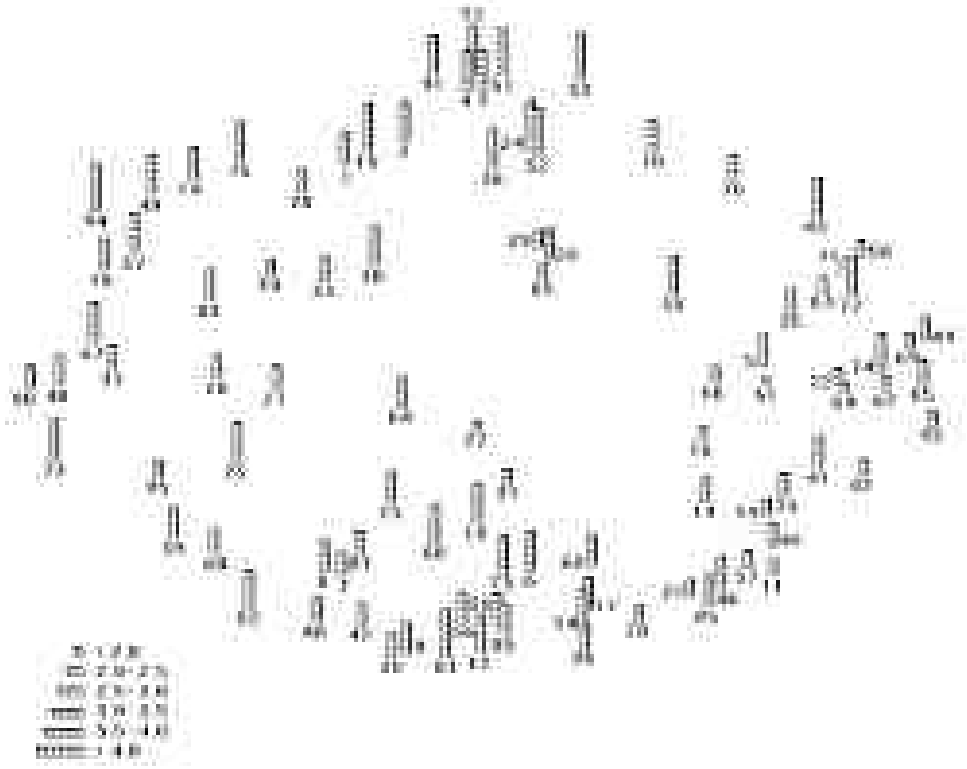


Image Source: Image Source: Trochim, W.M.K. (1989). An introduction to concept mapping for planning and evaluation. *Evaluation and Program Planning, 12* (1), 1-16.

Figure 11. Point rating map

The ratings of each statement were used to calculate the overall cluster rating value, which is shown pictorially as layers in the cluster – the rating corresponds to the number of layers of the cluster. There is no correct, or predetermined, number of clusters. The final number was selected by the investigator alone or with a small advisory group. For this study, I selected the final number of clusters and used my dissertation chair and CS Global MAX™ consultant as an advisory panel. Re-analyzing data to obtain a different number of clusters does not cause statements to move from cluster to cluster (CS Global MAX™, 2017). Clusters are derived from Ward's algorithm, which means

that the two-dimensional space is divided into non-overlapping cluster territories; statements are fixed in space (CS Global MAX™, 2017). Clusters are either

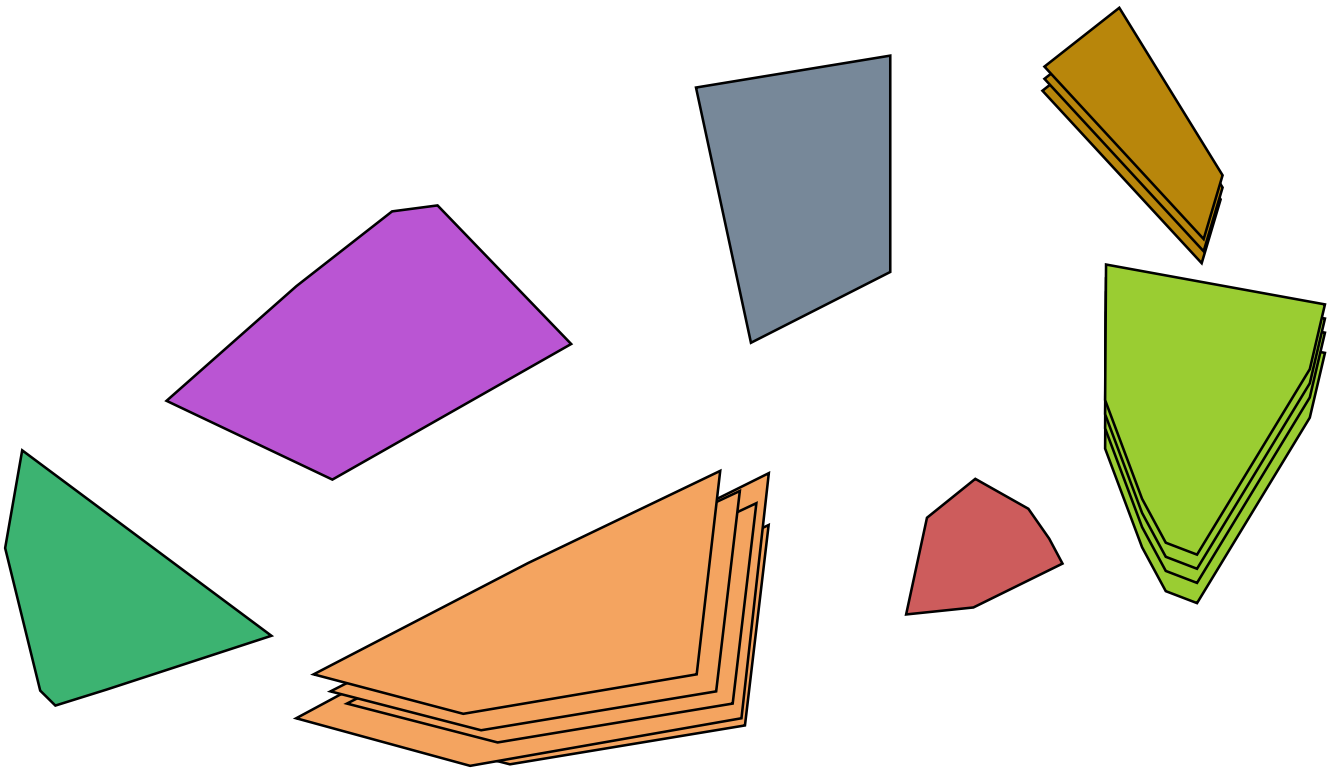


Figure 12. Cluster Rating Map

statistically subdivided to produce more clusters or combined to produce less (CS Global MAX™, 2017).

The final cluster rating map (Figure 12) shows each cluster statement in relation to other statements in the cluster as well as each layered cluster of statements in relation to the other layered clusters. For this study, two cluster rating maps were produced. Each category of adaptation is pictured below with a certain number of layers. These layers visually represent the value placed by raters. Therefore, clusters with more layers were

perceived to be more important. The colors shown in the figure below are insignificant and are for ease of viewing only. These maps could also have been presented in black and white. An additional map was created in the same fashion for ease; the clusters rated as able to be completed with ease have more layers than those perceived to be more difficult to complete.

Research Question 6. What is the correlation between importance and ease for each type of adaptation?

Importance and ease and their correlation for each type of adaptation were determined through the interpretation of pattern matching displays and bivariate plots.

Pattern Matching Displays. Pattern matching (Figure 13) was performed to compare the data equivalency from two cluster rating maps. It was used to compare clusters on the rating variables of relative importance and ease. The pattern match demonstrates how much agreement exists between the two scales by showing the average rating for each cluster (CS Global MAX™, 2017). Pattern matches are ladder graphs. Each statement's average value rating was aggregated to plot the cluster on a scale. The scale is determined by the highest and lowest average cluster ratings for that particular value rating. Pattern matches allow the researcher to compare differences at the *cluster* level (CS Global MAX™, 2017).

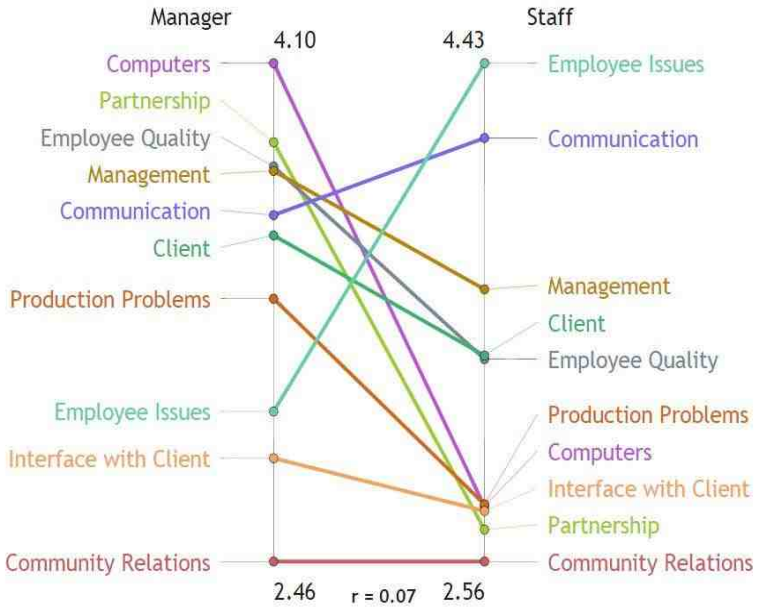


Image Source: CS Global MAX™

Figure 13. Example of a Pattern Matching Display

Bivariate plots. "Go-zones" are bivariate X-Y graphs of ratings that are shown within quadrants (Kane & Trochim, 2007) (Figure 14). The upper right quadrant, or "go-zone," is usually representative of the most actionable statements within each cluster (Kane & Trochim, 2007), e.g., adaptations that are both important and can be completed with ease. While pattern matches show the average cluster rating, go-zones show average *statement* rating (CS Global MAX™, 2017). Go-zones enhance the use of tactical or objective level details within the conceptual constructs that the map and pattern matches provide (CS Global MAX™, 2017). Pearson product-moment correlations were used in both pattern matching and go-zone plots.

Image Source: CS Global MAX™

Figure 14. Go-Zone Plot Example

R-value. The "r" value indicates the amount of predictable alignment between the two average ratings in a pattern match (CS Global MAX™, 2017). The pattern match correlation was calculated at the *cluster* level, while the go-zone correlation indicates agreement at the *statement* level (CS Global MAX™, 2017). The "r" value (-1.00 to +1.00; 0 = no correlation) is indicative of the strength of predictable relationship between the variables (CS Global MAX™, 2017). Positive or negative directionality denotes whether the variables are synchronized or inverse in their relationship (CS Global MAX™, 2017).

Data Interpretation

Phase 5. Interpretation and Integration of Maps

Qualitative Analysis. In the interpretation phase, the investigator processed and qualitatively analyzed the produced maps by assessing cluster domains, evaluating the statements that comprise each cluster, and analyzing the content of the clusters (Burke et al., 2005). I did so by reviewing the list of brainstormed statements, examining a numbered point map that graphically represents how close ideas are to one another, and reviewing the cluster listing and sample statements. Based on this data, cluster labels were assigned to each cluster. These labels were compared to the actual cluster map and point rating map. The point rating map was presented to assess for patterns among the ratings. Evaluation was subsequently performed on the cluster rating maps which display the correlation of relevant importance and ease to each cluster. Go-zones were then reviewed for each cluster. Completing all steps in this phase led to gaining a broad view of the data and their underlying relationships and allowed for interpretation that can drive future planning processes (Kane & Trochim, 2007).

Phase 6. Utilization of Findings

The utilization phase is used to determine how the findings best inform the original focal questions (Burke et al., 2005). The next phase of research beyond this study will aim to test the identified categories separately to determine which may lead to positive or sustainable program outcomes. The initial results will also be used to further our understanding of adaptation categories and provide a framework for implementation scientists and program planners to better incorporate planned adaptation into the implementation process.

Human Subjects

Potential Risks and Steps to Mitigate Risk

Potential risks of participation in this study were loss of confidentiality and participant burden.

Loss of confidentiality. Basic descriptive data[8] about the sample was collected through CS Global MAX™. However, no identifying characteristics such as name, organization name, or program title were recorded in final dissertation chapters or will be recorded in study publications. Participant names, email addresses, and organizations were kept by the researcher in a password protected secure server UNM HSC email account and on an Excel spreadsheet on a password protected UNM owned desktop for participant communication to determine eligibility prior to the study and for group contact purposes for the duration of the study; Concept Systems, Inc. did not have access to any participant information. Identifiable information was subsequently destroyed when data collection and analysis had been completed. No contact with participants or any form of data collection occurred before IRB approval was secured. Research data was stored in password protected CS Global MAX™ software by Concept Systems, Inc.[9], and all security information was thoroughly explained in a Concept Systems, Inc. security document. The software purchased is licensed for single project use only to the researcher. There were no ethical conflicts to report.

Participant burden. Although involving the same participants in subsequent sessions "facilitates the exploration of complex topics, encourages positive group dynamics, and contributes to the collection of rich in-depth data," participant burden

[8] Refer to data analysis section
[9] Please refer to Appendix I for CS Global MAX™ security and privacy information

potentially occurred (Burke et al., 2005). Participation in the study was voluntary. In addition, participant burden may have been alleviated by self-determined pacing of participation and by providing breaks and monetary compensation for the time involved. The asynchronous component allowed participants to be able to contribute during a time that was convenient for them, having one to three weeks per phase to participate. In addition, the provision of very clear and concise instructions, technical assistance, reducing the number of statements before sorting, providing activity training in the form of a sorting and rating webinar (https://youtu.be/xfkSZS-DWxQ), and coordinating activity invites and reminders on a timely basis could also have mitigated participant burden (CS Global MAX™, 2017).

Potential Benefits. There were no direct benefits for participation in this study except for a small monetary compensation. However, participants may have felt a sense of satisfaction from contributing to a more complete understanding of adaptations made to evidence-based public health interventions.

Informed Consent. A waiver of written informed consent was obtained through the IRB due to minimal human risk. All participants were informed of the risks and benefits of participation. Consent was implied by participants' online participation.

Chapter 4

Results

Introduction

Prior work focused in adaptation stems mainly from literature reviews or highly specified interventions. The purpose of this study was to describe, categorize, and conceptualize adaptations made during implementation of evidence-based public health interventions to demonstrate what adaptations occur, how important adaptations are perceived to be, and how easy or difficult it is to make modifications determined to be necessary by the program implementers. The perspectives of those who have implemented these interventions in a global health setting were the primary data source.

The purpose of this chapter is to provide the results of this study that were obtained through the use of concept mapping methodology and CS Global MAX ™ software. The main phases of this study were: (1) the preparation phase, (2) the generation or brainstorming phase, (3) the structuring phase, (4) the presentation phase, and (5) the analysis phase. In the preparation phase, the focus prompt was developed, participants were recruited, and a session schedule was developed. In the generation phase, the focus prompt was given to the group and statements (N = 125) were produced through participant brainstorming and through augmentation of adaptations in the literature. In the structuring phase, participants were asked to group the previously generated statements into logical groupings, assign substantive labels to each cluster, and rate each grouping on importance and ease of completion. In the representation phase, software analyses (hierarchical cluster analysis and multidimensional scaling) were conducted and data were converted into concept maps for review. In the interpretation

phase, I, the principal researcher, independently processed and qualitatively analyzed the produced maps by assessing cluster domains, evaluating the items that comprised each cluster, and analyzing the content of the clusters (Burke et al., 2005) in conjunction with a CS Global MAX ™ expert consultant.

Participant Characteristics

Purposive and subsequent snowball sampling methods were used to recruit participants with prior implementation experience in low- to middle-income countries. A total of 61 respondents completed the Survey Monkey eligibility questionnaire. All 30 (49%) participants who met eligibility requirements were enrolled. Reasons for ineligibility were involvement in program implementation that took place more than four years ago, inability to commit to three asynchronous online phases, lack of proficiency in the English language, experience in high-income countries only, implementation of non-evidence-based programs, or those that are involved only in a donor role or work in high-level administration.

Of the 30 who were eligible, 24 (80%) participants completed the brainstorming phase, 17 (57%) participants completed the sorting phase, 19 (63%) participants completed the first rating regarding ease, while only 17 (57%) completed the second rating regarding importance category (the 17 participants who completed the brainstorming and sorting phases were the same participants who completed both ratings in the final phase). Almost all participants reported that they had implemented programs in more than one country; the characteristics below are based upon those who completed the initial brainstorming phase (Figure 15, Table 3), as this is the phase in which all statements were generated.

The largest category of programs reported by participants were HIV prevention and treatment programs (n =7). However, there was a wide variety of programs from which participants used to draw their experiences for this study (Figure 16), such as TB, Maternal and Child Health, Sanitation, and Disease Detection. The 18 final participants responded to additional questions regarding level of education, associated professional organization, and prior formal implementation training (Table 4). All 18 completed the entire study, except one who completed only the rating for ease and did not rate for importance and another who did not complete the sorting phase. Half of participants (50%) held master's degrees, while 33% held doctoral degrees. Approximately 78% had prior formal implementation training and half of the sample works primarily in a university setting.

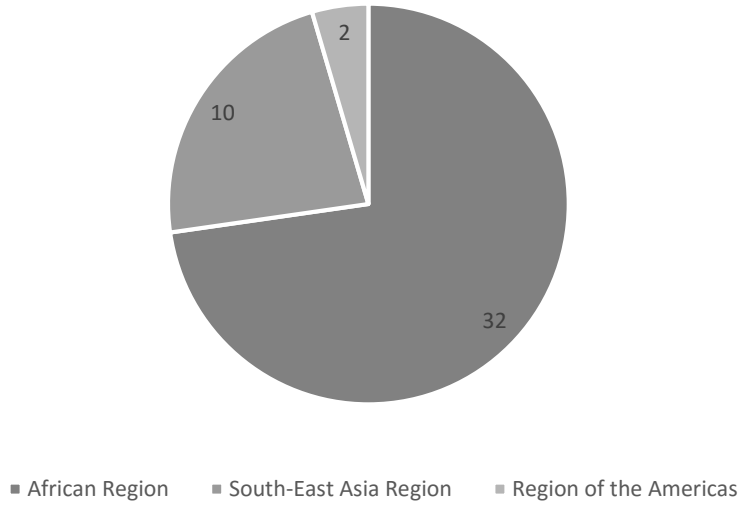


Figure 15. "Participants' (N =24) report of number of program implementation sites by WHO region

Table 3

Individual countries reported by participants (N=24) in which programs were implemented within WHO regions

African Region, n=32		South-East Asia Region, n=10		Region of the Americas, n=2	
Gambia	1	India	1	Dominican	
Zambia	2	Thailand	2	Republic	1
Ethiopia	2	Sri Lanka	4	Paraguay	1
Tanzania	2	Vietnam	1		
Mozambique	1	Nepal	2		
Zimbabwe	3				
South Africa	1				
Rwanda	3				
DR Congo	1				
Benin	1				
Madagascar	1				
Kenya	4				
Malawi	2				
Senegal	1				
Nigeria	1				
Ghana	3				
Uganda	1				
Cameroon	1				
Côte d' Ivoíre	1				

Note. Multiple countries reported for the majority of participants

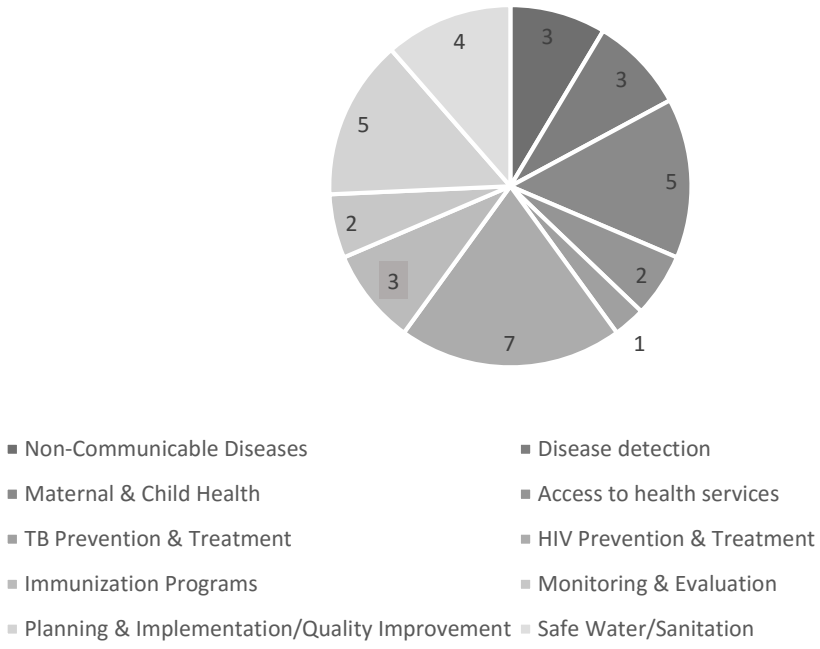


Figure 16. Types of programs (N=35) from which participant (N = 24) experience was drawn

Table 4
Education, Implementation Experience, and Primary Professional Organization (N =18)

Highest level of education		Prior formal implementation training		Primary professional organization	
Bachelor's Degree	1	Yes	14	NGO	2
Master's Degree	9	No	1	Governmental Organization	3
Doctoral Degree	6	Did not respond	3	University	9
Professional Degree	1			Hospital/Health Care System	3
Did not respond	1			Other	1

Major Adaptation Categories That Occur During Implementation

Research Question 1 was: What are the major categories of adaptation that occur during implementation of an EBP in a LMIC? CS Global MAX ™ software was used to analyze the data. The researcher began by entering 20 statements from the literature to

stimulate brainstorming as well as to ensure key concepts from the literature were represented for subsequent sorting and rating by participants. Approximately 145 statements were generated in all (125 generated by participants) during the initial brainstorming session. After removing duplicate statements and statements that did not answer the focus prompt, 125 final statements remained. In the second asynchronous phase, participants sorted each statement into categories that made sense to them, based on similarity of statement content. The only restrictions in the sorting phase were that there could be no piles of one individual statement, nor could there be one pile with all 125 statements. One participant did not complete the sort, most likely due to participant burnout because of difficulty with the English language or participant misunderstanding, which brought the sample to 18 for this phase. Of those that completed the sort, no sorts were eliminated.

This first research question was answered with the formation of the cluster map which is based on a similarity matrix and point map. First, a similarity matrix was created by the software by analyzing results across participants to estimate the similarity among statements across all participants (Kane & Trochim, 2007) (See Chapter 3, Figure 8). The total similarity matrix (T_{NxN}) was analyzed using nonmetric MDS analysis with a two-dimensional solution (Trochim, 1993). Using the MDS configuration as input to the cluster analysis forces the cluster analysis to split the MDS configuration into non-overlapping clusters in two-dimensional space. The MDS configuration is then used as the input for the HCA with Ward's algorithm as the basis for defining a cluster (Trochim et al., 1994, p.768) and contributes to the construction of the basic point map. Both MDS

and HCA were performed by the CS Global MAX™ software without manipulation by the researcher.

The cluster map is based on the basic point map (Figure 17); cluster boundaries are drawn based on the amount of times each statement was sorted together by the participants. MDS and HCA were used to create the cluster boundaries.

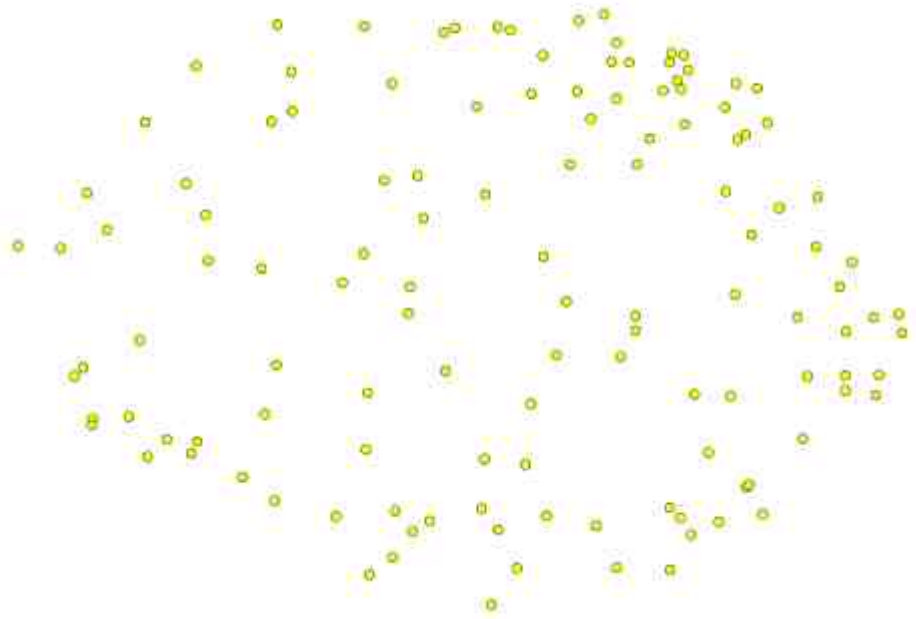


Figure 17. Basic point map

Cluster solutions were qualitatively evaluated for conceptual content similarity within each cluster. There is no mathematical or statistical criterion for choosing the correct number of final clusters. The researcher examined a number of cluster solutions beginning with a four-cluster solution and considered all configurations up to an 18-cluster solution. A judgment was made at each level regarding whether the merger or division of clusters was substantively reasonable in addition to the suitability of different cluster solutions (Trochim et al., 1994) that could most appropriately answer the first

research question. A cluster replay map is a feature available through the CS GlobalMAX ™ software that allows the researcher to see how the concept map changes at each level with an increasing or decreasing number of mergers or divisions (Table 5). Cluster solutions below 4 were not evaluated because very broad categories of adaptation were not consistent with the study purpose.

Table 5

Cluster Replay Solutions: From 20 to 4

At Cluster Solution	*Clusters Merged*
19	8, 9
18	4, 5
17	1, 2
16	19, 20
15	10, 11
14	16, 17
13	14, 15
12	12, 13
11	1, 2, 3
10	16, 17, 18
9	7, 8, 9
8	4, 5, 6
7	16, 17, 18, 19, 20
6	12, 13, 14, 15
5	4, 5, 6, 7, 8, 9
4	1, 2, 3, 5, 6, 7, 8, 9

Kruskal's stress value is indicative of the model's "goodness of fit" based on the final representation of participants' data structuring within the original similarity matrix (Petrucci & Quinlan, 2007; Rosas & Kane 2012). The final cluster solution consists of 10 clusters (Figure 18) with a stress value of 0.33; which falls below the recommended upper limit for concept mapping of 0.39 (Sturrock & Rocha, 2000; Rosas & Kane, 2012), indicating the two-dimensional solution in this study was not random or without structure (Rosas & Kane, 2012). Cluster solutions 11-18 separated ideas that were qualitatively

similar in nature, while cluster solutions below 10 began to group distinct concepts into the same cluster. Stress values range between 0 to 1, with a lower value representing a better fit. Stress values under 0.365 are considered acceptable in group concept mapping (Kane & Trochim, 2007).

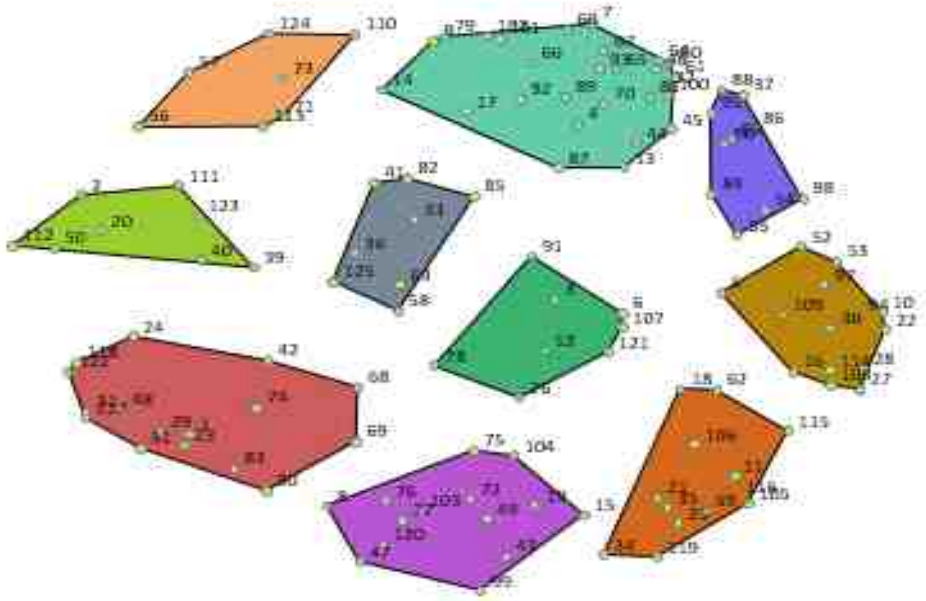


Figure 18. Final 10-cluster solution with statement points and statement numbers

Clusters were first labeled by each individual participant. The researcher then qualitatively evaluated the content of each cluster for a common theme in concordance with the suggested participant labels to create an appropriate label for each individual cluster. The final chosen labels are shown in Figure 19 and are as follows: (1) Culturally Appropriate Communication, (2) Monitoring & Evaluation, (3) Human Resources, (4) Capacity Building, (5) Community Input, (6) Local Expertise, (7) Evidence Transition to

Local Context, (8) Technology and Incentives, (9) Transparency, and (10) Cultural Considerations.

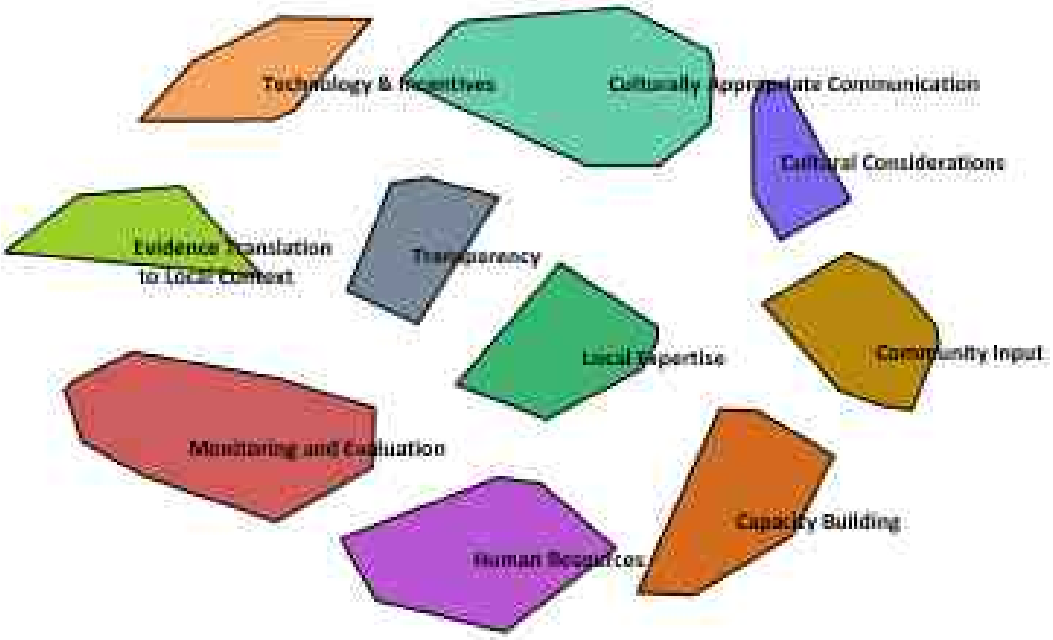


Figure 19. Final 10-cluster solution with adaptation category labels

As explained in Chapter 3, a bridging/anchoring analysis was performed by the software. A statement is referred to as an "anchor" statement when MDS places a statement in a certain location on the map because it was sorted by numerous participants with statements that are immediately next to it, reflecting the content in its vicinity (Kane & Trochim, 2007). At times, a statement is placed on the map in a certain area because it

was sorted with statements somewhat further away on one side of it and also distant on the other side (Kane & Trochim, 2007). The algorithm is forced to place the statement somewhere, so an intermediate position is chosen, creating a link, or bridge, between the two groups of statements (Kane & Trochim, 2007). The bridging values are used to better understand the map for interpretation. The bridging value ranges from 0 to 1 and indicates how often a statement was sorted together with other statements that are close to it on the map or whether it was sorted with statements that are farther away on the map (Concept-Systems, 1999). Statements with lower bridging values can better indicate the meaning of their part of the map than statements with higher bridging values, as higher values usually indicate that a statement is a bridge between different areas on the map (Trochim, 2005).

For example, the statements in the first cluster, 'Culturally Appropriate Communication,' have low bridging values, suggesting that these statements were sorted together quite frequently. However, bridging values on the high end of the spectrum indicate that the statements in the cluster 'Evidence Translation to Local Context' were not often sorted together, possibly because of the somewhat ambiguous nature of this cluster. Table 6 summarizes bridging values for each statement as well as an average overall bridging value for each cluster. Statement numbers have no significance other than the order they were entered into the software during the brainstorming session.

Table 6

Final Cluster Solution with Statements by Cluster and Bridging Values

Cluster Name Value *(Statement Number) Statement Value*	*Average Cluster Bridging* *Statement Bridging Value*
Culturally Appropriate Communication	0.16
(4) Fitting the program to local time frames	0.17
(7) Using social justice terms….	0.21
(9) Over communicate	0.42
(13) Complete health education in an oral manner	0.18
(14) All vaccinations in primary schools…	0.45
(17) Putting into context global, national, and sub-national agenda…	0.34
(32) Disseminate content in a very easy to understand language…	0.08
(44) Cultural training provided for the program implementers prior to departure	0.22
(45) Providing educational materials with primarily visuals or pictures	0.18
(46) Using local language and context when providing education	0.03
(60) Use of simple, lay language	0.10
(61) Ethiopian illustrations rather than Zimbabwean on health education messages	0.02
(64) Use of languages that are acceptable to local context	0.00
(65) Changes in terminology, branding, and messaging in response to local religious…	0.04
(66) Pictorial representation of concepts in the infection control guide	0.17
(67) Guide translated into regional languages	0.01
(70) Participants were given additional supplies such as culturally appropriate recipe…	0.11
(79) Standardization of health messages	0.36
(80) Use of culturally appropriate illustrations	0.01
(81) Simplification of structure and language	0.04
(87) Adding songs or prayers to the beginning of training and educational sessions	0.21
(89) Divide program activities by gender	0.21
(92) Road shows replaced pamphlets	0.15
(93) Translated materials into Spanish	0.06
(100) Use local publications for public program awareness	0.13
(101) Use local radio for public program awareness	0.26
(102) Use posters for public program awareness	0.20
Monitoring and Evaluation	0.41
(1) Narrowing the scope of the project	0.48
(23) Iterating/prototyping of concepts and activities based on frequent feedback	0.46
(24) More focus on data visualization and dashboards to easily and quickly interpret…	0.56
(29) Checking validity/need of certain tasks	0.43
(30) Mentoring outcome and evaluation team on data management, data visualization…	0.56
(31) Developing and tracking new quality indicators	0.29
(42) Discussion with local staff about record keeping or data collection and agreeing…	0.55
(48) Better monitoring and evaluation of implementation itself…	0.41
(51) Modifying targets based upon baseline findings	0.30
(68) Course material covering other sexually transmitted infections and reproductive…	0.34
(69) Various steps, questions, examples, and stories, normative or motivational…	0.37
(74) Diarrheal disease prevention methodology shifted instead to safe water storage	0.38
(83) Changing program goals	0.40

(117) Increase evaluation and monitoring during implementation	0.24
(118) Rolling out performance measurement exercises across several HIV care and...	0.41
(122) Accurate incident reporting	0.40
Human Resources	0.38
(8) Due to lack of faculty, moving to a concept-based teaching methodology	0.37
(15) Ensure adequate personnel…to enable coordination of public health programmes	0.36
(19) Make decisions to ensure effective program leadership and management	0.40
(43) Increase flexibility of all staff members	0.46
(47) Changing staff when a leader is ineffectual	0.53
(49) Supervision and feedback to implementers	0.45
(72) Task shifting to simplify service delivery	0.29
(75) Teachers made changes to the message content	0.27
(76) Teachers made changes to the program structure and method	0.31
(77) Teachers made changes to instructions	0.31
(99) Students were assigned to 'novice' supervisor who is assigned to expert	0.44
(103) Graduate students in all specialty tracks attend same class	0.43
(104) Concept first discussed and then exemplar case studies address unique pop…	0.32
(120) Task shifting to have nurses clerk patients and handle drug dispensing	0.37
Capacity Building	0.34
(11) Ensure staff/participant understanding of "short term" initiatives early on…	0.39
(18) Increase active participation of target beneficiaries/population	0.31
(21) Professionalism training for staff to increase adoption of program	0.32
(25) Peer mentorship to increase capacity building	0.32
(34) Increased training on new technical skills	0.36
(35) Training of the program implementers before departure, supervision and feedback…	0.32
(59) Additional training for frontline implementers	0.27
(62) End of day whole group briefings/discussions while in country…	0.35
(105) Ensure staff/participant understanding of "short term" risks early on…	0.43
(106) Framing discussion early on to help guide what a program's successful model…	0.38
(115) Creating learning opportunities for target population	0.39
(116) Creating learning opportunities for community health workers	0.33
(119) Training and equipping staff with tools to improve supervision	0.26
Community Input	0.36
(5) Eliminating various components from the program…	0.31
(10) Partner with local government-easy campaign and exposure….	0.42
(16) Expectations from beneficiaries and stakeholders should be pre-planned for…	0.31
(22) Involved community members in the program planning process	0.37
(27) Relationship-building first followed by implementation	0.32
(28) Close collaborations with local organizations and partners	0.34
(38) Development of a health program and empowering them…	0.35
(52) Ensuring all materials are fed back to the community after project end	0.38
(53) Getting community feedback before initiating an intervention	0.40
(94) Ensuring that local partner feedback is considered, and not just shoved aside	0.35
(97) Adding various components to the program, as advised by local partners…	0.33
(108) Government and NGO partnership creates an investment from people…	0.41
(109) Assume your program goal/message is the first time people are hearing about it	0.34
(114) Creating an assessment among target population to determine their needs…	0.40
Local Expertise	0.29
(3) Getting feedback from local partners periodically, even during implementation	0.31
(6) Change scope of project to reflect and follow the recommendations of local partners	0.29
(12) Leverage existing government programs to capitalize on volunteers	0.26

(26) Incorporating human-centered design principles into initial stages of developing…	0.34
(78) Emphasis on behavior activation versus cognitive restructuring	0.28
(91) Drowning interventions were adapted to include the use of playpens or daycare…	0.23
(107) Leverage existing government NGO programs to capitalize on volunteers	0.26
(121) Client education as group and individuals	0.31
Evidence Translation to Local Context	0.70
(2) Include a microfinance component…	1.00
(20) Base scaled-up interventions on pilot studies to increase uptake…	0.75
(39) Involving MOH experts from countries in development of a vaccine…	0.65
(40) Development of a technical working group that includes global experts…	0.73
(50) Requesting additional funding and/or time for project completion	0.64
(111) Use working model(s) and apply to similar PH initiatives (piggyback)	0.63
(112) Allocating budget for over-expectations from stakeholders/target population…	0.61
(123) Ensure statistics/numbers provided are relevant to local context	0.59
Technology & Incentives	0.62
(56) Inclusion of per diem/travel costs for participants for long meetings	0.78
(57) Use of free/open access software rather than proprietary	0.65
(71) Participants were provided an at-home blood pressure monitor…	0.54
(73) Prizes and rewards for participants	0.62
(110) CDs or MP3s that can be "checked out" to patients with health information	0.51
(113) Digital solutions/use of technology to increase capacity building	0.63
(124) Monetary units all in local equivalent	0.64
Transparency	0.37
(33) Keep ideas/concepts simple	0.30
(36) Being honest upfront about what may not work/addressing assumptions…	0.46
(41) Dissemination of guidelines via regional and country-based partners…	0.37
(58) Mapping of political landscape/decision makers ahead of time…	0.38
(63) Requirement of completion of a daily structured journal while in country…	0.35
(82) Replacing written forms with feedback discussions	0.34
(85) Midweek calls put in place during a parenting intervention were later deleted…	0.25
(125) Appreciating the uniqueness of various health care workers and their backgrounds	0.51
Cultural Considerations	0.19
(37) Assuming that an innovation or technology is culturally appropriate	0.11
(54) Bringing in social science expertise/anthropological and sociological knowledge…	0.33
(55) Starting "where they're at" with program maturity…	0.25
(84) Modifying metaphors	0.25
(86) Changing an American baseball player to a rugby player or netball player	0.25
(88) Incorporating local cultural values or metaphors	0.02
(90) Campaigns were targeted at female gathering places like water boreholes	0.14
(95) Fitting the program to local holidays	0.07
(96) Fitting the program to seasonality	0.13
(98) Refraining from using term 'third world' or 'developing countries'…	0.36

Note. Statement numbers have no significance other than the order they were entered into the software during the brainstorming session

Note. The bridging value ranges from 0 to 1 and indicates how often a statement was sorted together with other statements that are close to it on the map or whether it was sorted with statements that are farther away on the map

Final Cluster Solution Overview

Together with bridging values, statements were thematically evaluated both within clusters and qualitatively compared to statements in nearby clusters to ensure optimal conceptual significance.

Cluster 1: Culturally Appropriate Communication. This cluster focuses on using local and regional languages to fit the local context, using pictorial communication when deemed necessary and incorporates consideration for proper mode of communication. Cluster 1 consists of 27 statements (*M* 0.16, *SD* 0.12, *VAR* 0.02). Statements generally conceptualized adaptations to fit a program to the local context by enhancing communication by using local language and metaphors, using visual instead of written communication, culturally appropriate illustrations, dividing educational sessions by gender when appropriate, and incorporating the use of songs or prayers.

Cluster 2: Monitoring and Evaluation. Cluster 2 consists of 16 total statements (*M* 0.41, *SD* 0.09, *VAR* 0.01). Statements grouped in this cluster focused on project scope, data visualization, course material, adding program concepts, program methodology and goals, performance measures, and incident reporting.

Cluster 3: Human Resources. Cluster 3 consists of 14 statements (*M* 0.38, *SD* 0.07, *VAR* 0.01). Human resources consisted of changes to a program to ensure adequate staffing and personnel, promotion of effective leadership and management, supervision and feedback, task shifting to streamline service delivery, and training techniques.

Cluster 4: Capacity Building. The main theme in the capacity building cluster is the focus on health worker and implementer training. Cluster 4 consists of 13 statements (*M* 0.34, *SD* 0.05, *VAR* 0.00). Participant statements included changes to improve target population participation and involvement, peer mentorship, additional training for

frontline implementers, creating learning opportunities for the target population in addition to community health workers, and equipping staff with the necessary tools to promote success.

Cluster 5: Community Input. Cluster 5 consists of 14 statements (*M* 0.36, *SD* 0.04, *VAR* 0.00). Statements in this cluster focus on the importance of adaptations that will strengthen collaborations with local partners, stakeholders, and governments in the planning and beginning stages of program implementation. Specifically, adaptations that increase partnerships with local governments, consulting with respected local leaders to eliminate various components from a program if applicable, involving the target population, and incorporating community feedback.

Cluster 6: Local Expertise. Cluster 6 consists of 8 statements (*M* 0.29, *SD* 0.03, *VAR* 0.00). While this cluster is similar to Community Input, these adaptations stress continued communication throughout the life of the program with continual feedback from local stakeholders and members of the target population. Adaptations in this category focus on obtaining consistent feedback from local partners, changing project scope based on local expertise, leveraging existing programs, and incorporating human-centered design principles into program development.

Cluster 7: Evidence Translation to Local Context. Cluster 7 consists of 8 statements (*M* 0.70, *SD* 0.12, *VAR* 0.02). These adaptations comprise efforts made to improve program infrastructure with local stakeholders while using data that is reasonable and contextual. Adaptations in this category refer to the addition of a microfinance component, basing scale-up interventions on pilot studies, involving experts

from the Ministry of Health, adaptations based on advisement from technical working groups, and the incorporation of current successful public health models.

Cluster 8: Technology and Incentives. Cluster 8 consists of 7 statements (*M* 0.62, *SD* 0.08, *VAR* 0.01). Adaptations in this category focus on provision of travel costs, prizes and/or rewards for participants, use of open access software, CDs or MP3s that can be used by participants to provide health information, and at-home supplies such as blood pressure cuffs.

Cluster 9: Transparency. Cluster 9 has 8 total statements (*M* 0.37, *SD* 0.08, *VAR* 0.01). Adaptations in this cluster focus on simplifying ideas and concepts, honesty in the pre-implementation phase, dissemination of guidelines, replacing written forms with feedback discussions, and ensuring regular communication with stakeholders.

Cluster 10: Cultural Considerations. Cluster 10 consists of 10 statements (*M* 0.19, *SD* 0.11, *VAR* 0.01). While similar to Cluster 1, the statements in this cluster focus on overarching cultural considerations versus the first cluster, which focuses solely on language and communication. This cluster focuses on culturally appropriate technology or innovations, tailoring programs to fit local capacity or capabilities, using culturally appropriate metaphors, and consideration of local holidays, seasons, and sporting events.

Importance & Ease

Rating Maps

Point rating maps and cluster rating maps were created based on participant ratings of importance and ease. The point rating maps display the average ratings for each *statement* (Figures 20 & 22), while cluster rating maps show the average ratings for all statements divided by *cluster* (Kane & Trochim, 2007) (Figures 21 & 23). Rating maps

are depicted with layers to indicate average value, where more layers imply a higher average rating (Kane & Trochim, 2007).

Importance

The following results answer the second and third research questions: (1) Which categories of adaptation do implementers perceive to be relatively more important to achieve? and (2) Which categories of adaptation do implementers perceive to be relatively less important to achieve? The point rating map (Figure 20) depicts an average of how important each statement was rated by participants, with higher layers correlating to increased importance. Importance was rated on a scale of 1-5, with 1 being 'not important at all' and 5 being 'essential.' The cluster rating map (Figure 21) depicts each statement within each cluster, with average importance depicted by the cluster as a whole versus an individual statement rating. Therefore, clusters such as "Culturally Appropriate Communication" and "Community Input" were deemed to be much more important than "Technology & Incentives" or "Human Resources." Table 7 lists each statement's importance rating by cluster in addition to the overall cluster rating.

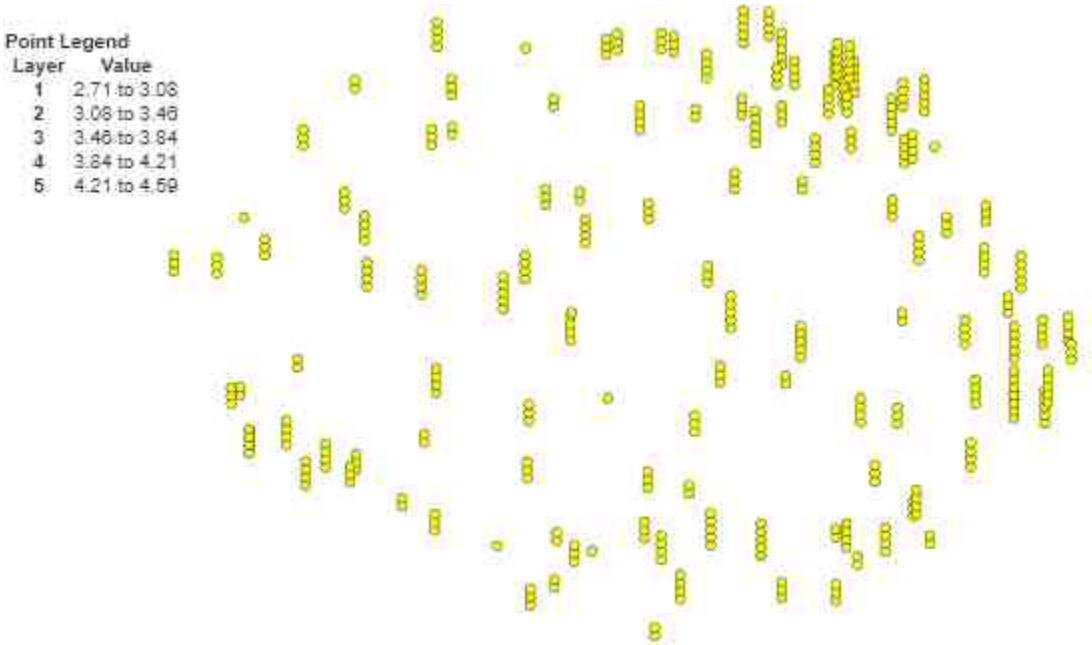


Figure 20. Point rating map, level of importance
Note. Higher values indicate higher levels of importance

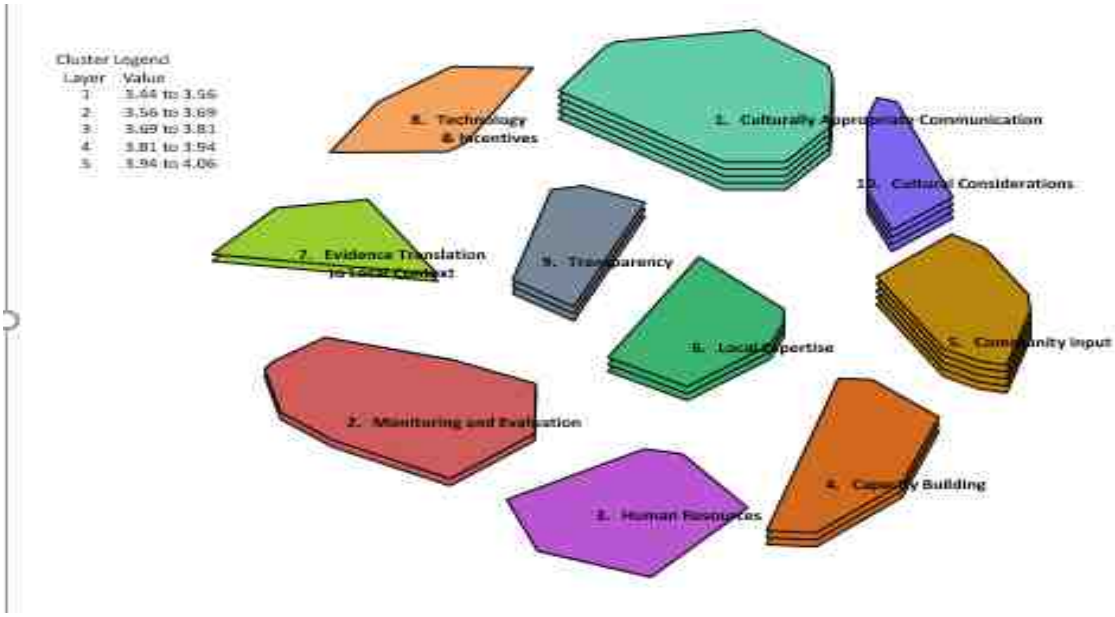


Figure 21. Cluster rating map, level of importance
Note. Higher values indicate higher levels of importance

Table 7

Average Ratings for Importance by Statement and Cluster

Cluster and Statements	Average Rating
Culturally Appropriate Communication	3.94
(46) Using local language and context when providing education	4.59
(60) Use of simple, lay language	4.53
(64) Use of languages that are acceptable to local context	4.53
(32) Disseminate content in a very easy to understand language…	4.53
(67) Guide translated into regional languages	4.47
(4) Fitting the program to local time frames	4.35
(80) Use of culturally appropriate illustrations	4.35
(61) Ethiopian illustrations rather than Zimbabwean on health education messages	4.35
(81) Simplification of structure and language	4.18
(65) Changes in terminology, branding, and messaging in response to local religious…	4.12
(66) Pictorial representation of concepts in the infection control guide	4.12
(44) Cultural training provided for the program implementers prior to departure	3.94
(7) Using social justice terms….	3.88
(17) Putting into context global, national, and sub-national agenda…	3.88
(100) Use local publications for public program awareness	3.82
(101) Use local radio for public program awareness	3.76
(45) Providing educational materials with primarily visuals or pictures	3.76
(9) Over communicate	3.71
(87) Adding songs or prayers to the beginning of training and educational sessions	3.71
(102) Use posters for public program awareness	3.65
(79) Standardization of health messages	3.65
(70) Participants were given additional supplies such as culturally appropriate recipe…	3.59
(93) Translated materials into Spanish	3.50
(89) Divide program activities by gender	3.47
(92) Road shows replaced pamphlets	3.35
(13) Complete health education in an oral manner	3.29
(14) All vaccinations in primary schools…	3.24
Monitoring and Evaluation	3.66
(42) Discussion with local staff about record keeping or data collection and agreeing…	4.12
(29) Checking validity/need of certain tasks	4.00
(48) Better monitoring and evaluation of implementation itself…	4.00
(51) Modifying targets based upon baseline findings	3.94
(117) Increase evaluation and monitoring during implementation	3.94
(69) Various steps, questions, examples, and stories, normative or motivational…	3.75
(122) Accurate incident reporting	3.75
(30) Mentoring outcome and evaluation team on data management, data visualization…	3.65
(23) Iterating/prototyping of concepts and activities based on frequent feedback	3.59
(68) Course material covering other sexually transmitted infections and reproductive…	3.53
(31) Developing and tracking new quality indicators	3.53
(1) Narrowing the scope of the project	3.47
(118) Rolling out performance measurement exercises across several HIV care and...	3.38
(24) More focus on data visualization and dashboards to easily and quickly interpret…	3.35
(74) Diarrheal disease prevention methodology shifted instead to safe water storage	3.29
(83) Changing program goals	3.24
Human Resources	3.56
(15) Ensure adequate personnel…to enable coordination of public health programmes	4.35
(19) Make decisions to ensure effective program leadership and management	4.29

(49) Supervision and feedback to implementers	3.88
(43) Increase flexibility of all staff members	3.88
(77) Teachers made changes to instructions	3.76
(72) Task shifting to simplify service delivery	3.71
(47) Changing staff when a leader is ineffectual	3.59
(75) Teachers made changes to the message content	3.47
(76) Teachers made changes to the program structure and method	3.41
(104) Concept first discussed and then exemplar case studies address unique pop…	3.29
(120) Task shifting to have nurses clerk patients and handle drug dispensing	3.25
(99) Students were assigned to 'novice' supervisor who is assigned to expert	3.24
(103) Graduate students in all specialty tracks attend same class	2.94
(8) Due to lack of faculty, moving to a concept-based teaching methodology	2.71
Capacity Building	3.72
(116) Creating learning opportunities for community health workers	4.13
(18) Increase active participation of target beneficiaries/population	4.12
(115) Creating learning opportunities for target population	4.06
(35) Training of the program implementers before departure, supervision and feedback…	3.88
(59) Additional training for frontline implementers	3.88
(106) Framing discussion early on to help guide what a program's successful model…	3.82
(119) Training and equipping staff with tools to improve supervision	3.81
(34) Increased training on new technical skills	3.71
(11) Ensure staff/participant understanding of "short term" initiatives early on…	3.53
(62) End of day whole group briefings/discussions while in country…	3.47
(25) Peer mentorship to increase capacity building	3.35
(105) Ensure staff/participant understanding of "short term" risks early on…	3.35
(21) Professionalism training for staff to increase adoption of program	3.29
Community Input	4.06
(53) Getting community feedback before initiating an intervention	4.53
(114) Creating an assessment among target population to determine their needs…	4.31
(28) Close collaborations with local organizations and partners	4.29
(27) Relationship-building first followed by implementation	4.24
(38) Development of a health program and empowering them…	4.24
(94) Ensuring that local partner feedback is considered, and not just shoved aside	4.18
(16) Expectations from beneficiaries and stakeholders should be pre-planned for…	4.18
(10) Partner with local government-easy campaign and exposure….	4.18
(52) Ensuring all materials are fed back to the community after project end	4.06
(108) Government and NGO partnership creates an investment from people…	4.00
(109) Assume your program goal/message is the first time people are hearing about it	3.88
(22) Involved community members in the program planning process	3.82
(97) Adding various components to the program, as advised by local partners…	3.75
(5) Eliminating various components from the program…	3.24
Local Expertise	3.69
(3) Getting feedback from local partners periodically, even during implementation	4.47
(107) Leverage existing government NGO programs to capitalize on volunteers	4.00
(6) Change scope of project to reflect and follow the recommendations of local partners	3.76
(12) Leverage existing government programs to capitalize on volunteers	3.65
(26) Incorporating human-centered design principles into initial stages of developing…	3.59
(91) Drowning interventions were adapted to include the use of playpens or daycare…	3.53
(121) Client education as group and individuals	3.44
(78) Emphasis on behavior activation versus cognitive restructuring	3.06

Evidence Translation to Local Context	3.68
(123) Ensure statistics/numbers provided are relevant to local context	4.13
(39) Involving MOH experts from countries in development of a vaccine…	4.12
(40) Development of a technical working group that includes global experts…	3.88
(20) Base scaled-up interventions on pilot studies to increase uptake…	3.76
(112) Allocating budget for over-expectations from stakeholders/target population…	3.75
(111) Use working model(s) and apply to similar PH initiatives (piggyback)	3.59
(50) Requesting additional funding and/or time for project completion	3.47
(2) Include a microfinance component…	2.76
Technology & Incentives	3.44
(124) Monetary units all in local equivalent	4.00
(56) Inclusion of per diem/travel costs for participants for long meetings	3.53
(113) Digital solutions/use of technology to increase capacity building	3.50
(73) Prizes and rewards for participants	3.47
(57) Use of free/open access software rather than proprietary	3.35
(71) Participants were provided an at-home blood pressure monitor…	3.24
(110) CDs or MP3s that can be "checked out" to patients with health information	3.00
Transparency	3.72
(125) Appreciating the uniqueness of various health care workers and their backgrounds	4.44
(36) Being honest upfront about what may not work/addressing assumptions…	4.18
(33) Keep ideas/concepts simple	4.06
(58) Mapping of political landscape/decision makers ahead of time…	4.00
(41) Dissemination of guidelines via regional and country-based partners…	3.47
(85) Midweek calls put in place during a parenting intervention were later deleted…	3.47
(82) Replacing written forms with feedback discussions	3.12
(63) Requirement of completion of a daily structured journal while in country…	3.06
Cultural Considerations	3.92
(37) Assuming that an innovation or technology is culturally appropriate	4.47
(95) Fitting the program to local holidays	4.29
(55) Starting "where they're at" with program maturity…	4.18
(88) Incorporating local cultural values or metaphors	4.18
(90) Campaigns were targeted at female gathering places like water boreholes	4.12
(96) Fitting the program to seasonality	4.00
(98) Refraining from using term 'third world' or 'developing countries'…	3.71
(84) Modifying metaphors	3.71
(54) Bringing in social science expertise/anthropological and sociological knowledge…	3.53
(86) Changing an American baseball player to a rugby player or netball player	3.06

Note. Statement numbers have no significance other than the order they were entered into the software during the brainstorming session
Note. Higher values indicate higher levels of importance

Ease

The fourth and fifth research questions were: (4) Which categories of adaptation do implementers perceive can be completed with relative ease? And (5) Which categories of adaptation do implementers perceive to be more difficult to achieve?

The point rating map (Figure 22) depicts an average of how easy to achieve each statement was rated by participants, with higher layers correlating to increased ease and lower ratings corresponding to increased perceived difficulty. Level of ease was rated on a scale of 1-5, with 1 being 'not achievable/not possible' and 5 being 'completed with relative ease.' The cluster rating map (Figure 23) depicts each statement within each cluster, with average level of ease depicted by the cluster as a whole versus an individual statement rating. Therefore, clusters such as "Culturally Appropriate Communication" and "Community Input" were deemed to be much easier than "Translation to Local Context." Table 8 lists each statement's level of ease rating by cluster in addition to the overall cluster rating.

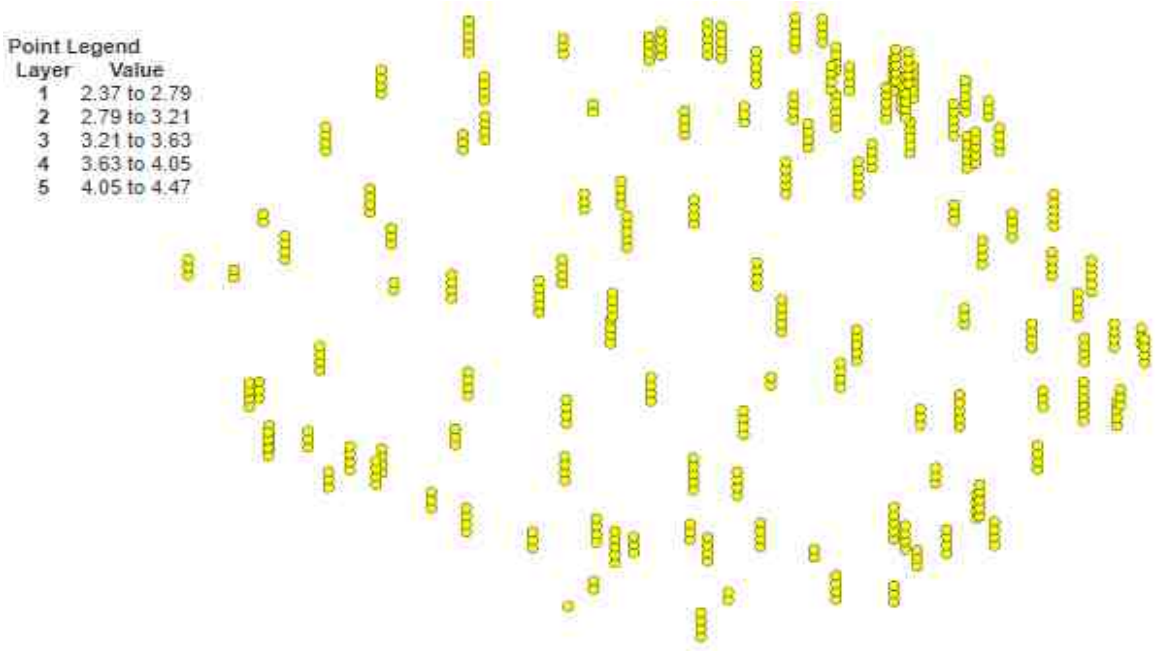


Figure 22. Point rating map, level of ease

Note. Higher values indicate higher levels of ease

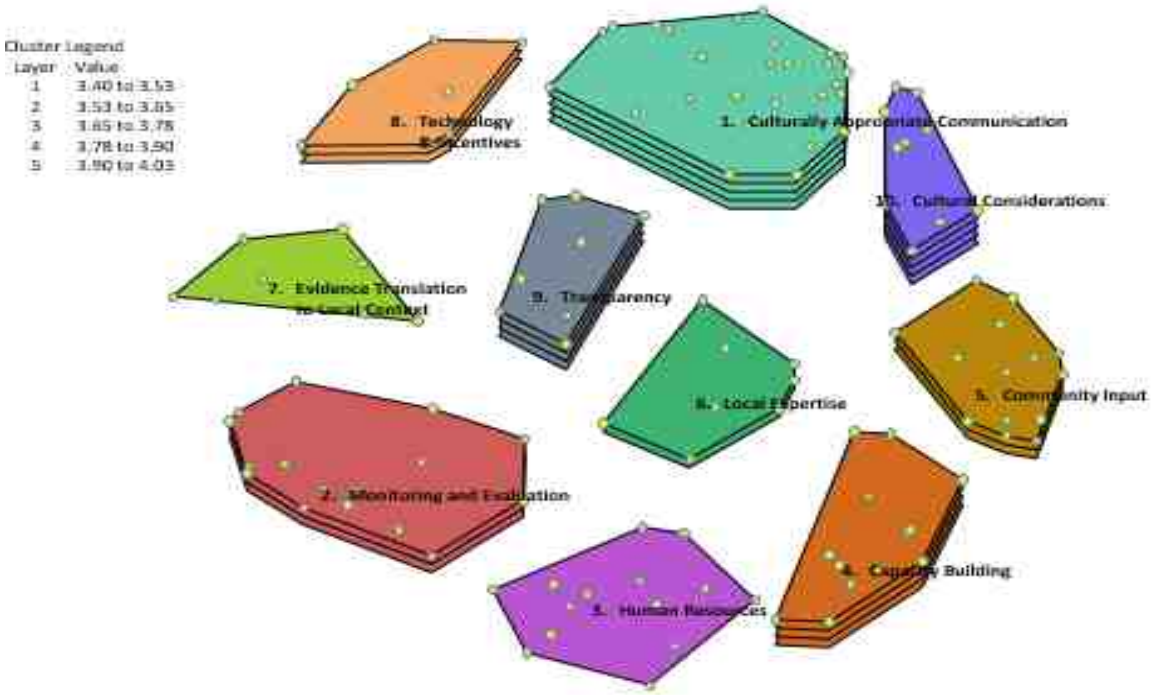


Figure 23. Cluster rating map, level of ease

Note. Higher values indicate higher levels of ease

Table 8

Average Ratings for Ease by Statement and Cluster

Cluster and Statements	Average Rating
Culturally Appropriate Communication	4.03
(87) Adding songs or prayers to the beginning of training and educational sessions	4.47
(60) Use of simple, lay language	4.37
(102) Use posters for public program awareness	4.33
(80) Use of culturally appropriate illustrations	4.28
(61) Ethiopian illustrations rather than Zimbabwean on health education messages	4.26
(32) Disseminate content in a very easy to understand language…	4.26
(13) Complete health education in an oral manner	4.26
(70) Participants were given additional supplies such as culturally appropriate recipe…	4.21
(66) Pictorial representation of concepts in the infection control guide	4.21
(81) Simplification of structure and language	4.21
(45) Providing educational materials with primarily visuals or pictures	4.17
(46) Using local language and context when providing education	4.16
(101) Use local radio for public program awareness	4.11
(64) Use of languages that are acceptable to local context	4.11
(79) Standardization of health messages	4.00
(100) Use local publications for public program awareness	3.95
(44) Cultural training provided for the program implementers prior to departure	3.95
(7) Using social justice terms….	3.95
(9) Over communicate	3.89

(89) Divide program activities by gender	3.89
(65) Changes in terminology, branding, and messaging in response to local religious…	3.89
(4) Fitting the program to local time frames	3.89
(93) Translated materials into Spanish	3.79
(67) Guide translated into regional languages	3.74
(17) Putting into context global, national, and sub-national agenda…	3.72
(92) Road shows replaced pamphlets	3.58
(14) All vaccinations in primary schools…	3.11
Monitoring and Evaluation	3.66
(29) Checking validity/need of certain tasks	4.05
(30) Mentoring outcome and evaluation team on data management, data visualization…	3.95
(69) Various steps, questions, examples, and stories, normative or motivational…	3.95
(68) Course material covering other sexually transmitted infections and reproductive…	3.84
(24) More focus on data visualization and dashboards to easily and quickly interpret…	3.79
(117) Increase evaluation and monitoring during implementation	3.74
(23) Iterating/prototyping of concepts and activities based on frequent feedback	3.68
(122) Accurate incident reporting	3.68
(1) Narrowing the scope of the project	3.67
(31) Developing and tracking new quality indicators	3.63
(42) Discussion with local staff about record keeping or data collection and agreeing…	3.63
(74) Diarrheal disease prevention methodology shifted instead to safe water storage	3.47
(118) Rolling out performance measurement exercises across several HIV care and…	3.47
(51) Modifying targets based upon baseline findings	3.42
(48) Better monitoring and evaluation of implementation itself…	3.33
(83) Changing program goals	3.26
Human Resources	3.49
(77) Teachers made changes to instructions	4.26
(75) Teachers made changes to the message content	4.21
(76) Teachers made changes to the program structure and method	4.00
(49) Supervision and feedback to implementers	3.89
(104) Concept first discussed and then exemplar case studies address unique pop…	3.74
(99) Students were assigned to ‘novice’ supervisor who is assigned to expert	3.63
(19) Make decisions to ensure effective program leadership and management	3.63
(72) Task shifting to simplify service delivery	3.53
(103) Graduate students in all specialty tracks attend same class	3.37
(8) Due to lack of faculty, moving to a concept-based teaching methodology	3.26
(120) Task shifting to have nurses clerk patients and handle drug dispensing	3.21
(43) Increase flexibility of all staff members	2.95
(15) Ensure adequate personnel…to enable coordination of public health programmes	2.84
(47) Changing staff when a leader is ineffectual	2.37
Capacity Building	3.81
(116) Creating learning opportunities for community health workers	4.16
(21) Professionalism training for staff to increase adoption of program	4.11
(62) End of day whole group briefings/discussions while in country…	4.11
(34) Increased training on new technical skills	4.05
(11) Ensure staff/participant understanding of “short term” initiatives early on…	4.05
(115) Creating learning opportunities for target population	4.00
(35) Training of the program implementers before departure, supervision and feedback…	3.84
(59) Additional training for frontline implementers	3.74
(105) Ensure staff/participant understanding of “short term” risks early on…	3.74
(106) Framing discussion early on to help guide what a program’s successful model…	3.58
(119) Training and equipping staff with tools to improve supervision	3.53

(25) Peer mentorship to increase capacity building	3.37
(18) Increase active participation of target beneficiaries/population	3.32
Community Input	**3.73**
(53) Getting community feedback before initiating an intervention	4.16
(22) Involved community members in the program planning process	4.05
(114) Creating an assessment among target population to determine their needs…	4.00
(52) Ensuring all materials are fed back to the community after project end	3.95
(109) Assume your program goal/message is the first time people are hearing about it	3.84
(94) Ensuring that local partner feedback is considered, and not just shoved aside	3.79
(97) Adding various components to the program, as advised by local partners…	3.79
(27) Relationship-building first followed by implementation	3.63
(38) Development of a health program and empowering them…	3.63
(16) Expectations from beneficiaries and stakeholders should be pre-planned for…	3.58
(5) Eliminating various components from the program…	3.53
(10) Partner with local government-easy campaign and exposure….	3.42
(108) Government and NGO partnership creates an investment from people…	3.42
(28) Close collaborations with local organizations and partners	3.37
Local Expertise	**3.63**
(3) Getting feedback from local partners periodically, even during implementation	4.16
(91) Drowning interventions were adapted to include the use of playpens or daycare…	3.84
(121) Client education as group and individuals	3.79
(26) Incorporating human-centered design principles into initial stages of developing…	3.68
(78) Emphasis on behavior activation versus cognitive restructuring	3.63
(107) Leverage existing government NGO programs to capitalize on volunteers	3.42
(6) Change scope of project to reflect and follow the recommendations of local partners	3.37
(12) Leverage existing government programs to capitalize on volunteers	3.11
Evidence Translation to Local Context	**3.40**
(20) Base scaled-up interventions on pilot studies to increase uptake…	3.74
(39) Involving MOH experts from countries in development of a vaccine…	3.68
(111) Use working model(s) and apply to similar PH initiatives (piggyback)	3.68
(123) Ensure statistics/numbers provided are relevant to local context	3.42
(112) Allocating budget for over-expectations from stakeholders/target population…	3.32
(40) Development of a technical working group that includes global experts…	3.21
(2) Include a microfinance component…	3.16
(50) Requesting additional funding and/or time for project completion	3.00
Technology & Incentives	**3.73**
(124) Monetary units all in local equivalent	4.11
(56) Inclusion of per diem/travel costs for participants for long meetings	3.89
(57) Use of free/open access software rather than proprietary	3.84
(73) Prizes and rewards for participants	3.76
(71) Participants were provided an at-home blood pressure monitor…	3.68
(110) CDs or MP3s that can be “checked out” to patients with health information	3.53
(113) Digital solutions/use of technology to increase capacity building	3.32
Transparency	**3.84**
(33) Keep ideas/concepts simple	4.21
(125) Appreciating the uniqueness of various health care workers and their backgrounds	4.11
(36) Being honest upfront about what may not work/addressing assumptions…	3.89
(85) Midweek calls put in place during a parenting intervention were later deleted…	3.89
(58) Mapping of political landscape/decision makers ahead of time…	3.84
(63) Requirement of completion of a daily structured journal while in country…	3.79

(82) Replacing written forms with feedback discussions	3.74
(41) Dissemination of guidelines via regional and country-based partners…	3.26
Cultural Considerations	3.98
(98) Refraining from using term 'third world' or 'developing countries'…	3.71
(95) Fitting the program to local holidays	4.29
(96) Fitting the program to seasonality	4.00
(90) Campaigns were targeted at female gathering places like water boreholes	4.12
(88) Incorporating local cultural values or metaphors	4.18
(86) Changing an American baseball player to a rugby player or netball player	3.06
(54) Bringing in social science expertise/anthropological and sociological knowledge…	3.53
(55) Starting "where they're at" with program maturity…	4.18
(37) Assuming that an innovation or technology is culturally appropriate	4.47
(84) Modifying metaphors	3.71

Note. Statement numbers have no significance other than the order they were entered into the software during the brainstorming session

Note. Higher values indicate higher levels of ease

Correlation between Importance and Ease

Research Question 6 was: What is the correlation between importance and ease for each type of adaptation? Importance and ease and their correlation for each type cluster were further determined through the interpretation of a pattern matching display (Figure 24) and bivariate plots or "go-zones" (Figure 25).

Pattern Matching

Pattern matching was performed to compare the data equivalency from both cluster rating maps (importance and ease) and was used to compare clusters on the rating variables of relative importance and ease. Pattern matching was performed at the cluster level using a ladder graph representation. Lines connect cluster rating values on a pair of scales, which can be absolute or relative (Kane & Trochim, 2007). Figure 24 displays the pattern matching results using an absolute scale. An absolute scale was chosen in consultation with the Concept Systems Global ™ consultant, as the relative scale values were fairly similar and an absolute scale allowed for ease of comparison. A Pearson product moment correlation (r= 0.52) demonstrates the overall strength of correlation

between importance and ease, with "1" representing total positive linear correlation, "0" representing no linear correlation, and "-1" representing total negative linear correlation. An *r* value of 0.52 indicates a moderately positive correlation between importance and ease.

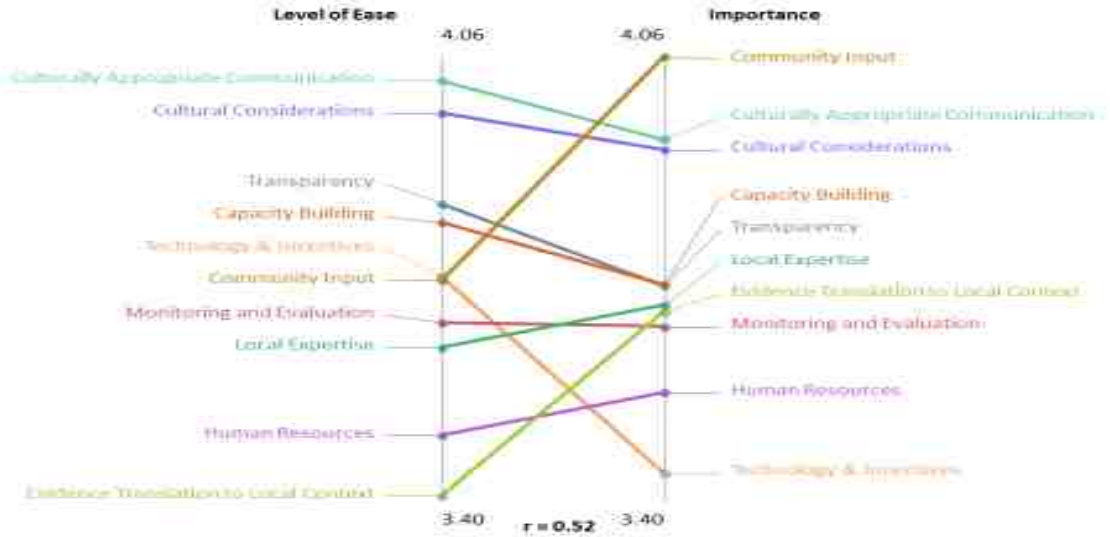


Figure 24. Pattern matching display, levels of importance and ease

While pattern matching displays quantify cluster results in a ladder display, bivariate plots provide a pictorial representation of the importance and ease of each individual statement and are displayed by cluster.

Bivariate Plots

Go-zones are bivariate *X*-*Y* graphs of ratings, shown within quadrants that are made by dividing above or below the mean for each variable, and they aid in further comprehension of the relative ratings of statements within each cluster (Kane & Trochim, 2007). As described in Chapter 3, the right upper quadrant is typically referred to as the "go-zone" and statements in this quadrant represent the most actionable ideas within each

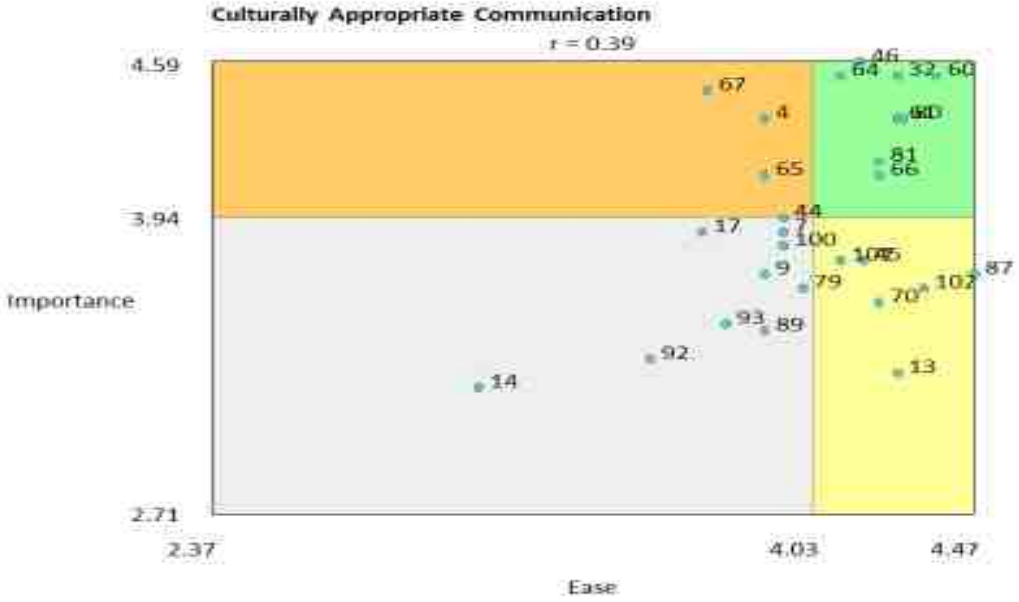
cluster (Kane & Trochim, 2007). Subsequently, statements located in the left lower quadrant may be considered the least important and most difficult adaptations to achieve (Table 9). Figure 25 displays each cluster's go-zone plots.

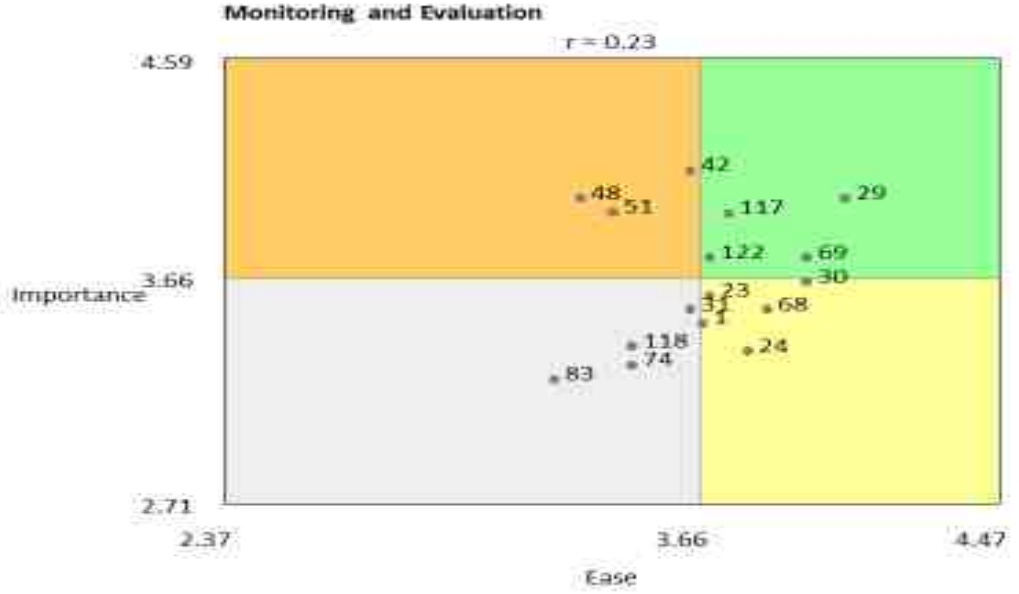
Table 9

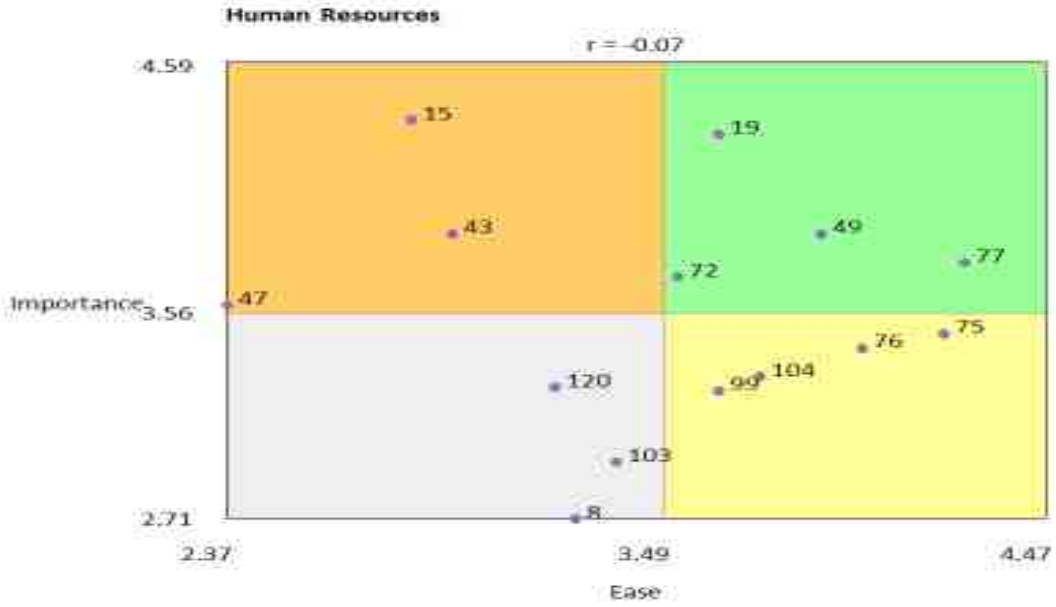
Individual statements rated most important and easy versus most unimportant and difficult by category

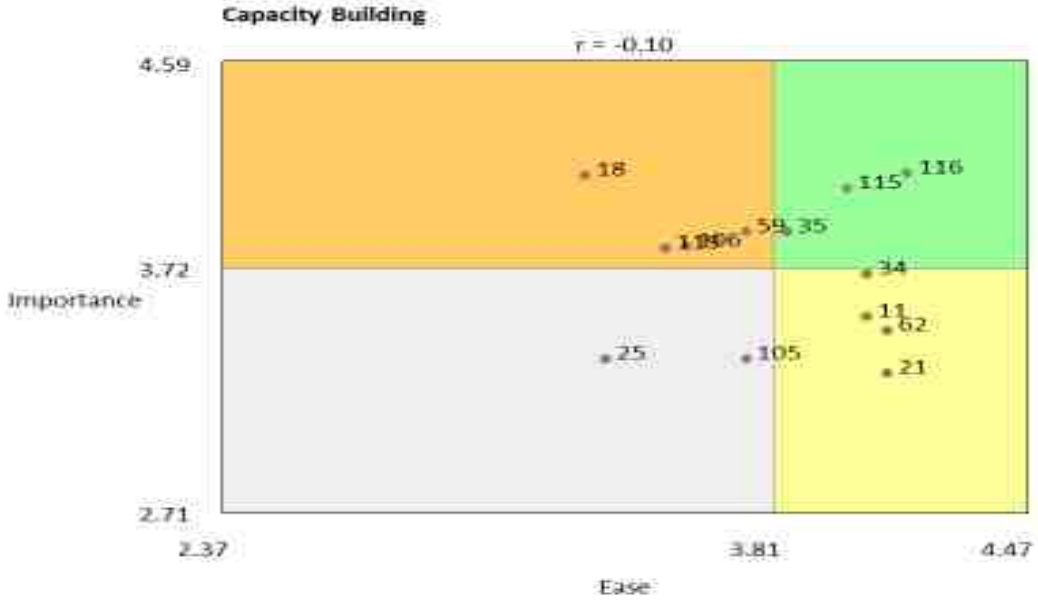
Cluster	*Important and easy*	*Unimportant and difficult*
Culturally Appropriate Communication	32. Disseminate content in a very easy to understand language in a format that is culturally and educationally appropriate. 46. Using local language and context when providing education 60. Use of simple, lay language 61. Use of pictures/phrases relevant to the cultural context (e.g., using Ethiopian illustrations rather than Zimbabwean on health education messages) 64. Use of languages that are acceptable to local context. 66. Pictorial representation of concepts in the infection control guide 80. Use of culturally appropriate illustrations 81. Simplification of structure and language	7. Using social justice terms with regard to Latin American, African, and Asian contexts 9. Over-communicate 14. All vaccinations in primary schools; asking families to join their children at drop off/pick up to also vaccinate other family members. 17. Putting into context global, national and sub-national agenda increases acceptability of public health innovations. 79. Standardization of health messages 89. Divide program activities by gender 92. Road shows replaced pamphlets 93. Translated material into Spanish 100. Use local publications for public program awareness.
Monitoring and Evaluation	29. Checking validity/ need of certain tasks 69. Various steps, questions, examples and stories, normative or motivational messages, and new concepts were added to the curriculum by the program implementers 117. Increase evaluation and monitoring during implementation 122. Accurate incident reporting	31. Developing and tracking new quality indicators 74. Diarrheal disease prevention methodology shifted instead to safe water storage 83. Changing program goals 118. Rolling out performance measurement exercises across several HIV care and treatment facilities
Human Resources	19. Make decisions to ensure effective program leadership and management 49. Supervision and feedback to implementers 72. Task shifting to simplify service delivery 77. Teachers made changes to instructions	8. Due to lack of faculty, moving to a concept-based teaching methodology. 103. Graduate students in all specialty tracks attend same class. 120. Task shifting to have nurses clerk patients and handle drug dispensing.
Capacity Building	35. Training of the program implementers before departure, supervision and feedback to implementer 115. Creating learning opportunities for target population 116. Creating learning opportunities for community health workers	25. Peer mentorship to increase capacity building 105. Ensure staff/participant understanding of "short term" risks early on in the process

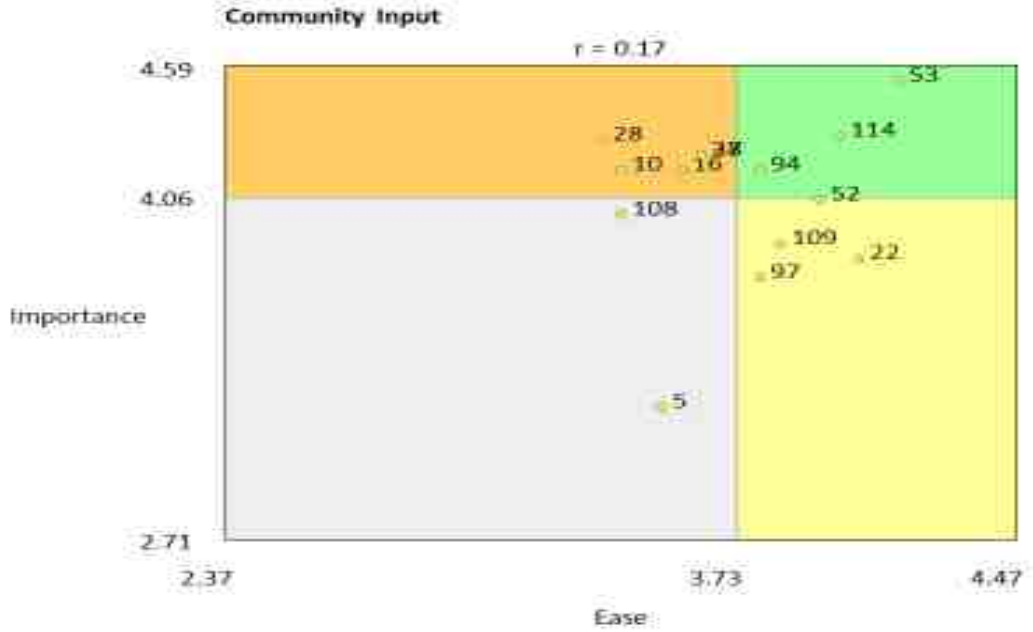
Community Input	53. Getting community feedback before initiating an intervention 94. Ensuring that local partner feedback is considered, and not just shoved aside. 114. Creating an assessment among target population to determine their needs and what they feel needs improvement.	5. Eliminating various components from the program, as advised by reputable and respected local partners who've worked with the population over time. 108. Government and NGO partnership creates an investment from people often embedded in the community while promoting longevity/sustainability.
Local Expertise	3. Getting feedback from local partners periodically, even during program implementation	12. Leverage existing government programs to capitalized on volunteers
Evidence Translation to Local Context	20. Base scaled- up interventions on pilot studies to increase uptake of evidence-based public health improvements 39. Involving MOH experts from countries in development of a vaccine or immunization strategy as it is being considered or documented - e.g. Meningitis Vaccine Programme, ARISE (Africa Routine Immunization System Essentials), Project Optimize 123. Ensure statistics/numbers provided are relevant to local context	2. Include a microfinance component (especially for marginalized groups within the community), no matter how small. 50. Requesting additional funding and/or time for project completion
Technology and Incentives	56. Inclusion of per diem/travel costs for participants for long meetings 73. Prizes and rewards for participants 124. Monetary units all in local equivalent	71. Participants were provided an at-home blood pressure monitor to prevent cardiovascular disease 110. CDs or MP3s that can be "checked out" to patients with health information
Transparency	33. Keep ideas/concepts simple. 36. Being honest upfront about what may not work/addressing assumptions in the pre-implementation phase 125. Appreciating the uniqueness of various health care workers and their backgrounds.	41. Dissemination of guidelines via regional and country-based partners and Ministries of Health to help them apply a new global health recommendation 63. Requirement of completion of a daily structured journal while in country for a cultural experience 82. Replacing written forms with feedback discussions
Cultural Considerations	88. Incorporating local cultural values or metaphors 90. Campaigns were targeted at female gathering places like water boreholes 95. Fitting the program to local holidays 96. Fitting the program to seasonality	54. Bringing in social science expertise/anthropological and sociological knowledge of a community in question 84. Modifying metaphors 86. Changing an American baseball player to a rugby player or netball player

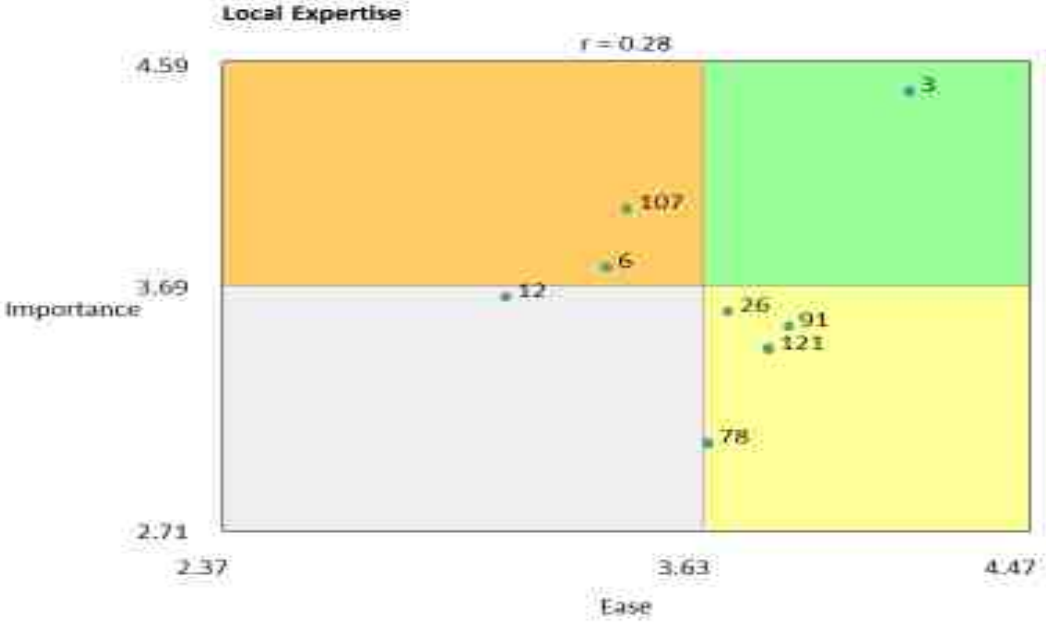

Culturally Appropriate Communication
r = 0.39
4.59
3.94
2.71
Importance
2.37
4.03
4.47
Ease
67
4
65
44
17
100
9
79
93
89
92
14
46
64
32, 60
81
66
87
102
70
13

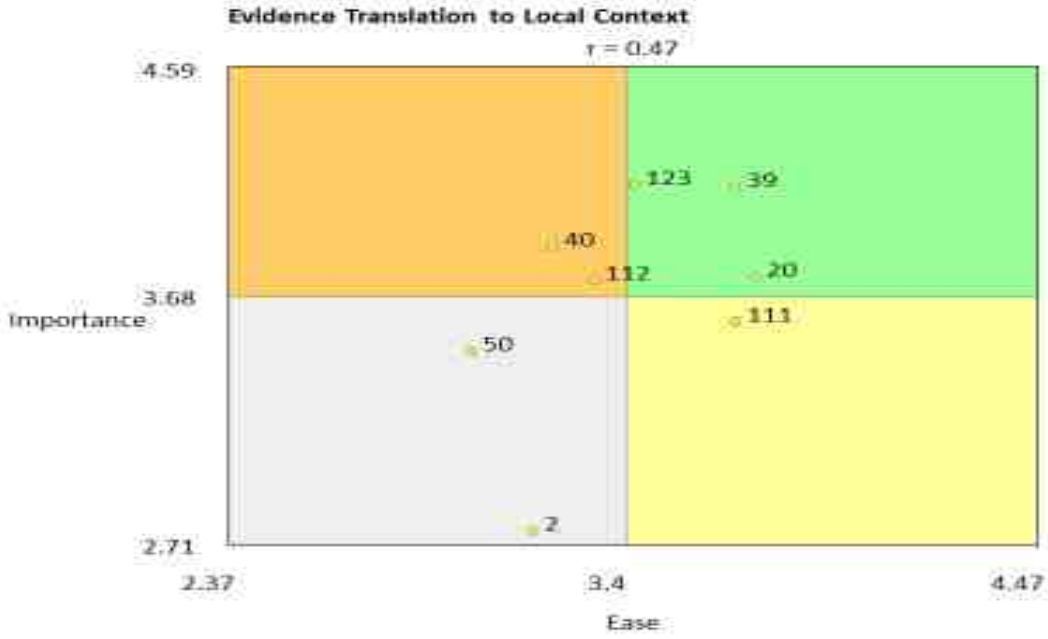

Monitoring and Evaluation
r = 0.23
4.59
3.66
2.71
Importance
2.37
3.66
4.47
Ease
42
48
51
117
29
122
69
30
23
68
118
74
24
83

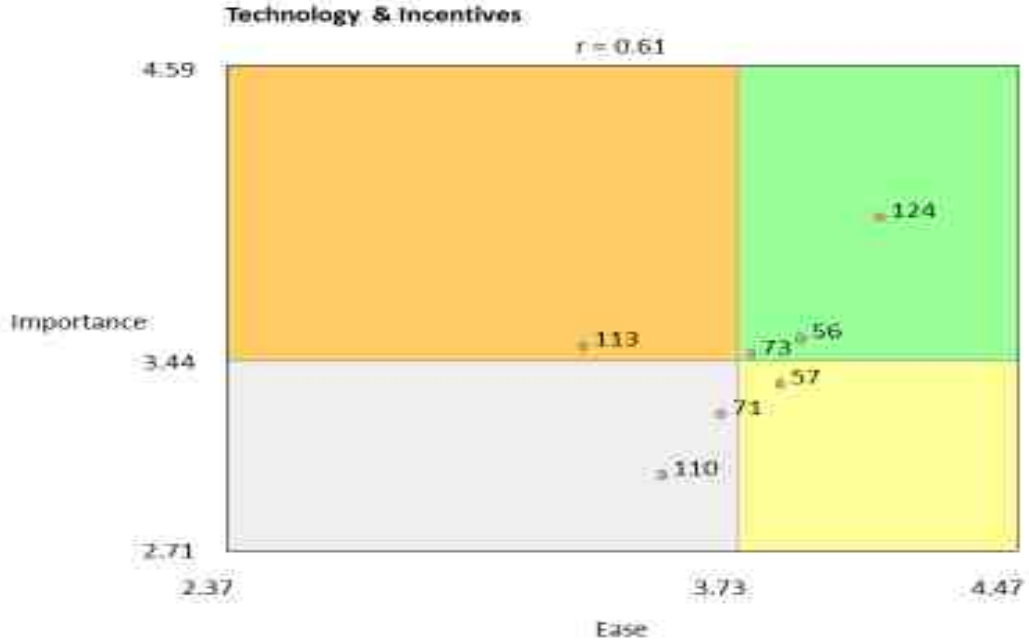

Human Resources
r = -0.07
4.59
3.56
2.71
Importance
15
19
43
49
77
72
47
76
75
120
104
99
103
8
2.37
3.49
4.47
Ease


Capacity Building
r = -0.10
4.59
3.72
2.71
Importance
18
115
116
35
34
11
62
25
105
21
2.37
3.81
4.47
Ease


Community Input
r = 0.17
4.59
4.06
2.71
Importance
2.37
3.73
4.47
Ease
53
114
28
10
16
94
52
108
109
22
97
5


Local Expertise
r = 0.28
4.59
3.69
2.71
Importance
2.37
3.63
4.47
Ease
3
107
6
12
26
91
121
78


Evidence Translation to Local Context
r = 0.47
4.59
3.68
2.71
Importance
123
39
40
112
20
111
50
2
2.37
3.4
4.47
Ease


Technology & Incentives
r = 0.61
4.59
3.44
2.71
Importance
124
113
73
56
57
71
110
2.37
3.73
4.47
Ease

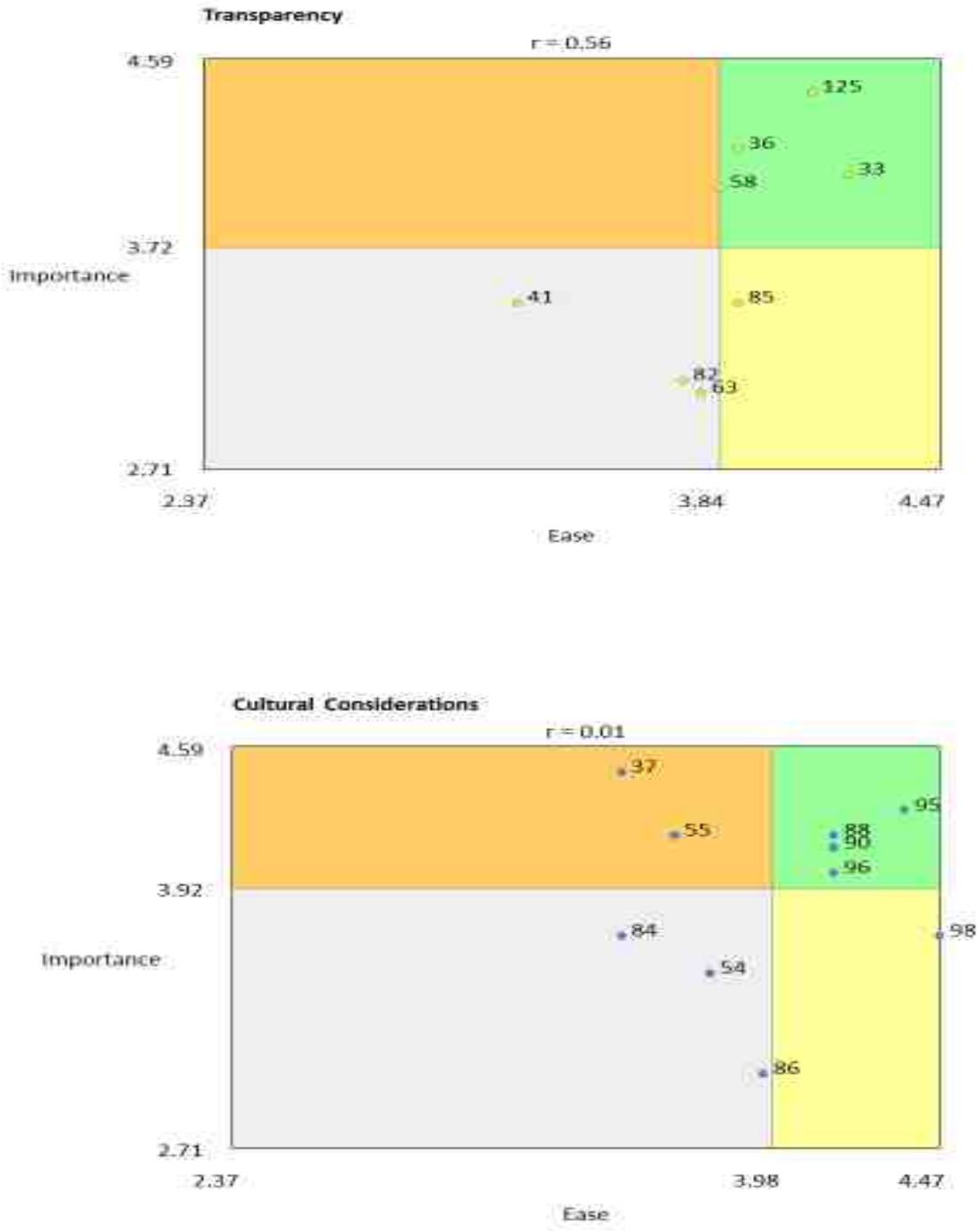


Figure 25. Go-zone plots by cluster

Cluster Data by Importance and Ease

Cluster 1: Culturally Appropriate Communication. These types of adaptations were deemed to be both very important and also very easy to accomplish (ease 4.03, importance 3.94). The "use of simple, lay language" was the most important and easiest adaptation in this cluster, while "asking families to join their children at school drop off/pick up to vaccinate other family members" was considered the most difficult and unimportant.

Cluster 2: Monitoring and Evaluation. This cluster was considered to be equally important and easy to complete during program adaptation, falling in the middle of all other clusters (ease 3.66, importance, 3.66). "Check validity/need of certain tasks" was considered to be the easiest and most important statement in this cluster, while "changing program goals" was considered the most difficult and unimportant.

Cluster 3: Human Resources. Human resource adaptations were considered by the group to be relatively unimportant and somewhat difficult to accomplish (ease 3.49, importance 3.56). "Teachers made changes to instructions" was considered to be the easiest and most important adaptation, while "moving to a concept-based methodology due to lack of faculty" was considered the least important and most difficult.

Cluster 4: Capacity Building. Capacity building adaptations were considered relatively easy to complete but were not as important to participants (ease 3.81, importance 3.72). "Creating learning opportunities for community health workers" was considered the most important and easiest to accomplish, while "peer mentorship to increase capacity building" was considered the most difficult and unimportant in the cluster.

Cluster 5: Community Input. Gaining community input was deemed to be very important, but somewhat difficult to obtain (ease 3.73, importance, 4.06). The easiest and most important adaptation in this cluster is considered to be "getting community feedback before initiating an intervention," while the most unimportant and most difficult is "eliminating various components from the program, as advised by reputable and respected local partners who've worked with the population over time."

Cluster 6: Local Expertise. Adaptations incorporating local expertise is considered to be somewhat important but also somewhat difficult to accomplish (ease 3.63, importance 3.69). The easiest and most important adaptation in this cluster is "getting feedback from local partners periodically, even during program implementation," while the hardest and least important is to "leverage existing government programs to capitalize on volunteers."

Cluster 7: Evidence Translation to Local Context. This type of adaptation was considered to be extremely difficult and only somewhat important (ease 3.40, importance 3.68). The easiest and most important adaptation in this cluster was considered to be "involving Ministry of Health experts from countries in development of vaccine or immunization strategy as it is being considered or documented," and the least important and most difficult adaptation is to "include a microfinance component."

Cluster 8: Technology and Incentives. These types of adaptations were considered to be somewhat easy to incorporate but not very important (ease 3.73, importance 3.44). The easiest and most important adaptation in this cluster is "monetary units all in local equivalent," the least important and most difficult is "CDs or MP3s that can be 'checked out' to patients with health information."

Cluster 9: Transparency. Adaptations contributing to program transparency were considered relatively easy and somewhat important (ease 3.84, importance 3.72). The easiest and most important adaptation in this cluster is "appreciating the uniqueness of various health care workers and their backgrounds," while the most difficult and unimportant is "dissemination of guidelines via regional and country-based partners and Ministries of Health to help them apply a new global health recommendation."

Cluster 10: Cultural Considerations. Cultural considerations were deemed to be slightly easier than they were important, but both ranked relatively high in levels of ease and importance (ease 3.98, importance, 3.92). "Fitting the program to local holiday" is considered to be the easiest and most important adaptation in this cluster, while "modifying metaphors" was deemed both unimportant and relatively difficult.

Summary

The concept map that resulted from this study characterizes ten major types of adaptations derived from 125 individual statements that may occur during implementation of an evidence-based global health program in a LMIC across a variety of programs and settings, including (1) Culturally Appropriate Communication, (2) Monitoring & Evaluation, (3) Human Resources, (4) Capacity Building, (5) Community Input, (6) Local Expertise, (7) Evidence Transition to Local Context, (8) Technology and Incentives, (9) Transparency, and (10) Cultural Considerations. Importance and ease for these adaptation types were also determined by the participants. Chapter 5 will discuss both research significance and policy implications of the above results.

Chapter 5

Discussion

The purpose of this study was to describe, categorize, and conceptualize adaptations made during implementation of evidence-based public health programs to demonstrate what adaptations occur, how important adaptations are perceived to be, and how easy or difficult it is to make modifications determined to be necessary by the program implementers. The perspectives of those that have implemented these programs in LMICs was the primary data source. Although substantial literature exists that focuses on adaptation types or categories, no study was found that attempted to categorize adaptations across a wide range of public health programs and different contexts. In addition, no studies attempt to identify the relative importance and ease of certain adaptations that occur during program implementation from the perspective of program implementers. This study was guided by Stirman and colleagues' system of classifying modifications to evidence-based programs (Stirman et al., 2013, p. 6) and used a concept mapping methodology. The findings of this study are significant for several reasons.

First, this study produced a unique conceptualization of adaptation categories by using a unique mixed methods analysis, with a significant quantitative component, to conceptualize adaptation categories beyond a comprehensive literature review, survey, or semi-structured interview. The researcher reviewed each individual statement within each cluster to determine relevance and fit to Stirman's model. While individual statements from each adaptation category fit within Stirman and colleagues' model (2013) (Table 10), the overall adaptations are categorized quite differently. Table 10 demonstrates which overall adaptation categories contained statements that embodied the categories

defined by Stirman and colleagues. For example, individual statements under the Human Resources category correlated with task shifting, training method modifications, format and personnel changes, and modification of content components. The Culturally Appropriate Communication category in this study contained statements that reflected the addition and modification of program components, changes to context such as format and setting, and modification of training methods. Table 6 lists all individual statements by cluster for further comparison or clarification.

Table 10

Adaptation categories produced by concept mapping mapped to Stirman et al.'s model (2013) *and literature review comparison*

STIRMAN ET AL.'S FRAMEWORK DEVELOPMENT AND CODING SYSTEM FOR MODIFICATIONS AND ADAPTATIONS OF EVIDENCE-BASED PROGRAMS					
NATURE OF CONTENT MODIFICATIONS		*CONTEXT*		*TRAINING METHODS*	
Stirman et al. (2013)	This study's adaptation categories	Stirman et al. (2013)	This study's adaptation categories	Stirman et al. (2013)	This study's adaptation categories
Addition	Culturally Appropriate Communications, Monitoring & Evaluation, Community Input, Technology & Incentives, Cultural Considerations	Format	Culturally Appropriate Communication, Monitoring & Evaluation, Human Resources, Community Input, Local Expertise, Evidence Translation to Local Context, Transparency, Cultural Considerations	Task shifting	Human Resources
Modification	Culturally Appropriate Communications, Monitoring & Evaluation, Human Resources, Local Expertise, Transparency, Cultural Considerations	Setting	Culturally Appropriate Communication, Community Input, Local Expertise, Technology & Incentives, Transparency, Cultural Considerations	Modification of Training Methods	Culturally Appropriate Communication, Human Resources, Capacity Building, Local Expertise, Transparency
Deletion	Monitoring & Evaluation	Personnel	Human Resources, Capacity Building, Transparency		
		Population			
		-Cultural	Culturally Appropriate Communication, Transparency, Cultural Considerations		
		-Economic	Capacity Building, Evidence Translation to Local Context, Technology & Incentives		
		-Epidemiological	Evidence Translation to Local Context		

In addition to Stirman and colleagues' model, Moore et al. (2013) surveyed program implementers involved with an EBP focused on crime and delinquency

prevention in Pennsylvania for the purpose of creating a taxonomy to understand adaptations. Their study was designed to provide information on several broad constructs with a focus on rationales for making adaptations (e.g., fit, timing, and valence), while the current study provides definitive adaptation categories. Combining the open-ended responses from participants with a strong quantitative component allows for the similarities of participants' statements to be examined through multidimensional scaling (MDS) while creating categories of similar statements through hierarchical cluster analysis (HCA), thus producing definitive adaptation categories.

Second, this study was one of only four studies to interview actual implementers, and the only study that included implementers from a variety of LMICs that drew from several types of public health programs. Kevany and colleagues (2012) drew from the experience of implementers in more than one LMIC, but again focused solely on HIV prevention programs. Moore et al. (2013) surveyed implementers working on crime and delinquency programs in one U.S. state, Pennsylvania. Hill et al. (2007) interviewed a variety of stakeholders surrounding a single school-based program. Although they developed a comprehensive list of adaptations as well as 15 additional categories of rationales for adapting, Hill and colleagues viewed adaptations as a deviation from fidelity instead of a strength to the program. In contrast, in this study, not only did implementers have differing viewpoints due to their varied program experiences and geographical locations, but implementers were also varied in perspective professionally (university settings, NGOs, governmental agencies, etc.). In addition, adaptation was viewed as a strength and a necessary component of the long-term sustainability of evidence-based programs.

Third, this is the only study to assess the relative importance and ease of adaptations from the viewpoint of program implementers. This information may provide significant insight to researchers and implementers before and during program implementation. The bivariate or go-zone plot analysis in conjunction with the pattern matching display makes it possible to identify which adaptations can be considered the "low-hanging fruit," or those that are easiest to achieve for program implementers while also considered very important to program success.

Cultural adaptations, especially those pertaining to language and context, were rated highly in both importance and ease. This is consistent with the abundance of literature existing on cultural adaptations. With so much emphasis placed on cultural adaptations, it is likely at this point that these types of adaptations are considered essential for program planners and implementers and are obvious adaptations to make to attain program success. Adaptations pertaining to technological program aspects may have been rated the least important due to the fact that this study required implementers who have worked in LMICs, where technology is often not the priority and may not even be possible to use or access in certain settings. Program adaptations that attempt to ameliorate translation of evidence to the local context may have been considered the most difficult as these adaptations rely on partnerships with regional or national government partners, scaling-up interventions, reliance on prior models, and inclusion of microfinance components, all of which are more complex than other adaptations generated in this study.

It is important to note that the software in itself is a limited technique and additional qualitative interpretation is useful. Statistical placement of each statement on

the concept maps does not always translate to real world use or benefit. For example, certain statements under the Transparency category (statements # 63, 85, and 125) do not reflect the concept of transparency as the other statements do. These statements are more in line with improving the program and taking into consideration the needs of participants and the growth of program staff, the latter perhaps included as a concept familiar to Western or wealthier study participants. In addition, statements regarding the use of local language were collectively rated both important and easy for three different statements, but one statement regarding the translation of materials into Spanish was rated unimportant and difficult. While this statement was likely to be a specific example that represented the use of language, perhaps it was taken literally by the majority of participants for their local contexts, which are not Spanish-speaking, and was therefore considered unimportant. As mentioned above, examples like this statement may be the consequence of overrepresentation in the African region.

In addition, the primary goal was to identify adaptations that were considered both important and easy to achieve. However, adaptations such as "dissemination of guidelines via regional and country-based partners and ministries of health…" was rated unimportant and difficult. Program components such as guideline dissemination are usually considered to be essential. Perhaps this adaptation was rated in this way because direct program implementers may not be responsible for dissemination of guidelines at the local program level; it may have been assumed that dissemination would take place by those who designed the program, by NGOs, or by ministries of health. Regardless, it is still essential to consider adaptations outside of the go-zone that may need to be

prioritized during implementation due to the components' criticality to the program, regardless of importance or ease.

Limitations

This study had some limitations. Although the sample in this study was strong in terms of programmatic and professional diversity, a larger sample of 40-60 participants would have been ideal and may have broadened the variety of statements to capture additional adaptation categories and increased equal representation of all WHO regions. Programs implemented in the African Region and those from university settings were overrepresented, likely due to snowball sampling methods. This overrepresentation may have implications for result interpretation, especially since it is unknown to the researcher the percentage of country nationals versus Western participants who have worked in LMICs represented in this study. I did not explore if differences exist between Western notions of importance and ease versus concepts that may differ in LMICs. On the other hand, limiting participants to those who spoke English as their native language may have contributed to greater clarity in the sorting phase.

In retrospect, arranging for "hands-on" collaborative and synchronous in-person sessions for brainstorming, sorting, and rating may have yielded improved results due to language barriers and technology access issues while reducing sorter burden or participant fatigue. However, using online concept mapping software allowed for the inclusion of a much more diverse sample, which was the aim of this study. Many of the implementers were focused on adaptations that could occur during the monitoring and evaluation phases of the program, versus those that may be important during the initial implementation process. Some participants listed adaptations that could be considered as

overarching program guidelines, such as “using social justice terms…”, “standardization of health messages,” “narrowing the scope of the project,” “developing and tracking new quality indicators,” “keep ideas and concepts simple,” etc. These types of responses may be from those involved in program oversight or planning or could be due to misunderstanding the focus prompt. These responses are scattered throughout different clusters, but future research may produce an additional adaptation category perhaps related to program planning and/or evaluation. In addition, Kevany et al.’s (2012, 2014) specific focus on diplomatic adaptations in conflict settings are well documented in the literature but are not mentioned in Stirman’s model (2013) and also did not arise in the present study. This may be due to general lack of experience in active conflict zones by the majority of implementers or implementation science researchers. Overall, the participants in this study provided diverse responses that allowed for a unique conceptualization of adaptation categories that could be applicable to numerous types of public health programs.

Future Implications

Policy

Policy makers are increasingly reliant on results derived from the best evidence on public health programs in order to improve health and development outcomes in LMICs, especially when frequently faced with substantial financial restraints (Perez et al., 2016). The evidence to practice gap is a crucial policy issue for policy makers, health care systems, researchers, and funding sources because it negatively impacts patients’ health, social, and economic outcomes by limiting the reach of clinical research (Willis et al., 2016; Cooksey, 2006). Service delivery can be improved by using evidence in health

system capacity building and policy making (Langlois et al., 2016). Furthermore, if we are able to understand how much we can adapt programs to local context without changing effectiveness, we are more likely to have sustained positive public health impact. This study has laid a foundation toward increasingly effective global health program implementation by providing a conceptual analysis of the adaptation process. Demonstrating consensus by diverse participants on adaptation categories is significant because it may allow local stakeholders to confidently implement programs based on pilot programs previously considered to be dissimilar while planning for adaptations identified in this study. Future research is needed to determine which categories are linked to sustainability and which, if any, may detract from program success. When this has been determined, agencies such as WHO may be able to recommend a general framework for incorporating adaptations into program implementation, regardless of program type, which would likely increase efficiency and reduce costs during program implementation.

Program Implementation

Comprehension of adaptation types, their importance, and the ease with which they can be completed is important for future work surrounding improved program planning efforts to account for such changes before active implementation has begun. Furthermore, increased adaptation description will aid implementation researchers and program implementers to understand adaptation within the context of EBP implementation while better articulating and examining issues related to the tension between fidelity and adaptation and effects on program outcome. In addition, decisions can be better made during the planning and implementation process regarding relative

importance of changes made during implementation as well as the ease with which certain adaptations are made. We now have some understanding as to which adaptations are deemed the most important or crucial to implementers and which are the easiest or most difficult to actually achieve. This may allow for program budgets to be allocated in a more responsible way to promote optimal program effectiveness.

Research

Since sustainability is a key outcome and priority within implementation science (Proctor et al., 2011; Glasgow & Chambers, 2012; Proctor et al., 2015) and sustained delivery of evidence-based programs is crucial to positive public health impact (Spoth et al., 2011; Proctor et al., 2015), clearly defined adaptation categories derived from LMIC exemplars can be tested in future studies to determine their relationship or importance to sustainability of EBPs. This study offered a beginning conceptual evaluation of the types of adaptation that occur when implementing EBPs in LMICs which has important implications for implementation scientists. Adding to models such as Stirman et al.'s while presenting adaptation categories in a different light will further aid implementation scientists and program planners to incorporate preparation for adaptations to occur in a controlled manner, which may increase program success and sustainability. In essence, the provision of adaptation types that can be generalized to the majority of programs implemented in a global health context will further the field of implementation science by providing a mechanism in which deliberate and planned adaptation can occur.

Future research should focus on broadening the study to include a much larger sample size, which may produce additional adaptation categories. Currently, there is a paucity of literature that successfully links types of adaptations to positive and

sustainable outcomes. In addition, guidelines developed from future studies can serve to strengthen and facilitate the work of those who focus on translational research.

Conclusion

This study contributed to the body of work focused on increasing external validity in order to focus the emphasis of research on the communities and populations that programs are meant to benefit. By coming to a consensus across the global health spectrum on adaptation types, researchers can further their knowledge on the truly essential 'core' components versus the many program elements that can be adapted without compromising program effectiveness in addition to understanding which adaptations can be completed with the least difficulty and which are considered the most important by those who implement programs. In the future, this work can be built upon in order to link adaptation types with successful and sustainable outcomes, which is the ultimate goal for the populations we serve in global health.

APPENDICES

Appendix A

Adaptation. The "degree to which an evidence-based program is changed or modified by a user during adoption and implementation to suit the needs of the setting or to improve the fit, characteristics, attitudes, and behaviors of individuals within an adopting organization" (Rabin et al., 2008, p. 120).

Community-based research. Community-based research is defined as "scientific inquiry involving humans that takes place in the community — that is, outside of the laboratory, hospital, or clinic setting. It guides public health workers engaged in improving the health of populations, just as traditional clinical research guides clinicians to care for individual patients" (Blumenthal et al., 2013, p. 1).

Deliberate/planned Adaptation. "Planned or purposeful changes to the design or delivery of a program" (Sundell et al., 2015, p. 786).

Evidence-Based Program/Program. A "collection of practices that are done within known parameters (philosophy, values, service delivery structure, and treatment components) and with accountability to the consumers and funders of those practices" (Fixsen et al.., 2005, p. 26) that demonstrate the highest level of evidence of effectiveness, and if implemented with fidelity, these programs are expected to produce positive outcomes (EPISCenter, 2015).

Evidence-Based Public Health. "…the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of communities and populations in the domain of health protection, disease prevention, health maintenance and

improvement (health promotion)" (Jenicek, 1997, p.190). It is also "…the process of systematically finding, appraising, and using contemporaneous research findings as the basis for decisions in public health" (Jenicek, 1997, p. 190).

Implementation Fidelity. The degree to which the program is implemented as intended by the program developers (Dusenbury et al., 2003). Critical components of fidelity include adherence to the program, dose or exposure, quality of delivery, participant responsiveness, and program differentiation (Dusenbury et al., 2003; Carroll et al., 2007).

Implementation Research. "The scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and hence to improve the quality and effectiveness of health services" (Eccles & Mittman, 2006, p.1).

Implementation Sciences. The study of "the use of strategies to adopt and integrate evidence-based health programs and change practice patterns within specific settings" (National Institutes of Health, 2013, para. 12).

Sustainability. Within the field of public health, sustainability refers to "the capacity to maintain program services at a level that will provide ongoing prevention and treatment for a health problem after termination of major financial, managerial, and technical assistance from an external donor" (LaPelle et al., 2006, p. 1363).

Under-resourced settings. Settings that lack funds to cover basic individual or societal health care costs which can lead to limited access to medication, equipment, supplies, devices, and fewer or less-trained health care personnel. These settings often lack basic

infrastructure, electricity, and running water (“Design for high-and low-resource settings”, 2014).

Appendix B

EBPs: Evidence-based programs/programs

SDGs: Sustainable Development Goals

MDGs: Millennium Development Goals

CA: Cluster analysis

MDS: Multidimensional scaling

LMICs: Low- to middle-income countries

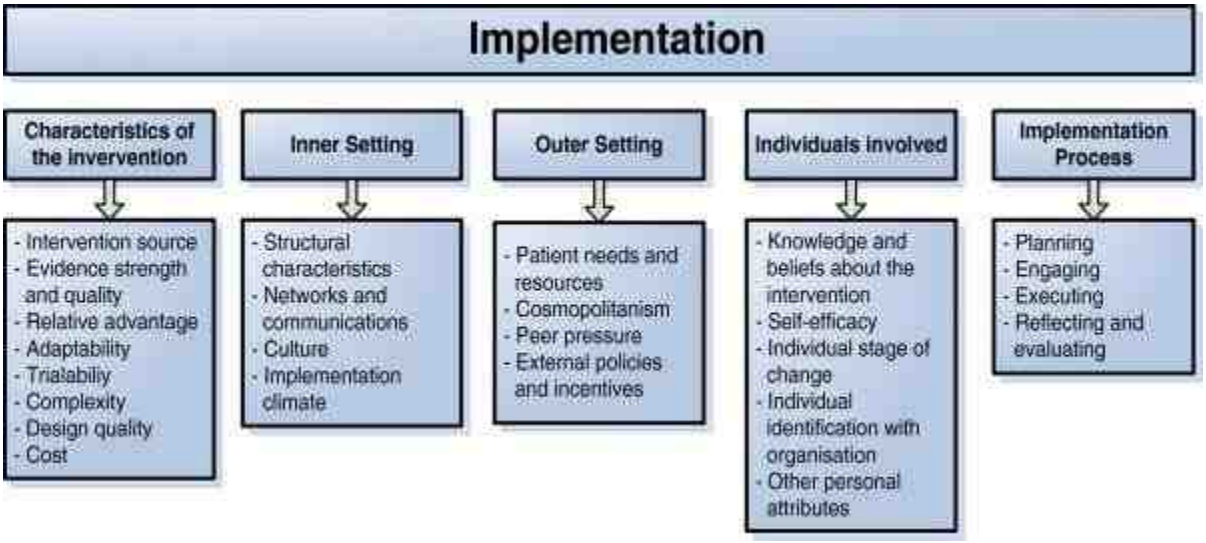
CFIR: Consolidated Framework for Implementation Research

RCTs: Randomized control trials

PEPFAR: The U.S. President's Emergency Plan for AIDS Relief

ACCESS: The Access to Clinical and Community Maternal, Neonatal and Women's Health Services

Appendix C



Source: Damschroder, L.J., Aron, D.C., Keith, R.E., Kirsh, S.R., Alexander, J.A., & Lowery, J.C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Science, 4* (50), 1-15. Image retrieved from https://www.google.com/search?q=CFIR&espv=2&biw=1244&bih=517&source=lnms&tbm=isch&sa=X&ved=0ahUKEwit86TiwdbRAhVJ7YMKHWkhAYUQ_AUIBygC#imgrc=lrb7KX-RBTAWPM%3A

Appendix D

June 16, 2017

[Organization Name]

Re: Study of Adaptation Categories in Global Health Program Implementation

Investigators: Elizabeth Holguin, MPH, MSN, FNP-BC
Ph.D. Candidate
University of New Mexico

Beth Tigges, Ph.D., RN, PNP, BC
Associate Professor and Regents' Professor, College of Nursing
University of New Mexico

Dear _____,

I am writing to let you know about an opportunity to participate in a research study on types of adaptations, or changes, that occur during implementation of evidence-based public health programs in low- to middle-income countries. This study is being conducted by Elizabeth Holguin, a Ph.D. candidate at the University of New Mexico. This study will use a mixed methods approach called Concept Mapping. You are receiving this letter because you have been identified as someone who may have experience implementing public health programs in this context.

Each participant will participate in three asynchronous (not concurrent) sessions using a web-based software. Each session will take you approximately 30-60 minutes to complete. You will have 1-2 weeks per session to complete your contribution, so you may work at your own pace. You will receive a $50 Visa gift card upon completion of this study. If you are interested in participating, please reply to this email to determine your eligibility. If you wish to only participate in the first session, where you will contribute your brainstormed statements without committing to the two following sessions, you may do so on a voluntary basis.

If you are interested in participating, please paste the following link in your browser to determine your eligibility by answering a short survey: [Insert SurveyMonkey link].

Please consider forwarding this research opportunity to colleagues who you believe may be interested in participating. Thank you again for considering this research opportunity.

Appendix E

Dear _____,

Thank you for your initial interest regarding participation in the following study: "Adaptation Categories Made to Evidence-Based Public Health Programs in Low-to-Middle-Income Countries: A Concept Mapping Analysis".

Please answer the following questions below to determine your eligibility:

1. Have you helped to implement a public health program in a low- or middle-income country (LMIC) that has required some modification or adaptation to the original program in the past four years?

- ☐ Yes
- ☐ No

2. Did any of the programs that you have worked with meet all of the following criteria? (Check all that apply)

- ☐ Population or community focus
- ☐ Emphasis on prevention or health promotion
- ☐ Evaluation performed on the original adopted program demonstrated positive outcomes or significant and sustained effects in any setting or population

3. Are you able to commit to participate in and provide input to three asynchronous sessions that will take approximately 30-60 minutes of your time every 1-2 weeks for a total of approximately six weeks?

- ☐ Yes
- ☐ No
- ☐ Please check here if you are interested in only the brainstorming portion (first phase) of the study on a voluntary basis

4. In what capacity were you involved in the program implementation process? (Choose all that apply)

- ☐ Donor

- Administrative tasks at the local level
- "Hands-on" implementer in the local setting involved in the day-to-day operations
- Management at the local level

The following two questions will be used for background information only and will not be linked to your responses:

1. Please list the types of evidence-based programs or interventions that you will be drawing your experiences from regarding adaptation (list as many that apply):

2. Please list the countries (low- to middle-income) in which the above evidence-based programs/interventions were located:

Thank you for taking the time to provide this information. If eligible, you will be contacted in 1-3 business days to be officially enrolled.

Sincerely,

Elizabeth Holguin, MPH, MSN, FNP-BC

Appendix F

Dear_____,

You have been determined to be eligible for the study: "Adaptation Categories Made to Evidence-Based Public Health Programs in Low- to Middle-Income Countries: A Concept Mapping Analysis." Once the recruitment process is complete, you will receive a link by email to the web interface for CS Global MAX™ software to complete the first session. Detailed instructions will be made available to you through the software and also by email before each phase begins. By creating a username and login on the CS Global MAX™ and proceeding with the first phase of the study, informed consent will be assumed or inferred, due to your voluntary participation.

Please provide a physical address to which the $50 Visa Gift Card can be sent to you upon completion of the study to elholguin@salud.unm.edu.

Elizabeth Holguin, MPH, MSN, FNP-BC

Appendix G

Subject: **ADAPTATIONS MADE TO EVIDENCE-BASED PUBLIC HEALTH PROGRAMS IN LOW- TO MIDDLE-INCOME COUNTRIES: A CONCEPT MAPPING ANALYSIS**

Please Contribute Your Knowledge!

Dear [Insert name],

I am writing to thank you for agreeing to participate in the study regarding adaptations made to public health programs in low- to middle-income countries, and to provide you with additional information about the study.

Sometimes, adaptations must be made to evidence-based public health programs when they are implemented so that they better fit the location. You as an implementer have experience with making such adaptations. We want to study adaptation so that we can eventually measure its effect on outcomes and better understand how to adapt programs without changing their outcomes. We want to understand what adaptations are made, and how important and easy you think these adaptations are to make.

We would like you to participate in the first part of the process (brainstorming ideas). It should take only about 30-60 minutes. **The first phase of data collection will run from now through DATE OF BRAINSTORMING CLOSURE**.

We are inviting you to take part in answering the following focus prompt:
"An example of a type of change I have seen made in order to make a global health program more successful is…….".

Please enter the website to get final study information and to submit your ideas by clicking on or pasting the following link to your browser:

https://conceptsystemsglobal.com/home.php?project=1495

Registration type: self-registration. You will be directed to register to obtain a sign-in name for the duration of the project. Remember, this is used for software data tracking purposes only. You and your responses remain anonymous throughout the study.

Shortly after the close of Brainstorming on BRAINSTORMING CLOSURE DATE, we will contact you with additional guidance about the **second phase of the study (sorting and rating) which is scheduled for DATES**.

Questions? If you have any questions about the project, please do not hesitate to contact me at **505-331-7773 or by email, elholguin@salud.unm.edu**

Sincerely,

Elizabeth Holguin, MPH, MSN, FNP-BC

Appendix H

Informed Consent On-Screen Script[10]

You have been asked to participate in a web-based project. Your participation is voluntary.

You may be asked to offer your input in a variety of ways:

- by providing your ideas
- rating the ideas or sorting them into groups of similar themes
- by providing non-identifying information about yourself.

You may participate in the entire project or participate only in the initial brainstorming phase. Your input in this project is confidential.

University of New Mexico Health Sciences Center

STUDY TITLE: Adaptation Categories Made to Evidence-Based Public Health Programs in Low- to Middle-Income Countries: A Concept Mapping Analysis

Dr. Beth Tigges and Elizabeth Holguin, MPH, MSN, FNP-BC, from the University of New Mexico's College of Nursing, are conducting a research study. The purpose of the study is to identify types of adaptations that occur during global health program implementation in low- to middle-income countries. You are being asked to participate in this study because you have been identified as someone who may have experience implementing public health programs in this context.

Your participation will involve three independent web-based sessions including brainstorming, sorting, and rating of statements; each session will take approximately 30-60 minutes to complete and you will have two weeks to complete each session. Your involvement in the study is voluntary, and you may choose not to participate. There are no names or identifying information associated with this project. The study includes a focus prompt regarding types of changes that you have experienced when implementing global health programs to help better fit the local environment. You can refuse to participate in any of the phases at any time, and also elect to participate in the brainstorming phase only. There are no known risks in this study, but some individuals may experience discomfort with participating. All data will be kept for two years in a locked password protected University of New Mexico computer and in the password protected administrator only access study software (CS Global MAX™) and then destroyed.

[10] This consent form template was recommended after consultation with HRPO staff on 10/4/2017. A waiver of written informed consent was not deemed necessary.

The findings from this project will provide information on types of adaptation that occur during implementation of global health programs in low- to middle income countries. If published, results will be presented in summary form only.

If you have any questions about this research project, please feel free to call Elizabeth Holguin at (505) 331-7773. If you have questions regarding your legal rights as a research subject, you may call the UNMHSC Office of Human Research Protections at (505) 272-1129.

By self-registering on the CS Global MAX™ web-based software, you are consenting to participate in the study.

Thank you for your consideration.

Sincerely,

Elizabeth Holguin, MPH, MSN, FNP-BC
Ph.D. Candidate

Appendix I

Concept Systems INCORPORATED

Security Information for CS Global MAX™

The server for the CS Global MAX™ website is located in a locked facility with restricted access. Only the host company has physical and electronic access to the server. All data is stored in a single database instance on the server. The database TCP-IP port is closed by the server computer firewall.

Browser sessions need to have persistent information stored for each user. A session record will be created in the database for each active browser session, and used to store this persistent information. A cookie-based session identifier can be used to recover from interrupted (i.e. crashed) session; a session will have an expiration time to minimize security issues with this approach.

All functional areas of the CS Global MAX™ web application have access restrictions. Access is checked at the start of every web page delivery, and invalid access exceptions are redirected to the appropriate page that explains why the intended page cannot be displayed.

Within a project, a project administrator has access to change the project settings and assign participants to the tasks of brainstorming, sorting statements, and rating statements. There are useful tools to assist the administrator which are especially helpful when the number of participants becomes large.

Participants are assigned by the project administrator to various tasks such as brainstorming, sorting, and rating statements. If access is attempted by a participant to an unauthorized task, then they are returned to a valid web page with an explanatory message.

Project administrators can only see participant personal information if they either created the participant account or the participant created the account in response to a direct request by the project administrator. Password information from user accounts that pre-existed an invitation from a project cannot be edited by the project administrator.

CS Global MAX™ projects can be run with, or without, encrypted packet transmission (SSL). Based on the project URL that is sent to participants, (e.g. http or https), that participant's session will or will not be encrypted.

CS Global MAX™ website does not collect IP Addresses of website users except on help requests that are submitted through the project website.

Concept Systems, Inc. does not gather, compile, or share any data from licensee projects and will not collect any information that specifically identifies a participant or their data. Additionally, the CS Global MAX™ website's analysis is designed to look at participant data in the aggregate, or based on subgroups defined by closed-ended questions which participants can respond to.

Appendix J

HRRC#

Online Self-Registration

Please fill out the form below to create your account. Please enter either a username OR an email address. This will become your sign-in name.

Introduction Page: Project Introduction On-Screen Script:

It is generally accepted that some degree of adaptation should occur in order to achieve positive, sustainable outcomes in public health programs. Therefore, the types of adaptation must be better defined and understood in order to lay the groundwork for future research surrounding sustainable impact that works for the populations in which they were meant to serve. To study the effects of adaptation, we need to have a clear conceptual and practical understanding of the construct. The purpose of this study is to describe, categorize, and conceptualize adaptations made during implementation of evidence-based public health interventions to demonstrate what adaptations occur, how important adaptations are perceived to be, and how easy or difficult it is to make modifications determined to be necessary by you, the program implementers.

Home Page: Language will change during each session as indicated below

- ► **Session 1: Brainstorming**

We would like you to participate in the first part of the process (brainstorming ideas). It should take only about 30-60 minutes. **The first phase of data collection will run from now through DATE OF BRAINSTORMING CLOSURE**.

We are inviting you to take part in answering the following focus prompt:

*"*An example of a type of change I have seen made in order to make a global health program more successful is…….".

You will have the ability to see other participants' statements made anonymously. Please generate as many unique statements as possible that you believe are pertinent to the topic, there is no limit.

- ► **Session 2: Tabletop Sorting Instructions**

We would like you to participate in the second part of the process (statement sorting). It should take only about 30-60 minutes. **The second phase of data collection will run from now through DATE OF SORTING CLOSURE**.

In this activity, you will categorize the statements, according to your view of their meaning or theme. (e.g.,……) To do this, you will sort each statement into piles in a way that makes sense to you. First, read through the statements in the Unsorted Statements column to the left.

Next, sort each statement into a pile you create. Group the statements for how **similar in meaning or theme** they are to one another. Give each pile a name that describes its theme or contents.

Do NOT create piles according to priority, or value, such as "Important" or "Hard To Do."

Do NOT create piles such as "Miscellaneous" or "Other" that group together dissimilar statements. Put a statement alone in its own pile if it is unrelated to all the other statements. Make sure every statement is put somewhere. Do not leave any statements in the Unsorted Statements column.

People vary in how many piles they create. Usually 5 to 20 piles work well to organize this number of statements.

► **Session 3: Rating of Statements**

We would like you to participate in the third part of the process (rating of statements). It should take only about 30-60 minutes. **The third phase of data collection will run from now through DATE OF RATING CLOSURE**.

Please scan the list of statements in its entirety to determine which are of highest and lowest priority; then try to use the full range of rating values (e.g., 1-5) when rating the statements. For importance, please rate how important you believe the statement to be to program success. For ease, please rate accordingly regarding how easy or difficult you feel the statement is to complete.

Please rate the following statements, in the range indicated below:

Importance	Ease
1= not important at all	1= not achievable/not possible
2=slightly important	2= very difficult
3= moderately important	3= somewhat difficult
4=very important	4= little difficulty

5= essential	5= completed with relative ease

References

Aarons, G.A., Green, A.E., Palinkas, L.A., Self-Brown, S., Whitaker, D.J… & Chaffin, M.J. (2012). Dynamic adaptation process to implement an evidence-based child maltreatment intervention. *Implementation Science, 7* (32), 1-9.

Aarons, G.A., Hurlburt, M., Horwitz, S.M. (2011). Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Administrative Policy in Mental Health and Mental Health Services, 38* (1), 4-23.

Abrahams-Gessel, S., Denman, C.A., Montano, C.M., Gaziano, T.A., Levitt, N., &…. Puoane, T. (2015). The training and fieldwork experiences of community health workers conducting population-based, noninvasive screening for CVD in LMIC. Global Heart, 10(1), 45-54.

Abry, T., Hulleman, C.S., & Rimm-Kaufman, S.E. (2015). Using indices of fidelity to intervention core components to identify program active ingredients. *American Journal of Evaluation, 36* (3), 320-338.

Ammerman, A., Smith, T.W., & Calancie, L. (2014). Practice-based evidence in public health: Improving reach, relevance, and results. *Annual Review of Public Health, 35*, 47-63.

Anderson, L.A., & Slonim, A. (2017). Perspectives on the strategic uses of concept mapping to address public health challenges. *Evaluation and Program Planning, 60*, 194-201.

Andrew, S. & Halcomb, E.J. (2007). Mixed methods research is an effective method of enquiry for community health research. *Contemporary Nurse, 23*(2), 145-53.

Atif, N., Krishna, R.N., Sikander, S., Lazarus, A., Nisar, A., Ahmad, I., … & Rahman, A. (2017). Mother-to-mother therapy in India and Pakistan: adaptation and feasibility evaluation of the peer-delivered Thinking Healthy Programme. BMC Psychiatry, 17(79), 1-14.

Akerlund, K. M. (2000). Prevention program sustainability: The state's perspective. *Journal of Community Psychology, 28*(3), 353-362.

Backer, T. E. (2001). *Finding the Balance—Program Fidelity and Adaptation in Substance Abuse Prevention: A State-of-the Art Review.* Center for Substance Abuse Prevention, Rockville, MD.

Barratt, M.J., Ferris, J.A., & Lenton, S. (2015). Hidden populations, online purposive sampling, and external validity: Taking off the blindfold. *Field Methods, 27* (1), 3-21.

Barrera, M., Castro, F.G., Strycker, L.A., & Toobert, D.J. (2013). Cultural adaptations of behavioral health interventions: a progress report. *Journal of Consulting and Clinical Psychology, 81*(2), 196-205.

Bauer, M.S., Damschroder, L., Hagedorn, H., Smith, J., & Kilbourne, A.M. (2015). An introduction to implementation science for the non-specialist. (2015). *BMC Psychology, 3* (32), 1-12.

Bauman, L.J., Stein, R.E.K., & Ireys, H. (1991). Reinventing fidelity: the transfer of social technology among settings. *American Journal of Community Psychology, 19*(4), 619-639.

Bellg, A.J., Borrelli, B., Resnick, B., Hecht, J., Minicucci, D.S., Ory, M., … & Czajkowski, S. (2004). Enhancing treatment fidelity in health behavior change studies: Best practices and recommendations from the NIH behavior change consortium. *Health Psychology, 23 (5),* 443-451.

Berman, P., & McLaughlin, M. (1976). Implementation of educational innovation. *Educational Forum, 40*, 347-370.

Berman, P., & McLaughlin, M.W. (1978). Federal programs supporting educational change, Vol. VIII: Implementing and sustaining innovations. [R-1589/8-HEW]. Santa Monica, CA: RAND. Retrieved from http://www.rand.org/content/dam/rand/pubs/reports/2006/R1589.8.pdf

Berman, P. (1980). Thinking about programmed and adaptive implementation: matching strategies to situations. In: Ingram, H., & Mann, D. (Eds). *Why policies succeed or fail.* Beverly Hills, CA: Sage Publications.

Biro, E., Veres-Balajti, I., Adany, R., & Kosa, K. (2017). Social cognitive intervention reduces stress in Hungarian university students. *Health Promotion International, 32* (1), 73-78.

Bishop, D.C., Pankratz, M.M., Hansen, W.B., Albritton, J., Albritton, L., & Strack, J. (2014). Measuring fidelity and adaptation: Reliability of an instrument for school-based prevention programs. *Evaluation & the Health Professions, 37* (2), 231-257.

Black, K.J., Wenger, M.B., & O'Fallon, M. (2015). Developing a fidelity assessment instrument for nurse home visitors. *Research in Nursing & Health, 38,* 232-240.

Blakely, C.H., Mayer, J.P., Gottschalk, R.G., Schmitt, N., Davidson, W.S…. & Emshoff, J.G. (1987). The fidelity-adaptation debate: Implications for the implementation of public sector social programs. *American Journal of Community Psychology, 15,* 253-268.

Bleijenberg, N., ten Dam, V.H., Drubbel, I., Numans, M.E., de Wit., N.J., & Schuurmans, M.J. (2016). Treatment fidelity of an evidence-based nurse-led intervention in a proactive primary care program for older people. Worldviews on Evidence-Based Nursing, 13 (1), 75-84.

Bloomfield, G.S., Wang, T.Y., Boulware, L.E., Califf, R.M., Hernandez, A.F., Velazquez, E.J., &… Li, J.S. (2015). Implementation of management strategies for diabetes and hypertension: from local to global health in cardiovascular diseases. Global Heart, 10(1), 31-38.

Blumenthal, D.S., Hopkins, E., & Yancey, E. (2013). *Community-based participatory research: An introduction.* (pp 1-18). In Blumenthal, D.S., DiClemente, R.J., Braithwaite, R.L., & Smith, S.A. (Eds). Community-based participatory health research: Issues, methods, and translation to practice. 2nd Ed. New York, NY: Springer Publishing Company, LLC.

Bopp, M., Saunders, R.P., & Lattimore, D. (2013). The tug-of-war: Fidelity versus adaptation throughout the health promotion program life cycle. *Journal of Primary Prevention, 34*(3), 193-207.

Borrelli, B. (2011). The assessment, monitoring, and enhancement of treatment fidelity in public health clinical trials. *Journal of Public Health Dentistry, 71*(s1), S52-S63.

Borrelli, B., Sepinwall, D., Ernst, D., Bellg, A.J., Czajkowski, S., … & Orwig, D. (2005). A new tool to assess treatment fidelity and evaluation of treatment fidelity across 10 years of health behavior research. *Journal of Consulting and Clinical Psychology, 73* (5), 852-860.

Bowen, S.K., Saunders, R.P., Richter, D.L., Hussey, J., Elder, K., & Lindley, L. (2010). Assessing levels of adaptation during implementation of evidence-based interventions: introducing the Rogers-Rütten framework. *Health Education & Behavior, 37*(6), 815-830.

Breitenstein, S.M., Fogg, L., Garvey, C., Hill, C., Resnick, B., & Gross, D. (2010). Measuring implementation fidelity in a community-based parenting program. *Nursing Research, 59* (3), 158-165. doi: 10.1097/NNR.0b013e3181dbb2e2.

Breitenstein, S.M., Gross, D., Garvey, C.A., Hill, C., Fogg, L., & Resnick, B. (2010b). Implementation fidelity in community-based programs. *Research in Nursing & Health, 33* (2), 164-173. doi: 10.1002/nur.20373.

Breitenstein, S., Robbins, L., & Muennich Cowell, J. (2012). [Editorial]. Attention to fidelity: Why is it important? *The Journal of School Nursing, 28* (6), 407-408.

Brown, C.H., Ten Have, T.R., Jo, B., Dagne, G., Wyman, P.A...& Gibbons, R.D. (2009). Adaptive designs for randomized trials in public health. *Annual Review of Public Health, 30,* 1-25.

Brownson, R.C., Kreuter, M.W., Arrington, B.A., & True, W.R. (2006). Translating scientific discoveries into public health action: How can schools of public health move us forward? *Public Health Reports, 121* (1), 97-103.

Brownson, R.C., Fielding, J.E., & Maylahn, C.M. (2009). Evidence-based public health: A fundamental concept for public health practice. *Annual Review of Public Health, 30,* 175-201.

Brownson, R.C. (Nov 2015). Adaptation and dissemination of evidence-based interventions for cancer prevention. [PowerPoint Presentation]. Innovations in Cancer Prevention and Research 2015 Conference. Austin, TX. Retrieved from cprit2015.org/downloads/11-9-15-130-Brownson-Wedgwood.pdf

Burke, J.G., O'Campo, P., Peak, G.L., Gielen, A.C., McDonnell, K.A., & Trochim, W.M.K. (2005). An introduction to concept mapping as a participatory public health research method. *Qualitative Health Research, 15* (10), 1392-1410.

Burroughs Pena, M.S. & Bloomfield, G.S. (2015). Cardiovascular disease research and the development agenda in low-and middle-income countries. [Editorial Viewpoint]. *Global Heart, 10*(1), 71-73.

Byrnes, H.F., Miller, B.A., Aalborg, A.E., Plasencia, A.V., & Keagy, C.D. (2010). Implementation fidelity in adolescent family-based prevention programs: relationship to family engagement. *Health Education Research, 25* (4), 531-541.

Cabassa, L.J., & Baumann, A.A. (2013). A two-way street: bridging implementation science and cultural adaptations of mental health treatments. *Implementation Science, 8* (90), 1-14.

Cambraia Windsor, L. (2013). Using concept mapping in community-based participatory research: A mixed methods approach. *Journal of Mixed Methods Research, 7* (3), 274-293.

Campbell, B.K. (2011). Fidelity in public health clinical trials: considering provider-participant relationship factors in community treatment settings.

Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). A conceptual framework for implementation fidelity. *Implementation Science, 2* (40), 1-9.

Carvalho, M.L., Honeycutt, S., Escoffrey, C., Glanz, K., Sabbs, D., & Kegler, M.C. (2013). Balancing fidelity and adaptation: Implementing evidence-based chronic disease prevention programs. *Journal of Public Health Management and Practice, 19* (4), 348-356.

Castro, F.G., Barrera, M., & Martinez, C.R. (2004). The cultural adaptation of prevention interventions. Resolving tension between fidelity and fit. *Prevention Science, 5*, 41-45.

Century, J., Rudnick, M., & Freeman, C. (2010). A framework for measuring fidelity of implementation: A foundation for shared language and accumulation of knowledge. *American Journal of Evaluation, 31* (2), 199-218.

Chambers, D.A., Glasgow, R.E., & Stange, K.C. (2013). The dynamic sustainability framework: Addressing the paradox of sustainment amid ongoing change. *Implementation Science, 8*(117), 1-11. doi:10.1186/1748-5908-8-117.

Chambers, D.A., & Kerner, J.F. (2007). *Closing the gap between discovery and delivery.* [PowerPoint Presentation: Dissemination and Implementation Research Workshop: Harnessing Science to Maximize Strength]. Retrieved from https://cancercontrol.cancer.gov/is/pdfs/BackgroundDisseminationImplementationResearch.pdf

Chambless, D., & Hollon, S. (1998). Defining empirically supported therapies. *Journal of Consulting and Clinical Psychology, 66* (1), 7-18.

Chow, S.C. (2014). Adaptive clinical trial design. *Annual Review of Medicine, 65*, 405-15.

Cohen, D.J., Crabtree, B.F., Etz, R.S., Balasubramanian, B.A. Donahue, K.E., … & Green, L.W. (2008). Fidelity versus flexibility: Translating evidence-based research into practice. *American Journal of Preventive Medicine, 35* (5S), S381-389.

Collins, C., Harshbarger, C., Sawyer, R., & Hamdallah, M. (2006). The diffusion of effective behavioral interventions project: Development, implementation, and lessons learned. *AIDS Education and Prevention, 18*(4 Suppl. A), 5-20.

Cook, T.D. & Campbell, D.T. (1979). *Quasi-experimentation: Design and analysis issues for field settings.* Boston: Houghton Mifflin.

Cook, T.D., Leviton, L.C., & Shadish, W.R. Jr. (1985). Program evaluation. In G. Lindzey & E. Aronson (Eds.), *The handbook of social psychology (3rd ed.).* New York: Random House.

Cooksey R. (2006). *A review of UK health research funding.* London: HMSO.

Cooney, S.M., Huser, M., Small, S., & O'Connor, C. (2007). Evidence-based programs: An overview. What Works, Wisconsin-Research to Practice Series, 6, 1-8. Retrieved from http://www.human.cornell.edu/outreach/upload/Evidence-based-Programs-Overview.pdf

Cooper, B.R., Shrestha, G., Hyman, L., Hill, L. (2016). Adaptations in a community-based family intervention: replication of two coding schemes. Journal of Primary Prevention, 37, 33-52.

Cordray, D.S. (2007). *Fidelity of intervention implementation*. [PowerPoint Presentation]. The IES Summer Training Institute on Cluster Randomized Control Trials: Nashville, TN.

Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I., & Petticrew, M. (2013). Developing and evaluating complex programs: The new Medical Research Council guidance. *International Journal of Nursing Studies*, *50*, 585-592.

Creswell, J.W., Klassen, A.C., Plano Clark, V.L., & Smith, K.C for the Office of Behavioral and Social Sciences Research. (2011). *Best practices for mixed methods research in the health sciences.* National Institutes of Health.

Cronbach, L. (1982). *Designing evaluations of educational and social programs.* San Francisco: Jossey-Bass.

CS Global MAX™. (2017). Developing Materials [PowerPoint Presentation]. Concept Systems, Inc.

Daire, J., Gilson, L., & Cleary, S. (April 2014). Developing leadership and management competencies in low and middle-income country health systems: a review of the literature. RESYST [Working Paper 4]. Retrieved from resist.lshtm.ac.uk/sites/resist.lshtm.ac.uk/files/docs/resources/WP4_Developing%20leadership%20and%20management%20competencies.pdf

Damschroder, L.J., Aron, D.C., Keith, R.E., Kirsh, S.R., Alexander, J.A., & Lowery, J.C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Science, 4* (50), 1-15.

Dane, A., & Schneider, B. (1998). Program integrity in primary and early secondary prevention: are implementation effects out of control. *Clinical Psychology Review, 18* (23), 23-45.

Davis, S., Patel, P., Sheikh, A., Anabwani, G., & Tolle, M.A. (2013). Adaptations of a general primary care package for HIV-infected adults to an HIV centre setting in Gaborone, Botswana. *Tropical Medicine and International Health, 18*(3), 328-343.

Dearing, J. (2008). Evolution of diffusion and dissemination theory. *Journal of Public Health Management & Practice, 14* (2), 94-103.

de Savigny, D., Adam, T. (2009). *System thinking for health system strengthening*. Geneva: Alliance for Health Policy and Systems Research.

Design for high-and low-resource settings (2014). Retrieved from http://courses.washington.edu/bioeteam/400_DesignHighLowResource2014.pdf

Dobson, D. & Cook, T.J. (1980). Avoiding type III error in program evaluation: Results from a field experiment. *Evaluation and Program Planning, 3*(4), 269-276.

Dogherty, E.J., Harrison, M.B., Baker, C., & Graham, I.D. (2012). Following a natural experiment of guideline adaptation and early implementation: a mixed-methods study of facilitation. *Implementation Science, 7* (9), 1-12.

Domitrovich, C.E., & Greenberg, M.T. (2000). The study of implementation: Current findings from effective programs that prevent mental disorders in school-aged children. *Journal of Educational and Psychological Consultation, 11*, 193-221.

Drolet, B.C., & Lorenzi, N.M. (2011). Translational research: understanding the continuum from bench to bedside. *Translational Research, 157*(1), 1-5. doi: 10.1016/j.trsl.2010.10.002

Durlak, J.A., & DuPre, E.P. (2008). Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American Journal of Community Psychology, 41,* 327-350.

Dusenbury, L., Brannigan, R., Falco, M., & Hansen, W.B. (2003). A review of research on fidelity of implementation: implications for drug abuse prevention in school settings. *Health Education Research, 18,* 237-56.

Eccles, M.P., & Mittman, B.S. (2006). Welcome to implementation science. *Implementation Science, 1* (1), 1-3.

El-Jardali, F., Lavis, J., Moat, K., Pantoja, T., & Ataya, N. (2014). Capturing lessons learned from evidence-to-policy initiatives through structured reflection. *Health Research Policy and Systems, 12* (2), 1-15.

Eke, A.N., Neumann, M.S., Wilkes, A.L., & Jones, P.L. (2006). Preparing effective behavioral interventions to be used by prevention providers: the role of researchers during HIV Prevention Research Trials. *AIDS Education & Prevention, 18* (4) (suppl A), 44-58.

Elliott, D.S. & Mihalic, S. (2004). Issues in disseminating and replicating effective prevention programs. *Prevention Science, 5*, 47-52.

Ennett, S.T., Haws, S., Ringwalt, C.L., Vincus, A.A., Hanley, S., … & Rohrbach, L.A. (2011). Evidence-based practice in school substance use prevention: fidelity of implementation under real-world conditions. *Health Education Research, 26* (2), 361-371.

EPISCenter. (2015). *Defining evidence-based programs*. Retrieved from www.episcenter.psu.edu/ebp/definition

Esbensen, F.A., Matsuda, K.N., Taylor, T.J., & Peterson, D. (2011). Multimethod strategy for assessing program fidelity: The national evaluation of the revised G.R.E.A.T. program. *Evaluation Review, 35* (1), 14-39.

Etikan, I., Alkassim, R., & Abubakar, S. (2016). Comparison of snowball sampling and sequential sampling technique. *Biometrics & Biostatistics International Journal,* 3 (1), 1-2.

Fagan, A.A., Hanson, K., Hawkins, J.D., & Arthur, M.W. (2008). Bridging science to practice: Achieving prevention program implementation fidelity in the Community Youth Development Study. *American Journal of Community Psychology, 41*, 235-249.

Fairweather, G.W., & Davidson, W.S. (1986). *An introduction to community experimentation: Theory, methods and practice.* New York: McGraw-Hill.

Fetterman, D.M. (1996). Empowerment evaluation: an introductory to theory and practice. In Fetterman, D., Kaftarian, S., and Wandersman, A. (Eds), *Empowerment Evaluation: Knowledge and Tools for Self-assessment and Accountability*. Sage, Thousand Oaks, CA, pp.3-46.

Fetters, M.D., Curry, L.A., & Creswell, J.W. (2013). Achieving integration in mixed methods designs-principles and practices. *Health Services Research, 48*(6 Pt 2), 2134-2156.

Fineberg, H. (1990). *Traditional distinctions between public health and medicine.* Table 5-1, Who will keep the public healthy? Evaluating Public Health Professionals for the 21st Century. Institute of Medicine, 2003. Retrieved from https://phpartners.org/tutorial/04-ebph/2-keyConcepts/4.2.1.html

Fixsen, D.L., Naoom, S.F., Blase, K.A., Friedman, R.M. & Wallace, F. (2005). *Implementation research: A synthesis of the literature* [FMHI Publication No. 231]. Tampa: University of South Florida, The Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network.

Fixsen, D.L. & Blase, K.A. (2008). Implementation: The missing link between research and practice. [PowerPoint Presentation].

Flay, B. (1986). Efficacy and effectiveness trials (and other phases of research) in the development of health promotion programs. *Preventive Medicine, 15,* 451-474.

Flay, B., Biglan, A., Boruch, R., Castro, F., Gottfredson, D. & Kellam, S. (2005). Standards of evidence: Criteria for efficacy, effectiveness, and dissemination. *Prevention Science, 6* (3), 151-175.

Frank, J.C., Coviak, C.P., Healy, T.C., Belza, B., & Casado, B.L. (2008). Addressing fidelity in evidence-based health promotion programs for older adults. *Journal of Applied Gerontology, 27* (1), 4-33. doi: 10.1177/0733464807308621

Fullan, M. (1983). Evaluating program implementation: What can be learned from follow through. *Curriculum Inquiry, 13,* 215-227.

Galbraith, J.S., Herbst, J.H., Whittier, D.K., Jones, P.L., Smith, B.D., Uhl, G., & Fisher, H.H. (2011). Taxonomy for strengthening the identification of core elements for evidence-based behavioral interventions for HIV/AIDS prevention. *Health Education and Research, 25*(5), 872-885.

Gannon, F. (2014). The steps from translatable to translational research. *EMBO Reports, 15*(11). doi: 10.15252/embr.201439587.

Garbers, S., Flandrick, K., Bermudez, D., Meserve, A., & Chiasson, M.A. (2014). Improving contraceptive choice: Fidelity of implementation and the gap between effectiveness and efficacy. *Health Promotion Practice, 15* (6), 894-903.

Gearing, R.E., El-Bassel, N., Ghesquiere, A., Baldwin, S., Gillies, J., & Ngeow, E. (2011). Major ingredients of fidelity: A review and scientific guide for improving quality of intervention research implementation. *Clinical Psychology Review, 31*, 79-88.

Glasgow, R.E., & Chambers, D. (2012). Developing robust, sustainable, implementation systems using rigorous, rapid and relevant science. *Clinical Translational Science, 5,* 48-55.

Glasgow, R.E., & Emmonds, K.M. (2007). How can we increase translation of research into practice? Types of evidence needed. *Annual Review of Public Health, 28,* 413-33.

Glasgow, R.E., Green, L., Klesges, L., Abrams, D., Fisher, E., … & Orleans, T. (2006). External validity: We need to do more. *Annals of Behavioral Medicine, 31,* 105-108.

Glasgow, R.E., Lichtenstein, E., & Marcus, A.C. (2003). Why don't we see more translation of public health promotion research into practice? Rethinking the efficacy to effectiveness transition. *American Journal of Public Health, 93* (8), 1261-1267.

Griffin, S.F., Wilcox, S., Ory, M.G., Lattimore, D., Leviton, L., …& Rheaume, C. (2010). Results from the Active for Life process evaluation: program delivery fidelity and adaptations. *Health Education Research, 25* (2), 325-342.

Gold, R., Hollombe, C., Bunce, A., Nelson, C., Davis, J.V., … & Smith, D. (2015). Study protocol for "Study of Practices Enabling Implementation and Adaptation in the Safety Net (SPREAD-NET)": a pragmatic trial comparing implementation strategies. *Implementation Science, 10* (144), 1-13.

Gosling, J., Case, P., Tulloch, J., Chandramohan, D., Wegbreit, J., …& Gosling, R. (2015). Effective program management: a cornerstone of malaria elimination. *American Journal of Tropical Medicine and Hygiene, 93*(1), 135-138.

Green, L.W., & Glasgow, R.E. (2006). Evaluating the relevance, generalization, and applicability of research. *Evaluation & the Health Professions, 29*, 126-153.

Greenhalgh, T., Robert, G., MacFarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: systematic review and recommendations. *The Milbank Quarterly, 82* (4), 581-629.

Hall, D.L., Lattie, E.G., McCalla, J.R., & Saab, P.G. (2016). Translation of the diabetes prevention program to ethnic communities in the United States. *Journal of Immigrant and Minority Health, 18*,479-489.

Hall, G.E., & Loucks, S.F. (1977). A developmental model for determining whether the treatment is actually implemented. *American Educational Research Journal, 14,* 263-276.

Hansen, W.B. (2013). Introduction to the special issue on adaptation and fidelity. Health Education, 113 (4), 260-263. doi: 10.1108/09654281311329213.

Hansen, W.B., Pankratz, M.M., Dusenbury, L., Giles, S.M., Bishop, D.C., …& Strack, J. (2013). Styles of adaptation: the impact of frequency and valence of adaptation on preventing substance use. *Health Education, 113*(4), 345-363.

Harachi, T.W., Abbott, R.D., Catalano, R.F., Haggerty, K.P., & Felming, C. (1999). Opening the black box: Using process evaluation measures to assess implementation and theory building. *American Journal of Community Psychology, 27,* 715-735.

Harris, C., Garrubba, M., Allen, K., King, R., Kelly, C., … & Farjou, D. (2015). Development, implementation and evaluation of an evidence-based program for introduction of new health technologies and clinical practices in a local healthcare setting. *BMC Health Services Research, 15* (575), 1-16.

Harrison, M.B., Graham, I.D., van den Hoek, J., Dogherty, E.J., Carley, M.E., & Angus, V. (2013). Guideline adaptation and implementation planning: a prospective observational study. *Implementation Science, 8* (49), 1-14.

Harshbarger, C., Simmons, G., Coelho, H., Sloop, K., & Collins, C. (2006). An empirical assessment of implementation, adaptation, and tailoring: the evaluation of CDC's National Diffusion of VOICES/VOCES. *AIDS Education & Prevention, 18* (4 Suppl A), 184-197.

Hassmiller Lich, K., Urban, J.B., Frerichs, L., & Dave, G. (2017). Extending systems thinking in planning and evaluation using group concept mapping and system dynamics to tackle complex problems. *Evaluation and Program Planning, 60,* 254-264.

Hartman, M.A., Stronks, K., Highfield, L., Cremer, S.W., Verhoeff, A.P., & Nierkens, V. (2015). [Meeting abstract]. Disseminating evidence-based interventions to new populations: a systematic approach to consider the need for adaptation. *Implementation Science, 10* (Suppl 1), A49.

Hasson, H., Blomberg, S., & Duner, A. (2012). Fidelity and moderating factors in complex programs: a case study of a continuum of care program for frail elderly people in health and social care. *Implementation Science, 7* (23), 1-11.

Hatch-Maillette, M.A., Burlew, A.K., Turnbull, S., Robinson, M., & Calsyn, D.A. (2013). Measuring fidelity to a culturally adapted HIV prevention program for men in substance abuse treatment. *Journal of Substance Abuse and Treatment, 45* (4), 363-9.

Hawe, P., Shiell, A., & Riley, T. (2004). Complex interventions: How "out of control" can a randomized controlled trial be? *British Medical Journal, 328,* 1561-1563.

Hawe, P., Shiell, A., Riley, T., & Gold, L. (2004). Methods for exploring implementation variation and local context within a cluster randomized community program trial. *Journal of Epidemiology and Community Health, 58,* 788-793.

Haynes, A., Brennan, S., Redman, S., Williamson, A., Gallego, G., Butow, P., & The CIPHER team. (2016). Figuring out fidelity: a worked example of the methods used to identify, critique, and revise the essential elements of a contextualized program in health policy agencies. *Implementation Science, 11* (23), 1-18.

Hill, L.G., Maucione, K., & Hood, B.K. (2007). A focused approach to assessing program fidelity. *Prevention Science, 8,* 25-34.

Hill, L.G., & Owens, R.W. (2013). Component analysis of adherence in a family program. *Health Education, 113* (4), 264-280. doi: 10.1108/09654281311329222.

Holland, S. (1985). Using program information to plan evaluations. In D.S. Cordray (Ed.), *Utilizing prior research in evaluation planning* (pp. 63-78). San Francisco: Jossey-Bass.

Hyder, A.A., Alonge, O., He, S., Wadhwaniya, S., Rahman, F....& El Arifeen, S. (2014). A framework for addressing implementation gap in global drowning prevention interventions: experiences from Bangladesh. *Journal of Health Population & Nutrition, 32(*4), 564-576.

Ingram, B., Flannery, D., Elkavich, A., & Rotheram-Borus, M.J. (2008). Common processes in evidence-based adolescent HIV prevention programs. *AIDS Behavior, 12,* 374-383.

Institute of Translational Health Sciences. (2017). T-phases of translational health research. Retrieved from https://www.iths.org/investigators/definitions/translational-research/

Ippoliti, N.B., & L'Engle, K. (2017). Meet us on the phone: mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries. *Reproductive Health, 14*(11), 1-8. doi: 10.1186/s12978-016-0276-z.

Jackson, K.M., & Trochim, W.M.K. (2002). Concept mapping as an alternative approach for the analysis of open-ended survey responses. *Organizational Research Methods, 5* (4), 307-336.

Janevic, M., Bryant-Stephens, T., Lara, M., Ohadike, Y., Persky, V., … & Malveaux, F. (2015). Adaptation reconceptualized: "retrofitting" ongoing organizational activities with essential elements of evidence-based interventions. *Implementation Science, 10* (Suppl 1), A35.

Jason, L.A., Durlak, J.A., & Holton-Walker, E. (1984). Prevention of child problems in the schools. In M.C. Roberts & L. Peterson (Eds.), *Prevention of problems in childhood* (pp. 311-342). New York: Wiley.

JBA: James Bell Associates. (2009). [Evaluation Brief]. *Measuring implementation fidelity.* Retrieved from www.jbassoc.com/ReportsPublications/Evaluation%20Brief%20-%20Measuring%20Implementation%20Fidelity_October.pdf

Jenicek, M. (1997). Epidemiology, evidence-based medicine, and evidence-based public health. *Journal of Epidemiology, 7* (4), 187-197.

Jhpiego. (2017). Access to health. Retrieved from https://www.jhpiego.org/accesstohealth/ .

Johnson, T., Boardman, C., Grainger Gasser, A. (2015). The 5x5 path toward rheumatic heart disease control: outcomes from the Third Rheumatic Heart Disease Forum. Global Heart, 10, 75-8.

Jones, K., Gray, P., Whiteside, Y.O., Wang, T., Bost, D., …& Johnson, W.D. (2008). Evaluation of an HIV prevention program adapted for Black men who have sex with men. *American Journal of Public Health, 98* (6), 1043-1050.

Kalolo, A., Radermacher, R., Stoermer, M., Meshack, M., & De Allegri, M. (2015). Factors affecting adoption, implementation fidelity, and sustainability of the Redesigned Community Health Fund in Tanzania: a mixed methods protocol for process evaluation in the Dodoma region. *Global Health Action, 8*, 1-12.

Kaltman, S., Pauk, J., & Alter, C.L. (2011). Meeting the mental health needs of low-income immigrants in primary care: a community adaptation of an evidence-based model. *American Journal of Orthopsychiatry, 81*(4), 543-551.

Kane, M., & Trochim, W. (2007). *Concept mapping for planning and evaluation* (Vol. 50). Thousand Oaks, CA: Sage Publications.

Kane, M., & Trochim, W. (2009). *Concept mapping for applied social research.* In L. Bickman & D. Rog (Eds.), The sage handbook of applied social research methods (pp.435-474). Thousand Oaks, CA: Sage Publications.

Kaunitz, C., Strandberg, A. (2009). Aggression replacement training (ART) in Sweden-evidence-based social work practice. *Socionomens forskningssupplement, 26*, 36-52.

Kaysen, D., Lindgren, K., Sabir Zangana, G.A., Murray, L., Bass, J., & Bolton, P. (2013). Adaptation of cognitive processing therapy for treatment of torture victims: Experience in Kurdistan, Iraq. *Psychological Trauma: Theory, Research, Practice, and Policy, 5* (2), 184-192.

Kelsey, M., Layzer, J. (2014). Implementing three evidence-based program models: early lessons from the teen pregnancy prevention replication study. *Journal of Adolescent Health, 54*, S45-S52.

Kerner, J. (2008). Integrating research, practice, and policy: What we see depends on where we stand. Journal of Public Health Management & Practice, 14 (2), 193-198.

Kevany, S., Hatfield, A., Workneh N.G., Durrani, B.A.Z., Bekele, Y., …& Myrick,R. (2012a). Diplomatic and operational adaptations to global health programmes in post-conflict settings: contributions of monitoring and evaluation systems to health sector development and 'nation-building' in South Sudan. *Medicine, Conflict, and Survival, 28*(3), 247-262.

Kevany, S. Khumalo-Sakutukwa, G., Murima, O., Chingono, A., Modiba, A…& Morin, S.F. (2012b). Health diplomacy and the adaptation of global health interventions to local needs in sub-Saharan Africa and Thailand: evaluating findings from Project Accept (HPTN 043). *BMC Public Health, 12*(459), 1-11.

Kevany, S., Sahak, O., Workneh, N.G., & Saeedzai, S.A. (2014). Global health diplomacy investments in Afghanistan: adaptations and outcomes of global fund malaria programs. *Medicine, Conflict and Survival, 30*(1), 37-55. doi: 10.1080/13623699.2014.874187.

Khoury, M.J., Gwinn, M., Yoon, P.W., Dowling, N., Moore, C.A., & Bradley, L. (2007). The continuum of translation research in genomic medicine: how can we accelerate the appropriate integration of human genomic discoveries into health care and disease prevention? *Genetic Medicine, 9*(10), 665-674.

Kilbourne, A.M., Neumann, M.S., Pincus, H.A., Bauer, M.S., & Stall, R. (2007). Implementing evidence-based interventions in health care: application of the replicating effective programs framework. *Implementation Science, 2* (42), 1-10.

Kolaczinski, J., Graham, K., Fahim, A., Brooker, S., & Rowland, M. (2005). Malaria control in Afghanistan: progress and challenges. *The Lancet, 365*(9469), 1506-1512.

Korda, H. (2013). [Editorial]. Bringing evidence-based interventions to the field: The fidelity challenge. *Journal of Public Health Management & Practice, 19* (1), 1-3.

Kothari, A., Rudman, D., Dobbins, M., Rouse, M., Sibbald, S., & Edwards, N. (2012). The use of tacit and explicit knowledge in public health: a qualitative study. *Implementation Science, 7* (20), 1-12.

Krippendorf, K. (1980). *Content analysis: An introduction to its methodology*, 1st ed. Beverly Hills, CA: Sage.

Kruskal, J.B., & Wish, M. (1978). *Multidimensional scaling*. Beverly Hills, CA: Sage.

Kumpfer, K.L., Magalhães, C., & Xie, J. (2017). Cultural adaptation and implementation of family evidence-based interventions with diverse populations. *Prevention Science, 18,* 649-659.

Kumpfer, K.L., Pinyuchon, M., de Melo, A.T., & Whiteside, H.O. (2008). Cultural adaptation process for international dissemination of the Strengthening Families Program (SFP). *Evaluation & the Health Professions, 31*(2), 226-239.

Kuruvilla, S., Schweitzer, J., Bishai, D., Chowdhury, S., Caramani, D., Frost, L., …& Bustreo, F. (2014). Success factors for reducing maternal and child mortality. *Bulletin of the World Health Organization, 92,* 533-544. doi: http://dx.doi.org/10.2471/BLT.14.138131

Langlois, E.V., Montekio, V.B., Young, T., Song, K., Alcalde-Rabanal, J., & Tran, N. (2016). Enhancing evidence informed policymaking in complex health systems: lessons from multi-site collaborative approaches. *Health Research Policy and Systems, 14* (20), 1-11.

Landry, R., Amara, N., Pablos-Mendes, A., Shademani, R., & Gold, I. (2006). The knowledge-value chain: a conceptual framework for knowledge translation in health. *Bulletin of the World Health Organization, 84,* 597-602.

LaPelle, N.R., Zapka, J., & Ockene, J.K. (2006). Sustainability of public health programs: The example of tobacco treatment services in Massachusetts. *American Journal of Public Health, 96* (8), 1363-1369.

Lara, M., Bryant-Stephens, T., Damitz, M., Findley, S., Gonzalez Gavillan, J., …& Woodell, C. (2011). Balancing fidelity and community context in the adaptation of asthma evidence-based interventions in the real world. Health Promotion Practice, 12 (1), 63S-72S. doi: 10.1177/1524839911414888.

Lau, A.S. (2006). Making the case for selective and directed cultural adaptations of evidence-based treatments: Examples from parent training. *Clinical Psychology: Science and Practice, 13* (4), 295-310.

Lavis, J.N., Oxman, A.D., Moynihan, R., & Paulsen, E.J. (2008). Evidence-informed health policy I-Synthesis of findings from a multi-method study of organizations that support the use of research evidence. *Implementation Science, 3* (53), 1-7.

Lee, C.S., August, G.J., Realmuto, G.M., Horowitz, J.L., Bloomquist, M.L., & Klimes-Dougan, B. (2008). Fidelity at a distance: Assessing implementation fidelity of

the Early Risers Prevention Program in a going-to-scale intervention trial. *Prevention Science, 9,* 215-229.

Leech, N.L., & Onwuegbuzie, A.J. (2009). A typology of mixed methods research designs. *Quality & Quantity, 43,* 265-275.

Leeuw, M., Goossens, M., de Vet, H., & Vlaeyen, J. (2009). The fidelity of treatment delivery can be assessed in treatment outcome studies: A successful illustration from behavioral medicine. *Journal of Clinical Epidemiology, 62* (1), 81-90.

Lynch, S. & O'Donnell, C. (2005). *The evolving definition, measurement, and conceptualization of fidelity of implementation in scale-up of highly rated science curriculum units in diverse middle schools.* Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Canada.

Maher, D., Biraro, S., Hosegood, V., Isingo, R., Lutalo, T., …& Zaba, B. (2010). Translating global health research aims into action: the example of the ALPHA network. *Tropical Medicine and International Health, 15*(3), 321-328.

Marchand, E., Stice, E., Rhode, P., & Becker, C.B. (2011). Moving from efficacy to effectiveness trials in prevention research. *Behavioral Research Therapy, 49* (1), 1-20.

Marsiglia, F.F., & Booth, J.M. (2014). Cultural adaptation of interventions in real practice settings. *Research on Social Work Practice,* 1-10. doi: 10.1177/1049731514535989.

McHugo, G.J., Drake, R.E., Whitley, R., Bond, G.R., Campbell, K., …& Finnerty, M.T. (2007). Fidelity outcomes in the national implementing evidence-based practices project. *Psychiatric Services, 58* (10), 1279-1284.

McKleroy, V.S., Galbraith, J.S., Cummings, B., Jones, P., Harshbarger, C.,…& ADAPT Team. (2006). Adapting evidence-based behavioral programs for new settings and target populations. *AIDS Education and Prevention, 18* (Supp.), 59-73.

Mejia, A., Leijten, P., Lachman, J.M., & Parra-Cardona, J. (2017). Different strokes for different folks? Contrasting approaches to cultural adaptation of parenting interventions. *Prevention Science, 18,* 630-639.

Miller, W.R., Sorensen, J.L., Selzer, J.A., Brigham, G.S. (2006). Disseminating evidence-based practices in substance abuse treatment: A review with suggestions. *Journal of Substance Abuse & Treatment, 31*, 25-39.

Miller-Day, M., Pettigrew, J., Hecht, M.L., Shin, Y., Graham, J., & Krieger, J. (2013). How prevention curricula are taught under real-world conditions: Types and reasons for teacher curriculum adaptations. *Health Education, 113,* 324-344. doi: 10.1108/09654281311329259.

Minkler, M. & Wallerstein, N. (eds), (2003). *Community Based Participatory Research in Health*. Jossey-Bass, San Francisco.

Miranda, J.J., Bernabé-Ortiz, A., Diez-Canseco, F., Malaga, G., Cardenas, M.K., &….Gilman, R.H. (2015). Building a platform for translational research in chronic noncommunicable diseases to address population health: lessons from NHLBI supported CRONICAS in Peru. *Global Heart, 10*(1), 13-19.

Moore, J.E., Bumbarger, B.K., & Cooper, B.R. (2013). Examining adaptations of evidence-based programs in natural contexts. *The Journal of Primary Prevention, 34*, 147-161.

Moncher, F.J., & Prinz, R.J. (1991). Treatment fidelity in outcome studies. *Clinical Psychology Review, 11*, 247-266.

Mowbray, C.T., Holter, M.C., Teague, G.B., & Bybee, D. (2003). Fidelity criteria: Development, measurement, and validation. *American Journal of Evaluation, 24*, 315-340.

Muir Gray, J.A. (2009). *Evidence-based healthcare and public health.* (3rd Ed.) Edinburgh: Elsevier.

Murray, L.K., Dorsey, S., Skavenski, S., Kasoma, M., Imasiku, M…& Cohen, J. (2013). Identification, modification, and implementation of an evidence-based psychotherapy for children in a low-income country: the use of TF-CBT in Zambia. *International Journal of Mental Health Systems, 7*(24), 2-12.

Murtagh, F. & Legendre, P. (2014). Ward's hierarchical agglomerative clustering method: Which algorithms implement Ward's criterion? *Journal of Classification, 31*, 274-295.

Nastasi, B.K., Varjas, K., Schensul, S.L., Tudor Silva, K., Schensul, J.J., & Ratnayake, P. (2000). The participatory program model: A framework for conceptualizing and promoting program acceptability. *School Psychology Quarterly, 15* (2), 207-232.

National Institutes of Health (NIH). (2005). *NINDS Cooperative Program in Translational Research.* Retrieved from: http://grants.nih.gov/grants/guide/pa-files/PAR-05-158.html Accessed August 30, 2017.

National Institutes of Health. (2013). Funding Opportunity Title. Retrieved from http://grants.nih.gov/grants/guide/pa-files/PAR-13-055.html

Nelson, M.C., Cordray, D.S., Hulleman, C.S., Darrow, C.L., & Sommer, E.C. (2012). A procedure for assessing intervention fidelity in experiments testing educational and behavioral interventions. *Journal of Behavioral Health Services and Research, 39,* 374-396.

Novick, G., Reid, A.E., Lewis, J., Kershaw, T.S., Rising, S.S., & Ickovics, J.R. (2013). Group prenatal care: model fidelity and outcomes. *American Journal of Obstetrics and Gynecology, 209* (112e), 1-6.

Oaks, S.C., Mitchell, V.S., Pearson, G.W., & Carpenter, C.C.J. (1991). *Malaria: obstacles and opportunities.* A report of the committee for the study on malaria prevention and control: Status review and alternative strategies. Institute of Medicine. Washington, D.C.:National Academy Press.

O'Connor, T.G., & Byrne, J.G. (2007). Attachment measures for research and practice. *Child and Adolescent Mental Health, 12*(4), 187-192.

Orsi, R. (2017). Use of multiple cluster analysis methods to explore the validity of a community outcomes concept map. *Evaluation and Program Planning, 60*, 277-283.

Owczarzak, J., Filippova, O., & Phillips, S.D. (2014). A novel, bottom-up approach to promote evidence-based HIV prevention for people who inject drugs in Ukraine: protocol for the MICT ('Bridge') HIV prevention exchange project. *Implementation Science, 9*(18), 1-9.

Palinkas, L.A., & Soydan, H. (2012). New horizons of translational research and research translation in social work. *Research on Social Work Practice, 22* (1), 85-92.

Patsopoulos, N.A. (2011). A pragmatic view on pragmatic trials. *Dialogues in Clincial Neuroscience, 13* (2), 217-224.

Pawson, R., & Manzano-Santaella, A. (2012). A realistic diagnostic workshop. *Evaluation, 18,* 176-191.

Pawson, R., & Tilley, N. (1997). *Realistic Evaluation.* London, U.K.: Sage.

Perez, D., Van der Stuyft, P., Zabala, M., Castro, M., Lefevre, P. (2016). A modified theoretical framework to assess implementation fidelity of adaptive public health programs. *Implementation Science, 11* (91), 1-11.

Peters, D.H., Adam, T., Alonge, O., Akua Agyepong, I., & Tran, N. (2013). Implementation research: what it is and how to do it. *British Medical Journal, 347*, 1-7.

Petrucci, C.J., & Quinlan, K.M. Bridging the research-practice gap: Concept mapping as a mixed-methods strategy in practice-based research and evaluation. *Journal of Social Service Research, 34(2*), 25-42.

Pokhrel, P., Regmi, S., & Piedade, E. (2008). HIV/AIDS prevention in the Nepalese context. *Evaluation & the Health Professions, 31*(2), 198-210.

Powell, B.J., Waltz, T.J., Chinman, M.J., Damschroder, L.J., Smith, J.L., Matthieu, M.M., et al.. (2015). A refined compilation of implementation strategies: results from the Expert Recommendations for Implementation Change (ERIC) project. *Implementation Science, 10* (21), 1-14.

Proctor, E.K., Luke, D., Calhoun, A., McMillen, C., Brownson, R., McCrary, S., & Padek, M. (2015). Sustainability of evidence-based healthcare: research agenda, methodological advances, and infrastructure support. *Implementation Science, 10* (88), 1-13.

Proctor, E.K., Powell, B.J., McMillen, J.C. (2013). Implementation strategies: recommendations for specifying and reporting. *Implementation Science, 8* (139), 1-11.

Proctor, E.K., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., …Hensley, M. (2011). Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research, 38* (2), 65-76.

Rabin, B.A. (Feb 2016). Fidelity and adaptation for implementation science: how can we reconcile the tension? [PowerPoint Presentation]. CRISP Seminar Series. Retrieved from www.ucdenver.edu/academics/colleges/.../CRISP%20**Rabin**_February%202016.pptx

Rabin, B.A., Brownson, R.C., Haire-Joshu, D., Kreuter, M.W., & Weaver, N.L. (2008). A glossary for dissemination and implementation research in health. *Journal of Public Health Management & Practice, 14* (2), 117-123.

Rebchook, M.G., Kegeles, S.M., Huebner, D., the TRIP Research Team. (2006). Translating research into practice: the dissemination and initial implementation of an evidence-based HIV prevention program. AIDS Education and Prevention, 18, 119-36.

Ringwalt, C.L., Vincus, A., Ennett, S., Johnson, R., & Rohrbach, L.A. (2004). Reasons for teachers' adaptation of substance use prevention curricula in schools with non-white student populations. *Prevention Science, 5*, 61-67.

Rippke, M., Briske, L., Olson Keller, L., & Strohschein, S. (2001). Public health nursing section: Public health programs-applicatoins for public health nursing practice. St. Paul: Minnesota Department of Health. Retrieved from http://www.health.state.mn.us/divs/opi/cd/phn/docs/0301wheel_manual.pdf

Rogers, E.M. (2003). *Diffusion of innovations.* 5th ed. New York, NY: Free Press.

Rohrbach, L.A., Grana, R., Sussman S., & Valente, T.W. (2006). Type II translation: transporting prevention interventions from research to real-world settings. *Evaluation and the Health Professions, 29,* 302-333.

Rosas, S.R., & Kane. M. (2012). Quality and rigor of the concept mapping methodology: a pooled study analysis. *Evaluation and Program Planning, 35*(2), 236-245.

Rosas, S.R., & Ridings, J.W. (2017). The use of concept mapping in measurement development and evaluation: Application and future directions. *Evaluation and Program Planning, 60,* 265-276.

Rubinstein, A.L., Irazola, V.E., Poggio, R., Gulayin, P., Nejamis, A., & Beratarrechea, A. (2015). Challenges and opportunities for implementation of interventions to prevent and control CVD in low-resource settings. *Global Heart, 10*(1), 21-29.

Ruggiero, L., Oros, S., & Choi Y.K. (2011). Community-based translation of the diabetes prevention program's lifestyle intervention in an underserved Latino population. The Diabetes Educator, 37(4), 564-572.

Ruiz-Primo, M.A. (2005). *A multi-method and multi-source approach for studying fidelity of implementation.* Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Canada.

Rychetnik, L., Hawe, P., Waters, E., Barratt, A., & Frommer, M. (2004). A glossary for evidence-based public health. *Journal of Epidemiology & Community Health, 58,* 538-545.

Sackett, D.L., Rosenberg, W.M.C., Muir Gray, J.A., Haynes, B., & Richardson, S. (1996). Evidence-based medicine: What it is and what it isn't [Editorial]. *British Medical Journal, 312,* 71-72.

Salter, K.L., & Kothari, A. (2014). Using realist evaluation to open the black box of knowledge translation: a state-of-the-art review. *Implementation Science, 9,* 1-14.

Sampson, U.K.A., Mensah, G.A., Narula, J. (2015). Implementation research: An imperative for improving global health and health inequities. [Editor's Page]. *Global Heart,10,* 1-2.

Sanetti, L.M.H., & Collier-Meek, M.A. (2014). Increasing the rigor of procedural fidelity assessment: An empirical comparison of direct observation and permanent product review methods. *Journal of Behavioral Education, 23,* 60-88.

Santacroce, S.J., Maccarelli, L.M., & Grey, M. (2004). Intervention fidelity. *Nursing Research, 53,* 63-66.

Sastry, S., Masroor, N., Bearman, G., Hajjeh, R., Holmes, A., …& Mehtar, S. (2017). The 17th International Congress on Infectious Diseases workshop on developing infection prevention and control resources for low-and middle-income countries. *International Journal of Infectious Diseases, 57*, 138-143.

Scheirer, M.A., & Dearing, J.W. (2011). An agenda for research on sustainability of public health programs. *American Journal of Public Health, 101* (11), 2059-2067.

Schoenwald, S.K, Garland, A.F., Chapman, J.E., Frazier, S.L., Sheidow, A.J., & Southam-Gerow, M.A. (2011). *Administration and Policy in Mental Health and Mental Health Services Research, 38,* 32-43.

Schoenwald, S.K., Letourneau, E.J., Halliday-Boykins, C. (2005). Predicting therapist adherence to a transported family-based treatment for youth. *Journal of Clinical Child & Adolescent Psychology, 34*, 658-670.

Schroeder, E. (2004). The continuum complete international encyclopedia of sexuality. Retrieved from http://www.indiana.edu/~kinsey/ccies/np.php

Singal, A.G., Higgins, P.D.R., & Waljee, A.K. (2014). A primer on effectiveness and efficacy trials. *Clinical and Translational Gastroenterology, 5* (e45), 1-4. doi: 10.1038/ctg.2013.13.

Slaughter, S.E., Hill, J.N., & Snelgrove-Clarke, E. (2015). What is the extent and quality of documentation and reporting of fidelity to implementation strategies: a scoping review. *Implementation Science, 10* (129), 1-12.

Smith, M.L., Glass, G.V., & Miller, T.I. (1980). *The benefits of psychotherapy*. Baltimore: Johns Hopkins University Press.

Spoth, R., Guyll, M., Redmond, C., Greenberg, M., Feinberg,M. (2011). Six-year sustainability of evidence-based program implementation quality by community-university partnerships: the PROSPER study. *American Journal of Community Psychology, 48*, 412-25.

Stirman, S., Kimberly, J., Cook, N., Calloway, A., Castro, F., & Charns, M. (2012). The sustainability of new programs and innovations: a review of the empirical literature and recommendations for future research. *Implementation Science, 7* (17), 1-19.

Stirman, S.W., Miller, C.J., Toder, K., & Calloway, A. (2013). Development of a framework and coding system for modifications and adaptations of evidence-based programs. *Implementation Science, 8* (65), 1-12.

Stirman, S.W., Calloway, A., Toder, K., Miller, C.J., DeVito, A.K., …Crits-Christoph, P. (2013b). Community mental health provider modifications to cognitive therapy: Implications for sustainability. *Psychiatric Services, 64*(10), 1056-1059.

Stolz, S.B. (1984). Preventive models: Implications for a technology of practice. In M.C. Roberts & L. Peterson (Eds.), *Prevention of problems in childhood* (pp.391-414). New York: Wiley.

Sturrock, K., & Rocha, J. (2000). A multidimensional scaling stress evaluation table. *Field Methods, 12*(1), 49-60.

Sundell, K., Beelmann, A., Hasson, H., von Thiele Schwarz, U. (2016). Novel programs, international adoptions, or contextual adaptations? Meta-analytical results from German and Swedish intervention research. *Journal of Clinical Child & Adolescent Psychology, 45*(6), 784-796.

Sussman, S., Valente., T.W., Rohrbach, L.A., Skara, S., & Pentz., M.A. (2006). Translation in the health professions: converting science into action. *Evaluation & the Health Professions, 29* (1), 7-32.

Sussman, S. & Palinkas, L.A. (2008). Reflections on international translation of evidence-based health behavior programs. *Evaluation & the Health Professions, 31*(3), 323-330.

Sussman, S., Unger, J.B., Palinkas, L.A. (2008b). Country prototypes and translation of health programs. *Evaluation & the Health Professions, 31*(2), 110-123.

Tomioka, M., & Braun, K.L. (2013). Implementing evidence-based programs: A four-step protocol for assuring replication with fidelity. *Health Promotion Practice, 14* (6), 850-858.

Tortolero, S.R., Markham, C.M., Parcel, G.S., Peters, R.J., Escobar-Chaves, S.L., …& Lewis, H.L. (2005). Using program mapping to adapt an effective HIV, sexually transmitted disease, and pregnancy prevention program for high-risk minority youth. *Health Promotion and Practice, 6*, 286-298.

Trochim, W. (1989). An introduction to concept mapping for planning and evaluation. *Evaluation and Program Planning, 12*, 1-16.

Trochim, W.M.K., (1989). Concept mapping: Soft science or hard art? *Evaluation and Program Planning, 12*(1), *87-110*

Trochim, W.M.K. (1993 November). *The reliability of concept mapping.* [Paper Presentation]. The Annual Conference of the American Evaluation Association.

Trochim, W.M.K. (2005). *Concept mapping: An introduction to structured conceptualization.* [PowerPoint slides]. Retrieved from https://www.socialresearchmethods.net/mapping/Concept%20Mapping%20Presentation

Trochim, W. & Kane, M. (2005). Concept mapping: an introduction to structured conceptualization in health care. *International Journal for Quality in Health Care, 17* (3), 187-191.

Trochim, W.M.K., & Kane, M. (2007). Concept mapping for planning and evaluation. Vol. 50. Thousand Oaks, CA: Sage Publications.

Trochim, W. & McLinden, D. (2017). Introduction to a special issue on concept mapping. *Evaluation and Program Planning, 60,* 166-175.

Tunis, S., Stryer, D., Clancy, C. (2003). Practical clinical trials: Increasing the value of clinical research for decision making in clinical and health policy. *Journal of the American Medical Association, 12,* 1624-1632.

United Nations. (2015). *Sustainable Development Goals.* Retrieved from http://www.un.org/sustainabledevelopment/development-agenda/

Usa.gov. The United States President's Emergency Plan for AIDS Relief. (2017). Retrieved from https://www.pepfar.gov/about/270968.htm

van Bon-Martens, M.J.H., van de Goor, I.A.M., & van Oers, H.A.M. (2017). Concept mapping as a method to enhance evidence-based public health. *Evaluation and Program Planning, 60,* 213-228.

van Daele, T., van Audenhove, C., Hermans, D., van den Bergh, O., & van den Broucke, S. (2012). Empowerment implementation: enhancing fidelity and adaptation in a psycho-educational intervention. *Health Promotion International, 29*(2), 212-222.

VanDevanter, N., Kumar, P., Nguyen, N., Nguyen, L., Nguyen, T., …& Shelley, D. (2017). Application of the Consolidated Framework for Implementation Research to assess factors that may influence implementation of tobacco use treatment guidelines in the Viet Nam public health care delivery system. *Implementation Science, 12*(27), 1-8. doi: 10.1186/s13012-017-0558-z.

Veniegas, R.C., Kao, U.H., Rosales, R., & Arellanes, M. (2009). HIV prevention technology transfer: Challenges and strategies in the real world. *American Journal of Public Health, 99*(Suppl 1), S124-S130.

von Thiele Schwartz, U., Hasson, H., Lindfors, P. (2014). Applying a fidelity framework to understand adaptations in an occupational health program. *Work, 51* (2), 195-203.

Wahabi, H.A., Siddiqui, A.R., Mohamed, A.G., Al-hazmi, A.M., Zakaria, N., & Al-Ansary, L.A. (2015). Evidence-based decision making in public health: capacity

building for public health students at King Saud University in Riyadh. *BioMed Research International, 2015,* 1-8.

Wandersman, A., & Snell-Johns, J. (2005). Empowerment evaluation: clarity, dialogue, and growth. *American Journal of Evaluation, 26*(3), 421-428.

Wang, M.C., Nojan, M., Strom, C.D., & Walberg, H.J. (1984). The utility of degree of implementation measures in program implementation and evaluation research. *Curriculum Inquiry, 14,* 249-286.

Welch, V., Ueffing, E., & Tugwell, P. (2009). An opportunity to reduce global health inequalities. *Journal of International Development, 21,* 1066-1082.

Wheeldon, J. (2010). Mapping mixed methods research: Methods, measures and meaning. *Journal of Mixed Methods Research, 4* (2), 87-102.

Willis, T.A., Hartley, S., Glidewell, L., Farrin, A.J., Lawton, R., …Foy, R. (2016). Action to Support Practices Implement Research Evidence (ASPIRE): Protocol for a cluster-randomised evaluation of adaptable implementation packages targeting 'high impact' clinical practice recommendations in general practice. *Implementation Science, 11* (25), 1-11. doi: 10.1186/s13012-016-0387-5.

World Health Organization. (2008). *Task shifting: rational redistribution of tasks among health workforce teams. Global recommendations and guidelines.* Geneva, Switzerland: World Health Organization. Retrieved from http://www.who.int/healthsystems/TTR-TaskShifting.pdf?ua=1

Zafar, S., Sikander, S., Usman Hamdani, S., Atif, N., Akhtar, P., …& Rahman, A. (2016). The effectiveness of Technology-assisted Cascade Training and Supervision of community health workers in delivering the Thinking Healthy Program for perinatal depression in a post-conflict area of Pakistan-study protocol for a randomized controlled trial. *Trials, 17*(188), 1-8. doi: 10.1186/s13063-016-1308-2.

Zapka, J., Goins, K.V., Pbert, L., & Ockene, J.K. (2004). Translating efficacy research to effectiveness studies in practice: Lessons from research to promote smoking cessation in community health centers. *Health Promotion Practice, 5*, 245-255.

Zimmerman, M.A., Rappaport, J., & Seldman, E. *Empowerment theory: psychological, organizational, and community levels of analysis.* Handbook of Community Psychology. New York: Plenum.