

**The Role of Context in the Implementation of a Rural, Church-based, CVD Risk-reduction
Intervention**

BY

KRISTINE ZIMMERMANN
B.S., Beloit College, 1996
M.P.H., University of Illinois at Chicago, 2003

THESIS

Submitted as partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Public Health Sciences
in the Graduate College of the
University of Illinois at Chicago, 2019

Chicago, Illinois

Defense Committee:

Naoko Muramatsu, Chair
Susan Altfeld, Advisor
Stacie Geller, Obstetrics and Gynecology
Yamilé Molina, Community Health Sciences
Michael Schoeny, Rush University

ACKNOWLEDGEMENTS

I am truly grateful for the support I have received throughout my pursuit of my doctoral degree. Many thanks to my committee. I extend my sincerest gratitude to Dr. Naoko Muramatsu for chairing my committee and providing invaluable guidance, feedback, and support. I also wish to thank Dr. Susan Altfeld, my advisor, for her confidence in me. I am indebted to Dr. Stacie Geller for her mentorship, for challenging me to excel, and inspiring me to achieve my goals. I am grateful for Dr. Yamilé Molina for her wisdom, her thoughtfulness, for helping me stay on track, and for keeping my caffeinated. Finally, I am grateful to Dr. Michael Schoeny for his contributions and invaluable methodological guidance.

My dissertation would not have been possible without the contributions of the Heart Smart study team at the UIC Center for Research on Women and Gender and the Southern Seven Health Department along with the 12 Heart Smart churches. I am especially grateful to all of the Heart Smart coordinators and participants and to Dr. Stacie Geller, Patricia Moehring, Leslie Carnahan, Stephanie Fisher, Nancy Holt, Cindy Oliver, Sandy Schwartz, Cherie Wright, Dr. Heather Risser, Dr. Yamilé Molina, Ellen Paulsey, and Diana Rusz. I extend my deepest gratitude to Dr. Manorama Khare, who was traveling to southern Illinois with me when I decided to start the PhD program and has been a consistent source of encouragement. Manu, thank you for your invaluable support and your friendship.

I also wish to thank my colleagues and friends, past and present, from the Center for Research on Women and Gender, for being flexible, supportive, motivating, and helpful. In particular, thank you to Dr. Stacie Geller, Leslie Carnahan, Katie Garland, Dr. Manorama Khare, Dr. Abby Koch, Dr. Yamilé Molina, and Patricia Newton.

I am so fortunate to have shared the journey towards my PhD with Anna Baccellieri and Dr. Kate Vergara. Thank you both for your unwavering encouragement and inspiration. I look forward to continuing to learn from both of you! Thanks also to Dr. Kate Vergara, Leslie

Carnahan, Anna Baccellieri, and Perla Chebli for agreeing to join me in our peer mentor group. I am truly grateful to have such a caring and bright group of women to listen, shared ideas, and advice. I have enjoyed our fruitful conversations and eagerly await more conversations as well as celebrations of our respective successes!

Finally, I am grateful to the support I received from my family. Thanks to my mom, Evie, for showing me what persistence means and for her unconditional support. Thanks to my dad, Roger, and to Eric, Joe, Lisa, Jen, and Sandy for believing in me. Thanks to Maggie and Ruby for their diversions and unconditional love. Finally, I could not have completed this work without the support of my husband and best friend, Jeff Smith. Thank you, Jeff, for your patience and love.

TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
I. INTRODUCTION	1
A. Background	1
B. Heart Smart for Women	2
C. Role of Implementation Science in Intervention Evaluation	3
D. Study Purpose	3
E. Study Approach	4
F. Study Significance	4
II. LITERATURE REVIEW	5
A. Epidemiology of Rural CVD Prevalence, Mortality, and Risk	5
B. Primary and Secondary Interventions to Prevent CVD in Rural Communities	7
B.1. Public Health Interventions in Faith Settings	8
C. Role of Context in Intervention Implementation in Rural Areas	9
D. Heart Smart for Women Intervention	10
D.1. Church-based Heart Smart Intervention in Southernmost Illinois ...	11
E. Implementation Science for Understanding Intervention Context	12
E.1. Implementation Science Frameworks	12
F. Summary	14
III. METHODS	15
A. Specific Aims	15
B. Study Design Overview	16
B.1. Aim 1 Overview	16
B.2. Aim 2 Overview	17
C. Research Setting and Context Surrounding the 12 Intervention Churches	18
D. Intervention	19
D.1. Heart Smart for Women	19
D.1. Heart Smart Maintenance	19
E. Data Sources Overview	20
F. Aim 1 Methods	21
F.1. Key Stakeholder Interviews	21
F.1.a. Key Stakeholder Interviewee Identification and Recruitment	21
F.1.b. Key Stakeholder Interview Instruments	24
F.1.c. Key Stakeholder Interview Data Collection and Transcription	24
F.2. Coordinator Feedback Forms	25
F.2.a. HSM Coordinator Feedback Form Instrument	25
F.2.b. HSM Coordinator Feedback Form Data Collection Procedures, Data Entry, and Data Management	26
F.3. Qualitative Data Analysis	27
F.3.a. Codebook Development and Coding Procedures.....	27
F.3.b. Deductive Analysis, Case Story Development, and Cross- case Analysis	28

TABLE OF CONTENTS (continued)

<u>CHAPTER</u>	<u>PAGE</u>
F.4. Development of Organizational-level Quantitative Data and Hypotheses to be Tested in Aim 2	30
G. Aim 2 Methods	31
G.1. Description of Person-level Data	32
G.1.a. Heart Smart for Women	32
G.1.b. Heart Smart Maintenance	33
G.2. Measures	33
G.2.a. Dependent Variables	37
G.2.b. Independent Variables	38
G.2.c. Additional Covariates	39
G.3. Data Analysis	40
IV. CONTEXTUAL FACTORS WITHIN CHURCHES	43
A. Intervention Churches	43
B. Church Case Stories	47
B.1. Church A	47
B.2. Church B	48
B.3. Church C	49
B.4. Church D	50
B.5. Church E	51
B.6. Church F	52
B.7. Church G	53
B.8. Church H	54
B.9. Church I	55
B.10. Church J	55
B.11. Church K	56
B.12. Church L	57
C. Organizational Culture and Structure	59
C.1. Culture to Support Health Promotion	59
C.1.a. Health Promotion is Consistent with Christian Beliefs about the Body	60
C.1.b. Being Healthy Supports Serving Others	61
C.1.c. Limited Value of Health Promotion	61
C.2. Implementation Climate	62
C.2.a. History of Health Programs in the Church	62
C.2.b. Priority and Need for the Intervention	62
C.3. Leadership Engagement	64
C.3.a. HSM Coordinator Engagement	65
C.3.b. Pastor Involvement	67
D. Interpersonal Context	68
D.1. Social Relationships Among Congregants	68
D.1.a. Social Support and Accountability	68
D.1.b. Social Connectedness	69
D.2. Connection with Coordinators	70
E. Summary	71

TABLE OF CONTENTS (continued)

<u>CHAPTER</u>	<u>PAGE</u>
V. PROGRAM PARTICIPATION AND COMPLETION BY CHURCH	72
A. HSFW and HSM Participant Characteristics	72
B. Program Participation by Church	72
B.1. HSFW Attendance	72
B.2. HSFW Completion	73
B.3. HSM Participation Among HSFW Attendees	74
B.4. HSM Attendance	75
C. Adjusted Models of Program Participation by Church	75
C.1. HSFW Attendance	75
C.2. HSFW Completion	75
C.3. HSM Participation Among HSFW Attendees	76
C.4. HSM Attendance	76
D. Summary	77
VI. CHURCH CONTEXTUAL FACTORS AND INTERVENTION PARTICIPATION	81
A. Development of Contextual Variables Using Qualitative Analysis	81
A.1. Organizational Culture and Structure	81
A.2. Interpersonal Context	82
A.3. Conceptual Framework	82
B. HSFW Attendance	83
B.1. Organizational Culture and Structure and HSFW Attendance	83
B.2. Interpersonal Context and HSFW Attendance	84
C. HSFW Completion	84
C.1. Organizational Culture and Structure and HSFW Completion	84
C.2. Interpersonal Context and HSFW Completion	86
D. HSM Participation Among HSFW Attendees	86
D.1. Organizational Culture and Structure and HSM Participation Among HSFW Attendees	86
D.2. Interpersonal Context and HSM Participation Among HSFW Attendees	86
E. HSM Attendance	88
E.1. Organizational Culture and Structure and HSM Attendance	88
E.2. Interpersonal Context and HSM Attendance	88
F. Summary	88
V. DISCUSSION	93
A. Summary of Findings	93
B. Interpretation of Findings	94
C. Study Limitations and Strengths	97
D. Implications for Research and Practice	100
E. Conclusion	103
APPENDICES	104
Appendix A	105
Appendix B	107
Appendix C	109

TABLE OF CONTENTS (continued)

<u>CHAPTER</u>	<u>PAGE</u>
Appendix D	111
Appendix E	118
CITED LITERATURE	124
VITA	135

LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
I. HEART SMART PRE- AND POST-INTERVENTION KEY STAKEHOLDER INTERVIEWEE CHARACTERISTICS AND HSM COORDINATOR FEEDBACK FORMS BY CHURCH	26
II. HEART SMART IMPLEMENTATION CASE STORY OUTLINE AND DESCRIPTION OF CONTENT	31
III. HEART SMART FOR WOMEN AND HEART SMART MAINTENANCE PERSON-LEVEL AND CHURCH-LEVEL DATA INCLUDED IN STUDY	34
IV. SUMMARY OF CASE STORY INFORMATION BY CHURCH FROM THE STUDY OF THE IMPLEMENTATION OF THE HEART SMART INTERVENTION IN 12 SOUTHERNMOST ILLINOIS CHURCHES	44
V. DEMOGRAPHICS OF HSFW AND HSM PARTICIPANTS	73
VI. HEART SMART FOR WOMEN AND HEART SMART MAINTENANCE PROGRAM ATTENDANCE AND COMPLETION BY CHURCH AND OVERALL (N = 12 CHURCHES)	74
VII. FIXED EFFECTS LINEAR REGRESSION MODELS FOR THE PROPORTION OF HSFW SESSIONS ATTENDED (OUT OF 12 SESSIONS) (N = 133)	76
VIII. FIXED EFFECTS LOGISTIC REGRESSION MODELS FOR HSFW COMPLETION (N = 133)	77
IX. FIXED EFFECTS LOGISTIC REGRESSION MODELS FOR HSM PARTICIPATION AMONG HSFW ATTENDEES (N = 133)	78
X. FIXED EFFECTS LINEAR REGRESSION MODELS FOR THE PROPORTION OF HSM SESSIONS ATTENDED (N = 136)	79
XI. LINEAR REGRESSION GENERALIZED ESTIMATING EQUATIONS MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS IN THE PROPORTION OF HSFW SESSIONS ATTENDED (OUT OF 12 SESSIONS)	85
XII. LOGISTIC REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND HSFW COMPLETION	87

LIST OF TABLES (continued)

<u>TABLE</u>	<u>PAGE</u>
XIII. LOGISTIC REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND PARTICIPATION IN HSM AMONG HSFW ATTENDEES (N = 133)	89
XIV. LINEAR REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND THE PROPORTION OF HSM SESSIONS ATTENDED	90
XV. LINEAR REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND THE PROPORTION OF HSM SESSIONS ATTENDED AMONG HSFW PARTICIPANTS ONLY (N = 83)	92
XVI. QUALITATIVE CODEBOOK, ADAPTED FROM THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR) AND USED TO IDENTIFY CONTEXTUAL CHARACTERISTICS IN CHURCHES PARTICIPATING IN THE HEART SMART INTERVENTION	111
XVII. HSFW PARTICIPANT DEMOGRAPHIC AND HEALTH STATUS CHARACTERISTICS BY CHURCH (N = 133)	118
XVIII. HSM PARTICIPANT DEMOGRAPHIC AND HEALTH STATUS CHARACTERISTICS BY CHURCH (N = 136)	119
XIX. HSFW SESSION ATTENDANCE, PROPORTION OF COMPLETERS, AND HSM PARTICIPATION AMONG HSFW ATTENDEES BY DEMOGRAPHIC AND HEALTH STATUS CHARACTERISTICS (N = 133) .	120
XX. HSM ATTENDANCE BY DEMOGRAPHIC AND HEALTH STATUS CHARACTERISTICS (N = 136)	121
XXI. DEMOGRAPHICS OF HSFW-ONLY PARTICIPANTS COMPARED TO HSFW+HSM PARTICIPANTS (N = 133)	122
XXII. DEMOGRAPHICS OF HSFW+HSM PARTICIPANTS COMPARED TO HSM-ONLY PARTICIPANTS (N = 136)	123

LIST OF FIGURES

<u>FIGURE</u>	<u>PAGE</u>
1. Consolidated Framework for Implementation Research (CFIR) domains and constructs	14
2. Embedded, single case design used in the examination of context in the implementation of the Heart Smart intervention in southernmost Illinois	17
3. Heart Smart intervention flow and data collection diagram (implemented 2011-2016)	22
4. Application of the Consolidated Framework for Implementation Research (CFIR) to analyze contextual factors associated with the Heart Smart intervention implementation in 12 rural southernmost Illinois churches	29
5. Conceptual framework, developed based on qualitative analysis Heart Smart key stakeholder interviews and program documents to guide quantitative analysis	82

LIST OF ABBREVIATIONS

BRFSS	Behavioral Risk Factor Surveillance System
CFIR	Consolidated Framework for Implementation Research
CVD	Cardiovascular disease
GEE	Generalized Estimating Equations
HSFW	Heart Smart for Women
HSM	Heart Smart Maintenance
IRB	Institutional Review Board
NHANES	National Health and Nutrition Examination Survey
PARiHS	Promoting Action in Research Implementation in Health Services
PRISM	Practical Robust Implementation and Sustainability Model
RE-AIM	Reach, Effectiveness, Adoption, Implementation, and Maintenance
REDCap	Research Electronic Data Capture
RUCC	Rural-Urban Continuum Codes
S7	Southernmost seven counties of Illinois
S7HD	Southern Seven Health Department
UIC	University of Illinois at Chicago

SUMMARY

Due to disproportionately high rates of cardiovascular disease (CVD) and CVD mortality facing rural US populations compared to urban, effective primary and secondary prevention strategies are needed. Rural, community-based interventions, such as those implemented in collaboration with churches, provide an opportunity to address this needed

I carried out a multi-phase, mixed methods study to identify and assess the role of contextual characteristics in the implementation of a 12-week CVD risk-reduction intervention for rural adult women followed by a 2-year maintenance intervention in rural churches. In the initial, qualitative phase of the study, I used an implementation science framework to analyze interview transcripts and program documents to identify potential contextual characteristics that might be associated with intervention implementation. In phase two, the quantitative phase, I examined the associations between characteristics identified in phase one and implementation outcomes related to intervention participation, attendance, and completion.

My qualitative findings were grouped into two broad contextual categories. Organizational culture and structure included a religious basis for health promotion in the church, a history of health activities in the church, congregational support for the intervention, engagement of the intervention coordinator who served as the liaison between her church and the research team, and pastor involvement. The interpersonal context category included social connectedness within the church and a connection with the intervention coordinator.

In my quantitative analysis, I found that characteristics of intervention participants, such as demographics, were insufficient for explaining differences in intervention participation and attendance across churches. Thus, examining alternative explanations for differences in participation, such as contextual characteristics of churches, was warranted. In the 12-week intervention, congregational support for the intervention and social connectedness were associated with intervention attendance and completion, but a religious basis for health

promotion, a history of health activities in the church, and connection with the intervention coordinator were not. In the maintenance intervention, congregational support for the intervention and a religious basis for health promotion were associated with a higher odds of maintenance participation among attendees of the 12-week intervention, and there were no significant associations between church contextual characteristics and session attendance in the maintenance intervention.

Community-based interventions are necessary to reduce rural health disparities. In rural, church-based interventions, organizational context, particularly organizational support for the intervention and relationships among individuals within the organization, may be associated with implementation effectiveness. To improve the implementation of CVD risk-reduction interventions in rural communities, it is essential for public health researchers and practitioners to understand how implementation context—within and across organizations—might contribute to or impede intervention success.

I. INTRODUCTION

A. Background

Residents of the rural US experience higher rates of cardiovascular disease (CVD) mortality compared to non-rural (Howard et al., 2017; Ingram & Montresor-Lopez, 2015; Kulshreshtha, Goyal, Dabhadkar, Veledar, & Vaccarino, 2014; Singh & Siahpash, 2014a). They are also more likely to have a diagnosis of CVD and have CVD risk factors (Howard et al., 2017; Meit et al., 2014; O'Connor & Wellenius, 2012), and are less likely to engage in risk reduction behaviors (Befort, Nazir, & Perri, 2012; Garcia et al., 2017; Meit et al., 2014). Effective strategies for reducing CVD risk through behavior change are available (Artinian et al., 2010); however, when translated for rural settings, studies often either fail to demonstrate effectiveness or lack of sufficient rigor to demonstrate effectiveness (Cai & Richards, 2016; Cleland et al., 2017; Crouch, Wilson, & Newbury, 2011; Rodrigues, Ball, Ski, Stewart, & Carrington, 2016; Walsh, Umstattd Meyer, Gamble, Patterson, & Moore, 2017).

Reasons for limited effectiveness of CVD risk-reduction interventions implemented in rural settings include failure to adapt the intervention to the specific community or target population (Cai & Richards, 2016; Ory et al., 2015; Rodrigues et al., 2016; Walsh et al., 2017). For this reason, community-based interventions that are tailored for specific rural communities and their residents hold promise for improving intervention effectiveness. Rodrigues et al. (2016) found that community-based interventions to address CVD risk in rural settings were more effective than those that were not community based (e.g., university-based randomized controlled trials), possibly because they considered the contexts in which they were implemented, for example, by incorporating community resources; adapting to community cultural, political, and socioeconomic factors; and leveraging existing social networks—factors that can potentially mitigate barriers to intervention implementation, participation, and behavior change.

In rural communities, churches are a specific setting that may be particularly appropriate to engage in rural health promotion due to the high prevalence of those who self-identify as “religious” in rural communities (77% compared to 57% in large cities) (Froese et al., 2017), and the role of churches as social and cultural resources in some rural communities (Kegler, Escoffery, et al., 2012; Kruger et al., 2012; Zimmermann et al., 2014).

B. Heart Smart for Women

An example of an evidence-based intervention adapted for implementation in a rural community was Heart Smart for Women (HSFW), a 12-week intervention offered in a group setting to promote skills for improving dietary and physical activity behaviors (Khare, Koch, Zimmermann, Moehring, & Geller, 2014). Developed based on two efficacious randomized controlled trials conducted in an urban setting (Carpenter, Finley, & Barlow, 2004; Dunn et al., 1998; Dunn et al., 1999), HSFW was adapted by The Cooper Institute for community-based implementation and was implemented from 2007-2010 in local health department clinics, community organizations, and churches in the rural, southernmost seven (S7) counties of Illinois (Khare et al., 2014). Participants demonstrated significant short-term improvements in diet, physical activity, and cholesterol, but improvements were not sustained at one-year from baseline. In a subsequent community health assessment in the S7 counties, churches were identified as an important source of support for S7 women (Zimmermann et al., 2014). Based on the two studies described above (Khare et al., 2014; Zimmermann, et al., 2014), HSFW was adapted further to be implemented in partnership with S7 churches and include a 24-month maintenance intervention. This adapted intervention, implemented from 2011-2016, is the focus of this study.

C. Role of Implementation Science in Intervention Evaluation

A growing body of research that seeks to improve intervention implementation and effectiveness emphasizes the importance of understanding intervention context (Hawe, Shiell, & Riley, 2004; McLaren, Ghali, Lorenzetti, & Rock, 2006; Nápoles, Santoyo-Olsson, & Stewart, 2013). While the field of implementation science offers frameworks for understanding context (Landsverk et al., 2012), an implementation science lens has only recently been applied to the evaluation of community-based CVD risk reduction interventions targeting adults in rural settings; these studies highlight the importance of intervention tailoring, continuous engagement between communities and researchers, and consideration of community capacity in the translation of evidence-based interventions (Balis, Strayer, Ramalingam, & Harden, 2018; Perry et al., 2017; Sriram et al., 2019; Wilcox et al., 2018). While several prior studies have included partnerships with rural churches to promote CVD risk reduction and related behaviors (e.g., Abbott & Slate, 2018; Abbott, Slate, & Lemacks, 2019; Thomson, Goodman, & Tussing-Humphreys, 2015; Thomson, Tussing-Humphreys, Zoellner, & Goodman, 2016; Thomson, Zoellner, & Tussing-Humphreys, 2014; Thomson, Zoellner, Tussing-Humphreys, & Goodman, 2016; Tussing-Humphreys et al., 2013), until recently, no studies examined rural church context as it relates to intervention implementation or effectiveness (Wilcox et al., 2018).

D. Purpose of Study

The purpose of this study is to consider the role of intervention context in the implementation of a community-based CVD risk reduction intervention implemented in a rural setting. Specifically, I identified contextual characteristics in rural southernmost Illinois churches and assessed their role in the implementation of a cardiovascular risk reduction intervention conducted in partnership with 12 churches. The overall goal of this study is to contribute to knowledge that will improve the translation of evidence-based interventions in rural communities as a step towards reducing rural health disparities.

E. Study Approach

To address my study goal, I used a multiphase, mixed-methods, embedded case study approach to achieve the following aims:

1. Aim 1: Using an implementation science framework, identify and describe contextual factors within rural churches that may contribute to the implementation of a CVD risk-reduction intervention implemented in these churches
2. Aim 2: Assess the contribution of contextual factors within churches to evaluate intervention implementation.

I used previously collected qualitative and quantitative data from a 12-week cardiovascular risk reduction intervention (Heart Smart for Women, HSFW) and a subsequent 24-month maintenance intervention (Heart Smart Maintenance, HSM) implemented in collaboration with a local health department and 12 churches in rural, southernmost Illinois.

F. Study Significance

Despite established knowledge about the modifiable risk factors for CVD, efficacious strategies to reduce CVD risk, and primary and secondary prevention efforts to address CVD risk factors (Artinian et al., 2010), CVD remains the leading cause of death in the rural US and is the leading contributor to the rural mortality penalty (Ingram & Montresor-Lopez, 2015; Moy, 2017; Singh & Siahpush, 2014a; Singh & Siahpush, 2014b). To reduce CVD risk and mortality in rural areas, I propose a reconsideration of how we evaluate community-based public health interventions addressing CVD. Consideration of intervention context and its relationship to implementation will contribute to public health research and practice by improving the dissemination and implementation of efficacious interventions in rural settings, the use of scarce public health resources, and by extension, health outcomes, thereby reducing health disparities facing rural adults.

II. LITERATURE REVIEW

In the following chapter, I discuss the need for CVD risk reduction in rural US communities followed by a summary of strategies that have been implemented to address this need and the limitations of those strategies. I then introduce “context” as a useful and understudied construct for examining intervention implementation in rural community-based settings. Next, I describe a specific strategy that is the focus of this dissertation—the Heart Smart intervention, which was implemented in 12 rural churches with the goal of improving and maintaining healthy behaviors and reducing CVD risk among intervention participants. Finally, I provide an overview of the role of implementation science for examining intervention context in the implementation of the Heart Smart intervention.

A. Epidemiology of Rural CVD Prevalence, Mortality, and Risk

Cardiovascular disease is the leading cause of death in the US, with approximately one out of every three deaths attributed to CVD (Mozaffarian et al., 2016). Rural communities face substantial disparities in CVD mortality compared to non-rural (Howard et al., 2017; Ingram & Montresor-Lopez, 2015; Kulshreshtha et al., 2014; Moy, 2017; Singh & Siahpush, 2014a; Singh & Siahpush, 2014b). From 2005-2009, the average, age-adjusted annual mortality rate from CVD was 248.3 deaths per 100,000 in metropolitan areas compared to 280.22 deaths per 100,000 in non-metropolitan areas (Singh & Siahpush, 2014a). Average life expectancy in rural counties is 76.7 years compared to 79.1 years in large metropolitan counties, and CVD is the leading cause of excess rural mortality, contributing 26.7% of excess rural deaths (Singh & Siahpush, 2014b).

Excess mortality from CVD in the rural US can be attributed, in part, to modifiable CVD risk factors that disproportionately affect rural populations, including overweight/obesity, insufficient physical activity, dietary habits, and smoking (Befort et al., 2012; Biswas et al., 2015;

Garcia et al., 2017; Lundeen, Park, Pan, O'Toole, Matthews, & Blanck, 2018; Meit et al., 2014; O'Connor & Wellenius, 2012). Rural residents are more likely to be physically inactive than non-rural (Meit et al., 2014; Trivedi et al., 2015). According to the 1999-2006 National Health and Nutrition Examination Survey (NHANES), a greater proportion of rural adults (38.8%) reported no leisure-time physical activity compared to urban (31.8%), and only 41.5% of rural adults met recommended physical activity guidelines compared to 47.2% of urban adults (Trivedi et al., 2015). Rural adults are also more likely than non-rural to have poor dietary habits, including lower fiber intake, higher sweetened beverage consumption, and a higher intake of calories from fat compared to urban adults (Befort et al., 2012; Trivedi et al., 2015). Finally, smoking among adults living in rural counties are significantly higher than in non-rural counties, with rates of 25% among rural women and 29% among rural men, compared to 13% among women and 19% among men in large metropolitan counties (Meit et al., 2014). According to the 2005-2008 NHANES, 39.6% of rural adults were obese versus 33.4% of urban adults, and differences in obesity prevalence were significant even after controlling for demographics, diet, and physical activity (Befort et al., 2012). More recently, using 2016 Behavioral Risk Factor Surveillance System (BRFSS) data, the CDC found that 34.2% of adults living in nonmetropolitan US counties were obese compared to 28.7% in metropolitan counties (Lundeen et al., 2018). This finding suggests additional factors contribute to rural health disparities, including socioeconomic disadvantage (e.g., low income and education levels, transportation challenges) (Singh, Williams, Siahpush, & Mulhollen, 2012; Smith, Humphreys, & Wilson, 2008), as well as cultural and environmental factors, such as limited access to physical activity opportunities and supermarkets, and limited family and peer support for engaging in healthy behaviors (Carnahan, Zimmermann, & Peacock, 2016; Frost et al., 2010; Humpel, Owen, & Leslie, 2002; Parks, Housemann, & Brownson, 2003; Wilcox, Castro, King, Housemann, & Brownson, 2000; Zimmermann, Carnahan, & Peacock, 2016).

B. Primary and Secondary Interventions to Prevent CVD in Rural Communities

A substantial body of literature describes the components of effective health behavior interventions for the primary and secondary prevention of CVD (Artinian et al., 2010); however, few studies have focused on prevention interventions in rural communities. Studies that have been implemented in rural settings have often shown limited effectiveness in improving clinical indicators related to CVD or improving CVD risk behaviors such as PA engagement and weight loss, or they lack sufficient rigor to demonstrate effectiveness (Cai & Richards, 2016; Cleland et al., 2017; Crouch et al., 2011; Rodrigues et al., 2016; Walsh et al., 2017). Rural, CVD risk-reduction interventions have also demonstrated poor long-term results (i.e., sustained change after 12 months or longer) (Cai & Richards, 2016; Khare et al., 2014; Rodrigues et al., 2016).

These programs may have limited effectiveness due to their failure to adapt to rural settings or the populations being served (Cai & Richards, 2016; Ory et al., 2015; Rodrigues et al., 2016). Other barriers to intervention effectiveness include geographic characteristics of rural settings that make engaging in healthy behaviors challenging and socioeconomic characteristics of community members that limit feasibility of intervention participation (e.g., lack of time due to family and work commitments or inability to afford transportation) (Gatewood et al., 2008; Tussing-Humphreys, Thomson, Mayo, & Edmond, 2013). However, these barriers to intervention effectiveness can potentially be mitigated through community-based interventions adapted for rural settings, such as those integrated into worksites and faith settings. In rural communities, these types of interventions have shown evidence of greater effectiveness than those that are not community based (e.g., university-based randomized controlled trials), possibly due to being able to incorporate community resources; adapt to community cultural, political, and socioeconomic factors; and leverage existing social networks (Holben, Rambo, Howe, Murray, & Shubrook, 2017; Pullyblank et al., 2019; Rodrigues et al., 2016; Seguin et al., 2018).

B.1. Public Health Interventions in Faith Settings

Churches and other faith organizations have frequently served as implementation sites for community-based public health interventions in both rural and urban communities (e.g., Campbell, et al., 2007; DeHaven, Hunter, Wilder, Walton, & Berry, 2004; Hou & Cao, 2018; Maynard, 2017; Peterson, Atwood, & Yates, 2002; Wilcox et al., 2013). These interventions include “faith-based” interventions, developed within faith settings; “faith-placed” interventions, developed by researchers and implemented within faith settings; and collaborative interventions, developed and implemented through partnerships among faith organizations and health professionals (DeHaven et al., 2004).

In rural US communities, churches specifically are potentially ideal intervention sites. Rural US residents are more likely to identify as religious than non-rural (Froese et al., 2017), and in some rural US communities, churches are important social and cultural resources (Kegler, Escoffery, et al., 2012; Kruger et al., 2012; Zimmermann, et al., 2014). The published literature includes several formative and summative quantitative and qualitative studies (e.g., Kegler, Escoffery, et al., 2012; Kegler, Swan, Alcantara, Wrensford, & Glanz, 2012; Martinez et al., 2016; Williams, Glanz, Kegler, & Davis, 2012) and effectiveness studies (e.g., Abbott & Slate, 2018; Abbott et al., 2019; Thomson et al., 2015; Thomson, Tussing-Humphreys, et al., 2016; Thomson et al., 2014; Thomson, Zoellner, et al., 2016; Tussing-Humphreys et al., 2013; Wilcox et al., 2018), in which rural churches were the settings for research related to CVD risk reduction. However, the majority of these studies have focused specifically on rural African American populations, and intervention studies had inconsistent outcomes. In addition, until recently, effectiveness studies examining CVD risk reduction or similar health concerns in rural churches have not considered church context in their implementation or outcomes (Wilcox et al., 2018). This study, therefore, seeks to help fill this gap.

C. Role of Context in Intervention Implementation in Rural Areas

According to Pfadenhauer et al. (2017), “context” is:

a set of characteristics and circumstances that consist of active and unique factors, within which the implementation is embedded. As such, context. . . interacts, influences, modifies and facilitates or constrains the intervention and its implementation. . . . It is an overarching concept, comprising not only a physical location but also roles, interactions and relationships at multiple levels. (p. 6)

There are multiple reasons why context may be important to consider in studies of the implementation of CVD risk reduction interventions for rural adults. The context in which an intervention is implemented may influence both its effectiveness and sustainability (Shiell, Hawe, & Gold, 2008). Efficacy studies take place in “optimal,” not real-world settings, so when evidence-based programs are implemented in communities, understanding what happens is essential for improving the external validity of research (Green & Glasgow, 2006). Communities are dynamic and non-linear, and an intervention may interact with the community in which it is implemented. Thus, different community contexts may affect intervention implementation differently (Hawe et al., 2004). The limited effectiveness of rural, CVD risk-reduction interventions—despite their use of evidence-based practice—suggests that greater attention to context may be warranted (Rodrigues et al., 2016).

Many interventions in the public health literature are developed using socio-ecological models (e.g., McLeroy, Bibeau, Steckler, & Glanz, 1988; Sallis, Owen, & Fisher, 2008) to aid in understanding the various contextual levels of influence on health and/or behavior (e.g., Seguin et al., 2018; Warren, Maley, Sugarwala, Wells, & Devine, 2010). Fewer studies have considered context in assessing study implementation and outcomes, but those that have often concluded that intervention implementation between contexts matters. For example, a school-based obesity reduction study conducted in multiple schools in different regions of California grouped analyses of student outcomes by school to account for correlations within schools (Scherr et al., 2017). The researchers found that outcomes differed between regions, potentially due to differences in how the intervention was implemented in different locations. A school-based

intervention to increase physical activity and reduce sedentary time among Belgian children used a calculated “intervention process score” for each school based on characteristics such as collaboration among school faculty towards intervention goals, playground features and changes to recess periods, support for physical education teachers, children’s’ and parents’ attitudes within the school, parent involvement, ability to integrate the intervention into the school curriculum, and policy factors (Verloigne et al., 2015). The researchers then assessed intervention outcomes based on a low, medium, or high score. Similar to Scherr et al. (2017), the study authors found between-school differences in outcomes based on intervention implementation scores. Despite these findings, until recently, context was rarely considered in studies of rural, CVD risk-reduction interventions (Balis et al., 2018; Perry et al., 2017; Sriram et al., 2019; Wilcox et al., 2018), and only one of these studies focused on a church-based intervention (Wilcox et al., 2018). The published studies of rural CVD risk-reduction interventions that addressed context emphasized the importance of intervention tailoring around the specific barriers related to healthy behavior change for rural residents (Balis et al., 2018; Perry et al., 2017; Sriram et al., 2019). For example, Balis and colleagues (2018) used the RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework (Glasgow, Vogt, & Boles, 1999) to assess the feasibility of scaling a cooperative extension program from one site to an entire state. Perry and colleagues (2017) used an intervention mapping process to adapt an existing intervention for rural Latinas. Wilcox and colleagues (2018) also used RE-AIM as a framework and found that churches that previously engaged in a public health program and those with a holistic approach that extended beyond spiritual health were more likely to engage in a state-wide, faith-based physical activity and nutrition intervention.

D. Heart Smart for Women Intervention

Given the gaps in the literature around effective CVD risk reduction interventions in rural settings, there is a need to better understand factors associated with effective implementation of

these programs to improve both health outcomes and use of public health resources. Heart Smart for Women (HSFW) is an example of an evidence-based intervention designed to be delivered in a group setting by a trained interventionist (Khare et al., 2014). Heart Smart for Women consists of 12 one-hour sessions and provides information and skill-building for improving dietary habits and physical activity behaviors and sustaining these behaviors. Heart Smart for Women was developed by The Cooper Institute based on two efficacious randomized controlled trials conducted in an urban setting (Carpenter et al., 2004; Dunn et al., 1998; Dunn et al., 1999) around the Social Cognitive Theory (Bandura, 1998) and the Transtheoretical Model (Prochaska, Redding, & Evers, 2002).

Through a collaboration among the Center for Research on Women and Gender at the University of Illinois at Chicago (UIC); the Southern Seven Health Department (S7HD), a local health department serving Illinois' southernmost seven (S7) counties; and the Illinois Department of Public Health, HSFW was adapted by The Cooper Institute for community-based implementation in a rural setting and was implemented from 2007-2010 in local health department clinics, community organizations, and churches in the S7 region (Khare et al., 2014). Intervention participants demonstrated significant improvements in fruit intake and minutes of moderate physical activity from baseline to post-intervention (12 weeks), and significant improvements in total cholesterol and low-density lipoprotein cholesterol from baseline to 6 months from baseline; however, at one year from baseline, only moderate physical activity minutes and vegetable consumption exceeded baseline levels, and no clinical improvements were evident (Khare et al., 2014), suggesting the need for intervention strategies to facilitate maintenance of positive behavior change.

D.1. Church-based Heart Smart Intervention in Southernmost Illinois

The CVD risk-reduction intervention that is the focus of the study was implemented from 2011-2016 through a partnership among UIC, the S7HD, and 12 churches in the S7 region (Award Number: US DHHS CCEWH111024, Principal Investigator: S. Geller). The intervention,

referred to as “Heart Smart,” included implementation of HSFW (described above); however, the study team made two important modifications from the prior implementation of HSFW in the S7 region. First, the intervention was conducted within and in collaboration with local churches. This modification was made based on results from a previous study wherein churches were identified as an important source of support for S7 women (Zimmermann et al., 2014). Additionally, a two-year maintenance intervention was planned after the end of the 12-week HSFW program as a way to sustain improvements in dietary and physical activity behaviors. The maintenance intervention, Heart Smart Maintenance (HSM), was to be implemented by partner churches (Zimmermann et al., in press). (Both HSFW and HSM are described in greater depth in Chapter III below.) This study examines the role of context in the implementation of the Heart Smart intervention.

E. Implementation Science for Understanding Intervention Context

Implementation science refers to the study of how evidence-based strategies are applied within specific settings and the spread of information and interventions to specific audiences (Colditz, 2012). Implementation science attempts to bridge the gap between research knowledge and practice with the goal of advancing health (Glasgow et al., 2012). Additionally, implementation science extends beyond intervention effectiveness to also consider the implementation process (e.g., exploration, adoption, maintenance) (Landsverk et al., 2012).

E.1. Implementation Science Frameworks

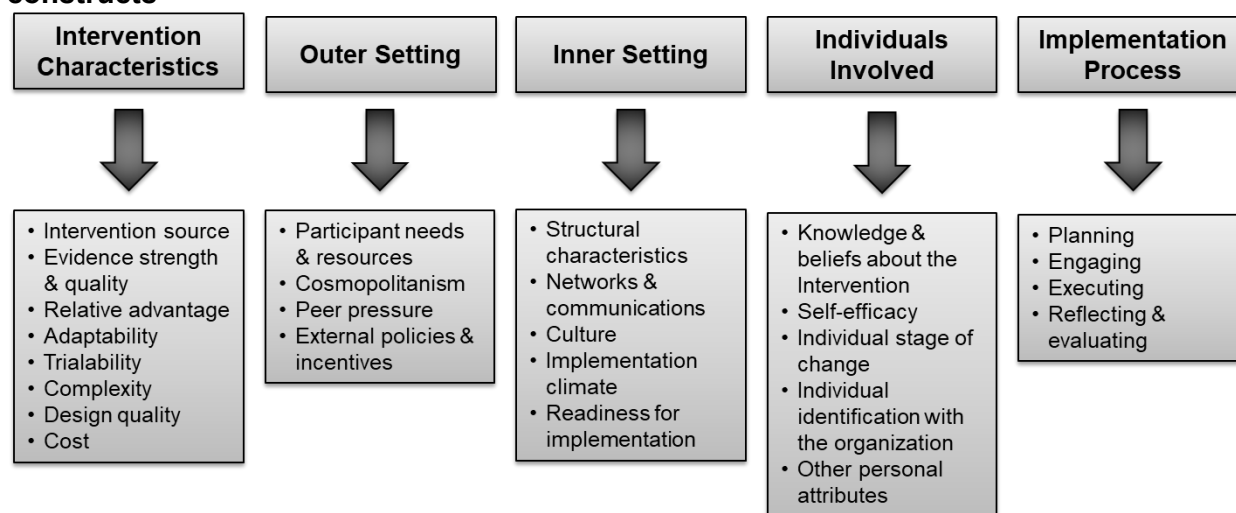
Several implementation science frameworks exist to aid in evaluating implementation activities (Gaglio & Glasgow, 2012), and selecting an appropriate framework depends on factors including relevance to the research and objectives and empirical support for the framework (Birken et al., 2017). The Consolidated Framework for Implementation Research (CFIR) is an implementation science meta-framework developed through the synthesis of prior implementation theories (Damschroder et al., 2009). The CFIR was developed using the

Diffusion of Innovation in Organizations framework (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004) as a starting point, and was expanded using literature citing Greenhalgh et al. (2004) and includes 18 other frameworks found in multiple studies (e.g., Promoting Action in Research Implementation in Health Services (PARiHS) (Rycroft-Malone, et al., 2004); Practical Robust Implementation and Sustainability Model (PRISM) (Feldstein & Glasgow, 2008)).

The CFIR is organized into five domains, each with multiple constructs: (i) intervention characteristics, including its core components and ability to be adapted; (ii) outer setting, or the economic, political, and social context in which the implementing organization is located; (iii) inner setting, or internal structure, political, and cultural context within an organization that may affect implementation; (iv) characteristics of the individuals involved in the implementation, engaged in decision-making related to implementation, or have influence on the implementation; and (v) process of implementation. Figure 1 provides a visual depiction of the CFIR domains and constructs. The CFIR has applications in both process and outcome evaluation, including to *“guide exploration into the question of what factors influenced implementation and how implementation influenced performance of the intervention”* (p.13) (Damschroder et al., 2009).

The CFIR allows users to choose relevant domains and constructs. The CFIR's standard definitions, flexibility of use, and broad scope make it an ideal framework for examining intervention implementation, and it has been cited extensively (Damschroder et al., 2009 has been cited 1,428 times in PubMed, as of 8/21/19). While the CFIR has previously been used as a framework for understanding factors associated with implementation in community-based primary and secondary CVD risk reduction program implementation targeting adults (e.g., Rich et al., 2018) and/or evaluation (e.g., Desveaux et al., 2016), until recently (Wilcox et al., 2018), no studies had been implemented in rural settings.

Figure 1. Consolidated Framework for Implementation Research (CFIR) domains and constructs



F. Summary

Rural adults in the US face disproportionately high rates of CVD and efforts to address these rates through primary and secondary prevention have been largely ineffective. While community-based settings hold promise as intervention sites, the contexts in which interventions are implemented are rarely considered in rural, community-based, CVD risk-reduction research. To contribute to knowledge on the implementation of CVD risk-reduction interventions in rural settings, I propose using an implementation science approach to consider the role of context in intervention implementation. Churches are often important organizations in rural communities. Therefore, this study uses the CFIR to examine implementation context, particularly internal context and implementation processes (Damschroder et al., 2009), within rural churches in Illinois' S7 region that participated in the Heart Smart intervention. This study seeks to contribute to knowledge on intervention of CVD risk-reduction interventions in rural settings.

III. METHODS

In this study, I used a multiphase, mixed-methods, embedded case study approach to assess the role of context in the implementation of an intervention for the primary and secondary prevention of CVD risk in a rural region of Illinois. The Heart Smart cardiovascular risk reduction intervention was implemented in 12 rural churches in collaboration with UIC and a local health department. This study is guided by the following research questions: (i) What contextual factors within churches may have a role in intervention implementation? (ii) What is the role of Consolidated Framework for Implementation Research (CFIR) “inner setting” and “implementation process” qualities (Damschroder et al., 2009) in implementation outcomes of participation and attendance?, and (iii) Are there combinations of church-level characteristics that are associated with implementation outcomes?

To answer these research questions, my study used previously collected data, examined in two stages. First, I conducted a qualitative analysis of interview transcripts and program documents, guided by the CFIR implementation science framework (Damschroder et al., 2009). I used the qualitative analysis to develop case stories for each of the 12 churches. I then analyzed the case stories to generate hypotheses around potential contextual factors involved in Heart Smart implementation. In stage two, I created dichotomous variables to describe contextual characteristics of churches based on my qualitative analyses. I then used quantitative analyses to test the hypotheses generated through my qualitative analyses using previously collected survey and participant attendance data. These methods are described in depth below.

A. Specific Aims

This study examines the role of context in the implementation of the “Heart Smart” intervention, a church-based CVD risk reduction intervention in 12 churches in rural,

southernmost Illinois. “Heart Smart” consisted of two interventions: (i) “Heart Smart for Women” (HSFW), an evidence-based behavior change program implemented to groups of women in 12 weekly sessions, and (ii) “Heart Smart Maintenance” (HSM) a 24-month maintenance intervention that followed HSFW. This specific aims of this study are to:

Aim 1: Identify and describe contextual factors within rural churches that may contribute to the implementation of a CVD risk reduction intervention implemented in these churches.

Aim 2: Assess the association between contextual factors within churches and implementation outcomes of the CVD risk reduction intervention.

B. Study Design Overview

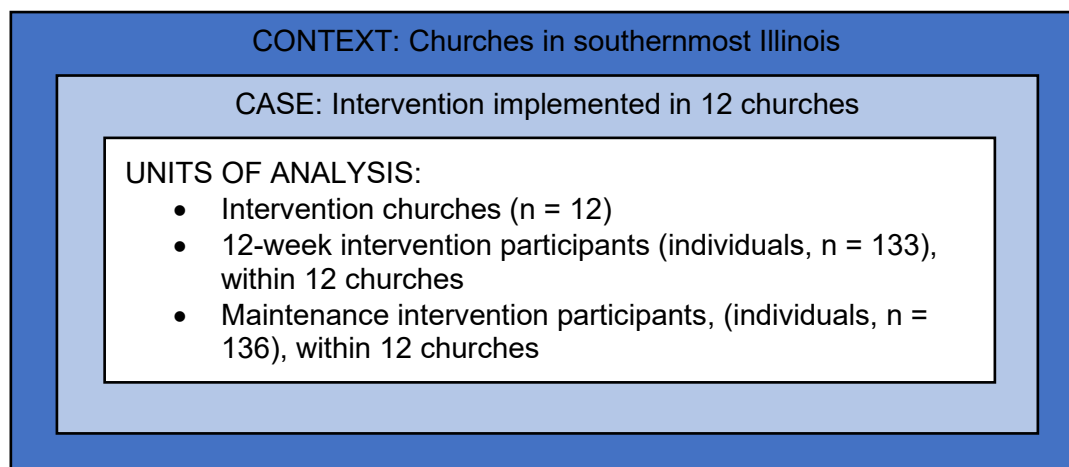
This study used a multiphase, mixed methods design in which previously collected qualitative and quantitative data were analyzed sequentially such that my qualitative findings were used to inform subsequent quantitative data analysis (Creswell, 2015; DeCuir-Gunby & Schutz, 2016). The primary reason for using this approach was the complementarity of using qualitative and quantitative data for answering my research questions (Plano Clark & Ivankova, 2015). By using a mixed methods design for this study, I was able to integrate qualitative findings and quantitative data as described below to yield quantitative findings and draw overall conclusions in a way that would not be possible with a single method (Creswell, 2015; Plano Clark & Ivankova, 2015).

B.1. Aim 1 Overview

For the qualitative study (Aim 1), I analyzed previously collected key stakeholder interview transcripts and program documents from the 12 participating Heart Smart churches to obtain an in-depth understanding of contextual factors related to the intervention implementation, and through the analysis I developed case stories for each church. I used an embedded case study approach, which is appropriate for understanding a phenomenon within a real-world setting (Yin, 2013). I selected this design to support improving knowledge and

application of theory related to community-based and church-based implementation of evidence-based programs in rural settings for the purpose of improving public health practice. Figure 2 provides a visual depiction of my specific case study. In my case study approach, I used my initial qualitative analysis to develop case stories, and further analyzed the case stories to develop hypotheses (see **F. Aim 1 Methods**), which I assessed in Aim 2.

Figure 2. Embedded, single case design used in the examination of context in the implementation of the Heart Smart intervention in southernmost Illinois



B.2. Aim 2 Overview

For Aim 2, I integrated my qualitative findings with quantitative data from Heart Smart intervention participants to understand the relationship between context and intervention implementation (Aim 2). Specifically, using my Aim 1 results, I created dichotomous variables describing contextual characteristics within churches. I then used quantitative analyses to test the hypotheses generated in Aim 1 using previously collected, person-level survey and participant attendance data (see **G. Aim 2 Methods**).

C. Research Setting and Context Surrounding the 12 Intervention Churches

Study activities took place in the southernmost seven (S7) region of Illinois, which comprises Alexander, Hardin, Johnson, Massac, Pope, Pulaski, and Union counties. The region has 67,190 residents over approximately 2,000 square miles (U.S. Census Bureau, 2015). The S7 counties are among 16 Illinois counties that are part of the “Mississippi River Delta” region of the US, which is known for high poverty rates and poor health status (Health Resources and Services Administration Office of Rural Health Policy, 2004). Based on the 2013 Rural-Urban Continuum Codes (RUCC) codes, which classify US census tracts as metropolitan based on population size or nonmetropolitan based distance to a metropolitan area, six of the S7 counties are considered “nonmetropolitan,” or rural (United States Department of Agriculture Economic Research Service, 2019).

The S7 counties are consistently ranked among the lowest in Illinois in the County Health Rankings for both health factors (assesses behavioral characteristics; clinical care characteristics; and social, economic and physical environment characteristics that affect health) and health outcomes (assesses health status) (University of Wisconsin Population Health Institute, 2019). According to the 2019 County Health Rankings for Illinois, of the 102 Illinois counties, four of the S7 counties (Alexander, Hardin, Massac, and Pulaski) are ranked in the lowest six in Illinois for health outcomes. Additionally, for health factors, all of the S7 counties are in the bottom 25%, and Hardin, Pulaski, and Alexander counties are ranked 99, 101, and 102 respectively (University of Wisconsin Population Health Institute, 2019).

According to the BRFSS, among S7 adults, 47% have been told by a health care provider that they have high blood cholesterol (38% in Illinois), 34% have been told they have high blood pressure (27% in Illinois), 12% have been told they have diabetes (9% in Illinois), and 71% are overweight or obese (62% in Illinois) (Illinois Department of Public Health, 2014).

D. Intervention

As described in Chapter 2, the CVD risk-reduction intervention that was the focus of the study, “Heart Smart,” was developed and implemented in response to the chronic disease risk and prevalence in the S7 region. The intervention was implemented from 2011-2016 through a partnership among the Center for Research on Women and Gender at the University of Illinois at Chicago (UIC); the Southern Seven Health Department (S7HD), which serves Illinois’ S7 counties; and 12 churches in the S7 region (Award number: US DHHS CCEWH111024, Principal Investigator: S. Geller). Heart Smart included two interventions, (1) Heart Smart for Women (HSFW), designed to improve dietary and physical activity behaviors to reduce CVD risk, followed by (2) Heart Smart Maintenance (HSM), designed to sustain behavior change. Heart Smart was implemented in 12 intervention churches based in nine communities within six of the S7 counties (Zimmermann et al., in press). All 12 churches that participated in the Heart Smart intervention implemented both HSFW and HSM, but participation of individuals in one or both interventions was voluntary (participants were not randomized to intervention conditions).

D.1. Heart Smart for Women

Heart Smart for Women (HSFW) is an evidence-based intervention designed to be delivered to groups of 15-20 women by a trained interventionist in 12 weekly, one-hour sessions (Khare et al., 2014). The intervention provides information and skill-building for improving dietary habits and physical activity behaviors and sustaining these behaviors. For the current study, HSFW classes were delivered by staff from the S7HD to interested adult women in partnership with 12 churches. As described in Chapter II, in response to the limited long-term effectiveness in the 2007-2010 implementation (Khare et al., 2014), our program included a maintenance intervention described below.

D.2. Heart Smart Maintenance

Heart Smart Maintenance (HSM) was a two-year maintenance program implemented by an “HSM coordinator” from each intervention church following the completion of HSFW with the

goal of helping HSFW participants maintain behavior changes adopted during HSFW and promoting health among adults who did not participate in HSFW. In each church, HSM activities were planned and implemented by the HSM coordinator such that they were tailored based on the needs and interests of HSFW participants and church members to foster behavior change. The HSM coordinator served as the liaison between her church and the Heart Smart intervention. Three churches opted to have “co-coordinators,” in which two church members shared the coordinator role.

Monthly HSM activities were open to HSFW participants at each of the 12 churches as well as other interested church and community members. Thus, HSM activities were intended to be community specific and culturally appropriate. A wide variety of topics were covered in HSM sessions, many related to HSFW such as healthy behaviors (e.g., reading food labels, healthy snacks, emotional eating, stress management), cooking demonstrations (e.g., healthy smoothies, crock pot cooking), and fitness activities (e.g., swimming pool walking, yoga, stretching, indoor and outdoor walking). Sessions also covered specific health topics (e.g., obesity, diabetes, breast cancer, mental health, blood pressure).

The HSM protocol specified participating churches were to implement at least one group-based activity each month for two years. Eleven churches participated in HSM for at least 20 months (until the end of the grant); however, in one church, the HSM coordinator moved out of state during the second year of HSM implementation, and the pastor opted not to continue HSM at the church. Churches were reimbursed up to \$6,000 over three years for the HSM coordinator’s time and supplies and expenses related to HSM implementation.

E. Data Sources Overview

Before HSFW implementation within each church, qualitative key stakeholder interviews were conducted to obtain perspectives about community and church health needs, barriers to being healthy, and the role of the church in health promotion. Post-intervention interviews were

conducted after HSM ended to understand stakeholders' experience with the Heart Smart Initiative. At the time of enrollment for both HSFW and HSM, demographic and health status information was collected from participants, and attendance data were collected during each program. Finally, HSM coordinators completed monthly "coordinator forms" to describe their respective HSM activities. Figure 3 presents a diagram of the data collection activities before, during, and after implementation, along with a flow diagram describing HSFW and HSM participants. Each of the data sources are described in greater depth in sections **F. Aim 1 Methods** and **G. Aim 2 Methods** below.

F. Aim 1 Methods

I used an embedded case study approach to create case stories for the 12 churches using transcripts from semi-structured key stakeholder interviews (n = 26 pre-intervention and n = 15 post-intervention transcripts) and monthly feedback forms completed by HSM coordinators after HSM sessions (n = 238 forms) (Figure 3).

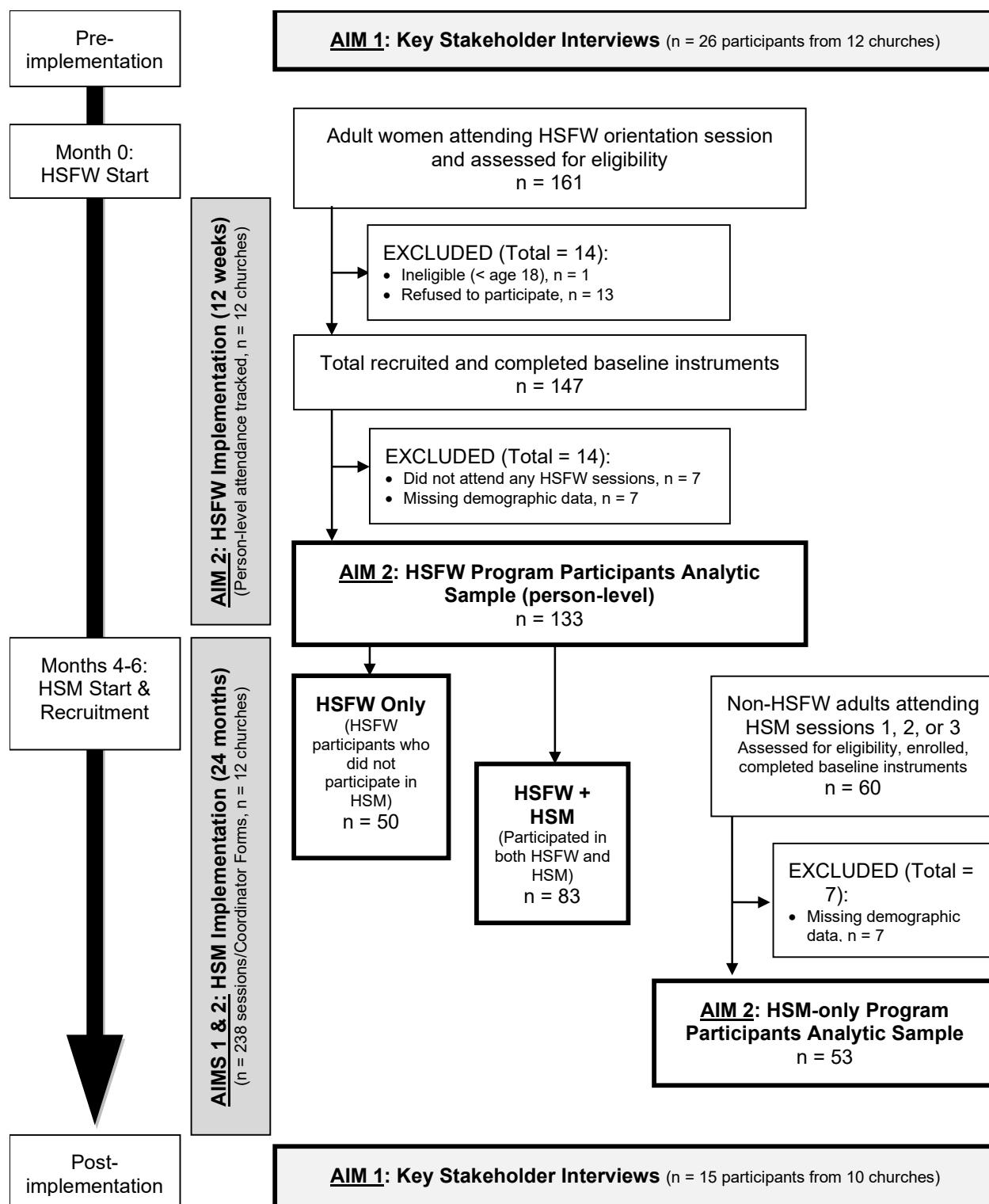
F.1. Key Stakeholder Interviews

Key stakeholder interviews were conducted before intervention activities began to collect information to inform intervention activities. Interviews were conducted again after two years of HSM activities to obtain feedback about implementation (Figure 3). The study team chose purposive sampling to identify potential interview participants because they were seeking to understand the perspectives of church leaders, including those with a formal title within the church as well as informal or lay leaders.

F.1.a. Key Stakeholder Interviewee Identification and Recruitment

For both pre- and post-intervention interviews, members of the study team asked the church pastor and HSM coordinator(s) to identify potential key stakeholders to participate in one-on-one interviews. At pre-intervention, key stakeholders were identified after the church agreed to participate in Heart Smart. Key stakeholders included, at minimum, the coordinator(s)

Figure 3. Heart Smart intervention flow and data collection diagram (implemented 2011-2016)



and the pastor; however, many Heart Smart churches identified 1-2 additional key stakeholders. At the end of HSM, the study team again asked the HSM coordinator(s) and pastors to identify potential key stakeholder. The researchers did not make a specific effort to interview the same key stakeholders and pre/post time points with the exception of the coordinator(s) and pastor (when the same pastor was in the church at both time points).

The research team received contact information for identified key stakeholders from each church pastor and/or coordinator. All identified stakeholders were contacted by phone and/or email to introduce the researcher team, provide information about the study, and invite potential stakeholders to schedule an interview. Upon agreement to participate, the interview was scheduled for a later date. The research team made multiple attempts to contact key stakeholders in an effort to complete at least two interviews per church at each time point. Interviews were conducted with all who volunteered to participate and were still available at their scheduled interview time. The research team attempted to reschedule any cancelled interviews.

A total of 34 key stakeholders were identified for pre-intervention interviews. Among those identified for an interview, 26 individuals from 12 churches completed pre-intervention interviews (see Figure 3) (76.5% of those who were contacted). The most common reasons for non-participation were lack of response to voicemail or email, or inability to leave a phone message ($n = 6$), inability to participate in interview due to time constraints ($n = 1$), and inability to schedule an interview after communication has been initiated ($n = 1$).

At the end of HSM, the researchers again asked the coordinator(s) from 11 of the 12 churches to recommend key stakeholders to participate in post-intervention interviews. In the twelfth church, the HSM coordinator moved out of state during the second year of HSM implementation, and the pastor opted not to continue HSM at the church and post-intervention interviews could not be conducted with stakeholders from this church. Of the 30 key stakeholders identified for post-intervention interviews, 15 individuals from 10 churches completed post-intervention interviews (see Figure 3) (50% of those who were contacted). In

one church, the research team was not successfully able to complete an interview after multiple scheduling attempts. The most common reasons for non-participation at post-intervention was lack of response to voicemail or email or inability to leave a phone message (n = 6), inability to participate in interview due to time constraints (n = 4), inability to schedule an interview after communication has been initiated (n = 2), and other unknown reasons (n = 3).

The Heart Smart interview protocol was approved by the UIC Institutional Review Board (UIC IRB 2011-0889). Interview participation was voluntary. Participants provided either written or verbal consent prior to the start of each interview. Interviews were audio recorded, transcribed verbatim, and stored without personal identifiers.

F.1.b. Key Stakeholder Interview Instruments

Both pre- and post- intervention interviews were conducted using semi-structured interview guides developed by the research team. Pre-intervention interview topics included attitudes and beliefs about health, particularly chronic disease and chronic disease risk behaviors; health needs in the church congregation and community; perceptions about existing health activities within the church; and perspectives about the role of the church in health promotion (see Appendix A for pre-intervention interview guide). Post-intervention interviews addressed perceptions about the Heart Smart interventions and perceptions about other health activities within the church (see Appendix B for post-intervention interview guide). Interviewers used the interview guides to facilitate conversation with interviewees and probed for additional information where appropriate.

F.1.c. Key Stakeholder Interview Data Collection and Transcription

Multiple members of the research team were involved in conducting interviews (26 pre-intervention interviews conducted between July 2012-August 2014 and 15 post-intervention interviews conducted between September 2014-September 2016). All interviewers had previous training and experience with qualitative interviewing. Interviews were primarily conducted by phone (n = 39) but two interviews were conducted in person. To conduct the Heart Smart

interviews, a member of the research team called prospective interviewees at the scheduled time or met the interviewee at a predetermined location chosen by the interviewee. Pre-intervention interviews had a mean length of 40 minutes (Range: 14-60 minutes). Post-intervention interviews had a mean length of 31 minutes (Range: 4-57 minutes).

Interview recordings were transcribed either by a member of the research team or a professional transcription service and were reviewed by a member of the research team for completeness, errors, and to de-identify content.

As described in Table I, all churches had at least one pre-intervention interview and 10 of the 12 churches had post-intervention interviews. Most interviewees at both time points were female and they were HSM coordinators. Half of the pre-intervention interviewees ($n = 13$) participated in a post-intervention interview.

F.2. Coordinator Feedback Forms

The HSM Coordinator Feedback Form was created as a mechanism to track HSM session dates, activities, attendance, and coordinators' comments and reflections about their monthly HSM sessions. All submitted Coordinator Feedback Forms from the 12 Heart Smart churches ($n = 238$ forms) were included in the analysis (see Figure 3). Coordinator feedback forms ranged from 13 forms (Churches D and K) to 32 forms (Church B), as listed in Table I. The forms for each church correspond to the number of HSM activities implemented. The process of collecting feedback from HSM coordinators was approved by the UIC Institutional Review Board (UIC IRB 2011-2098). Written informed consent was provided by HSM coordinators prior to completing feedback forms.

F.2.a. HSM Coordinator Feedback Form Instrument

The HSM Coordinator Feedback Form was customized for each church by pre-populating the church's name and assigned participant identification numbers on the form (see Appendix C for sample template). By pre-populating the form, coordinators were able to check participants'

attendance rather than write ID numbers, which served to save time and reduce the potential for transcription errors.

TABLE I. HEART SMART PRE- AND POST-INTERVENTION KEY STAKEHOLDER INTERVIEWEE CHARACTERISTICS AND HSM COORDINATOR FEEDBACK FORMS BY CHURCH

	Pre-intervention (n = 26)		Post-intervention (n = 15)		Pre- and post-intervention (n = 13)		HSM Coordinator Feedback Forms
	n	%	n	%	n	%	n
Role							
Coordinator	13	50.0	9	60.0	9	69.2	
Pastor	6	23.1	3	20.0	2	15.4	
Other stakeholder	7	26.9	3	20.0	2	15.4	
Gender							
Male	6	23.1	3	20.0	2	15.4	
Female	20	76.9	12	80.0	11	78.6	
Church							
Church A	4	15.4	3	20.0	2	15.4	14
Church B	3	11.5	1	6.7	1	7.7	32
Church C	3	11.5	1	6.7	1	7.7	28
Church D	1	3.8	-	-	-	-	13
Church E	1	3.8	-	-	-	-	15
Church F	2	7.7	1	6.7	1	7.7	23
Church G	3	11.5	3	20.0	2	15.4	24
Church H	3	11.5	2	13.3	2	15.4	22
Church I	2	7.7	1	6.7	1	7.7	22
Church J	1	3.8	1	6.7	1	7.7	14
Church K	1	3.8	1	6.7	1	7.7	13
Church L	2	7.7	1	6.7	1	7.7	18

F.2.b. HSM Coordinator Feedback Form Data Collection Procedures, Data Entry, and Data Management

Prior to HSM initiation within a church, the coordinator received 24 blank HSM Coordinator Feedback Forms customized for her church along with 24 postage-paid envelopes. For each monthly HSM session, the church coordinator was asked to complete and return a Coordinator Feedback Form via US Mail. Returned forms were entered into a REDCap

database by a member of the research team. When a church did not submit a form, a member of the research team contacted the HSM coordinator to remind her to send the form or notify the research team if HSM was not implemented during the month with the missing form.

F.3. Qualitative Data Analysis

The purpose of my qualitative analysis was to identify and describe the contextual factors within Heart Smart churches that may contribute to implementation of a CVD risk reduction intervention implemented in these churches. From my analysis, I developed operational themes based on CFIR constructs, and created case stories for each Heart Smart church. Next, I conducted a cross-case analysis of churches to discern contextual similarities and differences across churches to use in my Aim 2 analysis (Patton, 2002; Yin, 2013). All interviews and HSM coordinator feedback forms were included in the analysis.

F.3.a. Codebook Development and Coding Procedures

I used a deductive content analysis process to analyze the interview transcripts and coordinator feedback forms (Patton, 2002) using an adapted version of the CFIR qualitative analysis codebook (CFIR Research Team – Center for Clinical Management Research, 2019). To adapt the codebook, I first reviewed constructs/codes from the published CFIR codebook, and omitted constructs that were not applicable to my study. For example, in the CFIR codebook, “Individual Stage of Change” describes the extent to which those implementing an innovation have the skills, enthusiasm, and able to sustain its use (CFIR Research Team – Center for Clinical Management Research, 2019). Because we did not collect data to explicitly assess “individual stage of change,” I excluded this code. Next, I collapsed codes into code families if I did not expect topics to be prominent in the data but wanted to capture discussion about the topic if it arose naturally. For example, I combined multiple codes related to perceived characteristics about the intervention if I did not expect them to be prominent in the transcripts (i.e., evidence supporting the intervention, relative advantage over other programs, and intervention quality and packaging) but wanted to capture interviewee perceptions if they were

discussed, as they were potentially relevant to the Heart Smart intervention. I next expanded and clarified some code definitions based on Greenhalgh's Diffusion of Innovations for Organizations (Greenhalgh et al., 2004) to create a draft codebook to use for preliminary coding. Using my draft codebook, to enhance the reliability of the coding process, I worked with a second researcher (Leslie Carnahan) to refine the codebook. Specifically, Ms. Carnahan and I coded the same transcript, and then met to review coding discrepancies. I modified the codebook and code definitions based on our discussions, and we repeated the process until we achieved a common understanding of code definitions. The final codebook included six parent codes with 26 child codes. Five of the six parent codes represented the five CFIR domains (Intervention Characteristics, Outer Setting, Inner Setting, Characteristics of Individuals, and Process) (Damschroder et al., 2009). The sixth parent code included additional child codes I created that were not related to the CFIR domains (i.e., descriptive information about interviewees; sustained changes as a result of Heart Smart or planning for sustaining changes; interviewees' perceptions about personal health, community health needs, healthy activities, and barriers and facilitators to being healthy) (see Appendix D for final adapted codebook).

After finalizing the codebook, I hand-coded all transcripts and coordinator forms. While coding, I also took notes to capture analytic thoughts and impressions. After hand-coding, I entered all codes into the Dedoose web application (SocioCultural Research Consultants, LLC, Los Angeles, CA), which I used to facilitate my analysis. Unfortunately, time limitations for the second coder did not permit her to continue as a second coder in my study.

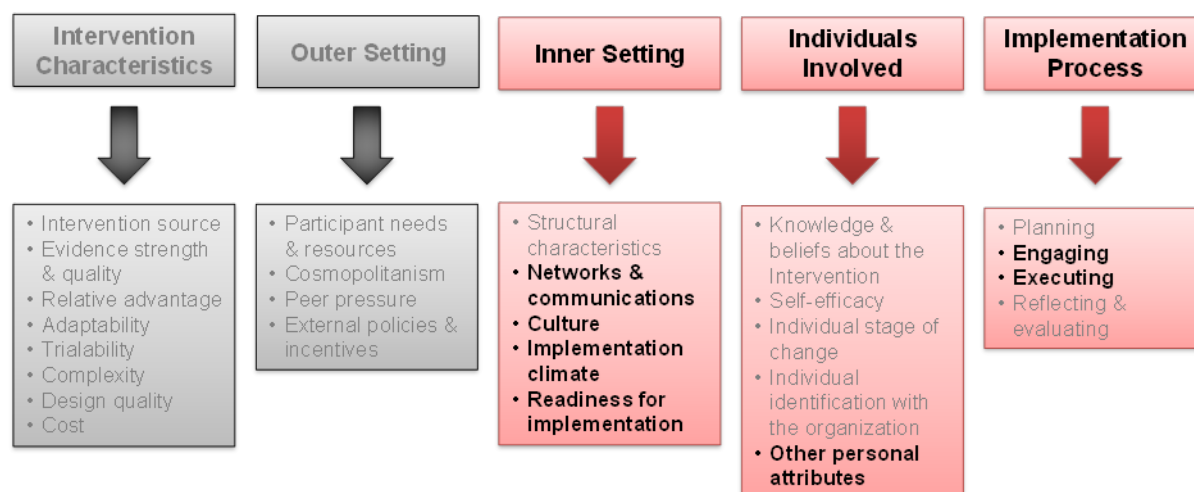
F.3.b. Deductive Analysis, Case Story Development, and Cross-case Analysis

After I completed coding, I reviewed all coded data segments by parent and/or child codes for each church. Reviewing codes one church at a time, I recorded summary notes along with my analytic thoughts and impressions in response to my research question. I organized my initial analytic notes into five emergent thematic categories: (i) church culture and relationship to

health, (ii) perceptions about being healthy in a rural community, (iii) feedback/notes about HSWF, (iv) feedback/notes about HSM, and (v) sustainability. I tracked additional, potentially relevant concepts within a broader category, “other relevant comments.”

After developing my analytic notes, I mapped the notes and data summaries back onto the CFIR domains (Damschroder et al., 2009). My analytic notes and data primarily belonged to three CFIR domains (i) “Inner Setting”, including the networks and communications, culture, implementation climate, and readiness for implementation constructs; (ii) “Individuals Involved,” including personal attributes of the HSM coordinators; and (iii) “Implementation Process,” including engagement of stakeholders and program champions and execution of the intervention within each church. The three domains and the specific constructs within the three domains are denoted in bold in Figure 4; CFIR domains and constructs that did not feature prominently in my analysis are displayed in gray.

Figure 4. Application of the Consolidated Framework for Implementation Research (CFIR) to analyze contextual factors associated with the Heart Smart intervention implementation in 12 rural southernmost Illinois churches ^a



^a Red boxes denote CFIR domains that emerged as the focus of the qualitative analysis; bold text within red boxes were prominent constructs in the analysis. Gray domains and constructs were not prominent themes in the qualitative analysis.

Using a cross-case analysis process (Patton, 2002; Yin 2013), I compared and contrasted data summaries for each church by CFIR constructs. This process helped me to develop a strategy for organizing case stories by theme and create an outline template for my case stories. This outline, which aligns with the CFIR constructs described above and displayed in Figure 4 in bold, is provided Table II. Using this outline, I created 12 case stories (one for each church) based on my analytic notes and supplemented them with descriptive information about each church (e.g., US Census information).

F.4. Development of Organizational-level Quantitative Data and Hypotheses to be Tested in Aim 2

After composing the 12 case stories, I continued my cross-case analysis to develop possible hypotheses to test in Aim 2. I created a conceptual framework based on prominent themes focusing on distinct contextual characteristics that were likely to be pertinent to intervention implementation and in which there were differences between churches. Along with this conceptual framework I created variables to describe church contextual characteristics. My final conceptual framework and the contextual characteristics included in the conceptual framework are described in Chapter VI.

This study uses individual-level data in the form of key stakeholder interviews as well as programmatic documents to describe organizational-level characteristics. Chan (1998) offers a typology for developing higher-level (i.e., organizational) variables based on lower-level (i.e., individual) level data, but this typology relies on quantitative data collected from individuals, which were not available for the current study because it was conceptualized after data collection ended. Therefore, to conduct my Aim 2 analyses, I used findings from qualitative, key informant interviews to develop variables describing churches. In this process, I converted rich qualitative data into dichotomous variables. I implemented procedures to foster study quality and minimize bias during this process (Driscoll, Appiah-Yeboah, Salib, & Rupert, 2007; Plano

Clark & Ivankova, 2015). Specifically, I kept detailed notes during my qualitative analysis process including operational definitions of church characteristics. As I refined these definitions, I frequently returned to the qualitative transcripts and case stories to verify categorization of churches.

TABLE II. HEART SMART IMPLEMENTATION CASE STORY OUTLINE AND DESCRIPTION OF CONTENT

Heading/Subheading	Description
I. Description of Data	Data used to develop the case story, including number of interview transcripts and HSM Coordinator Feedback Forms
II. External Setting Description	Demographic information about the town and county in which the church is located
III. Internal Setting Description	Descriptive information about the church, including denomination, geographic location, membership, and weekly attendance
IV. Intervention Details	Details related to the HSFw and HSM implementation, such as dates, participation, and HSM session topics
V. Internal Setting	Church characteristics related to the CFIR Inner Setting domain
<i>a. Implementation culture</i>	Perceptions related to the value of promoting health within the church
<i>b. Implementation climate</i>	Perceptions about the compatibility of the intervention within the church, based on (1) whether or not the church has a history of health programs, (2) perceptions about the structure of Heart Smart, and (3) perceived need for the intervention
<i>c. Readiness for implementation</i>	Tangible implementation resources
<i>d. Networks/ Communications</i>	Strength of social networks and communication within the church, including the extent to which church members are drawn to being together.
VI. Personal attributes of coordinator	Characteristics of HSM coordinator (e.g., roles within the church, previous health experience) and the extent to which church members are drawn to the coordinator.
VII. Program champions	Characteristics of the church pastor and the pastor's involvement in the intervention

G. Aim 2 Methods

To test the hypotheses developed in Aim 1, I conducted a series of regression analyses using church-specific characteristics developed based on my qualitative analysis and person-

level HSFW and HSM participation and attendance data with participants. Aim 2 focused on assessing HSFW and HSM participation and attendance to represent how well the Heart Smart intervention was implemented.

G.1. Description of Person-level Data

G.1.a. Heart Smart for Women

The HSFW intervention targeted adult women who were members of participating churches, their family members, and other community members. All interested adult women were eligible to receive the intervention and participate in the HSFW evaluation. Participants in HSFW were recruited for the HSFW evaluation using a recruitment script and fact sheet presented at the first HSFW class. No incentives were given at the time of enrollment. Participants signed an informed consent form prior to participating (UIC IRB 2011-1098).

Person-level survey data were collected in person at the time of enrollment using paper-based survey instruments, self-administered by intervention participants. The current study used participant data collected at baseline via demographic and health history surveys (see Figure 3). All surveys were entered by a member of the research team into a REDCap (Research Electronic Data Capture) database hosted at UIC (Harris et al., 2009).

This study also included HSFW session attendance data, which was monitored by the HSFW interventionists who implemented HSFW groups at each church (see Figure 3). The HSFW interventionists sent Excel spreadsheets with attendance information by HSFW identification number to the research team via email at the end of each 12-week HSFW session.

All recruited participants had demographic and health history surveys and attendance data (no instruments were missing). Participants for whom attendance was equal to 0 (no HSFW sessions attended) were excluded from this study ($n = 7$) (see Figure 3). In addition, participants with missing demographic values were excluded from this study ($n = 7$) (Graham, 2009) (see Figure 3).

G.1.b. Heart Smart Maintenance

All HSFW participants were invited to participate in HSM, and those who did were tracked via their HSFW identification number. Additionally, adult HSM participants who did not take part in HSFW were invited to be part of the HSM evaluation, and were recruited at the first, second, and third HSM events at each church (see Figure 3). (*Note: Adults could attend HSM sessions at any time, regardless of enrollment in the HSFW or HSM studies. These individuals were not included in the HSM evaluation and are not a focus of this study.*) No incentives were given at the time of enrollment. Participants were required to sign an informed consent form to participate in the evaluation (UIC IRB 2011-1098).

Paper-based survey instruments were self-administered by intervention participants at the time of enrollment. This study used participant data collected at baseline via demographic and health history surveys. The surveys were the same as those used for HSFW, except the HSM survey included an item for participant sex. All surveys were entered into a REDCap database.

This study also used HSM attendance data, which was tracked by coordinators, reported on Coordinator Feedback Forms (described in **F.2. Coordinator Feedback Forms**, above) (see Figure 3). Attendance data for HSM were entered into a REDCap database.

All recruited HSM participants had baseline demographic and health status data and attendance data. Participants who were missing demographic variables of interest ($n = 7$) were excluded from the study (Graham, 2009) (see Figure 3).

G.2. Measures

The dependent variables, independent variables, and other covariates used in this study and a description of how they were measured or derived are described below and in Table III.

TABLE III. HEART SMART FOR WOMEN AND HEART SMART MAINTENANCE PERSON-LEVEL AND CHURCH-LEVEL DATA INCLUDED IN STUDY

Variable	Variable Type	Description
<u>DEPENDENT VARIABLES (PERSON-LEVEL)</u>		
HSFW Attendance	Proportion	<ul style="list-style-type: none"> • Tracked by HSFW interventionists; sent to research team • HSFW sessions attended out of 12 total sessions
HSFW Completion	Dichotomous	<ul style="list-style-type: none"> • Yes: Attended ≥ 8 HSFW sessions • No: Attended < 8 HSFW sessions
HSFW participant who attended HSM	Dichotomous	<ul style="list-style-type: none"> • Yes: Had both HSFW and HSM ID numbers <u>and</u> attendance > 0 for both HSFW and HSM • No: Missing either HSFW or HSM ID number <u>or</u> attendance = 0 for HSFW or HSM
HSM Attendance	Proportion	<ul style="list-style-type: none"> • Tracked by HSM coordinators; sent to research team via HSM coordinator forms • HSM sessions attended as a proportion of the number of HSM sessions implemented in the first 20 months of HSM implementation at participant's church
<u>INDEPENDENT VARIABLES (CHURCH-LEVEL)</u> ^a		
Church	Categorical ^b	Derived based on participant ID numbers, which had 3 or 4 characters that identified the church.
<i>Context: Organizational Culture and Structure</i>		
Religious basis for health promotion within church	Dichotomous	<ul style="list-style-type: none"> • Yes: Qualitative evidence indicating a belief that health promotion is consistent with Christian beliefs about the body, and/or that being healthy contributes to a Christian mission of being able to serve others • No: Lack of evidence
History of health activities in the church	Dichotomous	<ul style="list-style-type: none"> • Yes: Qualitative evidence of prior health activities being implemented in the church • No: Lack of evidence
Support for intervention by church members	Dichotomous	<ul style="list-style-type: none"> • Yes: Qualitative evidence of church members' support for the Heart Smart intervention or absence of evidence of lack of support • No: Qualitative evidence of church members' lack of support for the Heart Smart intervention
HSM coordinator engagement	Dichotomous	<ul style="list-style-type: none"> • Yes: Qualitative evidence of HSM coordinators' engagement in overall intervention activities • No: Lack of evidence
Pastor involvement in HSM	Dichotomous	<ul style="list-style-type: none"> • Yes: Qualitative evidence of pastors' engagement in HSM activities • No: Lack of evidence

TABLE III. HEART SMART FOR WOMEN AND HEART SMART MAINTENANCE PERSON-LEVEL AND CHURCH-LEVEL DATA INCLUDED IN STUDY (CONTINUED)

Variable	Variable Type	Description
Context: Interpersonal		
Social connectedness	Dichotomous	<ul style="list-style-type: none"> • Yes: Qualitative evidence of strong social connections among church members • No: Lack of evidence
Connection with coordinator	Dichotomous	<ul style="list-style-type: none"> • Yes: Qualitative evidence of strong connections with the HSM coordinator. <i>Churches were excluded from HSFw analysis if coordinators did not participate in HSFw (n = 2 churches).</i> • No: Lack of evidence
<u>OTHER COVARIATES (PERSON-LEVEL)</u>		
Sex	Dichotomous	<ul style="list-style-type: none"> • Collected categorical (Male/Female) • Missingness: n = 0
Age	Continuous	Participants with missing age excluded from analysis (HSFW: n = 1; HSM: n = 1)
Race/ Ethnicity	Dichotomous	<ul style="list-style-type: none"> • Collected Race (Categorical) and Hispanic/Latino ethnicity (Yes/No); • Non-response to Hispanic/Latino ethnicity recoded as No (HSFW: n = 9; HSM: n = 4) • Participants with missing Race excluded (HSFW: n = 1; HSM: n = 1) • Dichotomized: White, non-Hispanic: Yes/No
Education	<ul style="list-style-type: none"> • Categorical • Dichotomous 	<ul style="list-style-type: none"> • Collected categorical (< high school; high school degree or GED; some college, no degree; associate's degree; bachelor's degree or higher) • Participants with missing Education excluded (HSFW: n = 1; HSM: n = 1) • Collapsed into 4 categories (< high school, high school degree or GED, some college, bachelor's degree or higher) • Dichotomized: >=Bachelor's degree: Yes/No
Marital status	Dichotomous	<ul style="list-style-type: none"> • Collected categorical (married; unmarried, living with partner; unmarried, not living with partner) • Participants with missing Marital Status excluded (HSFW: n = 2; HSM: n = 0) • Dichotomized: "married or living with partner" (Yes/No)
Employment status	Dichotomous	<ul style="list-style-type: none"> • Collected categorical (retired, work part-time, work full-time, unemployed, homemaker, student, other) • Participants with missing Employment excluded (HSFW: n = 2; HSM: n = 4) • Dichotomized: "employed" or "not employed" • Recoded written "Other" responses: "Disability" or "Sick leave" recoded as "not employed"; "Self-employed" or "Farmer" recoded as "employed"

TABLE III. HEART SMART FOR WOMEN AND HEART SMART MAINTENANCE PERSON-LEVEL AND CHURCH-LEVEL DATA INCLUDED IN STUDY (CONTINUED)

Variable	Variable Type	Description
Hypertension diagnosis	<ul style="list-style-type: none"> • Categorical • Dichotomous 	<ul style="list-style-type: none"> • Collected categorical (ever told by a health care provider you have: high blood pressure/hypertension, borderline high blood pressure/prehypertension, no) • Missingness: n = 0 • Dichotomized: "hypertension/pre-hypertension diagnosis" (Yes/No)
HSFW participation	<ul style="list-style-type: none"> • Dichotomous 	Created based on whether participant attended HSFw and used for HSM attendance models only.

^a Independent variables, while describing church-level characteristics, were first-level (person-level) variables. These variables were generated based on Aim 1 analysis.

^b "Church" was a first-level (person-level) variable in analyses in which churches were identified by dummy variables; In Generalized Estimating Equations (GEE), used in Aim 2 analyses, "Church" was a categorical variable, as participants were clustered by church.

G.2.a. Dependent Variables

The dependent variables in this study represent the four implementation outcomes: (i) HSFW attendance, (ii) HSFW completion, (iii) HSM participation among HSFW attendees, and (iv) HSM attendance (Table III). I used attendance, completion, and participation as measures of implementation effectiveness. The use of participation and attendance data to assess intervention implementation is also supported by implementation science frameworks including RE-AIM (Glasgow et al., 1999). The “Implementation” component of the RE-AIM framework is concerned with the extent to which an intervention is implemented as it is supposed to be implemented, which is necessary for understanding health-related outcomes for studies conducted outside of controlled research settings (Glasgow et al., 1999), as is the case in this study. This assessment of fidelity includes whether individual participants follow intervention participation protocols to receive the recommended intervention dose (i.e., attendance) (Glasgow et al., 1999). Prior studies have used attendance and participation as implementation outcome measures (e.g., Conlon et al., 2015; Heerman, et al., 2018; Nhim et al., 2019; Yeary et al., 2019) or measures of fidelity (e.g., James Bell Associates, 2009; King et al., 2019), which supports their use in the current study.

The “HSFW attendance” variable was calculated as person-level sessions attended as a proportion of 12 sessions implemented (Table III). As described above, assessing HSFW attendance as a continuous outcome aids in understanding the extent to which participants receive the intervention as intended.

Attendance at eight or more HSFW sessions represented “HSFW completion,” as eight sessions was determined to be the minimum required intervention dosage by the HSFW developer, The Cooper Institute (Table III). The HSFW completion variable was determined at the person level and was represented as a dichotomous variable (i.e., Completer = Yes/No). While HSFW completion and HSFW attendance are similar, assessing completion is important

for understanding minimum intervention dosage, as attending all intervention sessions may not be necessary for achieving desired changes in behaviors.

The “HSM participation among HSFW attendees” variable was calculated as a person-level dichotomous variable based on whether HSFW attendees participated in at least one HSM session (Table III). Because HSM was developed as a maintenance intervention to support sustained behavioral changes adopted during HSFW, the study team was interested in maximizing the number of HSFW attendees who also participated in HSM, in support of the program theory guiding the overall intervention.

“HSM attendance” was calculated at the person-level as a proportion of the number of sessions implemented at the participant’s church to account for variations in the number of HSM sessions implemented in each church (Table III) (this variation in HSM sessions implemented by church is discussed in greater depth in Chapter IV). Given the goal of HSM in supporting maintenance of behaviors adopted during HSFW, ongoing attendance at HSM was theorized by the study team to be a critical component to achieving long-term effectiveness in the overall intervention. Heart Smart churches implemented HSM for varying lengths of time. (In the last cohort of Heart Smart churches, they had only 20 months to implement HSM before funding ended; however, some churches that began before the last cohort voluntarily extended the length of their HSM programs, as depicted in Table I). Due to the variations in length of HSM implementation by church, the HSM attendance variable was calculated based on the number of HSM sessions implemented during the first 20 months of HSM implementation by church.

G.2.b. Independent Variables

The independent variables included participant church as well as contextual characteristics in churches, identified through my qualitative analysis. Participant church was treated as a dummy variable for single-level analyses of outcomes by church (described below in **G.3. Data Analysis**). Participant church was also used to cluster participants in analyses

using Generalized Estimating Equations (GEE) to assess the variables representing contextual characteristics as described below.

Church contextual characteristics were grouped into two broad categories, “organizational culture and structure” and “interpersonal context” (see Table III), and were dichotomous variables representing the presence or absence of data to support whether churches had each characteristic. I created five independent variables related to organizational culture and structure: (i) religious basis for health promotion, which corresponded to a belief that health promotion is consistent with Christian beliefs about the body, and/or that being healthy contributed to a Christian mission of being able to serve others; (ii) history of health activities in the church, which reflected whether health activities were implemented in the church prior to Heart Smart; (iii) congregational support for the intervention, which particularly referred to evidence of church members’ lack of support for the Heart Smart intervention as well as evidence of support for the intervention; (iv) HSM coordinator engagement, which referred to the HSM coordinators’ overall engagement in grant activities, including HSM coordinator meetings and events; and (v), pastor involvement, which reflected the pastor’s involvement in HSM.

The interpersonal context category included two variables: (i) social connectedness, which referred to evidence of strong social ties among church members, and (ii) connection with the HSM coordinator, which reflected evidence of strong connections between HSFV participants and the HSM coordinator (Table III).

Chapter IV presents the findings used to derive these variables. While contextual variables described churches, they were applied to participants at the individual level (see **G.2.d. Data Analysis** below).

G.2.c. Additional Covariates

Other covariates examined in this study included participant demographics and health status, specifically age, race, ethnicity, education, marital status, employment status, a diagnosis of hypertension/prehypertension, and a diabetes/prediabetes diagnosis (see Table

III). For the HSM attendance outcome, previous participation in HSFw was also included as a covariate. Age was collected as a continuous variable. Most other variables were collected as categorical variables and were converted to dichotomous variables for the purposes of data analysis.

The covariates included in my adjusted multivariable analyses were those deemed theoretically important to the constructs of interest. For example, higher age may be associated with higher attendance due to older adults having more free time or a higher perceived CVD risk. However, age may also be associated with lower attendance due to travel barriers encountered in getting to intervention sessions. Similarly, race/ethnicity may be associated with participation if there are racial/ethnic variations in participant acceptability of the program and perceptions of CVD risk. Because HSFw was only for women but HSM was for men and women, I anticipated that women would be more likely to engage in HSM. Thus, all models were adjusted for age and race/ethnicity, and HSM attendance models were adjusted for participant sex. Due to the small sample size and high potential for empty cells, other theorized covariates listed in Table III were included in multivariable models only if they were significantly associated with any participation outcomes based on bivariate models (see Appendix E). Therefore, education and hypertension status were also included as covariates in all adjusted models, but other covariates were excluded.

G.3. Data Analysis

I conducted univariate analysis to describe HSFw and HSM participants (e.g., demographics) and overall participation outcomes. I used bivariate analysis to examine how demographic and health status differed by church and by participant group (i.e., HSFw-only versus HSFw plus HSM; HSFw plus HSM versus HSM only). I also used bivariate analysis to assess how demographic and health status were associated with HSFw and HSM participation outcomes. (See Appendix E for supplemental tables with bivariate analysis results.)

I conducted the following multivariable analyses to examine the relationships between independent and dependent variables, adjusting for participant characteristics. First, I assessed each of the four dependent variables for church differences, using person-level analysis in which churches were assigned dummy variables. I used single-level multivariable regression to model participation and attendance outcomes for individual churches. For HSFW and HSM attendance, I created crude and adjusted linear regression models, controlling for participant characteristics. For HSFW completion, I created crude and adjusted logistic regression models and used the Firth bias correction due to quasi-separation (Heinze & Schemper, 2002). For HSM participation among HSFW attendees, I created crude and adjusted logistic regression models. (See Appendix F for crude analysis results).

In my subsequent analyses, I examined church characteristics by category. Thus, for each outcome, I conducted a set of analyses for organizational culture and structure characteristics and for interpersonal context characteristics. In these analyses, I assessed each characteristic alone and in combination with the other variables in the same category. For HSFW and HSM attendance, I created crude and adjusted linear regression Generalized Estimating Equations (GEE) models using an independent correlation structure and accounted for church-level clustering. For HSFW completion and HSM participation among HSFW attendees, I created crude and adjusted logistic regression GEE models using an independent correlation structure and accounted for church-level clustering. I assessed multicollinearity of predictors, and did not detect multicollinearity based on a variance inflation factor (VIF) of 10 (Schreiber-Gregory & Jackson, 2017; The Pennsylvania State University Department of Statistics Online Programs, 2018).

I conducted additional analyses as needed to confirm or explain my results. The HSFW attendance outcome was left-skewed and could not be made normal by transformation. Therefore, I conducted multilevel ordinal logistic regression, assessing attendance rates in quartiles, to confirm the linear regression results (Ramezani, 2016). I also conducted multiple

sensitivity analyses. Specifically, I examined HSM attendance among the subgroup of HSM participants who also attended HSFW and I ran multivariable models with and without the race/ethnicity variable.

I used SAS version 9.4 (SAS Institute Inc., Cary, NC) to complete my quantitative analyses.

IV. CONTEXTUAL FACTORS WITHIN CHURCHES

My Aim 1 hypothesis states, characteristics of rural churches such as leadership, infrastructure, values, and history of health programming may play a role in intervention implementation, effectiveness, and sustainability. This chapter presents my Aim 1 results. First, I describe the 12 churches that participated in the Heart Smart intervention as identified by my qualitative analysis of key stakeholder interviews and HSM coordinator forms, case story development, and cross-case analysis. Next, I identify and describe contextual characteristics associated with churches that I hypothesized would play a role in intervention implementation. These characteristics were situated within two broad categories. The “organizational culture and structure” category included contextual factors related to the overall fit of the Heart Smart intervention within churches and how these factors might affect implementation. The “interpersonal context” category included relationships among individuals within churches and describes how these relationships might affect the implementation of the Heart Smart intervention. These church-based characteristics were then used to develop my Aim 2 hypotheses (described in Chapter VI).

A. Intervention Churches

This study included 12 churches located in 10 different communities within six of the S7 counties of Illinois. Table IV describes each of the 12 churches. Section A of Table IV describes information about the county and town in which each church is located. Section B of the Table IV provides details about the Heart Smart implementation in each church. Sections C and D include details about the contextual characteristics in each church, which are discussed in depth below in sections C and D of this chapter.

TABLE IV. SUMMARY OF CASE STORY INFORMATION BY CHURCH FROM THE STUDY OF THE IMPLEMENTATION OF THE HEART SMART INTERVENTION IN 12 SOUTHERNMOST ILLINOIS CHURCHES

	Church A	Church B	Church C	Church D	Church E	Church F	Church G	Church H	Church I	Church J	Church K	Church L
A. "OUTER SETTING" DESCRIPTIVE INFORMATION												
County	#1	#2	#3	#4	#2	#5	#3	#6	#5	#2	#1	#1
County rurality (RUCC code) ^a	6	8	8	8	8	7	8	3	7	8	6	6
Town population ^b	1,821	206	1,434	668	210	6,537	1,049	2,831	6,537	463	4,442	4,442
Individuals living in poverty in towns ^c	19.9%	13.1%	25.0%	32.0%	10.4%	26.1%	8.3%	46.5%	26.1%	28.2%	22.9%	22.9%
B. HEART SMART IMPLEMENTATION												
HSFW Dates (month/year)	3/12-5/12	3/12-5/12	8/12-11/12	8/12-11/12	2/13-5/13	3/13-6/13	9/13-11/13	2/14-5/14	3/14-6/14	8/14-11/14	9/14-11/14	9/14-11/14
HSFW participants, n	8	13	11	11	8	11	12	18	9	7	15	10
Proportion of HSFW sessions attended, M (S.D.)	0.84 (0.09)	0.87 (0.10)	0.74 (0.20)	0.83 (0.17)	0.80 (0.14)	0.54 (0.36)	0.72 (0.21)	0.70 (0.34)	0.66 (0.40)	0.61 (0.37)	0.91 (0.08)	0.72 (0.29)
HSFW completers, n (%)	8 (100.0)	13 (100.0)	9 (81.8)	9 (81.8)	7 (87.5)	5 (45.5)	10 (83.3)	12 (66.7)	6 (66.7)	5 (71.4)	15 (100.0)	7 (70.0)
HSM dates (month/year)	7/12-5/14	6/12-8/14	1/13-6/15	2/13-2/14	8/13-7/15	8/13-6/15	1/14-1/16	6/14-5/16	7/14-7/16	1/15-7/16	1/15-8/16	1/15-8/16
HSM sessions during the first 20 implementation months	12	18	20	13	12	20	19	18	17	14	12	18
Consistent implementation	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes
HSFW participants who attended HSM, n (%)	7 (87.5)	12 (92.3)	6 (54.6)	9 (81.8)	5 (62.5)	3 (27.3)	10 (83.3)	9 (50.0)	7 (77.8)	4 (57.1)	7 (46.7)	4 (40.0)
Total HSM participants	12	16	9	15	8	13	12	15	12	4	11	7
Proportion of implemented sessions attended, M (S.D.)	0.58 (0.28)	0.66 (0.24)	0.40 (0.22)	0.63 (0.32)	0.79 (0.31)	0.72 (0.14)	0.68 (0.31)	0.44 (0.38)	0.39 (0.37)	0.57 (0.38)	0.48 (0.30)	0.58 (0.35)
C. ORGANIZATIONAL CULTURES STRUCTURE ^d												
"Inner Setting" Constructs												
Culture												
Religious basis for health promotion	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	Yes
Implementation Climate												
Compatibility: History of health activities	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	No	Yes	No
Priority/Need: Support for intervention ^e	No	Yes	No	Yes	Yes	No	No	No	Yes	No	Yes	No

TABLE IV. SUMMARY OF CASE STORY INFORMATION BY CHURCH FROM THE STUDY OF THE IMPLEMENTATION OF THE HEART SMART INTERVENTION IN 12 SOUTHERNMOST ILLINOIS CHURCHES (CONTINUED)

	Church A	Church B	Church C	Church D	Church E	Church F	Church G	Church H	Church I	Church J	Church K	Church L
Leadership Engagement												
HSM coordinator attributes												
<i>Coordinator participation in HSWF</i>	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
<i>Co-coordinators implemented HSM</i>	No	No	No	No	Yes	No	Yes	Yes	No	No	No	No
<i>Coordinator health experience</i>	Faith community nurse	Other health-related experience	Other health-related experience	Nurse	No	Other health-related experience	Faith community nurse	No	Other health-related experience	Nurse	Faith community nurse	Nurse
<i>High engagement in grant activities</i>	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No	No	Yes
Pastor attributes												
<i>Pastor attended HSM</i>	Yes	No	No	Yes	Yes	No	No	Yes	No	No	No	No
<i>Pastor support</i>	Pastor involved	Pastor supportive	Pastor changed during HSM; not involved	Pastor involved	Pastor involved	Pastor not involved	Pastor supportive	Pastor involved	Pastor supportive	Pastor not involved	Pastor not involved	Pastor supportive
<i>Other pastor characteristics</i>	Moved away during HSM		Pastor changed twice during intervention	Pastor supportive until HSM coordinator moved away			First pastor supportive; changed churches during HSM; Second pastor not involved				Pastor on leave during HSM	
D. INTERPERSONAL CONTEXT ^d												
<i>Social connectedness: "Like a family"</i>	Yes	Yes	No	Yes	Yes	No	No	No	Yes	No	Yes	Yes
<i>Connection with HSM coordinator</i>	No	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No

^a United States Department of Agriculture Economic Research Service. (2019). Rural-Urban Continuum Codes. Retrieved from <https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/>

^b U.S. Census Bureau (2015). 2010 Census. American Factfinder. Retrieved from: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

^c U.S. Census Bureau (n.d.). 2012-2016 American Community Survey Retrieved from: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

^d Shaded cells designate presence of church characteristics that were used as variables in Aim 2 analyses

^e If "Support for the intervention" = "No," evidence of a lack of support for the intervention exists.

Despite all churches being in the same rural region of Illinois, the geographic settings of the churches varied. Eleven of the 12 Heart Smart churches were in counties with a RUCC = 6 (“Urban population of 2,500 to 19,999, adjacent to a metro area”), RUCC = 7 (“Urban population of 2,500 to 19,999, not adjacent to a metro area”), or RUCC = 8 (“Completely rural or less than 2,500 urban population, adjacent to a metro area”) (Table IV) (United States Department of Agriculture Economic Research Service, 2019). Only one church was in a region defined as “Metropolitan” (RUCC = 3: “County in metro areas of fewer than 250,000 population”) due to its proximity to Cape Girardeau, MO. All S7 counties are designated Medically Underserved Areas (Health Resources & Services Administration, n.d.) (Table IV).

The towns in which participating churches were located ranged from very small communities of about 200 residents to larger communities ranging from 1,049 to over 6,537 residents (Table IV). Several communities in the S7 region had high levels of socioeconomic need, and this is reflected by the proportion of individuals living in poverty in the towns where Heart Smart churches were located (Range: 8.3% (Church G) – 46.5% (Church H)) (Table IV). Nine of the 12 Heart Smart churches were in towns with poverty levels that are higher than the state rate of 14.0% (U.S. Census, n.d.) (Table IV).

Churches were also located in a variety of geographic settings within their respective communities. Seven churches were in or near the “downtown” or “town center” in their communities. Two churches, both located in communities of 4,000-6,000 residents, were located outside of downtown, but within residential areas in their communities. The remaining three churches were in remote settings, situated adjacent to highways, and surrounded by agricultural land, forest, or other undeveloped land.

Heart Smart churches fell within four different denominations: Methodist (n = 6), Non-denominational (n = 3), Baptist (n = 2), and Lutheran (n = 1). Church membership and weekly attendance reflected the variation in community populations, ranging from less than 50 to 200-

400. To preserve the confidentiality of churches and key stakeholders, I present key characteristics such as denomination and specific location in aggregate.

B. Church Case Stories

Summary information from the case stories for each participating church are presented below.

B.1. Church A

Church A, located in the downtown center of a community in County #1 had a population of 1,821 and 19.9% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). The HSFW intervention was implemented from March-May, 2012, with 8 participants. The HSM coordinator from Church A did not take part in HSFW prior to HSM. The HSM intervention was implemented from July 2012-May 2014 with 15 participants and implementation was sporadic, with 12 HSM sessions implemented over 20 months.

Interviewees at Church A endorsed a religious basis for health promotion. Church A's pastor was highly engaged in his personal health and actively promoted health within the church. He attended HSM sessions until he left the church during the second year of HSM implementation. The pastor's successor came to the church near the end of HSM, so was not involved in the intervention.

Church A had an extensive history of health activities, including screenings and events. The HSM coordinator, a faith-community nurse, was frequently engaged in implementing health activities in the church, often with the assistance of a second faith-community nurse. These activities included health screenings, faith-based physical activity promotion events, and health resources available in the church library. While interviewees recognized health needs in the community, congregants were not necessarily amenable to behavior change. Thus, Heart Smart was a priority for some, but not all congregants.

Church A was particularly notable for its strong social networks, which were considered particularly important within the church and viewed as a way to foster accountability and provide support among congregants:

Interviewer: What do you think are some of the things that help people in stay on that path [to health]?

Pastor: Being in a relationship with others, where there is encouragement and support. . . in the faith community, we notice something's going on with a person, 'How are you? How can I help you?'. . . When you are in a healthy relationship with somebody, you care about them and you're going to seek to help them in whatever way you can, in a non-judgmental way.
(Pre-intervention)

B.2. Church B

Church B, in County #2, was located in a town with a population of 206 where 13.1% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). Church B was situated on the main highway running through town. The HSFW intervention was implemented from March-May 2012 with 14 attendees. The HSM intervention was implemented from June 2012-August 2015 with 24 participants. Implementation of HSM was consistent, with 18 sessions implemented in the first 20 months. Church B was in the first Heart Smart cohort, and due to its early implementation successes—including a high level of engagement by the HSM coordinator and participants—it was offered an opportunity to pilot a third year of HSM, which resulted in implementation of 32 HSM sessions over 39 months. The HSM coordinator reported that social networks were strengthened as a result of the Heart Smart intervention: *“we’ve had things shared in that group that we may have never known just sitting on the pews side-by-side”*
(Post-intervention).

Church B interviewees discussed the prevalence of parishioners with health concerns and perceived challenges to being healthy, including geographic barriers to accessing healthy resources, lack of awareness about health, and lack of motivation to be healthy. Church B also endorsed a religious basis for health promotion. The pastor of Church B did not participate in HSM but he actively promoted health within the church. The church had an extensive history of

promoting health among congregants and in the community through health education and health screenings, including HIV, diabetes, and cholesterol.

The HSM coordinator, who participated in HSFW, was highly active in her church. She also had prior employment experience that supported her role as an HSM coordinator including working in a healthcare setting, training and experience as an addictions counselor, and a history of providing community health education. She was also highly engaged in grant activities related to HSM. She considered health to be “*the greatest gift*,” and was passionate about serving others.

B.3. Church C

Church C, in County #3, was near the downtown area of a community with a population of 1,434 in which 25.0% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). The HSFW intervention was implemented from August-November 2012 with 12 participants. The HSM intervention was implemented from January 2013-June 2015, voluntarily extending their implementation period by 6 months. At Church C, HSM had 17 participants, and implementation was consistent, with 20 sessions implemented over the first 20 months.

Interviewees from Church C described a religious basis for health promotion, related to both engaging in self-care and serving others. Church C interviewees identified numerous health needs and barriers to engaging health behaviors within their community; however, engaging in healthy lifestyles did not appear to be a priority among parishioners. Church C had a history of health programming for both church members and the community. The HSM coordinator from Church C was involved in some of these activities.

The HSM Coordinator was highly engaged in her church, and she had experience with wellness promotion in her community via a well-known national wellness organization. She participated in HSFW prior to HSM and was highly engaged in grant activities. Despite her positive perceptions about HSM prior to implementation, after the program ended, the

Coordinator said HSM would have benefited from greater participation by members of her church.

The pastor who led Church C at the beginning of Heart Smart implementation within the church, while enthusiastic and supportive of the program, did not engage in HSM. That pastor was succeeded by two additional pastors, neither of whom engaged in HSM.

B.4. Church D

Church D, located within the Shawnee National Forest, was in County #4, in a town with a population of 668 where 32.0% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). Church D was situated on a highway between two of the S7 counties. The HSFW intervention was implemented from August-November 2012 with 14 attendees. The HSM intervention was implemented from February 2013-February 2014, until the coordinator announced her plans to move out of the region. The church pastor would not allow the program to continue after the HSM coordinator left. Thus, Church D only implemented 13 HSM sessions, but implementation was consistent, with an HSM session every month in which they were part of Heart Smart. A total of 19 individuals participated in HSM at Church D.

Church D did not have a history of engaging in health activities prior to Heart Smart, but the HSM coordinator hoped the intervention would help to address some of the health needs among church members, which she attributed to both lack of awareness about health and living in a community with very few resources to support healthy behaviors. The HSM coordinator participated in HSFW prior to HSM and was an active participant in overall grant activities until she moved. She was also highly engaged in activities at her church, reporting, that if something was happening, "*my hands are usually in it.*" Outside of Heart Smart, she was employed as a nurse.

The Church D pastor was highly engaged in HSM. He regularly participated and even presented at HSM sessions, including a session on the relationship between spiritual and physical health.

Particularly notable about Church D was closeness of congregants: *“we like to fellowship and we like to come together and that’s one thing we have all in common is we want to be together”* (Coordinator, Pre-intervention). The coordinator hoped to build upon this closeness to support healthy behavior changes in her church as well as advocate for policy and environmental change in the larger in her community.

B.5. Church E

Church E, located in County #2, was situated in a town with a population of 210 (US Census Bureau, 2015), located on a country highway and surrounded by agricultural and undeveloped land. In the town where Church E was located, 10.4% of residents lived in poverty (US Census Bureau, n.d.). The HSFW intervention was implemented from February-May 2013 with 8 participants. The HSM intervention was implemented from August 2013-July 2015 with 8 participants. At Church E, HSM was implemented by co-coordinators and implementation was sporadic, with 12 sessions over the first 20 months.

There was a perceived need for health resources in Church E’s community, due to concerns about cancer and chronic disease and barriers to engaging in healthy behaviors, including busy lifestyles and the rural geography. However, health was not considered a priority at the church. Health promotion was not supported by religious beliefs, and the church did not have a history of health programs. Rather, Heart Smart was perceived as potentially beneficial to church members.

Interviewer: Could you go on to a little bit more detail about what if any role you see the church in promoting better health for its members?

HSM Coordinator: I think we’re not obligated to do that, but I think if we can show benefits for some of our members and how much we enjoy this.
(Pre-intervention)

The coordinator anticipated that the group structure of Heart Smart would be well-suited to the family-like relationships in the church:

We have a small church and it’s a close-knit church, it’s like a family. And if they can see one person feeling better and getting healthy, this will flow over into our church and our

other members and they'll say, 'hey, I wanna do that, too. I wanna feel better.' (Pre-intervention)

Both HSM coordinators at Church E were highly engaged in activities at their church, and one of the co-coordinators was employed in a healthcare field. Both coordinators attended HSFW and the pastor attended HSM. Neither coordinator was engaged in overall grant activities.

B.6. Church F

Church F, in County #5, was located in the downtown area of a community with a population of 6,537 in which 26.1% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). The HSFW intervention was implemented from March-June 2013 with 11 attendees, and HSM was implemented from August 2013-June 2015 with 14 participants. Notably, only 3 of the 11 HSFW participants also attended HSM. At Church F, HSM implementation was consistent, with 20 sessions implemented in the first 20 months.

The perspective within Church F was that while health was important, it was not necessarily a significant priority within the church, nor was it considered to be an obligation for the church to address. Despite this perspective, the church had a history of engaging in health activities, including blood pressure screenings after Sunday services and supporting aging parishioners with health concerns. The health needs at Church F were largely attributed to the older age of congregants as well as geographic and economic barriers to engaging in healthy behaviors in the region.

One stakeholder attributed the accomplishments of Heart Smart within Church F to the HSM coordinator, suggesting that participants attended HSM because of the coordinator. The HSM Coordinator did not participate in HSFW and was somewhat involved in church activities outside of Heart Smart. She was known in the larger community for teaching fitness classes. She emphasized that for women who attended her fitness classes, the social aspect of participating was as important as the physical activity component to maintain physical as well as

mental health. The HSM Coordinator was not engaged in overall grant activities. The Church F pastor was not involved in HSM.

B.7. Church G

Church G, in County #3, was located near the downtown area of a community of 1,049 residents where 8.3% of the population lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). The HSFW intervention was implemented from September-November 2013 with 12 participants. The HSM intervention was implemented from January 2014-January 2016 and implementation was consistent, with 19 sessions implemented in the first 20 months. A total of 13 participants attended HSM.

Notable about Church G was the enthusiasm and support of the program from Church G's pastor, who was fairly new to the church when Heart Smart was introduced as an opportunity. He was expressed enthusiasm for the church to participate due to his personal interest in health and eagerness to promote health in the congregation. He saw Heart Smart as consistent with Christian beliefs within the church:

[The] Heart Smart program is just an example of something that I think that the church can do to offer programs that promote health in a way to involve the church. It's compatible to what we teach in the church. . . . Taking care of our bodies is the same thing as taking care to follow the Lord. (Pre-intervention)

While the Church G pastor was passionate about health and Heart Smart, he did not participate in HSM. He had been moved to a different church at the time when HSM ended, and Church G did not yet have a replacement.

Despite the pastor's enthusiasm and support as well as health needs in the congregation, not all congregants were supportive of the intervention, either because they were not interested in changing their personal behaviors or because they did not want the church space used for a health intervention.

Prior to Heart Smart, Church G had a history of engaging in health activities, often organized and implemented by two members, Church G's HSM co-coordinators, who were also

faith community nurses. The nurses regularly offered blood pressure screenings on Sunday mornings, provided health education, visited church members who were ill, and wrote health-related articles for the church newsletter. Both coordinators participated in HSFW prior to HSM implementation and were highly engaged in overall grant activities. The co-coordinators planned to continue to convene their HSM participants periodically after HSM ended.

B.8. Church H

Church H, in County #6, was in a town of 2,831 residents in which 46.5% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). Church H was in a residential area, one block from the main road through town. The HSFW intervention was implemented from February-May 2013 with 19 attendees. The HSM intervention was implemented from June 2014-May 2016 with 16 participants and implementation was consistent, with 18 sessions implemented during the first 20 months.

The HSM intervention was implemented by co-coordinators who were very active in their church and in the broader community, and they were highly engaged in overall grant activities. Unique among the Heart Smart churches, neither HSM coordinator from Church H had a background working in health and wellness or healthcare, but they often used their extensive community networks to bring experts to lead HSM activities. The pastor periodically attended HSM activities.

Health was historically not an emphasis within Church H. On the contrary, church activities often included unhealthy foods and poor health was evident among church members. In his pre-intervention interview, the Pastor stated he believed that due to health issues among congregants and in the community, it should have a greater focus. The Church H pastor and both coordinators expressed a religious basis for health promotion, and a responsibility of the church to promote health not only in the church but also in the larger community, which experienced substantial health needs and multiple barriers related to location, economic conditions, and individual-level factors such as limited time, energy, and motivation:

We consider ourselves a community church and our doors are always open for different activities, always. And [Heart Smart] is one that we were anxious to participate in, because it is so important to help the community. (Coordinator 2, Church H, Pre-intervention)

B.9. Church I

Church I, in County #5, was in a town with a population of 6,537 in which 26.1% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). Church I was situated in a residential neighborhood. The HSFW intervention was implemented from March-June 2014 with 9 participants. The HSM intervention was implemented from July 2014-July 2016 and was implemented consistently, with 17 sessions during the first 20 months. While 12 participants who engaged HSM took part in the HSFW/HSM evaluation study, Church I was unique in that new participants regularly joined the group after HSM enrollment ended; 29 individuals participated in at least one HSM session at Church I.

Interviewees from Church I discussed a religious basis for health promotion. The pastor of Church I had a history of health issues related to his weight. When he needed to change his behaviors due to his personal health, he began promoting health within the congregation as well. While he was supportive of Heart Smart, he was not engaged in the intervention.

Church I had a history of implementing health programs, including fitness classes offered by the HSM coordinator. While those classes were not taking place when Heart Smart was initiated, Heart Smart appeared to create a desire among congregants to resume the classes: *"The kickboxing class that I'm [teaching] now is a result of the Heart Smart"* (Coordinator, Post-intervention). The HSM coordinator was employed by her church for a period of time during the Heart Smart implementation, and thus had a high level of involvement in church activities. However, she was not engaged in overall grant activities.

B.10. Church J

Church J, in County #2, was in a town of 463 residents where 28.2% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). Church J was situated on a main

highway through the county, surrounded by agricultural land. The HSFW intervention was implemented at Church J from August-November 2014 with 7 attendees. The HSM intervention was implemented from January 2015-July 2016 with 4 attendees, all of whom also participated in HSFW. Because Church J was in the final Heart Smart cohort, it only had 20 months for HSM implementation due to the grant period ending. Church J implemented 14 sessions over 20 months.

The pastor did not describe any religious reasons within the church for supporting a program like Heart Smart. He indicated that he received health-related messages from his church's larger denomination but he did not disseminate these messages to his congregation.

Occasionally you get things from our denomination. . . . Pastors are notorious in my denomination for not taking care of themselves. So [denomination leader] was trying to promote a healthy diet, losing weight, in my denomination. But, again, that wouldn't be down in [County #2], that would be sort of like, more in terms of associating with each other. (Pre-intervention)

Church J also did not previously engage in health activities prior to Heart Smart. The pastor was supportive of health initiatives in the church, including Heart Smart, but indicated he would not be involved in the planning or implementation of such programs, and he was not involved in Heart Smart:

I think people should be encouraged to exercise. . . . We do have areas [to walk] or ride a bike, we've got a pretty nice bike trail not too far. . . if somebody in the church wanted to encourage people to start biking, you know I certainly support that. (Pre-intervention)

Health was perceived as a need in Church J, due to the older age of church members and the limited health resources within the community. However, actual support for Heart Smart within the congregation was limited. The HSM Coordinator had a nursing background and participated in HSFW prior to HSM but was not involved in overall grant activities.

B.11. Church K

Church K, located in County #1, was in a town with a population of 4,442 where 22.9% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). The church was located near the downtown area of the community. The HSFW intervention was

implemented from September-November 2014 with 16 attendees. The HSM intervention was implemented from January 2015-August 2016 with 12 participants. Because Church K was in the final Heart Smart cohort, it only had 20 months for HSM implementation due to the grant period ending. Implementation was sporadic, with 12 sessions implemented over 20 months. The coordinator reported periodically cancelling HSM sessions due to winter weather.

Church K had a history of offering health programs, primarily organized by the HSM coordinator, a faith-community nurse. The HSM coordinator consulted with church members about their health questions and provided alternative therapies. She also ran church-based programs to promote health and well-being including monthly blood pressure checks, and she wrote health articles for the monthly church newsletter. In addition to HSM sessions, the coordinator implemented weekly tai chi classes in response to requests from HSM participants. The HSM coordinator perceived herself as a role model, particularly for the largely older congregation.

If I'm not healthy I'm no good to anybody else. It's important for me to stay healthy, not only for myself though but to set an example. . . . I have problems. I have arthritis, I have this, I have that. . . . I still consider myself very healthy because I keep them under control. And I'd like to have others recognize that they may have problems, what can they do to get them under control? (Coordinator, Church K, Pre-intervention)

The HSM coordinator participated in HSFW prior to HSM implementation. She was not engaged in overall grant activities.

The pastor of Church K was not involved in Heart Smart. Shortly after the church agreed to participate, the pastor of Church K went on leave. The church did not have a permanent pastor again until the end of HSM.

B.12. Church L

Church L, in County #1, was in a town with a population of 4,442 and 22.9% of residents lived in poverty (US Census Bureau, 2015; US Census Bureau, n.d.). Church L was situated adjacent to both a commercial area and a residential area in the community. The HSFW intervention was implemented from September-November 2014 with 10 participants. The HSM

intervention was implemented from January 2015-August 2016 with 7 participants. Because Church L was in the final Heart Smart cohort, it only had 20 months for HSM implementation due to the grant period ending. Church L had consistent implementation, with 18 sessions over 20 months.

There were multiple ways in which the culture at Church L was consistent with supporting a health intervention like Heart Smart; however, the church had a limited history of engaging in health activities. The belief within Church L was that treating one's body with care was a way to honor God: *"Our body is supposed to be a temple of God, and so we're supposed to treat our bodies with respect, and I think it's good that it starts at the church"* (Coordinator, Pre-intervention). While the pastor was supportive of Heart Smart, he emphasized that physical health is not the *"main focus of the church."* The pastor did not participate in HSM.

Evidence from Church L suggested that while church members experienced health needs and faced multiple barriers to engaging in healthy behaviors, they may not care about or be able to prioritize their health due to competing priorities, such as limited time, economic challenges, and apathy. These factors were proposed as potentially limiting engagement in Heart Smart.

Church L stakeholders described the church "like a family," which was evident in the HSM coordinator's monthly reports. She often described activities with phrases like, *"being together," "talking with friends,"* and *"laughter is the best medicine."* She also reported that for one of their sessions, the group walked to a local nursing home to visit a fellow Heart Smart participant who was recovering from a stroke. In her post-intervention interview, the HSM Coordinator expressed members of the group might *"occasionally get together and share ideas, recipes. It seems like we really enjoyed that."*

The HSM coordinator was involved in her church in various capacities, including teaching Sunday school, assisting in the nursery, singing in the choir, and playing in the orchestra. Outside of church she worked as a nurse. She participated in HSFW prior to

implemented HSM. She reported being motivated during the program by engagement and enjoyment of other Heart Smart participants. She was highly engaged in overall grant activities.

C. Organizational Culture and Structure

This section presents the first of two categories of church contextual characteristics that emerged from my cross-case analysis, organizational culture and structure. The second category, interpersonal context, is subsequently presented in section D below.

The ***organizational culture and structure*** of participating churches encompassed contextual characteristics such as infrastructure, capacity, and support for the church-based Heart Smart intervention. My qualitative findings are categorized within three thematic areas related to organizational culture and structure category: (i) a church culture that supports health promotion, (ii) implementation climate, and (iii) engagement of key church leaders. I identified a fourth thematic area, readiness for implementation, which included having physical and/or human resources within the church to support the intervention (e.g., facilities, faith community nurses). However, all participating churches possessed these resources, and therefore, findings are not reported.

C.1. Culture to Support Health Promotion

Culture refers to the big picture norms, values, and assumptions within the organization (Damschroder et al., 2009). In participating churches, a primary way in which culture was related to Heart Smart implementation was in the congruence between church values and beliefs and the purpose of the intervention. I examined this concept in terms of whether stakeholders described church values in a way that was consistent with promoting health in the church, which I identified as, ***religious basis for health promotion***. A religious basis for health promotion was demonstrated in two ways: (i) the belief that health promotion is consistent with Christian beliefs about the body, and (ii) the belief that being healthy contributes to a Christian

mission of being able to serve others. Evidence of one or both of these features was observed in eight churches (Churches A, B, C, D, G, H, I, and L) (Table IV).

C.1.a. Health Promotion is Consistent with Christian Beliefs about the Body

Interviewees from seven churches discussed the belief that health promotion is consistent with Christian beliefs about the body (Churches A, B, C, D, G, I, and L).

The body is a gift: One way in which interviewees discussed the relationship between health promotion and their Christian beliefs was in their perspectives about the body, which they perceived as a “gift” that should be respected and cared for through engaging in healthy behaviors. This belief was described by the Pastor from Church G: *“The body is a temple. If we are spiritual beings, then God resides within us. . . . I preach that since we have this body, it’s our responsibility to take care of it”* (Pre-intervention). Along with the responsibility for caring for the body is understanding that health status is dynamic, and individuals have the ability to change their health, such as through behavior change.

We are a church who are taught and believe that life and abundant life is a gift from God, and so of course we want to be able to experience it well. . . . We’ve had some serious health challenges. . . . It’s been in our faith that health can be improved. (Church B, Coordinator, Pre-intervention)

Healthy mind, body, and spirit: In addition to the belief that the body is a gift and should be cared for, in some churches, promoting overall wellness—not just spiritual wellness—was perceived as a responsibility of the church. Interviewees from multiple churches described the relationship between physical and mental health with spiritual health, suggesting physical health is one component of overall wellness.

Taking care of ourselves is important to our psychological, spiritual, as well as physical well-being. I often find that people who are not taking care of themselves physically also find themselves declining mentally and spiritually. . . . We understand that all of our life is a gift from God and is not to be squandered. . . the church’s role is to try to help members and the community live full and healthy lifestyles, and so that our role is to try to promote whatever does those things and helps us to take care of ourselves, body, mind, and spirit. (Church C, Pastor, Pre-intervention)

Establishing a link between physical health and faith-centered beliefs provides support for church-based programs to promote health.

C.1.b. Being Healthy Supports Serving Others

A second way in which church values were consistent with health promotion was related to the service mission described by some interviewees. Interviewees from six churches (Churches A, B, C, G, H, I) indicated that health was important because church members have a responsibility to serve others and share their beliefs with others. They emphasized that being physically healthy helped to facilitate these activities, as described by a stakeholder from Church I: *“We’re called to serve other people, and if we’re not taking care of ourselves, then we’re not going to be much good to our community”* (Pre-intervention). Similarly, the Pastor from Church H stated, *“Our faith requires us to reach out and to bring in others, and so physically if we can’t do that, then we fall short of what the Word of God has called us to do”* (Pre-intervention). In these churches, health was deemed important because being healthy helps congregants to achieve the mission of the church.

C.1.c. Limited Value of Health Promotion

In contrast to perspectives supporting a religious basis for health promotion, interviewees from four churches (Churches E, F, J, and K) either did not explicitly describe the value of health in their churches, indicated that their church was not responsible for health promotion, or suggested health promotion was not the church’s priority. This perspective was exemplified by a comment from a stakeholder from Church F: *“I think there’s other things more important such as values and that kind of thing”* (Pre-intervention).

Establishing the connection between a healthy body and one’s religious beliefs or mission lends support for church-based opportunities to promote health. Based on the variation in perspectives about the church’s role in health promotion, I expected churches that expressed a religious basis for health promotion (Table IV) would have better quantitative outcomes, as operationalized by attendance and participation (see Chapter VI).

C.2. Implementation Climate

Implementation climate captures capacity for, receptiveness to, and perceptions about support for an innovation (Damschroder et al., 2009). I examined implementation climate in terms of intervention “compatibility” and “priority and need for the intervention” within the church.

C.2.a. History of Health Programs in the Church

I operationalized compatibility as whether the church had a history of implementing and engaging in health programs. I anticipated churches with a **history of health programs** would have a greater capacity to support the Heart Smart intervention and church members would be receptive to engaging in the Heart Smart program because they would be accustomed to health activities being offered in their churches and engaging in church-based health activities. One Pastor explained his church’s rationale for engaging in health programs: *“our role is to try to promote those things. . . trying to hold those kinds of [healthy lifestyle] programs like that in a small town, rural area, that does not have many options like that”* (Church C, Pre-intervention).

Interviewees from seven churches indicated having a history of health activities (Church A, B, C, F, G, I, K) (Table IV). Health programs included faith community nurse programs, health screenings such as blood pressure and diabetes, weight-loss groups, and fitness classes. I expected churches with a history of health activities to have better quantitative outcomes (i.e., participation and attendance in the HSFW and HSM interventions) than churches without a history of health activities (see Chapter VI).

C.2.b. Priority and Need for the Intervention

Stakeholders discussed their perspectives about whether there was a need for an intervention to address CVD risk in their churches and whether Heart Smart was appropriate for filling that need. Interviewees from all participating churches discussed the prevalence of poor health in the S7 region and/or within their churches. These needs were frequently discussed in relationship to individual-level behaviors contributing to poor health, such as smoking, sedentary behavior, and poor dietary habits, as well as lack of awareness and motivation to change

behaviors. Thus, increasing knowledge and awareness about health was often discussed as a need in the S7 population.

People do what they want. That's why I'm such a big proponent of the education portion. If you can help them understand why they need it or why it's good for them, I think they respond better. . . . If they don't know how important it is they may not do it. (Church B, Coordinator, Pre-intervention)

Interviewees also noted community-level factors that contributed to poor health, including low socioeconomic status; limited geographic access to healthy resources, such as health care providers, physical activity opportunities, and healthy foods; and cultural attitudes that supported unhealthy behaviors. For example, the HSM coordinator from Church D described physical activity barriers in her community: *"We're in this community and there's not really a whole lot of things going on. There's no Curves. . . , it's hilly so it's hard to get out—you have to choose your places to ride a bike"* (Pre-intervention). Similarly, interviewees discussed cultural barriers to healthy eating:

I just don't think people know how to cook healthy. They've grown up on lard and that kind of thing. . . . I know we live in Illinois, but we're really Southerners, so there's a lot of southern cooking going on—frying and that kind of thing... (Church F, Coordinator, Pre-intervention)

In response to these needs and challenges, interviewees from many churches discussed the potential role of churches for addressing health concerns within their congregations, as described by the Pastor from Church H: *"a lot of my members have health issues. . . . In the church, if we can show them the importance of health, then it's also going to help them have a better quality of life"* (Pre-intervention). A stakeholder from Church D also described the way in which group accountability through the church could help with weight loss: *"We'll lose weight for a while. . . . Next thing you know, we fell off the wagon and we've gained 30 pounds back. . . . We'd like something to keep us on the same page"* (Pre-intervention).

While interviewees clearly established the health needs within their congregations, acknowledgement of need did not always translate to endorsement of the Heart Smart intervention. Evidence of a lack of **congregational support for the intervention** was present in

seven churches (Churches A, C, F, G, H, J, L) (Table IV). Coordinator 1 from Church G provides evidence of this lack of support before Heart Smart started: “*Some people don’t know why we’re doing [Heart Smart]. . . . A couple people said we’ll be tying up the church every Thursday*” (Pre-intervention). After HSM ended, the coordinator from Church C reflected on lack of interest from her church:

I didn’t see the interest increase in the church members. . . . Once that 12 weeks was over and we started the Maintenance, quite a few of the members of the church just didn’t want to, weren’t interested in continuing the Maintenance. (Church C, Coordinator, Post-intervention)

Interviewees from some churches also noted apathy among congregation members regarding improving their health, as exemplified by a comment from Coordinator 1 from Church G: “*A lot of them say. . . ‘I’m not going to participate because I know I don’t eat healthy’*” (Post-intervention). Lack of interest in behavior change was likely a barrier to intervention participation, as was lack of awareness of the importance of behavior change: “*People just don’t care. . . . There’ll be a percentage of that, that that’s just not on their radar*” (Church L, Pastor, Pre-intervention).

Because interviewees from all churches discussed health needs, the expressions of need, opportunity, apathy, and lack of support were not mutually exclusive within churches. Health needs in the S7 region were attributed in part to behavioral factors that could be addressed through interventions focused on behavior change. However, congregational support for the Heart Smart intervention was mixed (Table IV). I expected churches with evidence of a lack of **congregational support for the intervention** would have worse quantitative implementation outcomes (see Chapter VI).

C.3. Leadership Engagement

The implementation process domain of CFIR includes constructs related to planning and executing the intervention, including engagement of key stakeholders in the intervention (Damschroder et al., 2009). Given the critical role of the HSM coordinator in planning and

implementing HSM, and the key leadership role of pastors within churches, I examined characteristics and attributes of the HSM coordinators as well as engagement of church pastors in the Heart Smart intervention.

C.3.a. HSM Coordinator Engagement

Most Heart Smart churches implemented HSM with a single coordinator, but three churches had two “co-coordinators” who shared responsibilities (Churches E, G and H) (Table IV). Typically, HSM coordinators reported being actively involved in their churches through committees, programs and activities (Churches A, B, C, D, E, G, H, L). In churches A, G, and K, the HSM coordinators were also faith community nurses and active in southern Illinois’ faith community nurse organization. In two churches (I and K), the HSM coordinators were employed by their churches and they engaged in Heart Smart through their roles as church employees.

During the implementation of Heart Smart, the study team conducted monthly conference calls for the purpose of providing updates, idea sharing, and troubleshooting. While HSM coordinators were required to participate in conference calls, there were no consequences for not participating. Minutes from conference calls along with any requested resources were shared with HSM coordinators via email. The study team also hosted an annual luncheon to recognize HSM coordinators for their efforts. The level of engagement by HSM coordinators in these activities varied, and those who regularly participated in conference calls reported that calls were beneficial for implementation at their own churches, including the HSM Coordinator from Church C: “[on] the monthly conference calls, I enjoyed finding out information the other teams were doing. . . . [I] gathered ideas from that” (Post-intervention).

I expected that higher levels of **HSM coordinator engagement** might suggest greater investment in HSM and would translate to higher participation levels in HSM. This idea is exemplified in a comment from HSM Coordinator 1 at Church H: *We didn’t just throw programs together. We thought about what we wanted to accomplish, and we pushed for it*” (Post-intervention). Coordinators from churches B, C, D, G, H, and L were highly engaged in

intervention (Table IV). Having co-coordinators in Churches G and H may have facilitated their engagement.

It is important to note that engagement is a dynamic construct, which can shift over the course of a multi-year intervention. Post-intervention responses from some coordinators suggested a potential relationship between coordinator and participant engagement. That is, HSM coordinators who perceived a high level of interest and engagement from participants were more enthusiastic about the program, which may have reinforced their own engagement.

I thought the camaraderie was good. We had [participants] who were loyal, loyal no matter what. When we didn't think we did so well that particular night, if there was a night like that, the ladies always encouraged us. 'Hey, we're enjoying it, and I'm getting a lot from it.' That would always get us back on track. (Coordinator 1, Church H, Post-intervention)

In contrast, if participant engagement was low, this may have been reflected in coordinator attitudes towards the program.

Interviewer: What were your thoughts about the Heart Smart Maintenance meeting structure?

Respondent: The whole concept is wonderful. . . . From my perspective and from my participants' perspective the third year, at the end of this last little bit has become a little fatiguing for them. And that's why. . . since January 1st we went to an every-other-month meeting, which seemed to help.
(Coordinator, Church A, Post-intervention)

Because of the important role of the HSM coordinator, I expected high levels of **HSM coordinator engagement** would be associated with higher participation in HSM among HSFW attendees and HSM attendance (see Chapter VI). However, due to the potentially dynamic nature of their engagement by both participants and coordinators, lack of participant engagement could contribute to inconsistent HSM implementation (i.e., failure to implement HSM sessions every month or nearly every month). Four churches (A, E, J, and K) implemented between 12-14 HSM sessions within the first 20 months of implementation and periodically skipped one or more months between sessions. In comparison, all other churches implemented between 17-20 sessions over 20 months. The exception was Church D, which implemented 13

sessions over 13 months, and then dropped out of the intervention because the HSM coordinator moved out of the area.

C.3.b. Pastor Involvement

Given their leadership role in the church, I expected **engagement of pastors** to be important to set an example for parishioners on the importance of the intervention, and therefore be associated with higher HSM participation among HSFW attendees and HSM attendance (see Chapter VI). Because 11 of the 12 Heart Smart pastors were men, they were not expected to attend HSFW sessions. However, pastors were welcome to attend HSM. While pastors were generally supportive of the intervention, they only participated in HSM activities at four churches (A, D, E and H) (Table IV). For example, a stakeholder from Church H described her pastor's participation in HSM: *"[Our Pastor] came into several sessions with his wife as well. . . . He's told me that he still uses a couple of the activities that we did when he was there"* (Post-intervention).

At another four churches, pastors explicitly emphasized health messages that were consistent with Heart Smart messages but they were not engaged in the intervention (Churches B, G, I, and L). A stakeholder from Church I described her pastor's rationale and approach for promoting wellness in her church: *"[Our Head Pastor] had an issue with weight. . . . He made a real effort to work out, exercise, eat better, and. . . shed many, many pounds. . . . He's kind of tried to bring that to church."* (Pre-intervention).

In the remaining four churches, pastors were not involved in HSM and the data show no evidence that they contributed to messages in support of the Heart Smart intervention (Churches C, F, J, K). Particularly in the Methodist denomination, church pastors may change after one or two years. In churches C and K, the pastor changed during the Heart Smart intervention implementation, as discussed by a stakeholder from Church C. *"[Our church] didn't get as involved with it as what I had hoped. . . . During [Heart Smart], we've had 3 different pastors"* (Church C, Stakeholder, Post-intervention). As suggested by this quote, this change in

leadership may have played a role in pastors' lack of involvement as well as congregational participation. However, during the intervention implementation period, changes in leadership also occurred in churches A and G, where the initial pastors were highly supportive of the intervention. Thus, while leadership changes within churches may suggest less long-term investment in an intervention, pastor engagement varied across churches, regardless of whether the pastor stayed at the church for the duration of the intervention.

D. Interpersonal Context

In addition to the organizational culture and structure in churches, the ***social infrastructure*** in churches arose as a potentially important contextual feature for intervention implementation. Multiple interviewees discussed the importance of social networks for promoting health behavior. Additionally, interviewees emphasized the role of churches in promoting and supporting social relationships. Interviewees discussed the nature and quality of their social networks in various ways. I examined perceptions of social relationships within churches broadly, as well as the relationship between Heart Smart participants and their HSM coordinators.

D.1. Social Relationships Among Congregants

D.1.a. Social Support and Accountability

Interviewees from several churches discussed church networks as a source of accountability and social support (Churches A, B, C, D, G, H, K, L). Particularly pastors discussed how their churches actively promoted community building and social relationships within their churches.

It's just. . . knowing that you matter and that you're not alone. And having an intentional process that connects people and encourages them to look out for each other. . . . It creates a desire and an interest in connecting with other people when you know that they have genuine care for you and a genuine interest, and you hear other people talking about the struggles that they go through, and you know that you're going through the same things, and you support and encourage each other. . . . Creating healthy community is what it's all about. (Church C, Pastor, Pre-intervention)

This “intentional process” of creating community within churches was viewed as a way to develop support, encouragement, role modeling, and accountability for one another, and encourage participation in the intervention and in healthy behaviors, as described by a stakeholder from Church A:

And accountability is another thing. . . when people know that they’re going to be coming to church and they see the ones that’s on the program, they’re going to be a whole lot more accountable than if they’re sitting at home and they’ve never seen the person who’s done the program before. (Stakeholder 1, Pre-intervention)

Thus, some interviewees endorsed the Heart Smart intervention because of its potential for supporting social relationships, which could foster healthy behaviors, as described by the Church C Pastor:

When you offer something like this and somebody is benefiting from it, they talk to other people about it. . . . They encourage them to create networks themselves, and then encouraging them to invite others, and one by one, they begin to get it. . . . Getting people to change patterns is based on the relationships they have. (Pre-intervention)

Interviewees from some churches also discussed group activities that grew out of Heart Smart, which highlighted the power of social networks within churches. For example, in Church D, the Coordinator discussed her plan to create a “*Get A Buddy*” walking program to encourage activity church members to be more active (pre-intervention). In Church G, Coordinator 2 also discussed a walking group that was initiated due to Heart Smart.

We do have a walking group we’ve started. . . . We walk once a week. It’s starting out very slowly, but now we’re hopefully. . . going to start picking up a few more people, since the weather hopefully will be getting better. (Church G, Coordinator 2, Post-intervention)

D.1.b. Social Connectedness

Beyond stressing the importance of social networks and the role of churches in facilitating social relationships and accountability, according to some interviewees, in some churches, social support went beyond a concept that was encouraged by leaders. In these churches, interviewees expressed the nature of the ***social connections as being “like a family”*** (Churches A, B, D, E, I, K, L) (Table IV).

We're a family. Some people see their church family more than they see their actual family. They live far away or whatever. The church family does become your family. . . . You're more concerned with your family members, or most people are, I guess normally, than strangers. What I'm trying to say is the church family becomes as important because it becomes a family. (Church L, Coordinator, Pre-intervention)

Interviewees from these churches expressed the fellowship provided by these relationships.

Members felt close to one another and enjoyed spending time together outside of regular church activities.

Our church, once a month, has a fellowship night that we pick someplace. . . to eat, and anybody in the church is eligible to go, and it's strictly just for social outing. . . we eat and have a social time. . . and it is very well attended. (Church A, Stakeholder 2, Pre-intervention)

Interviewees perceived that a benefit to being like a family was the church members could influence and support one another.

We have a small church and it's a close-knit church, it's like a family. And if they can see one person feeling better and getting healthy, this will flow over into our church and our other members and they'll say, 'hey, I wanna do that, too. I wanna feel better'. . . . I just like to say it's small but it's like a family and we help each other. And if I see somebody that I think that might benefit from [Heart Smart], then I think I'll approach them and say, 'hey, come and see what it can do for you,' without telling them, 'hey, you need to lose weight.' (Church E, Coordinator, Pre-intervention)

I expected these churches with particularly strong **social connectedness** to have better quantitative implementation outcomes (see Chapter VI).

D.2. Connection with Coordinators

Because of its implementation by one or two church members, I expected HSFW and HSM participant relationships with the HSM coordinators in their respective churches to be associated with both HSM participation among HSFW attendees and HSM attendance (see Chapter VI). A **connection with the HSM coordinator** among HSM participants was emphasized by some interviewees (Churches B, F, I, K) (Table IV).

[Heart Smart is] a really, really good program, and. . . the key was getting the right person to head the program up. [Church F Coordinator] has done an outstanding job. . . . She has motivated those who were attending to do things to keep themselves healthy and well. That was the perfect person for our church for this point in time, and perfect combination of skills and talents for presenting the Heart Smart program. (Stakeholder, Church F, Post-intervention)

Most HSM coordinators participated in HSFW, except in churches A and F. Thus, I excluded these two churches in my Aim 2 analysis examining the association between connection with the HSM coordinator and HSFW attendance and completion.

E. Summary

My qualitative findings indicated that contextual characteristics within the 12 churches varied. I described specific characteristics within two broader categories—"organizational culture and structure" and "interpersonal context." As described in Table IV, the 12 churches that participated in the Heart Smart intervention varied widely across the five organizational culture and structure characteristics (i.e., religious basis for health promotion, history of health activities, congregational support for the intervention, HSM coordinator engagement, church pastor engagement), as well as the interpersonal context characteristics (social connectedness, connection with the HSM coordinator). I used these characteristics to develop variables for assessing the associations between church characteristics and intervention participation outcomes. A description of the development of these variables and conceptual framework along with my examination of the variables is presented in Chapter VI.

V. PROGRAM PARTICIPATION AND COMPLETION BY CHURCH

Among my Aim 2 hypotheses (**Hypothesis 2A**), I hypothesized churches would *exhibit differences in HSFW attendance, HSFW completion, HSM participation among HSFW attendees, and HSM attendance*. The goal of this chapter is to examine this hypothesis, namely, program implementation by church, focusing on participant attendance and completion. I begin with a description of HSFW and HSM participant characteristics, followed by an assessment of the four participation outcomes used in this study: HSFW attendance, HSFW completion, HSM participation among HSFW attendees, and HSM attendance, which are presented overall and by church.

A. HSFW and HSM Participant Characteristics

Across the 12 Heart Smart churches, there were 133 HSFW participants and 136 HSM participants, for whom demographic characteristics are presented in Table V. Of the 133 HSFW participants, 83 (62%) participated in HSM. An additional 53 adults participated in HSM only. The majority of participants in both groups were non-Hispanic White (HSFW: 77%, HSM: 76%), had attended some college or had a bachelor's degree (HSFW: 78%, HSM: 79%), were married or living with a partner (HSFW: 61%; HSM: 62%), were not employed (HSFW: 57%; HSM: 55%), and had hypertension or prehypertension (HSFW: 61%, HSM: 57%).

B. Program Participation by Church

B.1. HSFW Attendance

Each participant's HSFW attendance represented their proportion of sessions attended out of the 12 sessions implemented. Across all HSFW participants ($n = 133$), the mean proportion of sessions attended was 0.75 ($SD = 0.26$) of the 12 HSFW sessions. Attendance was highest in Churches A, B, D, E, and K, where the mean proportion of sessions attended

TABLE V. DEMOGRAPHICS OF HSFW AND HSM PARTICIPANTS ^{a,b,c}

	HSFW Overall		HSM Overall	
	(n = 133)		(n = 136)	
Age (M, SD)	59.53	14.63	59.63	14.69
Sex (n, %)				
Female	133	100.00	117	86.03
Male	0		19	13.97
Race/Ethnicity (n, %)				
White, non-Hispanic	102	76.69	104	76.47
African American/Black	28	21.05	29	21.32
Other ^d	3	0.02	3	0.02
Education (n, %)				
< High school	8	6.02	6	4.41
High School or equivalent	21	15.79	23	16.91
Some college	65	48.87	65	47.79
Bachelor's degree or higher	39	29.32	42	30.88
Marital Status (n, %)				
Married or living with partner	81	60.90	84	61.76
Unmarried and not living with partner	52	39.10	52	38.24
Employment (n, %)				
Employed	57	42.86	61	44.85
Not employed (retired, homemaker, etc.)	76	57.14	75	55.15
Hypertension (n, %)				
Hypertension/pre-hypertension	81	60.90	77	56.62
No hypertension	52	39.10	59	43.38
Diabetes (n, %)				
Diabetes/pre-diabetes diagnosis	30	22.56	22	16.18
No diabetes	100	77.44	114	83.82

^a Overall n = 186; HSM includes 83 HSFW participants and 53 individuals who engaged in HSM only (see Tables XXI and XXII, Appendix E).

^b There were no demographic or health status differences between HSFW-only participants (n = 50) and HSFW + HSM participants (n = 83) (see Table XXI, Appendix E).

^c In comparing HSFW + HSM participants (n = 83) with HSM-only participants (n = 53), there were no demographic differences except sex (HSFW included women only and HSM included both men and women) and pre-diabetes/diabetes prevalence (see Table XXII, Appendix E).

^d "Other" includes Asian, American Indian/Alaska Native, Hispanic/Latino ethnicity, and more than one race/ethnicity. Categories are suppressed to protect participant anonymity.

was 0.80 or higher. Church F had the lowest mean proportion of sessions attended by HSFW participants at 0.54 (SD = 0.36) (Table VI).

B.2. HSFW Completion

The HSFW intervention developers defined HSFW completion as attending at least 8 of the 12 HSFW sessions. Overall, 80% of HSFW participants (n = 106) completed the intervention

(Table VI). Completion of HSFW was highest in Churches A, B, and K, which all had a 100% completion rate. Church F had the lowest completion rate (46%) (Table VI).

TABLE VI. HEART SMART FOR WOMEN AND HEART SMART MAINTENANCE PROGRAM ATTENDANCE AND COMPLETION BY CHURCH AND OVERALL (N = 12 CHURCHES)

Church	HSFW (n = 133 participants)				HSM (n = 136 participants)			
	Proportion of HSFW sessions attended^a		HSFW Completion Rate^b		HSM participation among HSFW attendees		Proportion of HSM sessions attended^c	
	M	SD	n	%	n	%	M	SD
A	0.84	0.09	8	100.00	7	87.50	0.58	0.28
B	0.87	0.10	13	100.00	12	92.31	0.66	0.24
C	0.74	0.20	9	81.82	6	54.55	0.40	0.22
D	0.83	0.17	9	81.82	9	81.82	0.63	0.32
E	0.80	0.14	7	87.50	5	62.50	0.79	0.31
F	0.54	0.36	5	45.45	3	27.27	0.72	0.14
G	0.72	0.22	10	83.33	10	83.33	0.68	0.31
H	0.70	0.34	12	66.67	9	50.00	0.44	0.38
I	0.66	0.40	6	66.67	7	77.78	0.39	0.37
J	0.61	0.37	5	71.43	4	57.14	0.57	0.38
K	0.91	0.08	15	100.00	7	46.67	0.48	0.30
L	0.72	0.29	7	70.00	4	40.00	0.58	0.35
Overall Participation^{d,e}	0.75	0.26	106	79.70	83	62.41	0.58	0.31

^a Proportion of sessions attended out of 12 sessions

^b HSFW completion = attendance at 8 or more HSFW sessions. The HSFW Completion Rate was calculated based on the number of participants completing 8 or more sessions divided by the total number of participants.

^c Proportion of HSM sessions attended was calculated based on number of sessions attended during the first 20 months of HSM at each church divided by the number of HSM sessions implemented during the same period (Range: 12-20 sessions; see Table IV).

^d Assessed differences in HSFW attendance and HSFW completion between HSFW-only participants compared to HSFW + HSM participants using t-tests and chi-square tests, respectively (see Table XXI, Appendix E). Those with higher attendance and those who completed HSFW were more likely to participate in HSM ($p < .001$).

^e Assessed differences in HSM attendance between HSFW+HSM participants and HSM-only participants using t-tests (see Table XXII, Appendix E). Those who attended HSFW attended a higher proportion of HSM sessions ($p = .007$).

B.3. HSM Participation Among HSFW Attendees

Among HSM participants, I calculated the proportion from each church who had also participated in HSFW. Overall, 62% of HSFW attendees (n = 83) also participated in HSM (Table VI). These rates were highest in Churches A, B, D, and G, in which over 80% of HSFW

attendees participated in HSM. Churches F, H, K, and L had the lowest proportions of HSFW attendees who participated in HSM (50% or less) (Table VI).

In addition, among all HSFW participants, HSFW completers and those with higher HSFW attendance levels were more likely to participate in HSM than non-completers and those with lower attendance rates (p 's < .001) (see Table XXI, Appendix E).

B.4. HSM Attendance

Among the 136 HSM participants, the mean proportion of sessions attended was 0.58 (SD = 0.31) (Table VI). Participants in Churches B, E, F, and G had the highest mean proportions of HSM sessions attended (Range: 0.66 – 0.79), and participants in churches C, H, and I had the lowest proportions of HSM sessions attended (Range: 0.39 – 0.44) (Table VI). Additionally, HSFW participants had higher HSM attendance levels than HSM participants who did not attend HSFW (p = .007) (see Table XXII, Appendix E).

C. Adjusted Models of Program Participation by Church

C.1 HSFW Attendance

When HSFW attendance was assessed by church and adjusted for covariates, Churches A, D, E, and K had significantly higher attendance than Church F, which had the lowest HSFW completion rate (Table VII). Church B also had marginally higher HSFW attendance compared to Church F.

C.2. HSFW Completion

Similar to the HSFW attendance results, the adjusted HSFW completion rate was significantly higher in churches A and K compared to Church F (Table VIII). However, due to small cell sizes, the analysis produced unstable results, which should be interpreted with caution.

TABLE VII. FIXED EFFECTS LINEAR REGRESSION MODELS FOR THE PROPORTION OF HSFW SESSIONS ATTENDED (OUT OF 12 SESSIONS) (N = 133) ^{a,b,c}

	Model 1 ^d					Model 2 ^e				
	B	95% CI		t	p	B	95% CI		t	p
Intercept	0.80	0.59	1.00	7.63	<.001	0.66	0.39	0.92	4.85	<.001
Age	-0.001	-0.004	0.002	-0.62	.538	-0.002	-0.01	0.002	-0.90	.372
Race/Ethnicity ^f	-0.02	-0.13	0.09	-0.32	.748	-0.03	-0.25	0.19	-0.26	.793
Education ^g	-0.08	-0.17	0.02	-1.53	.129	-0.10	-0.20	0.00	-1.89	.061
Prehypertension /hypertension ^h	0.12	0.02	0.22	2.41	.017	0.11	0.02	0.21	2.32	.022
Church A						0.34	0.11	0.57	2.89	.005
Church B						0.27	-0.04	0.58	1.73	.086
Church C						0.15	-0.06	0.37	1.44	.152
Church D						0.31	0.10	0.52	2.92	.004
Church E						0.26	0.03	0.49	2.26	.026
Church F						Reference				
Church G						0.14	-0.06	0.35	1.38	.171
Church H						0.14	-0.13	0.40	1.01	.315
Church I						0.13	-0.10	0.36	1.13	.263
Church J						0.02	-0.22	0.27	0.19	.847
Church K						0.34	0.14	0.53	3.40	<.001
Church L						0.17	-0.05	0.38	1.53	.129

^a Reference church = Church F, which had the lowest mean session attendance

^b Model 2 adjusted for age, race/ethnicity, education and prehypertension/hypertension diagnosis, based on theorized variables of interest and bivariate analysis (see Chapter III for details).

^c Shading denotes significantly higher attendance compared to the reference church (Church F)

^d $F(4, 128) = 2.09$, $p = .085$, $R^2 = 0.06$

^e $F(15, 117) = 2.23$, $p = .009$, $R^2 = 0.22$

^f Reference = White, non-Hispanic

^g Reference = College graduate

^h Reference = No hypertension or pre-hypertension diagnosis

C.3. HSM Participation Among HSFW Attendees

Controlling for participant characteristics, participants in churches A, B, D, G, and I had significantly higher odds of HSM participation among HSFW attendees compared to Church F, which had the lowest proportion of HSFW participants attending HSM (Table IX). However, as with HSFW completion, small cell sizes contributed to unstable results, which should be interpreted with caution.

C.4. HSM Attendance

Controlling for participant characteristics, participants from Churches D, E, and F attended significantly higher proportions of HSM sessions compared to Church I, the reference

TABLE VIII. FIXED EFFECTS LOGISTIC REGRESSION MODELS FOR HSFW COMPLETION
(N = 133) ^{a,b,c,d}

	OR	Model 1		p	OR	Model 2		p
		95% CI				95% CI		
Age ^e	0.99	0.96	1.02	.457	0.98	0.95	1.02	.330
Race/Ethnicity ^f	0.76	0.25	2.27	.619	0.90	0.11	7.25	.924
Education ^g	0.48	0.16	1.39	.175	0.44	0.15	1.35	.153
Prehypertension/hypertension ^h	2.71	1.06	6.96	.037	2.35	0.86	6.46	.097
Church A					30.04	1.10	823.95	.044
Church B					17.18	0.39	766.35	.142
Church C					2.95	0.43	20.50	.273
Church D					5.13	0.72	36.29	.102
Church E					5.90	0.63	55.46	.121
Church F					Reference			
Church G					4.24	0.61	29.33	.143
Church H					1.63	0.15	17.89	.691
Church I					2.31	0.32	16.60	.405
Church J					1.70	0.19	15.12	.636
Church K					30.13	1.40	646.69	.030
Church L					2.26	0.35	14.61	.390

^a HSFW Completion = Attendance at 8 or more HSFW sessions

^b Reference church = Church F, which had the lowest mean session attendance, church odds ratios are church listed vs. Church F

^c Model 2 adjusted for age, race/ethnicity, education and prehypertension/hypertension diagnosis, based on theorized variables of interest and bivariate analysis (see Chapter III for details).

^d Shading denotes significantly higher completion compared to the reference church (Church F)

^e Odds ratios present odds of outcome age vs. age plus 1 year

^f Reference = White, non-Hispanic

^g Reference = College graduate

^h Reference = No hypertension or pre-hypertension diagnosis

church, which had the lowest mean session attendance (Table X). Additionally, individuals from Churches A and G attended marginally higher proportions of sessions compared to Church I.

D. Summary

The above analysis of HSFW attendance, HSFW completion, and HSM participation among HSFW attendees indicated that churches varied significantly when controlling for age, race/ethnicity, education, and a diagnosis of prehypertension or hypertension. Similar results were seen for HSM attendance, which varied significantly when controlling for the same variables plus sex and previous participation in HSFW. These results demonstrate that church-specific differences were not explained by person-level characteristics alone, thus supporting

TABLE IX. FIXED EFFECTS LOGISTIC REGRESSION MODELS FOR HSM PARTICIPATION AMONG HSFW ATTENDEES (N = 133) ^{a,b,c}

	OR	Model 1		p	OR	Model 2		p
		95% CI				95% CI		
Age ^d	1.02	0.99	1.05	.156	1.03	1.00	1.06	.070
Race/Ethnicity ^e	1.65	0.67	4.08	.279	0.69	0.11	4.61	.705
Education ^f	1.06	0.48	2.30	.891	0.93	0.38	2.31	.880
Prehypertension/hypertension ^g	0.73	0.34	1.61	.438	0.54	0.22	1.34	.184
Church A					18.27	1.45	229.40	.024
Church B					102.90	3.98	2661.20	.005
Church C					3.91	0.61	25.04	.150
Church D					15.26	1.91	122.00	.010
Church E					4.95	0.67	36.39	.116
Church F					Reference			
Church G					15.33	1.92	122.20	.010
Church H					5.09	0.50	52.32	.171
Church I					14.13	1.62	123.60	.017
Church J					6.78	0.77	59.82	.085
Church K					2.90	0.51	16.29	.228
Church L					2.42	0.36	16.13	.362

^a Reference church = Church F, which had the lowest mean session attendance, church odds ratios are church listed vs. Church F

^b Model 2 adjusted for age, race/ethnicity, education and prehypertension/hypertension diagnosis, based on theorized variables of interest and bivariate analysis (see Chapter III for details).

^c Shading denotes significantly higher HSM participation among HSFW attendees compared to the reference church (Church F)

^d Odds ratios present odds of outcome age vs. age plus 1 year

^e Reference = White, non-Hispanic

^f Reference = College graduate

^g Reference = No hypertension or pre-hypertension diagnosis

the need for further investigation to discern the associations between context-specific characteristics and implementation outcomes.

Notably, participants from Church F had the lowest proportion of HSFW sessions attended ($M = 0.54$, $SD = 0.36$), rate of completion (45%), and HSM participation among HSFW attendees (27%), yet it had the among highest proportion of HSM sessions attended ($M = 0.72$, $SD = 0.14$). Church F had 13 HSM participants, but only three had previously attended HSFW (Table IV). Church F was one of four churches in which stakeholders described a **connection with the HSM coordinator**; however, the Church F coordinator did not participate in HSFW. Thus, it is possible that in Church F, the HSM Coordinator was a greater draw for participants than the Heart Smart program itself.

TABLE X. FIXED EFFECTS LINEAR REGRESSION MODELS FOR THE PROPORTION OF HSM SESSIONS ATTENDED (N = 136) ^{a,b,c}

	Model 1 ^d					Model 2 ^e				
	B	95% CI		t	p	B	95% CI		t	p
Intercept	0.40	0.07	0.60	2.47	.015	0.20	1.36	-0.09	0.49	.177
Age	0.002	-0.001	0.01	1.24	.217	0.002	0.95	-0.002	0.01	.342
Sex ^f	0.04	-0.14	0.22	0.44	.660	0.05	0.58	-0.12	0.23	.562
Race/Ethnicity ^g	0.02	-0.12	0.15	0.25	.802	0.26	1.82	-0.02	0.55	.071
Education ^h	-0.03	-0.14	0.09	-0.46	.644	-0.08	-1.35	-0.20	0.04	.181
Prehypertension /hypertension ⁱ	0.003	-0.11	0.12	0.05	.962	0.01	0.21	-0.10	0.13	.837
HSFW participant ^j	0.16	0.03	0.28	2.44	.016	0.20	3.10	0.07	0.32	.003
Church A						0.20	1.70	-0.03	0.44	.092
Church B						-0.01	-0.09	-0.36	0.33	.931
Church C						-0.03	-0.21	-0.30	0.24	.837
Church D						0.28	2.37	0.05	0.51	.020
Church E						0.41	2.96	0.13	0.68	.004
Church F						0.37	2.98	0.13	0.62	.004
Church G						0.24	1.93	-0.01	0.49	.055
Church H						-0.18	-1.16	-0.50	0.13	.249
Church I						Reference				
Church J						0.11	0.65	-0.23	0.45	.515
Church K						0.04	0.30	-0.21	0.29	.767
Church L						0.19	1.31	-0.10	0.47	.192

^a Reference church = Church I, which had the lowest mean HSM participation

^b Model 2 adjusted for age, sex, race/ethnicity, education, prehypertension/hypertension diagnosis, and previous participation in HSFHW based on theorized variables of interest and bivariate analysis (see Chapter III for details).

^c Shading denotes significantly higher HSM attendance compared to the reference church (Church I)

^d $F(6, 129) = 1.60$, $p = .151$, $R^2 = 0.07$

^e $F(17, 118) = 2.32$, $p = .004$, $R^2 = 0.25$

^f Reference = Female

^g Reference = White, non-Hispanic

^h Reference = College graduate

ⁱ Reference = No hypertension or pre-hypertension diagnosis

^j Reference = Did not participate in HSFHW

Also notable, Churches A, D, E, and K had significantly higher HSFHW attendance rates compared to Church F. All four of these churches also had evidence of **strong social connectedness**, suggesting a potential role of existing social connections in intervention participation.

Churches A, B, D, G, and I had significantly higher participation in HSM among HSFHW attendees compared to Church F. Four of these five churches (Churches A, B, G, I) had a combination of a **religious basis for health promotion** and a **history of health activities**,

suggesting these cultural characteristics may contribute to congregants' acceptance of health promotion activities within their churches.

Finally, Church D had high levels of HSFW attendance, HSM participation among HSFW attendees, and HSM attendance. Church D had a highly ***engaged HSM coordinator***, a ***pastor who was involved in the intervention***, and strong ***social connectedness***. Unfortunately, when the HSM coordinator moved out of the area, the church dropped out of the intervention.

The findings discussed above, along with the unstable results associated with small sample sizes, led me to explore the role of church contextual characteristics in program participation and attendance. The findings of this analysis are presented next in Chapter VI.

VI. CHURCH CONTEXTUAL FACTORS AND INTERVENTION PARTICIPATION

In this chapter, I describe my development of variables to represent the contextual characteristics of churches that I identified in Aim 1. Next, I present my analysis using the variables representing church contextual characteristics as independent variables and the same dependent variables as presented in Chapter V—HSFW attendance, HSFW completion, HSM participation among HSFW attendees, and HSM attendance—clustering participants at the church level.

A. Development of Contextual Variables Using Qualitative Analysis

Based on my qualitative analysis described in Chapter IV, I generated independent variables within two broad contextual categories to describe churches, “organizational culture and structure” and “interpersonal context.”

A.1. Organizational Culture and Structure

The “organizational culture and structure” category included five characteristics I hypothesized to be important to Heart Smart implementation: (i) church values about health promotion (i.e., a religious basis for health promotion), (ii) a history of health activities in the church, (iii) congregational support for the intervention, and leadership engagement in the intervention, including (iv) HSM coordinator engagement in the intervention and (v) pastor involvement. I used these characteristics to develop dichotomous variables, where “1” represented presence of the characteristic and “0” represented the absence or lack of evidence of the characteristic. Based on my qualitative analysis, eight churches described a religious basis for health promotion, seven churches had a history of health activities, seven churches had evidence of a lack of congregational support for the intervention, coordinators from six churches were defined as having HSM coordinators who were highly engaged in intervention activities, and pastors from four churches participated in HSM.

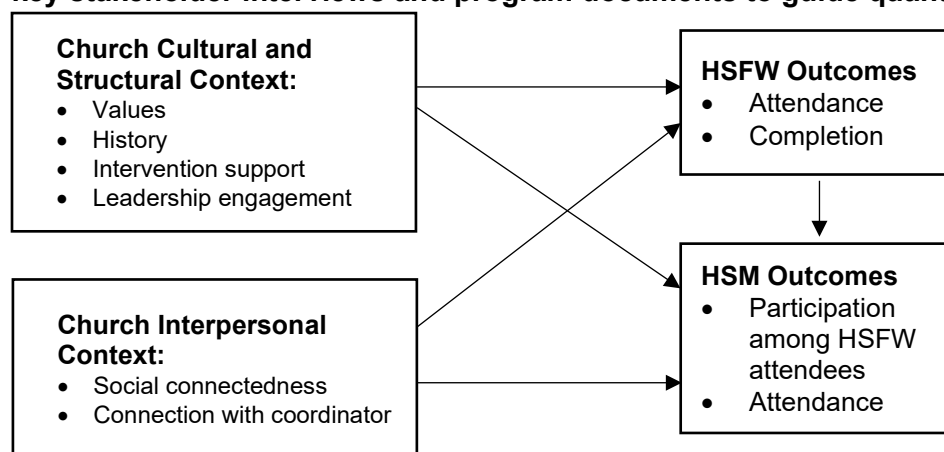
A.2. Interpersonal Context

The interpersonal context category included two characteristics: (i) a high level of social connectedness among church members and (ii) a strong connection between HSM coordinators and participants. As above, I used these characteristics to develop dichotomous variables, where “1” represented presence of the characteristic and “0” represented absence or lack of evidence of the characteristic. A high level of social connectedness was evident in seven churches, and a strong connection with the HSM coordinator was present in four churches.

A.3. Conceptual Framework

I used my qualitative findings as the basis for my Aim 2 hypotheses and conceptual framework. Thus, my conceptual framework included the two overarching contextual categories, “church structure and culture” and “interpersonal context,” with each category encompassing the characteristics described above, as depicted in Figure 5.

Figure 5. Conceptual framework, developed based on qualitative analysis Heart Smart key stakeholder interviews and program documents to guide quantitative analysis



My conceptual framework is linked with two Aim 2 hypotheses (Hypothesis 2A is discussed in Chapter V):

Hypothesis 2B: Evidence of a religious basis for health promotion, a history of health activities, support for the intervention from congregation members, coordinator engagement, and pastor involvement within churches will be associated with higher HSFW attendance and completion, a higher proportion of HSFW participants who attend HSM, and higher HSM attendance rates compared to churches without these characteristics

Hypothesis 2C: Evidence of high levels of social connectedness and/or a connection with an HSM coordinator will be associated with higher HSFW attendance, HSFW completion, HSM participation among HSFW attendees, and HSM attendance compared to churches with one or neither of these characteristics.

The results of the analyses assessing these hypotheses are discussed below.

B. HSFW Attendance

B.1. Organizational Culture and Structure and HSFW Attendance

In the assessment of HSFW attendance, I analyzed three of the five organizational culture and structure predictors: religious basis for health promotion, history of health activities in the church, and congregational support for the intervention. HSM coordinator engagement was omitted from the analysis because the program was in its early phases when HSFW was implemented, and the role of the HSM coordinator during that time was minimal. Pastor involvement was omitted from the analysis because 11 of the 12 pastors were men and HSFW was implemented for groups of women.

When adjusted for participant characteristics, congregational support for the intervention was the only organizational culture and structure predictor associated with HSFW attendance (Table XI). The relationship was significant both alone and when modeled with the other two predictors (p 's < .001). In the full model, when controlling for participant characteristics, attendees in churches with congregational support for the intervention attended 15% more HSFW sessions than churches without congregational support for the intervention.

B.2. Interpersonal Context and HSFW Attendance

Of the two interpersonal context characteristics, controlling for participant characteristics, social connectedness was associated with significantly higher HSFW attendance, both when modeled alone ($M = 0.14$, 95% CI [0.08, 0.20], $p < .001$), and together with connection with the HSM coordinator ($M = 0.13$, 95% CI [0.06, 0.21], $p < .001$) (Table XI). In these models, Churches A and F were excluded from the analysis for HSFW attendance and completion because the HSM coordinators at these churches did not participate in HSFW ($n = 114$). However, in the full sample assessing the relationship between social connectedness and HSFW attendance only and adjusting for participant characteristics ($n = 133$), results were similar to Table XI, B. Interpersonal Context, Model 1 ($M = 0.17$, 95% CI [0.10, 0.23], $p < .001$) (full model not shown).

Churches with a strong connection with the HSM coordinator also had a 10% higher HSFW attendance rate compared to those without connection with the coordinator when modeled alone ($p = .054$) (Table XI). However, when modeled with social connectedness, the association disappeared. This may have been because three of the four churches with a strong connection with the coordinator were also churches with strong social connectedness (see Chapter IV, Table IV).

C. HSFW Completion

C.1. Organizational Culture and Structure and HSFW Completion

Like HSFW attendance above, in the assessment of HSFW completion, defined as attendance at a minimum of eight of the 12 HSFW sessions, I analyzed only three of the five organizational culture and structure independent variables: religious basis for health promotion, history of health activities in the church, and congregational support for the intervention.

TABLE XI. LINEAR REGRESSION GENERALIZED ESTIMATING EQUATIONS MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS IN THE PROPORTION OF HSFW SESSIONS ATTENDED (OUT OF 12 SESSIONS)^{a,b,c}

A. ORGANIZATIONAL CULTURE AND STRUCTURE (n = 133)																				
	Model 1					Model 2					Model 3					Model 4 (full model)				
	B	95% CI		Z	p	B	95% CI		Z	p	B	95% CI		Z	p	B	95% CI		Z	p
Intercept	0.79	0.44	1.13	4.47	<.001	0.79	0.46	1.13	4.62	<.001	0.72	0.41	1.03	4.53	<.001	0.68	0.38	0.99	4.45	<.001
Age	-0.001	-0.01	0.005	-0.36	.721	-0.001	-0.01	0.005	-0.39	.697	-0.001	-0.01	0.01	-0.19	.847	-0.001	-0.01	0.005	-0.21	.831
Race/Ethnicity ^d	-0.03	-0.05	0.06	-0.55	.582	-0.02	-0.11	0.08	-0.33	.743	-0.03	-0.09	0.03	-1.06	.288	-0.06	-0.11	0.00	-1.95	.051
Education ^e	-0.08	-0.16	0.01	-1.76	.079	-0.08	-0.17	0.02	-1.63	.103	-0.09	-0.18	0.01	-1.79	.073	-0.09	-0.18	-0.002	-2.00	.045
Prehypertension/ hypertension ^f	0.12	0.01	0.23	2.12	.034	0.12	0.003	0.23	2.02	.044	0.12	0.02	0.22	2.26	.024	0.12	0.01	0.22	2.23	.026
Religious basis for health promotion ^g	0.02	-0.15	0.19	0.22	.824											0.06	-0.04	0.16	1.14	.255
History of health activities ^g						0.02	-0.09	0.12	0.34	.732						-0.003	-0.07	0.07	-0.08	.933
Congregation support for intervention ^g											0.14	0.06	0.22	3.48	<.001	0.15	0.07	0.24	3.51	<.001
B. INTERPERSONAL CONTEXT (n = 114)																				
	Model 1					Model 2					Model 3 (full model)									
	B	95% CI		Z	p	B	95% CI		Z	p	B	95% CI		Z	p					
Intercept	0.70	0.38	1.02	4.28	<.001	0.76	0.40	1.12	4.19	<.001	0.70	0.38	1.02	4.26	<.001					
Age	0.00	-0.01	0.01	0.03	.973	0.00	-0.01	0.01	-0.02	.983	0.00	-0.01	0.01	0.04	.972					
Race/Ethnicity ^d	-0.01	-0.08	0.05	-0.45	.653	-0.05	-0.12	0.02	-1.46	.145	-0.02	-0.09	0.06	-0.44	.657					
Education ^e	-0.13	-0.22	-0.04	-2.74	.006	-0.10	-0.20	-0.01	-2.14	.033	-0.13	-0.22	-0.03	-2.64	.008					
Prehypertension/ hypertension ^f	0.11	0.02	0.21	2.29	.022	0.09	-0.01	0.20	1.73	.084	0.11	0.01	0.21	2.22	.027					
Social connectedness ^g	0.14	0.08	0.20	4.74	<.001						0.13	0.06	0.21	3.42	<.001					
Connection with coordinator ^g						0.10	-0.002	0.21	1.93	.054	0.01	-0.12	0.14	0.14	.890					

^a All models account for church-level clustering; models adjusted for age, race/ethnicity, education and prehypertension/hypertension diagnosis, based on theorized variables of interest and bivariate analysis (see Chapter III for details).

^b Models evaluating the role of interpersonal context exclude Churches A and F; HSM coordinators did not participate in HSFw in these churches

^c Shading represents a significant association

^d Reference = White, non-Hispanic

^e Reference = College graduate

^f Reference = No diagnosis of hypertension

^g Reference = Absence of predictor

Consistent with HSFW attendance results, when adjusted for participant characteristics, congregational support for the intervention was the only significant predictor of HSFW completion, both alone and when modeled with religious basis for health promotion and history of health activities. In the combined model, congregational support for the intervention was associated with a higher odds of HSFW completion (OR = 3.70, $p = .034$) (Table XII).

C.2. Interpersonal Context and HSFW Completion

Also consistent with HSFW attendance results, when adjusted for participant characteristics, social connectedness, when modeled alone, was associated with a higher odds of HSFW completion (OR = 3.15, $p = .019$). However, when social connectedness and connection with the HSM coordinator were modeled together, the association with social connectedness was attenuated (OR 1.97, $p = .082$) (Table XII).

D. HSM Participation Among HSFW Attendees

D.1. Organizational Culture and Structure and HSM Participation Among HSFW Attendees

Among the organizational culture and structure predictors, when modeled alone and adjusted for participant characteristics, a religious basis for health promotion was the only predictor associated with HSM participation among HSFW attendees (OR = 2.71, $p = .018$) (Table XIII). In the adjusted model that included all predictors, religious basis for health promotion and congregational support for the intervention were both associated with higher HSM participation among HSFW attendees (OR = 2.61, $p = .016$ and OR = 2.52, $p = .007$, respectively) (Table XIII).

D.2. Interpersonal Context and HSM Participation Among HSFW Attendees

Of the interpersonal context predictors, neither predictor was associated with HSM participation among HSFW attendees when the predictors were modeled separately and adjusted for participant characteristics (Table XIII). When the two predictors were modeled

TABLE XII. LOGISTIC REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND HSFW COMPLETION^{a,b,c,d}

A. ORGANIZATIONAL CULTURE AND STRUCTURE (n = 133)																	
	Model 1				Model 2				Model 3				Model 4 (full model)				
	OR	95% CI	p		OR	95% CI	p		OR	95% CI	p		OR	95% CI	p		
Age ^e	0.99	0.95	1.03	.581	0.98	0.94	1.03	.478		0.99	0.95	1.04	.706	0.99	0.95	1.03	.526
Race/Ethnicity ^f	0.71	0.24	2.13	.544	0.80	0.30	2.13	.656		0.69	0.37	1.29	.240	0.67	0.37	1.19	.171
Education ^g	0.47	0.16	1.37	.167	0.48	0.16	1.42	.188		0.41	0.11	1.45	.166	0.40	0.13	1.27	.121
Prehypertension /hypertension ^h	2.71	1.24	5.93	.012	2.65	1.16	6.02	.020		2.91	1.28	6.60	.011	2.83	1.22	6.53	.015
Religious basis for health promotion ⁱ	1.18	0.28	5.01	.824										1.60	0.48	5.36	.443
History of health activities ⁱ					1.73	0.62	4.85	.298						1.63	0.69	3.84	.260
Congregation support for intervention ⁱ										3.55	1.18	10.73	.025	3.70	1.10	12.40	.034

B. INTERPERSONAL CONTEXT (n = 114)														
	Model 1				Model 2				Model 3 (full model)					
	OR	95% CI	p		OR	95% CI	p		OR	95% CI	p			
Age ^e	0.99	0.95	1.04	.746	0.99	0.95	1.04	.815		0.99	0.95	1.04	.781	
Race/Ethnicity ^f	0.80	0.41	1.57	.513	0.51	0.26	0.98	.042		0.63	0.35	1.13	.124	
Education ^g	0.21	0.05	0.88	.032	0.25	0.07	0.96	.043		0.22	0.05	0.90	.035	
Prehypertension /hypertension ^h	3.30	1.22	8.92	.019	2.73	1.00	7.49	.051		3.12	1.11	8.76	.031	
Social connectedness ⁱ	3.15	1.21	8.26	.019						1.97	0.92	4.23	.082	
Connection with coordinator ⁱ					4.08	0.62	26.71	.143		2.59	0.37	18.14	.339	

^a HSFW Completion = Attendance at 8 or more HSFW sessions

^b All models account for church-level clustering; models adjusted for age, race/ethnicity, education and prehypertension/hypertension diagnosis, based on theorized variables of interest and bivariate analysis (see Chapter III for details)

^c Models evaluating the role of interpersonal context exclude Churches A and F; HSM coordinators did not participate in HSFW in these churches

^d Shading represents a significant association

^e Odds ratios present odds of outcome age vs. age plus 1 year.

^f Reference = White, non-Hispanic

^g Reference = College graduate

^h Reference = No diagnosis of hypertension

ⁱ Reference = Absence of predictor

together, **social connectedness** was marginally associated with a higher odds of HSM participation among HSFW attendees (OR = 2.34, $p = .097$) (Table XIII).

E. HSM Attendance

E.1. Organizational Culture and Structure and HSM Attendance

Contrary to expectations, when modeled individually and adjusted for participant characteristics, no organizational culture and structure predictors were associated with HSM attendance. However, when predictors were modeled together, a religious basis for health promotion was marginally associated with lower HSM attendance ($B = -0.19$, $p = .090$) and coordinator engagement was associated with marginally higher attendance ($B = 0.11$, $p = .085$) (Table XIV).

I also examined HSM attendance among HSFW participants only ($n = 83$). However, in this analysis, no organizational culture and structure predictors were associated with HSM attendance (Table XV).

E.2. Interpersonal Context and HSM Attendance

Controlling for participant characteristics, neither social connectedness nor connection with the HSM coordinator were associated with HSM attendance, alone or when modeled together (Table XIV). In a model examining HSM attendance among HSFW participants only ($n = 83$), social connectedness was marginally associated with higher HSM attendance ($B = 0.11$, $p = .069$) (Table XV).

F. Summary

In summary, congregational support for the intervention appear and social connectedness appeared to yield positive outcomes related to participation in the short-term HSFW intervention, but other results were mixed. While church-level characteristics may be

TABLE XIII. LOGISTIC REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND PARTICIPATION IN HSM AMONG HSWF ATTENDEES (N = 133) ^{a,b}

A. ORGANIZATIONAL CULTURE AND STRUCTURE																								
	Model 1				Model 2				Model 3				Model 4				Model 5				Model 6 (full model)			
	OR	95% CI	p		OR	95% CI	p		OR	95% CI	p		OR	95% CI	p		OR	95% CI	p		OR	95% CI	p	
Age ^c	1.02	0.99	1.04	.146	1.02	0.99	1.04	.186	1.02	1.00	1.05	.097	1.02	0.99	1.05	.134	1.02	0.99	1.05	.179	1.02	0.99	1.05	.150
Race/Ethnicity ^d	1.13	0.24	5.31	.876	1.70	0.47	6.19	.421	1.53	0.53	4.43	.429	1.39	0.30	6.49	.676	1.59	0.34	7.41	.555	0.97	0.37	2.55	.954
Education ^e	0.99	0.45	2.19	.985	1.07	0.46	2.48	.869	1.01	0.44	2.33	.978	1.09	0.49	2.43	.836	1.04	0.47	2.30	.929	0.90	0.39	2.09	.807
Prehypertension /hypertension ^f	0.70	0.24	2.03	.513	0.70	0.24	2.05	.520	0.73	0.26	2.00	.536	0.70	0.25	1.96	.498	0.75	0.27	2.08	.580	0.68	0.25	1.86	.453
Religious basis for health promotion ^g	2.71	1.19	6.15	.018																	5.01	1.22	20.63	.026
History of health activities ^g					1.42	0.54	3.74	.479													1.33	0.27	6.62	.725
Congregation support for intervention ^g									2.07	0.76	5.61	.155									2.71	1.30	5.65	.008
Coordinator engagement ^g													1.51	0.59	3.86	.385					0.70	0.14	3.61	.669
Pastor involvement ^g																	1.16	0.40	3.34	.790	1.13	0.29	4.34	.859
B. INTERPERSONAL CONTEXT																								
	Model 1				Model 2				Model 3 (full model)															
	OR	95% CI	p		OR	95% CI	p		OR	95% CI	p													
Age ^c	1.02	1.00	1.05	.094	1.02	0.99	1.05	.164	1.02	1.00	1.05	.091												
Race/Ethnicity ^d	1.71	0.56	5.26	.347	1.71	0.34	8.46	.513	1.86	0.53	6.44	.330												
Education ^e	0.94	0.41	2.17	.885	1.05	0.47	2.37	.904	0.91	0.39	2.11	.827												
Prehypertension /hypertension ^f	0.75	0.27	2.06	.572	0.74	0.26	2.12	.572	0.76	0.28	2.07	.587												
Social connectedness ^g	2.00	0.74	5.40	.173					2.34	0.86	6.38	.097												
Connection with coordinator ^g					0.84	0.26	2.74	.779	0.62	0.22	1.73	.364												

^a All models account for church-level clustering; models adjusted for age, race/ethnicity, education and prehypertension/hypertension diagnosis, based on theorized variables of interest and bivariate analysis (see Chapter III for details).

^b Shading represents a significant association

^c Odds ratios present odds of outcome age vs. age plus 1 year

^d Reference = White, non-Hispanic

^e Reference = College graduate

^f Reference = No diagnosis of hypertension

^g Reference = Absence of predictor

TABLE XIV. LINEAR REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND THE PROPORTION OF HSM SESSIONS ATTENDED (N = 136)^{a,b}

A. ORGANIZATIONAL CULTURE AND STRUCTURE																								
	Model 1				Model 2				Model 3				Model 4				Model 5				Model 6 (full model)			
	B	95% CI	Z	p	B	95% CI	Z	p	B	95% CI	Z	p	B	95% CI	Z	p	B	95% CI	Z	p	B	95% CI	Z	p
Intercept	0.41	0.13 0.69	2.88	.004	0.34	0.13 0.55	3.14	.002	0.31	0.10 0.51	2.97	.003	0.34	0.11 0.57	2.87	.004	0.32	0.10 0.53	2.91	.004	0.36	0.11 0.61	2.80	.005
Age	0.002	-0.001 0.01	1.31	.189	0.003	-0.001 0.01	1.66	.098	0.003	0.00 0.01	1.73	.083	0.003	-0.001 0.01	1.58	.114	0.003	-0.001 0.01	1.60	.110	0.002	-0.001 0.01	1.15	.250
Sex ^c	0.04	-0.13 0.22	0.48	.631	0.04	-0.11 0.18	0.47	.636	0.04	-0.12 0.20	0.53	.593	0.04	-0.12 0.21	0.51	.608	0.03	-0.11 0.17	0.44	.663	0.03	-0.11 0.17	0.37	.711
Race/Ethnicity ^d	0.04	-0.07 0.14	0.63	.528	0.01	-0.09 0.11	0.13	.899	0.00	-0.09 0.10	0.10	.923	0.02	-0.09 0.13	0.34	.730	0.01	-0.10 0.11	0.12	.908	0.01	-0.09 0.11	0.16	.870
Education ^e	-0.02	-0.13 0.09	-0.35	.726	-0.02	-0.14 0.09	-0.41	.684	-0.03	-0.13 0.08	-0.52	.605	-0.02	-0.13 0.09	-0.43	.667	-0.03	-0.15 0.09	-0.45	.655	-0.02	-0.13 0.08	-0.47	.641
Prehypertension / hypertension ^f	0.001	-0.10 0.10	0.02	.988	0.01	-0.10 0.12	0.13	.895	0.004	-0.10 0.10	0.07	.944	0.003	-0.10 0.11	0.06	.950	0.01	-0.10 0.11	0.13	.899	-0.001	-0.10 0.10	-0.02	.988
HSFW participant ^g	0.17	0.01 0.32	2.12	.034	0.15	-0.005 0.31	1.90	.057	0.16	-0.02 0.33	1.79	.074	0.16	0.01 0.31	2.11	.035	0.15	-0.01 0.32	1.85	.065	0.16	0.02 0.31	2.16	.031
Religious basis for health promotion ^h	-0.10	-0.29 0.08	-1.08	.278																	-0.19	-0.42 0.03	-1.70	.090
History of health activities ^h					-0.02	-0.16 0.12	-0.31	.760													0.08	-0.09 0.24	0.91	.363
Congregation support for intervention ^h									0.03	-0.11 0.17	0.40	.689									0.02	-0.10 0.14	0.29	.775
Coordinator engagement ^h													-0.03	-0.16 0.11	-0.38	.706					0.10	-0.03 0.24	1.50	.134
Pastor involvement ^h																	0.03	-0.11 0.17	0.43	.668	0.11	-0.01 0.23	1.72	.085

B. INTERPERSONAL CONTEXT												
	Model 1				Model 2				Model 3 (full model)			
	B	95% CI	Z	p	B	95% CI	Z	p	B	95% CI	Z	p
Intercept	0.30	0.06 0.53	2.46	.014	0.32	0.12 0.52	3.15	.002	0.30	0.07 0.52	2.60	.009
Age	0.003	0.00 0.01	1.74	.082	0.003	-0.001 0.01	1.59	.113	0.003	0.00 0.01	1.77	.077
Sex ^c	0.04	-0.12 0.20	0.52	.605	0.04	-0.11 0.19	0.58	.564	0.04	-0.10 0.19	0.57	.567
Race/Ethnicity ^d	0.01	-0.08 0.10	0.22	.825	0.01	-0.10 0.11	0.10	.920	0.01	-0.10 0.12	0.18	.858
Education ^e	-0.03	-0.13 0.08	-0.54	.591	-0.02	-0.14 0.09	-0.37	.709	-0.03	-0.13 0.08	-0.53	.598
Prehypertension / hypertension ^f	0.003	-0.10 0.10	0.05	.961	0.004	-0.10 0.11	0.07	.944	0.002	-0.10 0.11	0.05	.963
HSFW participant ^g	0.16	-0.01 0.33	1.80	.072	0.16	0.01 0.31	2.10	.036	0.16	0.01 0.31	2.03	.043
Social connectedness ^h	0.03	-0.11 0.18	0.46	.647					0.03	-0.13 0.20	0.41	.678
Connection with coordinator ^h					0.01	-0.14 0.16	0.12	.903	0.001	-0.17 0.18	0.01	.994

TABLE XIV. LINEAR REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND THE PROPORTION OF HSM SESSIONS ATTENDED (N = 136)^{a,b} (CONTINUED)

^a HSM session attendance calculated based on the number of sessions attended each participant attended as a proportion of the number of sessions implemented at their respective church

^b All models account for church-level clustering; models adjusted for age, sex, race/ethnicity, education prehypertension/hypertension diagnosis, and previous participation in HSFW, based on theorized variables of interest and bivariate analysis (see Chapter III for details).

^c Reference = Female sex

^d Reference = White, non-Hispanic

^e Reference = College graduate

^f Reference = No diagnosis of hypertension

^g Reference = Not a HSFW participant

^h Reference = Absence of predictor

TABLE XV. LINEAR REGRESSION GENERALIZED ESTIMATING EQUATION MODELS OF THE ASSOCIATION BETWEEN (A) ORGANIZATIONAL CULTURE AND STRUCTURE CHARACTERISTICS AND (B) INTERPERSONAL CONTEXT CHARACTERISTICS AND THE PROPORTION OF HSM SESSIONS ATTENDED AMONG HSFW PARTICIPANTS ONLY (N = 83)^{a,b}

A. ORGANIZATIONAL CULTURE AND STRUCTURE					
	B	95% CI		Z	p
Intercept	0.51	0.11	0.90	2.51	.012
Age	0.00	-0.01	0.01	-0.01	.996
Race/Ethnicity ^c	-0.03	-0.15	0.10	-0.45	.650
Education ^d	0.02	-0.23	0.26	0.15	.882
Prehypertension / hypertension ^e	0.08	-0.02	0.19	1.59	.111
Religious basis for health promotion ^f	-0.06	-0.34	0.23	-0.39	.697
History of health activities ^f	0.06	-0.15	0.27	0.57	.567
Congregation support for intervention ^f	0.08	-0.06	0.22	1.13	.258
Coordinator engagement ^f	0.01	-0.20	0.21	0.09	.929
Pastor involvement ^f	0.09	-0.11	0.29	0.87	.387

B. INTERPERSONAL CONTEXT					
	B	95% CI		Z	p
Intercept	0.47	0.05	0.90	2.18	.029
Age	0.001	-0.004	0.005	0.23	.815
Race/Ethnicity ^c	-0.002	-0.13	0.13	-0.03	.974
Education ^d	-0.03	-0.24	0.18	-0.25	.804
Prehypertension / hypertension ^e	0.10	0.01	0.20	2.08	.037
Social connectedness ^f	0.19	-0.01	0.39	1.82	.069
Connection with coordinator ^f	-0.09	-0.31	0.13	-0.80	.425

^a HSM session attendance calculated based on the number of sessions attended each participant attended as a proportion of the number of sessions implemented at their respective church

^b All models account for church-level clustering; models adjusted for age, sex, race/ethnicity, education prehypertension/hypertension diagnosis, and previous participation in HSFW, based on theorized variables of interest and bivariate analysis (see Chapter III for details).

^c Reference = White, non-Hispanic

^d Reference = College graduate

^e Reference = No diagnosis of hypertension

^f Reference = Absence of predictor

helpful in understanding intervention outcomes, with the small sample size used in this study, it is possible that unique characteristics of individual churches may limit the ability to make generalizations across churches.

VII. DISCUSSION

This study used a multiphase, mixed-methods approach to explore the role of contextual factors within churches in the implementation of the Heart Smart CVD risk-reduction program, offered in 12 churches in rural, southernmost Illinois. The overall goal of this study was to contribute to knowledge on the implementation of community-based evidence-based programs in rural communities towards a long-term goal of reducing rural health disparities.

A. Summary of Findings

In the initial qualitative phase of my study, using the CFIR as a framework (Damschroder et al., 2009), I identified multiple contextual characteristics that could potentially be important considerations in a church-based intervention. These contextual characteristics were grouped into two broad categories—organizational culture and structure and interpersonal context. In phase two of my study, I quantitatively assessed the associations between these contextual categories and HSFW and HSM participation and attendance, which yielded mixed results.

In the 12-week HSFW intervention, congregational support for the intervention was associated with intervention attendance and completion, but a religious basis for health promotion and a history of health activities in the church were not. Additionally, in the HSFW intervention, social connectedness was associated with attendance and completion.

Contextual factors contributing to participation and attendance in a maintenance intervention may be more complex. In the 2-year HSM maintenance intervention, congregational support for the intervention and a religious basis for health promotion were associated with a higher odds of HSM participation among HSFW attendees, and social connectedness was marginally associated with a higher odds of HSM participation among HSFW attendees.

In assessing HSM attendance, contrary to expectations, a religious basis for health promotion was associated with marginally *lower* HSM attendance. Attendance by the church

pastor was associated with marginally higher HSM attendance. Because these effects were only observed in the combined model, I suspect they may be related to other correlated factors that were not measured in this study. Also contrary to expectations, neither of the interpersonal context characteristics was associated with HSM attendance.

Findings from this study also provide evidence that participant characteristics were insufficient in explaining differences in participation and attendance in HSFW and HSM across churches. Given that participation and attendance for both HSFW and HSM differed by church when controlling for participant characteristics, examining alternative explanations for differences in participation, such as contextual characteristics of churches, was warranted.

B. Interpretation of Findings

My qualitative findings related to contextual characteristics that may potentially have a role in implementation are supported by previous literature on organizational readiness for change within churches and other organizations. Previous studies suggest implementation of a new intervention within an organization may require a supportive climate and culture, capacity to engage in change, and a history of health programming (Castañeda et al., 2012; Maxwell et al., 2019; Tagai et al., 2018). While my qualitative findings were largely consistent with previous literature on the implementation of church-based health promotion interventions, the majority of prior studies either did not focus on rural populations or they pertained to rural African American churches in particular.

In support of a religious basis for health promotion to support church-based health interventions, a nationally representative study of faith leaders' perceptions about health and wellness found that some faith leaders articulated the link between health and spirituality or espoused a holistic view of health that included spiritual wellness (Webb, Bopp, & Fallon, 2013). However, the belief in a relationship between physical health and spiritual health was not universal across faith leaders (Webb et al., 2013; Williams et al., 2012). Additionally, faith

leaders may not feel comfortable or capable in addressing health, or, consistent with my findings, they may not perceive health and wellness to be the responsibility of the church (Webb et al., 2013; Williams et al., 2012). In a study by Bopp and Fallon (2013), some church leaders also expressed concern that church members would not be receptive to wellness promotion in churches, which supports my finding related to lack of congregational support for the intervention—the only organizational culture and structure characteristic associated with HSFW attendance and completion. It is possible that congregational support for the intervention contributed to interest in and acceptability of the Heart Smart intervention among church members, which facilitated HSFW attendance. These findings suggest buy-in from the congregation is an essential component of successful intervention implementation.

Church leaders—particularly pastors, are often cited as critical to health promotion within churches (Webb et al., 2013; Williams et al., 2012); however, few studies have assessed the impact of pastors on health intervention outcomes. In one study targeting African Methodist Episcopal churches, the authors found that pastor engagement, such as actively engaging in study activities and encouraging members to participate, was associated with study recruitment but not with retention (Baruth, Wilcox, & Saunders, 2013). This study supports my findings in which pastor involvement was not associated with HSM participation among HSFW attendees and was only marginally associated with HSM attendance, suggesting the pastor may be important but insufficient for explaining intervention implementation outcomes.

As HSM was implemented by lay leaders from within participating churches, my qualitative results suggested characteristics of lay leaders such as their level of engagement in the intervention and how they were perceived as health promotion leaders may play a role in attendance and outcomes. However, neither HSM coordinator engagement in the overall intervention nor participants' connection with the HSM coordinator were associated with any outcomes. However, the lack of association may have been related to factors such as the dynamic nature of coordinator and participant engagement as well as participant perceptions

about the intervention itself rather than coordinators specifically. Thus, assessment of this relationship with a consistent maintenance curriculum is warranted. An additional characteristic of HSM coordinators, their qualifications to serve as an HSM coordinator, was not assessed in this study because nearly all coordinators had a background in healthcare or wellness promotion.

Despite the lack of relationship between HSM coordinator characteristics and attendance and participation outcomes, HSM coordinators were critical to this study. Lay leaders involved in health programs can be advantageous in the dissemination of evidence-based interventions in healthcare shortage areas (Ory et al., 2015) and previous studies utilizing lay leaders in rural communities have demonstrated effectiveness in improving health outcomes (Ory et al., 2015; Patil et al., 2019). However, the limited availability of lay leaders in rural areas and their limited time for engaging in health promotion potentially overburdens those that have the skills and willingness to serve as lay leaders, and may be a barrier to rural interventions in faith settings (Bopp & Fallon, 2013). Importantly for this study, some HSM coordinators did not follow the protocol to implement HSM every month, and HSM coordinators were engaged in overall intervention activities (e.g., monthly and annual meetings) at different levels, suggesting that implementation of HSM was indeed burdensome for some coordinators. Potentially, if HSM participants perceived their coordinator's waning enthusiasm or fatigue, their own engagement in the program may also decrease (this was not assessed). At the end of HSM, some coordinators were ready for the program to end, and suggested continuing the program in their churches would require a new coordinator. Given the benefits and challenges to working with lay persons to implement interventions, successful implementation is dependent, in part, on time and energy that lay persons have available to devote to the program. Further research is needed to determine how to best support rural lay leaders involved in health interventions while also supporting participant outcomes.

“Interpersonal context” variables were based on my cross-case analysis, in which social constructs, particularly a high level of social connectedness among church members, emerged as potentially important to the success of Heart Smart implementation. Given the ways in which key stakeholders emphasized social connections in churches, it was not surprising that strong social connectedness was significantly associated with HSFW attendance and completion, and to some extent with HSM participation and attendance. This finding is supported by a substantial body of literature that supports the association between social support and social networks and engaging in healthy behaviors, including in rural communities (e.g., Eyler, 2003; Kegler, Escoffery, et al., 2012). My quantitative findings, which demonstrate greater HSFW attendance and completion in groups with high levels of social connectedness and marginal associations between social connectedness and HSFW attendees’ participation in and attendance at HSM, supports the implementation of rural community-based interventions with existing groups that have strong ties. In Heart Smart churches, these were groups in which interviewees described their church relationships as “familial.” This finding supports previous research on facilitating participation in group-based interventions by eliciting social support among group members (Peterson & Cheng, 2011; Sriram et al., 2019).

C. Study Limitations and Strengths

Among the limitations of the current study was that I conceptualized the study after data collection was complete, and therefore no data were collected specifically for use in this study. For example, the key stakeholder interview guides did not explicitly consider an implementation science perspective. However, because the key stakeholder interview guides addressed church and community context, I believe the collected data were appropriate for examining the topic under study. Additionally, due to my role in the project, I was in a unique position to observe the implementation in real time, including variations in implementation across churches. I was involved in the initial conceptualization of Heart Smart, I helped to write the grant that funded the

research, and I coordinated UIC-based activities related to the implementation. I was also involved in recruiting church partners, developing interview guides and other data collection tools, and guiding implementation activities. My role in the original study and my observations during its implementation led me to seek alternative ways to understand our results—namely, while the intervention was implemented in 12 churches, it was implemented in multiple different ways. Thus, I conceived of the current study based on my first-hand knowledge about the implementation. Given the gaps in the implementation science literature pertaining to rural, community-based research, this study offers an opportunity to contribute to the literature.

This study was also limited in that the number of interviews conducted at each church and the stakeholders who were interviewed, including roles represented in interviews, varied. Importantly, interviewees within churches sometimes had different perspectives about the same topic—which is critical as individual perspectives were used as the basis for developing church-level characteristics. However, the perspectives of those interviewed may not represent the full range of perspectives of all members in all Heart Smart churches. Additionally, interviews are subject to bias, such as recall or social desirability bias. To minimize bias, the interviewers assured participants that their information would remain confidential, and there were no right or wrong answers. Additionally, bias was minimized by involving interviewers who had no prior relationship with interviewees. Specifically, interviews were conducted by project staff who had not previously met with the coordinator, pastor, or other stakeholders and did not have regular contact with HSM coordinators. As the research coordinator for the intervention, I was involved in initial church recruitment meetings with pastors, coordinators, and other stakeholders. I also had regular contact with coordinators throughout the intervention. Therefore, I was not involved in conducting interviews.

A third limitation of this study is related to the voluntary nature of participation in the HSFw and HSM interventions. Because HSFw was open to all adult women and HSM was open to all adults, I cannot assess the extent to which intervention participants are

representative of the members of their respective church congregations versus those who are highly willing to engage in an intervention. Due to variations in how churches measure “attendance” and “membership,” I was unable to estimate the proportion of “eligible” church members who engaged in HSFW and HSM. Further study in which churches are randomized to intervention and control conditions may be beneficial to improve the generalizability of findings.

Another limitation is that due to the study design, which involved the analysis of previously collected data, there may be contextual factors within churches as well as within their larger communities that are important but were not identified in the qualitative data I analyzed and therefore were not assessed. This study also assumes that church context is static; however, church context likely changes over the duration of the intervention. Additionally, this study applied the perspectives of individuals (key stakeholder interviewees) and to describe church settings. Sometimes variables for particular churches were coded “0” based on the absence of discussion of a characteristic rather than absence of characteristic itself (that is, the construct was not discussed in interviews). As noted in Chapter III, Chan’s typology for developing organizational variables based on individual-level data relies on quantitative data collected from multiple individuals within groups (1998). However, these data were not available for the current study. While interview data were appropriate for developing some dichotomous variables to describe church characteristics (e.g., pastor involvement in HSM), had this study been conceptualized in advance, I could have used more robust measures to assess hypothesized contextual characteristics, or sampled larger groups of potential stakeholders to achieve consensus on church-based contextual characteristics (Chan, 1998). For example, surveys with congregation members could have been used to assess their perceptions about the Heart Smart intervention to ensure buy-in from the overall congregations. Similarly, an objective measure could have been used to assess social connectedness within each church (e.g., the Psychological Sense of Community Scale examines connectedness in relationship to the self, social relationships, and a specific group in which an individual belongs (Jason,

Stevens, & Ram, 2015)). This weakness is mitigated by my use of a mixed methods design, in which I was able to identify church-specific characteristics and nuances that may be important but may not be captured by quantitative data alone. An additional strength of this study is, given the few studies that examine organizational context in the implementation of rural CVD risk-reduction interventions, the methods used in this study offer potential contextual characteristics that can be examined in greater depth through future research.

I used multiple methods to reduce my personal bias in carrying out the qualitative phase of this research as well as my integration of qualitative findings to the quantitative phase of the study. First, I involved a second coder who helped me refine my codebook and code definitions to be clear and concrete. Additionally, meetings with committee members throughout the analysis period, in which I discussed preliminary findings, helped me distinguish preconceived beliefs about partner churches versus data-driven findings. Also, to ensure consideration of alternative explanations, I presented a poster and discussed my research and preliminary findings with attendees of the Science of Dissemination and Implementation Annual Meeting in December 2018, where several researchers suggested useful resources and references for helping me to complete my study. Finally, prior to completing my qualitative analysis, I updated my review of relevant literature related to organizational context and health intervention implementation to ensure I was not missing any important concepts in my analysis.

D. Implications for Research and Practice

Due to the disparities in CVD risk behaviors, incidence, and mortality in rural communities (Befort et al., 2012; Garcia et al., 2017; Howard et al., 2017; Ingram & Montresor-Lopez, 2015; Kulshreshtha et al., 2014; Meit et al., 2014; O'Connor & Wellenius, 2012; Singh & Siahpush, 2014a), and often limited effectiveness of evidence-based interventions translated for rural settings (Cai & Richards, 2016; Cleland, 2017; Crouch et al., 2011; Rodrigues et al., 2016; Walsh et al., 2017), this study considers context in examining the implementation of a CVD risk

reduction intervention, in an effort to inform future evidence-based interventions targeting rural populations. Due to the limited health resources in many rural communities and the role of churches that extends beyond spiritual wellness to include serving important cultural and social functions, they may be considered ideal settings for rural-based health promotion interventions (Kegler, Escoffery, et al., 2012; Kegler, Swan, et al., 2012; Kruger et al., 2012; Zimmermann et al., 2014.) However, a closer examination of contextual features within churches suggests their inclination, capacity, and support for engaging in health promotion interventions may vary—which may affect intervention participation and thus also impact. A mixed-methods implementation science approach to understanding the role of context in the implementation of a CVD risk-reduction intervention in rural churches offers important lessons for future implementation, as well as directions for future study.

First, the findings suggested that congregational support for the intervention was an important component to intervention implementation, which supports a greater role for “bottom-up” interventions, in which community empowerment is a priority, and community members play an important role in identifying community needs and priorities, and the most appropriate methods for addressing needs and priorities (Laverack & Labonte, 2000). While churches may be able to play a role in filling the gap in health resources available in rural communities, it is critical for public health researchers and practitioners to understand that faith settings and the beliefs and values of leaders and stakeholders are not all alike (Webb et al., 2013; Wilcox et al., 2018). Working closely with individual churches to understand values, history, and infrastructure for promoting health can help to enable these efforts in ways that are most acceptable to congregations (Wilcox et al., 2018), and may contribute to buy-in by both leaders and congregants. Community-grounded efforts, such as community-based participatory research (CBPR) are recommended to ensure congregational buy-in, thus facilitating uptake and participation, and ideally, leading to positive health outcomes.

Second, high levels of social connectedness may be important predictors of participation in a church-based intervention for rural adults. Previous research supports the role of social support and social networks in rural adults, and the relationship between social factors and participation in healthy behaviors (e.g., Eyler, 2003; Kegler, Escoffery, et al., 2012). Given the substantial health disparities facing rural populations, my findings support continued church-based health promotion efforts, along with an exploration of health promotion opportunities with other rural social groups, such as employee groups and clubs, as a way to reach broader segments of the population, including those who may not be affiliated with a church. Additionally, the current study—along with much of the extant literature related to primary and secondary prevention of CVD, diabetes, and related health conditions in rural adults—either focus on women in particular, or women are far more likely to self-enroll in interventions (e.g., Crouch et al., 2011; Khare et al., 2014; Peterson & Cheng, 2011; Seguin et al., 2018; Thomson et al., 2015; Warren et al., 2010; Yeary et al., 2019). Rural men may have different preferences regarding health promotion, which deserves further exploration.

Finally, maintaining the long-term benefits of CVD risk-reduction interventions is a persistent public health challenge (Artinian et al., 2010). Further research is warranted to understand (i) whether other contextual characteristics, including characteristics not measured in this study (i.e., social, organizational neighborhood, community, and policy characteristics), have a role in long-term attendance; (ii) whether contextual characteristics play a role in attendance trends (e.g., consistent vs. sporadic attendance, or attendance in the first 6-12 months of a maintenance intervention); (iii) whether other characteristics unrelated to context, such as the intervention itself, are associated with long-term attendance; and (iv) the relationship between organizational contextual characteristics health behavioral and clinical outcomes. Because HSM was tailored for each of the 12 Heart Smart churches, participants did not receive the same maintenance curriculum. Thus, further study using a consistent maintenance curriculum is also warranted to minimize variation across sites, and aid in

understanding the role of intervention context in maintenance participation (as opposed to differences in the intervention itself). Additionally, studies involving larger participant samples are warranted.

E. Conclusion

Community-based interventions are necessary to reduce rural health disparities. In rural, church-based interventions, organizational context, particularly organizational support for the intervention and relationships among individuals within the organization, may be associated with implementation effectiveness. To improve the implementation of CVD risk-reduction interventions in rural communities, it is essential for public health researchers and practitioners to understand how implementation context—within and across organizations—might contribute to or impede intervention success.

APPENDICES

APPENDIX A

HEART SMART PRE-INTERVENTION KEY STAKEHOLDER INTERVIEW GUIDE

INTRODUCTION:

In September 2011, the Southern Seven Coalition received funding to implement a project called the Faith-Based Collaborative to reduce chronic disease risk in women and families in southernmost Illinois. The overall goal of the Faith-Based Collaborative is to improve the health of women and their communities by empowering them to promote and engage in healthy lifestyle behaviors. Interviews are being conducted with the key stakeholders in participating churches to explore attitudes towards health, facilitators and barriers to being healthy, and differences between men and women with regard to health. The interviews will also be used to understand church members' perspectives about the overall role of the church in promoting the health of members and the community. Your participation in this interview will inform the development and implementation of health programs to be developed in your church to address the health needs of church members and the surrounding community.

Do you have any questions before we begin?

1. What is your role in your church?
2. Why is health important to you? Your church community?
3. What do you see as the role of the church in promoting better health for its members? For the community?

The Southern Seven Health Department has identified Obesity, Cardiovascular disease, Diabetes and Cancer as the priority health issues in the seven southernmost counties.

4. Do these health issues differ for men and women in your community?
 - a. If so, what differences exist and why?

Probe: differences based on roles in the workplace, community, church
5. What do you think are activities that are important to engage in to stay healthy?
6. What facilitates or prevents members of your church and community from engaging in these activities?

Probe: Specifically related to physical activity and healthy eating. Probe for specific barriers they face because of roles at work, in the household or community. Probe for differences between men and women.

- a. What can be done to help cope with these barriers?
7. What resources and tools are needed or important to stay healthy?
 - a. Does your community have the suggested resources and tools?
 - b. If yes, are these resources and tools utilized? Why or why not?

APPENDIX A (CONTINUED)

8. What changes can the church make to improve the health of its members and the community?

As I mentioned, your church is part of the Faith Based Collaborative that is working with churches such as yours to improve the health of the community. We will be working with members of your church to plan monthly activities that are related to healthy behaviors, such as increasing physical activity, healthy eating, disease prevention and health promotion. We would like to get your input on the kinds of activities you think your members would be interested in and how feasible it is to implement these activities. One of the goals of developing these activities is to encourage behavior change and sustain it over time.

9. What kinds of activities do you think will be helpful in your community? Think of all possible activities.
10. What challenges do you foresee as we plan and implement these activities?
11. Are there organizations that your church already works with provide resources and services to your church community?
12. To assess the effectiveness of these activities we would like to conduct surveys with the participants. What issues do you see with conducting these surveys?

APPENDIX B

HEART SMART POST-INTERVENTION KEY STAKEHOLDER INTERVIEW GUIDE

Introduction

In September 2011, the Southern Seven Coalition received funding to implement the Heart Smart program to reduce chronic disease risk in women and families in southernmost Illinois. About two and a half years ago, your church agreed to participate in the Heart Smart program and implemented the 12-week Heart Smart for Women class and then the monthly Heart Smart Maintenance Program. As you are aware, the formal evaluation of the Heart Smart Program is coming to an end. Because of this, we would like to conduct follow-up interviews with stakeholders, such as yourself, to discuss and understand church members' perspectives about health, health programming, and the overall experience of the Heart Smart Initiative within your church. Before we begin, do you have any questions?

Ask the following for Coordinators, pastors, and stakeholders

1. What is your role in the church?

Ask Q2-8 for coordinators only; for all others, skip to q9

2. Did you participate in the Heart Smart for Women class? If so, what are your thoughts about the Heart Smart for Women class?
 - a. Was the content relevant to the participants?
 - b. Is there anything you would change about the content or structure of the class?
3. What are your thoughts about the Heart Smart Maintenance meeting structure? *{If necessary, probe for specifics, such as frequency of meetings, having flexible content/no curriculum, planning requirements, etc.}*:
 - a. What was successful? What worked well?
 - b. What would you change?
4. What unforeseen challenges did you encounter during Heart Smart Maintenance? *{e.g., frequency of meeting, flexibility of content, preparation & planning requirements}*
 - a. What suggestions do you have for how challenges could be managed?
 - b. What resources would have been helpful?
5. Was your HSM group primarily women or women and men?
 - a. What were the advantages and disadvantages of [having men in the group/having a women-only group]?
6. What would a church need to continue programming beyond the 2-year Heart Smart Maintenance project period?
7. When the Heart Smart program was conceived, one goal was to support churches in promoting healthy lifestyles among their congregations and communities. Are there any plans to continue any aspects of HSM beyond the 2-year project period?
8. What did you enjoy most about being a Heart Smart coordinator?

APPENDIX B (CONTINUED)

Transition

Now we'd like you to think beyond your role as coordinator. We are going to switch gears and talk about the larger congregation and the church's role in health.

Ask Q9-Q14 for all coordinators, pastors, and stakeholders

9. What kinds of things does your church do to promote better health among your congregation? *{For coordinators, indicate that this refers to activities beyond Heart Smart.}*
 - a. How long has the church done [state activity here]? *{Repeat question for each activity mentioned}*
10. Some churches that we partner with have reported making changes in specific *practices* that are outside of Heart Smart to reduce chronic disease risk. For example, one church makes sure there are healthy dessert options at church meals. Were there any changes or attempted changes in practices that you are aware of?
 - a. What changes have worked well? *{Prompt: Can you tell me more about that?}*
 - b. What hasn't worked well? *{Prompt: Can you tell me more about that}*
11. Thinking about your larger community and not just the Heart Smart group, have you observed any changes related to healthy lifestyles or healthy lifestyle promotion? *{If the respondent is not sure how to answer, prompt that it could be changes related to people or resources or discussions}*
12. Do you think the Heart Smart program will influence future health programming at your church or the way members of your congregation think about health? If so, in what ways?
13. Did your church develop any new collaborations or partnerships as a result of its involvement in Heart Smart?
14. Do you have any additional comments or thoughts about the Heart Smart program?

APPENDIX C COORDINATOR FEEDBACK FORM

FBC Heart Smart Maintenance Evaluation Church Coordinator Feedback Form

Please fill out this portion before the Heart Smart Maintenance (HSM) Activity

1. Church Name: [CHURCH NAME]
2. Date of HSM Activity: _____
3. Location of HSM Activity: _____
4. Topic of HSM Activity: _____
5. Total # of participants: _____
 - a. # of men participants: _____
 - b. # of women participants: _____
6. As you initial HSM ID cards, record the participant's attendance below by checking the box with the participant's ID number:

- | | | | |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <input type="checkbox"/> 1010 | <input type="checkbox"/> 1269 | <input type="checkbox"/> 1548 | <input type="checkbox"/> 1838 |
| <input type="checkbox"/> 1040 | <input type="checkbox"/> 1283 | <input type="checkbox"/> 1557 | <input type="checkbox"/> 1845 |
| <input type="checkbox"/> 1051 | <input type="checkbox"/> 1363 | <input type="checkbox"/> 1565 | <input type="checkbox"/> 1862 |
| <input type="checkbox"/> 1061 | <input type="checkbox"/> 1384 | <input type="checkbox"/> 1592 | <input type="checkbox"/> 1870 |
| <input type="checkbox"/> 1081 | <input type="checkbox"/> 1407 | <input type="checkbox"/> 1617 | <input type="checkbox"/> 1876 |
| <input type="checkbox"/> 1091 | <input type="checkbox"/> 1421 | <input type="checkbox"/> 1642 | <input type="checkbox"/> 1880 |
| <input type="checkbox"/> 1097 | <input type="checkbox"/> 1442 | <input type="checkbox"/> 1645 | <input type="checkbox"/> 1911 |
| <input type="checkbox"/> 1164 | <input type="checkbox"/> 1494 | <input type="checkbox"/> 1690 | <input type="checkbox"/> 1933 |
| <input type="checkbox"/> 1165 | <input type="checkbox"/> 1521 | <input type="checkbox"/> 1691 | <input type="checkbox"/> 1950 |
| <input type="checkbox"/> 1186 | <input type="checkbox"/> 1532 | <input type="checkbox"/> 1692 | <input type="checkbox"/> 1974 |
| <input type="checkbox"/> 1199 | <input type="checkbox"/> 1536 | <input type="checkbox"/> 1698 | <input type="checkbox"/> 1991 |
| <input type="checkbox"/> 1258 | <input type="checkbox"/> 1538 | <input type="checkbox"/> 1735 | |
| <input type="checkbox"/> 1260 | <input type="checkbox"/> 1539 | <input type="checkbox"/> 1779 | |

- FRONT -

APPENDIX C (CONTINUED)

Please fill out this portion after the HSM Activity

1. Briefly describe the activity that took place today:

2. Please select the topic(s) that were included in this activity
 - ☐ Physical Activity
 - ☐ Healthy Eating
 - ☐ Other (please describe):

3. How long was the activity?

4. Describe one or more things that worked well during the activity?

5. Describe one or more things you would do differently for the next activity?

6. Are there any new health-related policies, practices, programs, events, or activities at your church or in your church community? If so, please list. *(Examples may include exercise classes, healthy choices offered at church meals, information sharing about health events, etc.)*

- BACK -

APPENDIX D

ADAPTED CFIR CODEBOOK FOR CURRENT STUDY

Codebook was adapted from CFIR Codebook, available at <https://cfirguide.org/evaluation-design/qualitative-data/> (CFIR Research Team – Center for Clinical Management Research, 2019). Codebook components drawn directly from the CFIR codebook are displayed in quotations and italicized.

TABLE XVI. QUALITATIVE CODEBOOK, ADAPTED FROM THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR) AND USED TO IDENTIFY CONTEXTUAL CHARACTERISTICS IN CHURCHES PARTICIPATING IN THE HEART SMART INTERVENTION ^a

Domain 1: INTERVENTION CHARACTERISTICS		Relates specifically to the Heart Smart intervention	
	Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example
1	Int_Percept	<ul style="list-style-type: none"> • Evidence Strength & Quality • Relative advantage • Design Quality & Packaging • Observability 	<p>Definition: “<i>Stakeholders’ perceptions of the quality and validity of evidence</i>” (including evidence that can be observed) “<i>supporting the belief that the [Heart Smart intervention] will have desired outcomes.</i>” Also, “<i>stakeholders’ perceptions of the advantage of implementing the [Heart Smart intervention] versus an alternative solution.</i>” Also, “<i>perceived excellence in how the [Heart Smart intervention] is bundled, presented, and assembled.</i>” Also, degree of risk associated with the Heart Smart intervention.</p> <p>Inclusion Criteria: Perceptions expressed by <u>church leaders, Heart Smart coordinators</u> related to “<i>awareness of, absence of, or desire for evidence</i>” about the Heart Smart intervention, or beliefs about whether the intervention is effective. Also, “<i>include statements that demonstrate the Heart Smart intervention is better or worse than other programs.</i>”</p> <p>Exclusion Criteria: Perceptions expressed by <u>church members</u></p> <p>Example: “I thought the class was good, um, by the end the health education, some of it was review, um, I was glad when they got, when they started the Maintenance, because I think I felt way the same way a lot of people did.”</p>
2	Int_Adapt	Adaptability	<p>Definition: “<i>The degree to which the [Heart Smart intervention] can be adapted, tailored, refined, or reinvented to meet local needs.</i>”</p> <p>Inclusion Criteria: “<i>Include statements regarding the ability to adapt the</i>” Heart Smart intervention for context, or examples of how the Heart Smart intervention might be adapted or was adapted, as expressed by <u>church leaders and Heart Smart coordinators</u></p> <p>Exclusion Criteria: Perceptions expressed by <u>church members</u></p> <p>Example:</p>

APPENDIX D (CONTINUED)

TABLE XVI. QUALITATIVE CODEBOOK, ADAPTED FROM THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR) AND USED TO IDENTIFY CONTEXTUAL CHARACTERISTICS IN CHURCHES PARTICIPATING IN THE HEART SMART INTERVENTION ^a (CONTINUED)

Domain 1: INTERVENTION CHARACTERISTICS		Relates specifically to the Heart Smart intervention	
	Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example
3	Int_Complex	Complexity	<p>Definition: Perceived simplicity or difficulty of Heart Smart implementation, “<i>reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.</i>” Also refers to knowledge required to adopt the Heart Smart intervention within the church setting. Also refers to support offered by UIC/S7HD/SSCWH to churches/coordinators related to Heart Smart implementation.</p> <p>Inclusion Criteria: Perceptions expressed by <u>church leaders, Heart Smart coordinators</u> about the complexity of the intervention broadly.</p> <p>Exclusion Criteria: Perceptions expressed by <u>church members</u>. Also exclude items related to complexity within the Inner Setting or Outer Setting if IS/OS codes are appropriate to use.</p> <p>Example:</p>
Domain 2: OUTER SETTING		Relates to the external community in which the intervention is being implemented (i.e., the community in which the church is located)	
	Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example
4	OS_NeedsRes	Patient Needs & Resources	<p>Definition: “<i>The extent to which [community members’ needs], as well as barriers and facilitators to meet those needs, are accurately known and prioritized by the [partner church].</i>”</p> <p>Inclusion Criteria: Statements reflecting awareness (or lack thereof) of “<i>needs and resources of those served by the organization</i>” (must be specific to respondents’ community). Feedback about whether Heart Smart met/did not meet needs/resources of those served. Statements about “<i>whether known needs/resources influenced adaptation/implementation</i>” of Heart Smart.</p> <p>Exclusion Criteria: General statements about health</p> <p>Examples: Distance between church members’ homes and church, geographic factors, community knowledge and attitudes</p>
5	OS_Network	Cosmopolitanism & Peer Pressure	<p>Definition: “<i>The degree to which a [partner church] is networked with other external organizations.</i>” Also, “<i>mimetic or competitive pressure to implement an innovation because other key peer organizations have already implemented</i>” it.</p> <p>Inclusion Criteria: Community connectedness of the church, previous collaboration with the local health department or other health agencies. Statements about hoping to be a role model for other churches, or joining Heart Smart because other churches have done so.</p> <p>Exclusion Criteria: “<i>Statements about general networking, communications, and relationships within the organization.</i>”</p> <p>Example: Being connected to the organization of parish nurses</p>

APPENDIX D (CONTINUED)

TABLE XVI. QUALITATIVE CODEBOOK, ADAPTED FROM THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR) AND USED TO IDENTIFY CONTEXTUAL CHARACTERISTICS IN CHURCHES PARTICIPATING IN THE HEART SMART INTERVENTION ^a (CONTINUED)

Domain 3: INNER SETTING			Relates to the church in which the Heart Smart intervention was implemented.
	Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example
6	IS_Structure	Structural Characteristics	<p>Definition: “The social architecture, age, maturity, and size of the [church].”</p> <p>Inclusion Criteria: Church characteristics including size/membership, church infrastructure, church leadership structure, denomination, factors related to clergy, geographic characteristics, racial/ethnic composition, other demographic characteristics of church members</p> <p>Exclusion Criteria:</p> <p>Example:</p>
7	IS_Networks	Networks & Communications	<p>Definition: “The nature and quality of webs of social networks and the nature and quality of formal and informal communications within [the church].”</p> <p>Inclusion Criteria: Social relationships within the church, social support church members provide to one another. Networking and communication within an organization.</p> <p>Exclusion Criteria:</p> <p>Example:</p>
8	IS_Culture	Culture	<p>Definition: “Norms, values, and basic assumptions of a [church].”</p> <p>Inclusion Criteria: Big picture church values</p> <p>Exclusion Criteria:</p> <p>Example: Health encompasses mind, body, and spirit, community service provided by church</p>
9	IS_Climate	<p>Implementation Climate:</p> <ul style="list-style-type: none"> • Tension for Change • Compatibility • Relative Priority • Organizational Incentives & Rewards • Learning Climate 	<p>Definition: “The absorptive capacity for change, shared receptivity of involved individuals and leaders to an [intervention] and the extent to which use of that intervention will be rewarded, supported, and expected within their organization.” Includes:</p> <ul style="list-style-type: none"> • “The degree of tangible fit between meaning and values attached to the [Heart Smart intervention] by involved individuals, and how those align with individuals’ own norms, values, and perceived risks and needs.” • How the Heart Smart intervention fits with organizational norms, values, and “existing workflows and systems.” • “Individuals’ shared perception of the importance of the implementation within the organization.” • “Extrinsic incentives such as goal-sharing awards, performance reviews, and less tangible incentives such as increased stature or respect.” • “Climate in which: a) leaders express their need for team members’ assistance and input; b) team members feel that they are essential, valued, and knowledgeable partners in the change process; c) individuals feel psychologically safe to try new methods; and d) there is sufficient time and space for reflective thinking and evaluation.”

APPENDIX D (CONTINUED)

TABLE XVI. QUALITATIVE CODEBOOK, ADAPTED FROM THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR) AND USED TO IDENTIFY CONTEXTUAL CHARACTERISTICS IN CHURCHES PARTICIPATING IN THE HEART SMART INTERVENTION ^a (CONTINUED)

Domain 3: INNER SETTING		Relates to the church in which the Heart Smart intervention was implemented.	
Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example	
		<p>Inclusion Criteria: Perceptions expressed by church leaders, Heart Smart coordinators, church members. Statements about the “<i>receptivity to [the intervention], the degree to which stakeholders perceive the current situation as needing change.</i>” Discussions of community ownership of the need for a program like Heart Smart. Include statements related to the need for the intervention (Heart Smart is “<i>absolutely necessary</i>”), or that the intervention is [unnecessary or] <i>redundant.</i>” “<i>Statements that demonstrate the level of compatibility between [Heart Smart and church] values and processes</i>”, such as other health-related activities (e.g., Parish Nurse, Health Ministry, etc.), and implementation of or engagement in healthy practices within the church (e.g., serving healthy food). “<i>Statements that reflect the relative priority</i>” of Heart Smart (vs. other priorities).</p> <p>Exclusion Criteria:</p> <p>Example: Expressions of the value of health among stakeholders, examples of previously implemented interventions, receptiveness to intervention</p>	
10	IS_Ready	Readiness for Implementation	<p>Definition: “<i>Tangible and immediate indicators of organizational commitment to its decision to implement</i>” an intervention.</p> <p>Inclusion Criteria: “<i>Statements about general level of readiness for implementation.</i>” Examples of previously implemented health interventions.</p> <p>Exclusion Criteria: “<i>Statements about the readiness for implementation that are captured by the sub-code</i>”</p> <p>Example: Space, communication channels</p>
11	IS_Ready_Resource	Readiness for Implementation: Available Knowledge, Information & Resources	<p>Definition: “<i>Ease of access to digestible information and knowledge about the [intervention] and how to incorporate it into work tasks.</i>” Also, “<i>the level of resources dedicated for [Heart Smart] implementation and on-going operations including [money, training, education], physical space, and time.</i>”</p> <p>Inclusion Criteria: “<i>Statements related to the presence or absence of resources specific to the [Heart Smart] intervention.</i>”</p> <p>Exclusion Criteria:</p> <p>Example:</p>

APPENDIX D (CONTINUED)

TABLE XVI. QUALITATIVE CODEBOOK, ADAPTED FROM THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR) AND USED TO IDENTIFY CONTEXTUAL CHARACTERISTICS IN CHURCHES PARTICIPATING IN THE HEART SMART INTERVENTION ^a (CONTINUED)

Domain 4: CHARACTERISTICS OF INDIVIDUALS			Relates to those involved with implementing the Heart Smart intervention (i.e., Heart Smart coordinators)
	Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example
12	Ind_Implement	<ul style="list-style-type: none"> Knowledge & beliefs about the intervention Self-efficacy related to intervention implementation 	<p>Definition: “Individuals’ attitudes toward and value placed on the [Heart Smart intervention] as well as familiarity with facts, truths, and principles related to the [intervention].” Also, “individual belief in their own capabilities to execute courses of action to achieve [Heart Smart] implementation goals.”</p> <p>Inclusion Criteria: Perspectives of heart smart coordinators. Perspectives of heart smart coordinators regarding self-efficacy. Also includes degree of consistency with coordinator’s existing tasks. Also relates to support provided to coordinator related to adoption</p> <p>Exclusion Criteria:</p> <p>Example:</p>
13	Ind_Identification	Individual Identification with Organization	<p>Definition: “A broad construct related to how individuals perceive the organization and their relationship and degree of commitment with that organization.”</p> <p>Inclusion Criteria: Perspectives of heart smart coordinators; Statements about health activities (not necessarily related to Heart Smart) implemented for the good of the congregation</p> <p>Exclusion Criteria:</p> <p>Example: Members of the church are like a family</p>
14	Ind_Other	Other Personal Attributes	<p>Definition: “A broad construct to include other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style.”</p> <p>Inclusion Criteria: Perspectives of heart smart coordinators about health activities not specifically related to Heart Smart</p> <p>Exclusion Criteria:</p> <p>Example:</p>
Domain 5: PROCESS			Relates to the intervention implementation
	Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example
15	Proc_Plan	Planning	<p>Definition: “The degree to which a scheme or method of behavior and tasks for implementing [the Heart Smart intervention] are developed in advance and the quality of those schemes or methods.”</p> <p>Inclusion Criteria: References to “pre-implementation planning” for Heart Smart and “refinements to the plan.” Responses to the question “What kinds of activities do you think would be helpful for your community?”</p> <p>Exclusion Criteria:</p> <p>Example:</p>

APPENDIX D (CONTINUED)

TABLE XVI. QUALITATIVE CODEBOOK, ADAPTED FROM THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR) AND USED TO IDENTIFY CONTEXTUAL CHARACTERISTICS IN CHURCHES PARTICIPATING IN THE HEART SMART INTERVENTION ^a (CONTINUED)

Domain 5: PROCESS		Relates to the intervention implementation	
	Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example
16	Proc_Engage	Engaging	<p>Definition: “Attracting and involving appropriate individuals in the [Heart Smart] implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, training, and other similar activities.”</p> <p>Inclusion Criteria: “Statements related to engagement strategies and outcomes” not captured by sub-codes, including champions, external change agents</p> <p>Exclusion Criteria:</p> <p>Example:</p>
17	Proc_Eng _Leaders	Engaging: Opinion Leaders	<p>Definition: Statements about “attracting and involving appropriate individuals in the implementation and use of the [Heart Smart] intervention” referring specifically to “individuals [within the church] who have formal or informal influence on the attitudes and beliefs” of others in the church with respect to implementing the Heart Smart intervention</p> <p>Inclusion Criteria: Statements about the Pastor’s or other church leaders’ engagement in Heart Smart or other health programming within the church</p> <p>Exclusion Criteria:</p> <p>Example:</p>
18	Proc_Eng _IntLeaders	Engaging: Formally Appointed internal implementation leaders	<p>Definition: Statements about “attracting and involving appropriate individuals in the implementation and use of the [Heart Smart] intervention” referring specifically to “individuals from within the [church] who have been formally appointed with responsibility for implementing” Heart Smart as coordinator.</p> <p>Inclusion Criteria: Statements about the Coordinator’s engagement in Heart Smart or other health programming within the church. Also, discussions about idea sharing among coordinators.</p> <p>Exclusion Criteria: Statements made by coordinators may be captured by the “Characteristics of Individuals” domain.</p> <p>Example:</p>
19	Proc_Eng _Stake	Engaging: Key Stakeholders & Participants	<p>Definition: Statements about “attracting and involving appropriate individuals in the implementation and use of the [Heart Smart] intervention” referring specifically to “individuals from within the [church] that are directly impacted by the [intervention],” including intervention participants</p> <p>Inclusion Criteria: Statements about engagement of church members broadly and Heart Smart participants specifically</p> <p>Exclusion Criteria:</p> <p>Example:</p>

APPENDIX D (CONTINUED)

TABLE XVI. QUALITATIVE CODEBOOK, ADAPTED FROM THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH (CFIR) AND USED TO IDENTIFY CONTEXTUAL CHARACTERISTICS IN CHURCHES PARTICIPATING IN THE HEART SMART INTERVENTION ^a (CONTINUED)

Domain 5: PROCESS		Relates to the intervention implementation	
Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example	
20	Proc_Exec	Executing	Definition: <i>"Carrying out or accomplishing the [Heart Smart] implementation according to plan."</i> Inclusion Criteria: <i>"Statements that demonstrate how [Heart Smart] implementation occurred with respect to the implementation plan."</i> Exclusion Criteria: Example:
21	Proc_Eval	Reflecting & Evaluating	Definition: <i>"Quantitative and qualitative feedback about the progress and quality of [Heart Smart] implementation accompanied with regular personal and team debriefing about progress and experience."</i> Inclusion Criteria: Reflections on Heart Smart progress and impact Exclusion Criteria: Example:
Domain 6 MISCELLANEOUS		Other codes not captured by domains above	
Code	Topic	Definition, Inclusion Criteria, Exclusion Criteria, Example	
22	Q: Intro	Research Participant Introduction and Background	Definition: Used for questions and responses to questions related to participant introductions and roles Inclusion Criteria: Exclusion Criteria: Example:
23	Sustain	Sustained changes and planning for sustaining changes	Definition: Used for descriptions of sustained changes and plans for sustaining changes made due to Heart Smart Inclusion Criteria: Exclusion Criteria: Example:
24	Q: Health	Perceptions about personal health, community health needs, gender differences, important health activities, and barriers to being healthy	Definition: Used for questions and responses to questions related to health Inclusion Criteria: <ul style="list-style-type: none"> • Q: What are the most important health issues in your community? • Q: How are men and women affected differently by these health issues? • Q: What are the barriers to engaging in healthy activities in your community? • Q: Why is health important to you? • Q: What activities are important to staying healthy? Exclusion Criteria: Example:

^a CFIR codebook available at <https://cfirguide.org/evaluation-design/qualitative-data/> (CFIR Research Team – Center for Clinical Management Research, 2019)

APPENDIX E
SUPPLEMENTAL DATA TABLES: BIVARIATE ANALYSIS TABLES

TABLE XVII. HSFW PARTICIPANT DEMOGRAPHIC AND HEALTH STATUS CHARACTERISTICS BY CHURCH (N = 133)

	<u>Church A</u> (n = 8)		<u>Church B</u> (n = 13)		<u>Church C</u> (n = 11)		<u>Church D</u> (n = 11)		<u>Church E</u> (n = 8)		<u>Church F</u> (n = 11)		<u>Church G</u> (n = 12)		<u>Church H</u> (n = 18)		<u>Church I</u> (n = 9)		<u>Church J</u> (n = 7)		<u>Church K</u> (n = 15)		<u>Church L</u> (n = 10)		p
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Age (M, SD)	70.1	9.8	50.8	16.7	61.8	9.8	56.5	13.3	63.1	11.2	64.0	12.5	69.3	7.4	58.9	16.3	55.4	8.0	42.9	16.8	62.7	17.1	55.4	13.8	.002
Race/Ethnicity																									<.001
White, non-Hispanic	8	100.0	0	-	11	100.0	11	100.0	8	100.0	11	100.0	12	100.0	3	16.7	7	77.8	7	100.0	14	93.3	10	100.0	
Other	0	-	13	100.0	0	-	0	-	0	-	0	-	0	-	15	83.3	2	22.2	0	-	1	6.7	0	-	
Education																									.221
Less than a bachelor's degree	8	100.0	7	53.9	5	45.4	10	90.9	6	75.0	8	72.7	9	75.0	11	61.1	8	88.9	4	57.7	10	66.7	8	80.0	
Bachelor's degree or higher	0	-	6	46.2	6	54.6	1	9.1	2	25.0	3	27.3	3	25.0	7	38.9	1	11.1	3	42.9	5	33.3	2	20.0	
Marital Status																									.360
Married or living with partner	3	37.5	5	38.5	9	81.8	6	54.6	6	75.0	7	63.6	9	75.0	8	44.4	6	66.7	5	71.4	9	60.0	8	80.0	
Unmarried and not living with partner	5	62.5	8	61.5	2	18.2	5	45.5	2	25.0	4	36.4	3	25.0	10	55.6	3	33.3	2	28.6	6	40.0	2	20.0	
Employment																									.012
Employed	2	25.0	6	46.2	4	36.4	8	72.7	4	50.0	4	36.4	1	8.3	7	38.9	5	55.6	6	85.7	3	20.0	7	70.0	
Not employed	6	75.0	7	53.9	7	63.6	3	27.3	4	50.0	7	63.6	11	91.7	11	61.1	4	44.4	1	14.3	12	80.0	3	30.0	
Hypertension																									.104
Hypertension or prehypertension	4	50.0	12	92.3	7	63.6	4	36.4	4	50.0	5	45.4	10	83.3	13	72.2	4	44.4	3	42.9	10	66.7	5	50.0	
No hypertension	4	50.0	1	7.7	4	36.4	7	63.6	4	50.0	6	54.6	2	16.7	5	27.8	5	55.6	4	57.1	5	33.3	5	50.0	
Type II Diabetes																									.562
Diabetes / prediabetes	2	25.0	4	30.8	4	36.4	3	27.3	2	25.0	1	9.1	2	16.7	5	27.8	3	33.3	0	-	4	26.7	0	-	
No diabetes	6	75.0	9	69.2	7	63.6	8	72.7	6	75.0	10	90.9	10	83.3	13	72.2	6	66.7	7	100.0	11	73.3	10	100.0	

APPENDIX E (CONTINUED)

TABLE XVIII. HSM PARTICIPANT DEMOGRAPHIC AND HEALTH STATUS CHARACTERISTICS BY CHURCH (N = 136)

	<u>Church A</u> (n = 14)		<u>Church B</u> (n = 16)		<u>Church C</u> (n = 9)		<u>Church D</u> (n = 15)		<u>Church E</u> (n = 8)		<u>Church F</u> (n = 13)		<u>Church G</u> (n = 12)		<u>Church H</u> (n = 15)		<u>Church I</u> (n = 12)		<u>Church J</u> (n = 4)		<u>Church K</u> (n = 11)		<u>Church L</u> (n = 7)		p
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	
Age (M, SD)	64.1	14.3	51.8	15.2	63.6	9.0	53.4	17.3	64.4	8.4	68.1	9.0	66.0	7.5	56.3	19.9	50.8	14.6	52.0	15.7	66.3	11.2	61.1	11.2	.006
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Sex																									.369
Female	11	78.6	16	100.0	9	100.0	11	73.3	7	87.5	10	76.9	12	100.0	11	73.3	11	91.7	4	100.0	9	81.8	6	85.7	
Male	3	21.4	0	-	0	-	4	26.7	1	12.5	3	23.1	0	-	4	26.7	1	8.3	-	-	2	18.2	1	14.3	
Race/Ethnicity																									<.001
White, non-Hispanic	14	100.0	0	-	9	100.0	15	100.0	8	100.0	13	100.0	12	100.0	2	13.3	10	83.3	4	100.0	10	90.9	7	100.0	
Other	0	-	16	100.0	0	-	0	-	0	-	0	-	0	-	13	86.7	2	16.7	-	-	1	9.1	0	-	
Education																									.019
Less than a bachelor's degree	10	71.4	9	56.3	3	33.3	15	100.0	7	87.5	8	61.5	9	75.0	9	60.0	11	91.7	2	50.0	7	63.6	4	57.1	
Bachelor's degree or higher	4	28.6	7	43.8	6	66.7	0	-	1	12.5	5	38.5	3	25.0	6	40.0	1	8.3	2	50.0	4	36.4	3	42.9	
Marital Status																									.187
Married or living with partner	9	64.3	6	37.5	8	88.9	9	60.0	7	87.5	9	69.2	10	83.3	6	40.0	8	66.7	3	75.0	5	45.5	4	57.1	
Unmarried and not living with partner	5	35.7	10	62.5	1	11.1	6	40.0	1	12.5	4	30.8	2	16.7	9	60.0	4	33.3	1	25.0	6	54.5	3	42.9	
Employment																									.195
Employed	6	42.9	8	50.0	3	33.3	11	73.3	3	37.5	3	23.1	3	25.0	9	60.0	5	41.7	3	75.0	3	27.3	4	57.1	
Not employed	8	57.1	8	50.0	6	66.7	4	26.7	5	62.5	10	76.9	9	75.0	6	40.0	7	58.3	1	25.0	8	72.7	3	42.9	
Hypertension																									.019
Hypertension or prehypertension	9	64.3	14	87.5	4	44.4	4	26.7	5	62.5	6	46.2	8	66.7	10	66.7	4	33.3	2	50.0	8	72.7	3	42.9	
No hypertension	5	35.7	2	12.5	5	55.6	11	73.3	3	37.5	7	53.8	4	33.3	5	33.3	8	66.7	2	50.0	3	27.3	4	57.1	
Type II Diabetes																									.489
Diabetes / prediabetes	2	14.3	4	25.0	2	22.2	2	13.3	1	12.5	0	-	1	8.3	4	26.7	2	16.7	0	-	4	36.4	0	-	
No diabetes	12	85.7	12	75.0	77	77.8	13	86.7	7	87.5	13	100.0	11	91.7	11	73.3	10	83.3	4	100.0	7	63.6	7	100.0	

APPENDIX E (CONTINUED)

TABLE XIX. HSFW SESSION ATTENDANCE, PROPORTION OF COMPLETERS, AND HSM PARTICIPATION AMONG HSFW ATTENDEES BY DEMOGRAPHIC AND HEALTH STATUS CHARACTERISTICS (N = 133)

<u>Proportion of HSFW sessions attended</u> ^a				<u>HSFW Completion</u> ^b				<u>HSM participation among HSFW attendees</u>						
	β		p	B	OR [95% CI]			p	B	OR [95% CI]			p	
Age	0.002		.986	-0.002	1.00	[0.97, 1.03]		.876	0.013	1.01	[0.99, 1.04]		.273	
	n	M	SD	p	<u>Completer</u> (n = 106)		<u>Non-completer</u> (n = 27)		p	<u>HSM participant</u> (n = 83)		<u>Non-participant</u> (n = 50)		p
	n	M	SD	p	n	%	n	%	p	n	%	n	%	p
Race									.881					.484
White, non-Hispanic	102	0.75	0.26	.711	81	79.41	21	20.59		62	60.78	40	39.22	
Other	31	0.77	0.28		25	80.65	6	19.35		21	67.74	10	32.26	
Education				.123					.167					.894
Less than a bachelor's degree	94	0.73	0.27		72	76.60	22	23.40		59	62.77	35	37.23	
Bachelor's degree or higher	39	0.81	0.24		34	87.18	5	12.82		24	61.54	15	38.46	
Marital Status				.584					.280					.570
Married or living with partner	81	0.76	0.24		67	82.72	14	17.28		49	60.49	32	39.51	
Unmarried and not living with partner	52	0.73	0.30		39	75.00	13	25.00		34	65.38	18	34.62	
Employment				.931					.852					.380
Employed	57	0.75	0.28		45	78.95	12	21.05		38	66.67	19	33.33	
Not employed	76	0.75	0.26		61	80.26	15	19.74		45	59.21	31	40.79	
Hypertension				.032					.050					.840
Hypertension / prehypertension diagnosis	81	0.79	0.22		69	85.19	12	14.81		50	61.73	31	38.27	
No hypertension	52	0.68	0.31		37	71.15	15	28.85		33	63.46	19	36.54	
Type II Diabetes				.908					.534					.905
Diabetes / prediabetes diagnosis	30	0.76	0.26		25	83.33	5	16.67		19	63.33	11	36.67	
No diabetes	103	0.75	0.27		81	78.64	22	21.36		64	62.14	39	37.86	

^a Proportion of HSFW sessions attended out of a total of 12^b Attended 8 or more HSFW sessions

APPENDIX E (CONTINUED)

TABLE XX. HSM ATTENDANCE BY DEMOGRAPHIC AND HEALTH STATUS CHARACTERISTICS (N = 136) ^{a,b,c}

		Proportion of HSM sessions attended		
		β	p	
Age		0.15	.091	
	n	M	SD	p
Sex				.312
Female	117	0.59	0.32	
Male	19	0.51	0.27	
Race				.918
White, non-Hispanic	104	0.58	0.31	
Non-white	32	0.57	0.34	
Education				.753
Less than a bachelor's degree	94	0.57	0.33	
Bachelor's degree or higher	42	0.59	0.29	
Marital Status				.357
Married or living with partner	84	0.60	0.31	
Unmarried and not living with partner	52	0.54	0.32	
Employment				.975
Employed (full or part time)	61	0.57	0.33	
Not employed (retired, homemaker, etc.)	75	0.58	0.30	
Hypertension				.442
Hypertension or prehypertension	77	0.59	0.31	
No hypertension	59	0.55	0.32	
Type II Diabetes				.474
Diabetes / prediabetes diagnosis	22	0.53	0.39	
No diabetes	114	0.58	0.30	
Participated in HSFW				.007
Yes	83	0.62	0.33	
No	53	0.48	0.27	

^a HSM attendance equals the number of sessions a participant attended as a proportion of the number of sessions implemented in their church

^b Sample includes both those who participated in HSFW and those who did not

^c Differences in proportion of sessions attended assessed using t-tests for all variables except age, which was assessed using linear regression

APPENDIX E (CONTINUED)

TABLE XXI. DEMOGRAPHICS OF HSFW-ONLY PARTICIPANTS COMPARED TO HSFW+HSM PARTICIPANTS (N = 133)

	<u>HSFW Overall</u> (n = 133)		<u>HSFW-only</u> (n = 50)		<u>HSFW+HSM</u> (n = 83)		<u>p</u>
Age (M, SD)	59.53	14.63	57.74	15.88	60.61	13.82	.274
Sex (n, %)							
Female	133	100.00	50	100.00	83	100.00	
Male	0		0		0		
Race/Ethnicity (n, %)							.484
White, non-Hispanic	102	76.69	40	80.00	62	74.70	
Other	31	23.31	10	20.00	21	25.30	
Education (n, %)							.902
< High school	8	6.02	2	4.00	6	7.23	
High School or equivalent	21	15.79	8	16.00	13	15.66	
Some college	65	48.87	25	50.00	40	48.19	
Bachelor's degree or higher	39	29.32	15	30.00	24	28.92	
Marital Status (n, %)							.570
Married or living with partner	81	60.90	32	64.00	49	59.04	
Unmarried and not living with partner	52	39.10	18	36.00	34	40.96	
Employment (n, %)							.380
Employed	57	42.86	19	38.00	38	45.78	
Not employed (retired, homemaker, etc.)	76	57.14	31	62.00	45	54.22	
Hypertension (n, %)							.840
Hypertension/ pre-hypertension	81	60.90	31	62.00	50	60.24	
No hypertension	52	39.10	19	38.00	33	39.76	
Diabetes (n, %)							.905
Diabetes/pre-diabetes	30	22.56	11	22.00	19	22.89	
No diabetes	100	77.44	39	78.00	64	77.11	
Outcomes							
Proportion of HSFW sessions attended (M, SD) ^a	0.75	0.26	0.61	0.33	0.84	0.17	<.001
HSFW completion (n, %) ^{a,b}	106	79.70	29	58.00	77	92.77	<.001

^a Assessed differences in HSFW attendance and HSFW completion between HSFW-only participants compared to HSFW+HSM participants. Those with higher attendance and those who completed HSFW were more likely to participate in HSM ($p < .001$).

^b HSFW completion defined as attending at least 8 HSFW sessions

APPENDIX E (CONTINUED)

TABLE XXII. DEMOGRAPHICS OF HSFW+HSM PARTICIPANTS COMPARED TO HSM-ONLY PARTICIPANTS (N = 136)

	<u>HSM Overall</u> (n = 136)		<u>HSFW+HSM</u> (n = 83)		<u>HSM-only</u> (n = 53)		<u>p</u>
Age (M, SD)	59.63	14.69	60.61	13.82	58.08	15.99	.328
Sex (n, %)							<.001
Female	117	86.03	83	100.00	34	64.15	
Male	19	13.97	0		19	35.85	
Race/Ethnicity (n, %)							.542
White, non-Hispanic	104	76.47	62	74.70	42	79.25	
Other	32	23.53	21	25.30	11	20.75	
Education (n, %)							.233
< High school	6	4.41	6	7.23	0		
High School or equivalent	23	16.91	13	15.66	10	18.87	
Some college	65	47.79	40	48.19	25	47.17	
Bachelor's degree or higher	42	30.88	24	28.92	18	33.96	
Marital Status (n, %)							.413
Married or living with partner	84	61.76	49	59.04	35	66.04	
Unmarried and not living with partner	52	38.24	34	40.96	18	33.96	
Employment (n, %)							.785
Employed	61	44.85	38	45.78	23	43.40	
Not employed (retired, homemaker, etc.)	75	55.15	45	54.22	30	56.60	
Hypertension (n, %)							.286
Hypertension/pre-hypertension diagnosis	77	56.62	50	60.24	27	50.94	
No hypertension	59	43.38	33	39.76	26	49.06	
Diabetes (n, %)							.008
Diabetes/pre-diabetes diagnosis	22	16.18	19	22.89	3	5.66	
No diabetes	114	83.82	64	77.11	50	14.34	
Outcomes							
Proportion of HSM sessions attended (M, SD) ^a	0.58	0.31	0.63	0.33	0.49	0.27	.007

^a Assessed differences in HSM attendance between HSFW+HSM participants and HSM-only participants. Those who attended HSFW attended a higher proportion of HSM sessions (p = .007)

CITED LITERATURE

- Abbott, L. S., & Slate, E. H. (2018). Improving cardiovascular disease knowledge among rural participants: The results of a cluster randomized trial. *Healthcare*, 6(3), 71. doi:10.3390/healthcare6030071
- Abbott, L. S., Slate, E. H., & Lemacks, J. L. (2019). Influencing cardiovascular health habits in the rural, deep south: Results of a cluster randomized trial. *Health Education Research*, 34(2), 200-208.
- Artinian, N. T., Fletcher, G. F., Mozaffarian, D., Kris-Etherton, P., Van Horn, L., Lichtenstein, A. H., . . . Burke, L. E. (2010). Interventions to promote physical activity and dietary lifestyle changes for cardiovascular risk factor reduction in adults. A scientific statement from the American Heart Association. *Circulation*, 122(4), 406-41.
- Balis, L. E., Strayer, T. E., 3rd, Ramalingam, N., & Harden, S. M. (2018). Beginning with the end in mind: Contextual considerations for scaling-out a community-based intervention. *Frontiers in Public Health*, 6, 357. doi:10.3389/fpubh.2018.00357
- Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13(4), 623-649.
- Baruth, M., Wilcox, S., & Saunders, R. P. (2013). The role of pastor support in a faith-based health promotion intervention. *Family and Community Health*, 36(3), 204-214.
- Befort, C. A., Nazir, N., & Perri, M. G. (2012). Prevalence of obesity among adults from rural and urban areas of the United States: Findings from NHANES (2005-2008). *Journal of Rural Health*, 28(4), 392-397. doi:10.1111/j.1748-0361.2012.00411.x
- Birken, S. A., Powell, B. J., Shea, C. M., Haines, E. R., Kirk, M. A., Leeman, J., . . . Pesseau, J. (2017). Criteria for selecting implementation science theories and frameworks: Results from an international survey. *Implementation Science*, 12(1), 124.
- Biswas, A., Oh, P. I., Faulkner, G. E., Bajaj, R. R., Silver, M. A., Mitchell, M. S., & Alter, D. A. (2015). Sedentary time and its association with risk for disease incidence, mortality, and hospitalization in adults: A systematic review and meta-analysis. *Annals of Internal Medicine*, 162(2), 123-132. doi:10.7326/M14-1651
- Bopp, M., & Fallon, E. A. (2013). Health and wellness programming in faith-based organizations: A description of a nationwide sample. *Health Promotion Practice*, 14(1), 122-131.
- Cai, Y., & Richards, E. A. (2016). Systematic review of physical activity outcomes of rural lifestyle interventions. *Western Journal of Nursing Research*, 38(7), 909-927.
- Campbell, M. K., Hudson, M. A., Resnicow, K., Blakeney, N., Paxton, A., & Baskin, M. (2007). Church-based health promotion interventions: Evidence and lessons learned. *Annual Review of Public Health*, 28, 213-234.

- Carnahan, L. R., Zimmermann, K., & Peacock, N. R. (2016). What rural women want the public health community to know about access to healthful food: A qualitative study, 2011. *Preventing Chronic Disease*, 13, E57. doi:10.5888/pcd13.150583
- Carpenter, R. A., Finley, C., & Barlow, C. E. (2004). Pilot test of a behavioral skill building intervention to improve overall diet quality. *Journal of Nutrition Education and Behavior*, 36(1), 20-24.
- Castañeda, S. F., Holscher, J., Mumman, M. K., Salgado, H., Keir, K. B., Foster-Fishman, P. G., & Talavera, G. A. (2012). Dimensions of community and organizational readiness for change. *Progress in Community Health Partnerships: Research, Education, and Action*, 6(2), 219-226.
- CFIR Research Team – Center for Clinical Management Research. (2019). Qualitative data – data analysis. Retrieved from <https://cfirguide.org/evaluation-design/qualitative-data/>
- Chan, D. (1998). Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology*, 83(2), 234-246.
- Cleland, V., Squibb, K., Stephens, L., Dalby, J., Timperio, A., Winzenberg, T., . . . Dollman, J. (2017). Effectiveness of interventions to promote physical activity and/or decrease sedentary behaviour among rural adults: A systematic review and meta-analysis. *Obesity Reviews*, 18(7), 727-741.
- Colditz, G. A. (2012). The promise and challenges of dissemination and implementation research. In R. Brownson, G.A. Colditz, & E. Proctor (Eds.), *Dissemination and implementation research in health: Translating science to practice* (pp. 3-22). New York, NY: Oxford University Press.
- Conlon, B. A., Kahan, M., Martinez, M., Isaac, K., Rossi, A., Skyhart, R., . . . Moadel-Robblee, A. (2015). Development and evaluation of the curriculum for BOLD (Bronx Oncology Living Daily) healthy living: A diabetes prevention and control program for underserved cancer survivors. *Journal of Cancer Education*, 30(3), 535–545. doi:10.1007/s13187-014-0750-7
- Creswell, J. W. (2015). *A concise introduction to mixed methods research*. Thousand Oaks, CA: Sage Publications, Inc.
- Crouch, R., Wilson, A., & Newbury, J. (2011). A systematic review of the effectiveness of primary health education or intervention programs in improving rural women's knowledge of heart disease risk factors and changing lifestyle behaviours. *International Journal of Evidence-Based Healthcare*, 9(3), 236-245.
- 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(1), 50.
- DeCuir-Gunby, J. T., & Schutz, P. A. (2016). *Developing a mixed methods proposal: A practical guide for beginning researchers*. Thousand Oaks, CA: Sage Publications.

- DeHaven, M. J., Hunter, I. B., Wilder, L., Walton, J. W., & Berry, J. (2004). Health programs in faith-based organizations: Are they effective? *American Journal of Public Health, 94*(6), 1030–36.
- Desveaux, L., Beauchamp, M. K., Lee, A., Ivers, N., Goldstein, R., & Brooks, D. (2016). Effects of a community-based, post-rehabilitation exercise program in COPD: Protocol for a randomized controlled trial with embedded process evaluation. *JMIR Research Protocols, 5*(2), e63.
- Driscoll, D. L., Appiah-Yeboah, A., Salib, P., & Rupert, D. J. (2007). Merging qualitative and quantitative data in mixed methods research: How to and why not. *Ecological and Environmental Anthropology, 18*. Retrieved from <http://digitalcommons.unl.edu/icwdmeea/18>
- Dunn, A. L., Garcia, M. E., Marcus, B. H., Kampert, J. B., Kohl, H. W., & Blair, S. N. (1998). Six-month physical activity and fitness changes in project active, a randomized trial. *Medicine and Science in Sports and Exercise, 30*(7), 1076-1083.
- Dunn, A. L., Marcus, B. H., Kampert, J. B., Garcia, M. E., Kohl, H. W., & Blair, S. N. (1999). Comparison of lifestyle and structured interventions to increase physical activity and cardiorespiratory fitness: A randomized trial. *JAMA, 281*(4), 327-334.
- Eyler, A. A. (2003). Personal, social, and environmental correlates of physical activity in rural midwestern white women. *American Journal of Preventive Medicine, 25*(3), 86-92.
- Feldstein, A. C., & Glasgow, R. E. (2008). A practical, robust implementation and sustainability model (PRISM) for integrating research findings into practice. *Joint Commission Journal on Quality and Patient Safety, 34*(4), 228-243.
- Froese, P., Uecker, J., Vaughan, K., Park, J., Davidson, J., Whitehead, A., & Thomson, B. (2017). American values, mental health, and using technology in the age of Trump: Findings from the Baylor Religion Survey, wave 5. Retrieved from <https://www.baylor.edu/baylorreligionsurvey/doc.php/292546.pdf>
- Frost, S. S., Goins, R. T., Hunter, R. H., Hooker, S. P., Bryant, L. L., Kruger, J., & Pluto, D. (2010). Effects of the built environment on physical activity of adults living in rural settings. *American Journal of Health Promotion, 24*(4), 267-283. doi:10.4278/ajhp.08040532
- Gaglio, B., & Glasgow, R. E. (2012). Evaluation approaches for dissemination and implementation research. In R. Brownson, G.A. Colditz, & E. Proctor (Eds.), *Dissemination and Implementation Research in health: Translating science to practice* (pp. 327-356). New York, NY: Oxford University Press.
- Garcia, M. C., Faul, M., Massetti, G., Thomas, C. C., Hong, Y., Bauer, U. E., & Iademarco, M. F. (2017). Reducing potentially excess deaths from the five leading causes of death in the rural United States. *MMWR. Surveillance Summaries, 66*(2), 1–7. doi:10.15585/mmwr.ss6602a1
- Gatewood, J. G., Litchfield, R. E., Ryan, S. J., Geadelmann, J. D. M., Pendergast, J. F., & Ullom, K. K. (2008). Perceived barriers to community-based health promotion program participation. *American Journal of Health Behavior, 32*(3), 260-271.

- Glasgow, R. E., Vinson, C., Chambers, D., Khoury, M. J., Kaplan, R. M., & Hunter, C. (2012). National Institutes of Health approaches to dissemination and implementation science: Current and future directions. *American Journal of Public Health, 102*(7), 1274-1281.
- Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: The RE-AIM framework. *American Journal of Public Health, 89*(9), 1322-1327.
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology, 60*, 549-576.
- Green, L. W., & Glasgow, R. E. (2006). Evaluating the relevance, generalization, and applicability of research: Issues in external validation and translation methodology. *Evaluation and the Health Professions, 29*(1), 126-153. doi: 10.1177/0163278705284445
- Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *Milbank Quarterly, 82*(4), 581-629.
- Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics, 42*(2), 377-381.
- Hawe, P., Shiell, A., & Riley, T. (2004). Complex interventions: How "out of control" can a randomised controlled trial be? *BMJ, 328*(7455), 1561-1563. doi:10.1136/bmj.328.7455.1561
- Health Resources and Services Administration. (n.d.) MUA find. Retrieved from: <https://data.hrsa.gov/tools/shortage-area/mua-find>
- Health Resources and Services Administration Office of Rural Health Policy. (2004). Delta States Initiative report. Retrieved from <https://www.ruralhealthinfo.org/assets/236-426/delta-states-initiative-report.pdf>
- Heerman, W. J., Schludnt, D., Harris, D., Teeters, L., Apple, R., & Barkin, S. L. (2018). Scale-out of a community-based behavioral intervention for childhood obesity: Pilot implementation evaluation. *BMC Public Health, 18*(1), 498. doi:10.1186/s12889-018-5403-z
- Heinze, G., & Schemper, M. (2002). A solution to the problem of separation in logistic regression. *Statistics in Medicine, 21*(16), 2409-2419.
- Holben, D. H., Rambo, C., Howe, C., Murray, D. H., & Shubrook, J. H. (2017). Cardiovascular disease risk factors after an employer-based risk reduction program: An observational cohort study. *Journal of the American Osteopathic Association, 117*(7), 425-32.

- Hou, S., & Cao, X. (2018). A systematic review of promising strategies of faith-based cancer education and lifestyle interventions among racial/ethnic minority groups. *Journal of Cancer Education*, 33(6), 1161-1175. doi:10.1007/s13187-017-1277-5.
- Howard, G., Kleindorfer, D. O., Cushman, M., Long, D. L., Jasne, A., Judd, S. E., ... Howard, V. J. (2017). Contributors to the excess stroke mortality in rural areas in the United States. *Stroke*, 48(7), 1773–1778. doi:10.1161/STROKEAHA.117.017089
- Humpel, N., Owen, N., & Leslie, E. (2002). Environmental factors associated with adults' participation in physical activity: A review. *American Journal of Preventive Medicine*, 22(3), 188-199. doi:10.1016/S0749-3797(01)00426-3
- Illinois Department of Public Health. (2014). Illinois Behavioral Risk Factor Surveillance System. Retrieved from http://app.idph.state.il.us/brfss/countydata.asp?selTopicCounty=physact&areaCounty=South7_88&show=freq&yrCounty=4&form=county&yr=&area=&selTopic=
- Ingram, D. D., & Montresor-Lopez, J. A. (2015). Differences in stroke mortality among adults aged 45 and over: United States, 2010-2013. *NCHS Data Brief*, 207, 1-8.
- James Bell Associates. (2009) Evaluation brief. Measuring implementation fidelity. Retrieved from https://www.acf.hhs.gov/sites/default/files/cb/measuring_implementation_fidelity.pdf
- Jason, L. A., Stevens, E., & Ram, D. (2015). Development of a three-factor psychological sense of community scale. *Journal of Community Psychology*, 43(8), 973–985. doi:10.1002/jcop.21726
- Kegler, M. C., Escoffery, C., Alcantara, I. C., Hinman, J., Addison, A., & Glanz, K. (2012). Perceptions of social and environmental support for healthy eating and physical activity in rural southern churches. *Journal of Religion and Health*, 51(3), 799-811.
- Kegler, M. C., Swan, D. W., Alcantara, I., Wrensford, L., & Glanz, K. (2012). Environmental influences on physical activity in rural adults: The relative contributions of home, church and work settings. *Journal of Physical Activity & Health*, 9(7), 996-1003.
- Khare, M. M., Koch, A., Zimmermann, K., Moehring, P. A., & Geller, S. E. (2014). Heart Smart for Women: A community-based lifestyle change intervention to reduce cardiovascular risk in rural women. *Journal of Rural Health*, 30(4), 359-368.
- King, E. S., Moore, C. J., Wilson, H. K., Harden, S. M., Davis, M., & Berg, A. C. (2019). Mixed methods evaluation of implementation and outcomes in a community-based cancer prevention intervention. *BMC Public Health*, 19(1), 1051. doi:10.1186/s12889-019-7315-y
- Kruger, T. M., Swanson, M., Davis, R. E., Wright, S., Dollarhide, K., & Schoenberg, N. E. (2012). Formative research conducted in rural Appalachia to inform a community physical activity intervention. *American Journal of Health Promotion*, 26(3), 143-151.
- Kulshreshtha, A., Goyal, A., Dabhadkar, K., Veledar, E., & Vaccarino, V. (2014). Urban-rural differences in coronary heart disease mortality in the United States: 1999-2009. *Public Health Reports*, 129(1), 19-29.

- Landsverk, J., Brown, C. H., Chamberlain, P., Palinkas, L., Ogihara, M., Czaja, S., . . . Horwitz, S. (2012). Design and analysis in dissemination and implementation research. . In R. Brownson, G.A. Colditz, & E. Proctor (Eds.), *Dissemination and implementation research in health: Translating science to practice* (pp. 225-260). New York, NY: Oxford University Press.
- Laverack, G., & Labonte, R. (2000). A planning framework for community empowerment goals within health promotion. *Health Policy and Planning*, 15(3), 255-262.
- Lundeen, E. A., Park, S., Pan, L., O'Toole, T., Matthews, K., & Blanck, H. M. (2018). Obesity prevalence among adults living in metropolitan and nonmetropolitan counties - United States, 2016. *MMWR*, 67(23), 653–658. doi:10.15585/mmwr.mm6723a1
- Martinez, D. J., Turner, M. M., Pratt-Chapman, M., Kashima, K., Hargreaves, M. K., Dignan, M. B., & Hebert, J. R. (2016). The effect of changes in health beliefs among African-American and rural white church congregants enrolled in an obesity intervention: A qualitative evaluation. *Journal of Community Health*, 41(3), 518-525.
- Maxwell, A. E., Santifer, R., Chang, L. C., Gatson, J., Crespi, C. M., & Lucas-Wright, A. (2019). Organizational readiness for wellness promotion—a survey of 100 African American church leaders in South Los Angeles. *BMC Public Health*, 19(1), 593.
- Maynard, M. J. (2017). Faith-based institutions as venues for obesity prevention. *Current Obesity Reports*, 6(2), 148-154.
- McLaren, L., Ghali, L. M., Lorenzetti, D., & Rock, M. (2006). Out of context? Translating evidence from the North Karelia project over place and time. *Health Education Research*, 22(3), 414-424.
- McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education & Behavior*, 15(4), 351-377.
- Meit, M., Knudson, A., Gilbert, T., Yu, A. T., Tanenbaum, E., Ormson, E., . . . Popat, M. S. (2014). The 2014 update of the rural-urban chartbook. Retrieved from <https://ruralhealth.und.edu/projects/health-reform-policy-research-center/pdf/2014-rural-urban-chartbook-update.pdf>
- Moy, E. (2017). Leading causes of death in nonmetropolitan and metropolitan areas — United States, 1999–2014. *MMWR. Surveillance Summaries*, 66(1), 1-8. doi:10.15585/mmwr.ss6601a1
- Mozaffarian, D., Benjamin, E. J., Go, A. S., Arnett, D. K., Blaha, M. J., Cushman, M., . . . Turner, M. B. (2016). Heart disease and stroke statistics—2016 update. *Circulation*, 133(4), e38-e360.
- Nápoles, A. M., Santoyo-Olsson, J., & Stewart, A. L. (2013). Methods for translating evidence-based behavioral interventions for health-disparity communities. *Preventing Chronic Disease*, 10, E193. doi:10.5888/pcd10.130133
- Nhim, K., Gruss, S. M., Porterfield, D. S., Jacobs, S., Elkins, W., Luman, E. T., ... Albright, A. (2019). Using a RE-AIM framework to identify promising practices in National Diabetes

- Prevention Program implementation. *Implementation Science*, 14(1), 81.
doi:10.1186/s13012-019-0928-9
- O'Connor, A., & Wellenius, G. (2012). Rural–urban disparities in the prevalence of diabetes and coronary heart disease. *Public Health*, 126(10), 813-820.
- Ory, M. G., Lee, S., Zollinger, A., Bhurtyal, K., Jiang, L., & Smith, M. L. (2015). Translation of Fit & Strong! For middle-aged and older adults: Examining implementation and effectiveness of a lay-led model in central Texas. *Frontiers in Public Health*, 2, 187.
doi:10.3389/fpubh.2014.00187
- Parks, S. E., Housemann, R. A., & Brownson, R. C. (2003). Differential correlates of physical activity in urban and rural adults of various socioeconomic backgrounds in the United States. *Journal of Epidemiology and Community Health*, 57(1), 29-35.
- Patil, S. J., Lewis, M., Tallon, E. M., Wareg, N. K., Murray, K. S., Elliott, S. G., ... & Mehr, D. R. (2019). Lay advisor interventions in rural populations: A systematic review and meta-analysis. *American Journal of Preventive Medicine*, 57(1):117-126.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.
- Perry, C. K., McCalmont, J. C., Ward, J. P., Menelas, H. K., Jackson, C., De Witz, J. R., ... Seguin, R. A. (2017). Mujeres Fuertes y Corazones Saludables: Adaptation of the StrongWomen - Healthy Hearts program for rural Latinas using an intervention mapping approach. *BMC Public Health*, 17(1), 982. doi:10.1186/s12889-017-4842-2
- Peterson, J., Atwood, J. R., & Yates, B. (2002). Key elements for church-based health promotion programs: Outcome-based literature review. *Public Health Nursing*, 19(6), 401-411.
- Peterson, J. A., & Cheng, A. L. (2011). Heart and Soul physical activity program for African American women. *Western Journal of Nursing Research*, 33(5), 652-670.
- Pfadenhauer, L. M., Gerhardus, A., Mozygemba, K., Lysdahl, K. B., Booth, A., Hofmann, B., ... & Rehfuess, E. (2017). Making sense of complexity in context and implementation: The Context and Implementation of Complex Interventions (CICI) framework. *Implementation Science*, 12(1), 21.
- Plano Clark, V. L., & Ivankova, N. V. (2015). *Mixed methods research: A guide to the field*. Thousand Oaks, CA: Sage Publications.
- Prochaska, J. O., Redding, C. A., & Evers, K. E. (2002). The transtheoretical model and stages of change. In K. Glanz, B.K. Rimer, & F.M. Lewis (Eds.), *Health behavior and health education* (3rd ed., pp. 99-120). San Francisco, CA: Jossey-Bass Publishers.
- Pullyblank, K., Strogatz, D., Folta, S. C., Paul, L., Nelson, M. E., Graham, M., ... & Seguin, R. A. (2019). Effects of the Strong Hearts, Healthy Communities intervention on functional fitness of rural women. *Journal of Rural Health*. Advance online publication.
doi:10.1111/jrh.12361

- Ramezani, N. (2016). Paper 11702-2016. Analyzing non-normal binomial and categorical response variables under varying data conditions. Retrieved from <https://support.sas.com/resources/papers/proceedings16/11702-2016.pdf>
- Rich, P., Aarons, G. A., Takemoto, M., Cardenas, V., Crist, K., Bolling, K., . . . Shi, Y. (2018). Implementation-effectiveness trial of an ecological intervention for physical activity in ethnically diverse low income senior centers. *BMC Public Health*, 18(1), 29.
- Rodrigues, A. L., Ball, J., Ski, C., Stewart, S., & Carrington, M. J. (2016). A systematic review and meta-analysis of primary prevention programmes to improve cardio-metabolic risk in non-urban communities. *Preventive Medicine*, 87, 22-34. doi:10.1016/j.ypmed.2016.02.011
- Rycroft-Malone, J., Harvey, G., Seers, K., Kitson, A., McCormack, B., & Titchen, A. (2004). An exploration of the factors that influence the implementation of evidence into practice. *Journal of Clinical Nursing*, 13(8), 913-924.
- Sallis, J. F., Owen, N., & Fisher, E. B. (2008). Ecological models of health behavior. In K. Glanz, B.K. Rimer, & F.M. Lewis (Eds.), *Health behavior and health education* (3rd ed., pp. 99-120). San Francisco, CA: Jossey-Bass Publishers.
- Scherr, R. E., Linnell, J. D., Dharmar, M., Beccarelli, L. M., Bergman, J. J., Briggs, M., . . . Zidenberg-Cherr, S. (2017). A multicomponent, school-based intervention, the shaping healthy choices program, improves nutrition-related outcomes. *Journal of Nutrition Education and Behavior*, 49(5), 368-379. doi:10.1016/j.jneb.2016.12.007
- Schreiber-Gregory, D. N., & Jackson, H. M. (2017). Multicollinearity: What is it, why should we care, and how can it be controlled. Retrieved from <https://support.sas.com/resources/papers/proceedings17/1404-2017.pdf>
- Seguin, R. A., Paul, L., Folta, S. C., Nelson, M. E., Strogatz, D., Graham, M. L., . . . Parry, S. A. (2018). Strong Hearts, Healthy Communities: A community-based randomized trial for rural women. *Obesity*, 26(5), 845–853. doi:10.1002/oby.22158
- Shiell, A., Hawe, P., & Gold, L. (2008). Complex interventions or complex systems? Implications for health economic evaluation. *BMJ*, 336(7656), 1281-1283.
- Singh, G. K., & Siahpush, M. (2014a). Widening rural–urban disparities in all-cause mortality and mortality from major causes of death in the USA, 1969–2009. *Journal of Urban Health*, 91(2), 272-292. doi:10.1007/s11524-013-9847-2
- Singh, G. K., & Siahpush, M. (2014b). Widening rural–urban disparities in life expectancy, U.S., 1969–2009. *American Journal of Preventive Medicine*, 46(2), e29. doi:10.1016/j.amepre.2013.10.017
- Singh, G. K., Williams, S. D., Siahpush, M., & Mulhollen, A. (2012). Socioeconomic, rural-urban, and racial inequalities in US cancer mortality: Part I—all cancers and lung cancer and part II—colorectal, prostate, breast, and cervical cancers. *Journal of Cancer Epidemiology*, 2011, 107497. doi:10.1155/2011/107497.

- Smith, K. B., Humphreys, J. S., & Wilson, M. G. (2008). Addressing the health disadvantage of rural populations: How does epidemiological evidence inform rural health policies and research? *Australian Journal of Rural Health, 16*(2), 56-66.
- Sriram, U., Sandreuter, K., Graham, M., Foltz, S., Pullyblank, K., Paul, L., & Seguin, R. (2019). Process evaluation of Strong Hearts, Healthy Communities: A rural community-based cardiovascular disease prevention program. *Journal of Nutrition Education and Behavior, 51*(2), 138-149.
- Tagai, E. K., Scheirer, M. A., Santos, S. L. Z., Haider, M., Bowie, J., Slade, J., ... & Holt, C. L. (2018). Assessing capacity of faith-based organizations for health promotion activities. *Health Promotion Practice, 19*(5), 714-723.
- The Pennsylvania State University Department of Statistics Online Programs. (2018). 10.7 - Detecting multicollinearity using variance inflation factors. Retrieved from <https://newonlinecourses.science.psu.edu/stat462/node/180/>
- Thomson, J. L., Goodman, M. H., & Tussing-Humphreys, L. (2015). Diet quality and physical activity outcome improvements resulting from a church-based diet and supervised physical activity intervention for rural, southern, African American adults: Delta Body and Soul III. *Health Promotion Practice, 16*(5), 677-688. doi:10.1177/1524839914566851
- Thomson, J. L., Tussing-Humphreys, L. M., Zoellner, J. M., & Goodman, M. H. (2016). Psychosocial constructs were not mediators of intervention effects for dietary and physical activity outcomes in a church-based lifestyle intervention: Delta Body and Soul III. *Public Health Nutrition, 19*(11), 2060-2069.
- Thomson, J. L., Zoellner, J. M., & Tussing-Humphreys, L. M. (2014). Psychosocial predictors of diet and physical activity in African Americans: Results from the Delta Body and Soul effectiveness trial, 2010–2011. *American Journal of Health Promotion, 28*(3), e91.
- Thomson, J. L., Zoellner, J. M., Tussing-Humphreys, L. M., & Goodman, M. H. (2016). Moderators of intervention dose effects on diet quality and physical activity changes in a church-based, multicomponent, lifestyle study: Delta Body and Soul III. *Health Education Research, 31*(3), 339-349.
- Trivedi, T., Liu, J., Probst, J., Merchant, A., Jhones, S., & Martin, A. (2015). Obesity and obesity-related behaviors among rural and urban adults in the USA. *Rural and Remote Health, 15*(3267), 1999-2006.
- Tussing-Humphreys, L., Thomson, J. L., Mayo, T., & Edmond, E. (2013). A church-based diet and physical activity intervention for rural, lower Mississippi delta African American adults: Delta Body and Soul effectiveness study, 2010–2011. *Preventing Chronic Disease, 10*, E92.
- U.S. Census Bureau (2015). 2010 Census. American Factfinder. Retrieved from: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml
- U.S. Census Bureau (n.d.). 2012-2016 American Community Survey Retrieved from: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

- United States Department of Agriculture Economic Research Service. (2019). Rural-Urban Continuum Codes. Retrieved from <https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/>
- University of Wisconsin Population Health Institute. (2019). Illinois. County Health Rankings and Roadmaps. Retrieved from <https://www.countyhealthrankings.org/app/illinois/2019/overview>
- Verloigne, M., Ahrens, W., De Henauw, S., Verbestel, V., Marild, S., Pigeot, I., & De Bourdeaudhuij, I. (2015). Process evaluation of the IDEFICS school intervention: Putting the evaluation of the effect on children's objectively measured physical activity and sedentary time in context. *Obesity Reviews*, 16(S2), 89-102.
- Walsh, S. M., Umstadtd Meyer, M. R., Gamble, A., Patterson, M. S., & Moore, J. B. (2017). A systematic review of rural, theory-based physical activity interventions. *American Journal of Health Behavior*, 41(3), 248–258. doi:10.5993/AJHB.41.3.4
- Warren, B. S., Maley, M., Sugarwala, L. J., Wells, M. T., & Devine, C. M. (2010). Small steps are easier together: A goal-based ecological intervention to increase walking by women in rural worksites. *Preventive Medicine*, 50(5-6), 230-234.
- Webb, B., Bopp, M., & Fallon, E. A. (2013). A qualitative study of faith leaders' perceptions of health and wellness. *Journal of Religion and Health*, 52(1), 235-246.
- Wilcox, S., Castro, C., King, A. C., Housemann, R., & Brownson, R. C. (2000). Determinants of leisure time physical activity in rural compared with urban older and ethnically diverse women in the United States. *Journal of Epidemiology and Community Health*, 54(9), 667-672.
- Wilcox, S., Parrott, A., Baruth, M., Laken, M., Condrasky, M., Saunders, R., ... & Kinnard, D. (2013). The Faith, Activity, and Nutrition program: A randomized controlled trial in African-American churches. *American Journal of Preventive Medicine*, 44(2), 122-131.
- Wilcox, S., Saunders, R. P., Kaczynski, A. T., Forthofer, M., Sharpe, P. A., Goodwin, C., ... Hutto, B. (2018). Faith, Activity, and Nutrition randomized dissemination and implementation study: Countywide adoption, reach, and effectiveness. *American Journal of Preventive Medicine*, 54(6), 776–785. doi:10.1016/j.amepre.2018.02.018
- Williams, R. M., Glanz, K., Kegler, M. C., & Davis, E. (2012). A study of rural church health promotion environments: Leaders' and members' perspectives. *Journal of Religion and Health*, 51(1), 148-160. doi:10.1007/s10943-009-9306-2
- Yeary, K. H. K., Moore, P. C., Gauss, C. H., Cornell, C., Prewitt, T. E., Shakya, S., ... Estabrooks, P. A. (2019). Reach and adoption of a randomized weight loss maintenance trial in rural African Americans of faith: The WORD (Wholeness, Oneness, Righteousness, Deliverance). *American Journal of Health Promotion*, 33(4), 549–557. doi:10.1177/0890117118805065
- Yin, R. K. (2013). *Case study research: Design and methods*. Thousand Oaks, CA: Sage Publications.

- Zimmermann, K., Carnahan, C., Khare, M. M., Chakraborty, A., Risser, H. J., Molina, Y., & Geller, S. (in press). Effectiveness of a church-based cardiovascular risk reduction intervention for rural adults. *Journal of Health Disparities Research and Practice*.
- Zimmermann, K., Carnahan, L. R., & Peacock, N. R. (2016). Age-associated perceptions of physical activity facilitators and barriers among women in rural southernmost Illinois. *Preventing Chronic Disease*, 13, E138. doi:10.5888/pcd13.160247
- Zimmermann, K., Khare, M. M., Wright, C., Hasler, A., Kerch, S., Moehring, P., & Geller, S. (2014). Application of a gender-based approach to conducting a community health assessment for rural women in southern Illinois. *Evaluation and Program Planning*, 51, 27-34.

VITA

Kristine Zimmermann

ACADEMIC HISTORY

- 2019** **Doctor of Philosophy**, Community Health Sciences Division, School of Public Health, University of Illinois at Chicago, Chicago, Illinois
- 2003** **Master of Public Health**, Community Health Sciences Division, School of Public Health, University of Illinois at Chicago, Chicago, Illinois
- 1996** **Bachelor of Science in Biochemistry and Sociology**, Beloit College, Beloit, Wisconsin

EMPLOYMENT HISTORY

- 2008-Present** **Assistant Director**, Center for Research on Women and Gender, University of Illinois at Chicago, Chicago, IL
- 2003-2008** **Project Coordinator**, Center for Research on Women and Gender, University of Illinois at Chicago
- 2000-2003** **Graduate Research Assistant**, Center for Research on Women and Gender, University of Illinois, Chicago, Illinois
- Summer 2002** **Intern**, Breast and Cervical Cancer Screening Program, Community Health Sciences, DuPage County Health Department, Wheaton, IL

TEACHING EXPERIENCE

- Spring 2019** **Guest Instructor**, Public Health Systems, Policy and Management, School of Public Health, University of Illinois at Chicago, Chicago, IL
- Spring 2018** **Lead Teaching Assistant**, Public Health Systems, Policy and Management, School of Public Health, University of Illinois at Chicago, Chicago, IL
- Spring 2018** **Guest Instructor**, Community Health 2: Evidence-Informed Community Health Interventions, School of Public Health, University of Illinois at Chicago, Chicago, IL
- Spring 2017** **Teaching Assistant**, Public Health Systems, Policy and Management, School of Public Health, University of Illinois at Chicago, Chicago, IL

AWARDS AND HONORS

- AY 2019-20 Conference Travel Award, School of Public Health, University of Illinois at Chicago

AY 2018-19	Conference Presenter Award, Graduate College, University of Illinois at Chicago
AY 2018-19	Conference Travel Award, School of Public Health, University of Illinois at Chicago
AY 2018-19	Conference Presenter Award, Health Professions Student Council, University of Illinois at Chicago
AY 2018-19	Conference Presenter Award, Community Health Sciences Division, School of Public Health, University of Illinois at Chicago
AY 2017-18	Conference Presenter Award, Graduate College, University of Illinois at Chicago
AY 2017-18	Conference Presenter Award, Health Professions Student Council, University of Illinois at Chicago
AY 2017-18	Conference Presenter Award, Community Health Sciences Division, School of Public Health, University of Illinois at Chicago
AY 2017-18	Conference Travel Award, School of Public Health, University of Illinois at Chicago
2017	Professional Development Award, Chancellor's Committee on the Status of Women, University of Illinois at Chicago
2016	Professional Development Award, Chancellor's Committee on the Status of Women, University of Illinois at Chicago
2015	Conference Travel Award, School of Public Health, University of Illinois at Chicago
2013	Chancellor's Academic Professional Excellence Award, University of Illinois at Chicago

FUNDING HISTORY

Current Funding Support

2018-2023	Illinois Department of Public Health (funded by CDC), "Illinois Diabetes, Heart Disease and Stroke Program Evaluation," \$500,000, (PI: M. Khare), Role: Evaluator
2018-2023	Illinois Department of Public Health (funded by CDC), "Evaluation of the Illinois WISEWOMAN Program," \$625,000, (PI: M. Khare), Role: Evaluator
2018-2021	Stephenson County Health Department (funded by HRSA), "Evaluation of the Enhanced Win With Wellness Program," (PI: M. Khare), Role: Evaluator

Completed Funding Support

2013-2018	Illinois Department of Public Health (funded by CDC), "Evaluation of the Illinois WISEWOMAN Program," \$409,000, (PI: M. Khare), Role: Evaluator
2017-2018	Ounce of Prevention Foundation, "Illinois Family Connects Formative Evaluation," \$49,234, (PI: A. Handler), Role: Co-Investigator
2015-2018	Stephenson County Health Department (funded by HRSA), "Evaluation of the Stephenson Carroll County Healthy Living Project," \$177,000, (PI: M. Khare), Role: Evaluator
2011-2016	Coalition for a Healthier Community Phase II, Office on Women's Health, US DHHS, "Southern Seven Coalition for Women's Health: Faith-Based Collaborative," \$1,500,000, (PI: S. Geller), Role: Program Coordinator
2011-2012	John Snow, Inc., "National Women and Girls HIV/AIDS Awareness Day: 3 rd Annual Safer Sex Fest," \$1,600, Role: Principal Investigator

- 2010-2011 Coalition for a Healthier Community Phase I, Office on Women's Health, US DHHS, "Southern Seven Coalition for Women's Health: Assessment and Planning Related to Cardiovascular Disease, Diabetes, Obesity and Cancer in the Community," \$100,000, (PI: S. Geller), **Role: Program Coordinator**
- 2009-2010 John Snow, Inc., "National Women and Girls HIV/AIDS Awareness Day: 2nd Annual Safer Sex Fest," \$1,650, **Role: Principal Investigator**
- 2008-2009 John Snow, Inc., "National Women and Girls HIV/AIDS Awareness Day 2009 Empowering Women to Take Action Against AIDS," \$1,994, **Role: Principal Investigator**
- 2007-2010 Advancing System Improvements to Support Targets Towards Healthy People 2010, Office on Women's Health, US DHHS, "Southern Seven Women's Initiative for Cardiovascular Health," \$933,837, (PI: S. Geller), **Role: Program Coordinator**
- 2007-2008 Office on Women's Health, US DHHS, "BodyWorks Adolescent Evaluation and Dissemination," \$14,271, (PI: S. Shirk), **Role: Co-Investigator**
- 2007-2008 Office on Women's Health, US DHHS, "National Women and Girls HIV/AIDS Awareness Day 2008," \$2,500, **Role: Principal Investigator**
- 2006-2008 Office of Women's Health, Illinois Department of Public Health, Women's Health Initiative Grants, "BodyWorks," \$50,000, (PI: S. Shirk), **Role: Co-Investigator**
- 2006-2007 Office on Women's Health, US DHHS, "National Women and Girls HIV/AIDS Awareness Day 2007," \$3,700, **Role: Principal Investigator**
- 2005-2006 Johnson & Johnson Foundation Implementation Grant, "Women's Health in Beauty Salons Initiative," \$25,000, **Role: Principal Investigator**
- 2005-2006 Office on Women's Health, US DHHS, "National Women and Girls HIV/AIDS Awareness Day 2006," \$2,000, **Role: Principal Investigator**
- 2004-2005 Johnson & Johnson Foundation Planning Grant, "Women's Health in Beauty Salons Initiative," \$10,000, **Role: Principal Investigator**
- 2004-2005 Office on Women's Health, US DHHS, "Women's Health in Beauty Salons Initiative," \$20,000, **Role: Principal Investigator**

PEER REVIEWED PUBLICATIONS

Original Research

Zimmermann, K., Carnahan, C., Khare, M. M., Chakraborty, A., Risser, H. J., Molina, Y., & Geller, S. (in press). Effectiveness of a church-based cardiovascular risk reduction intervention for rural adults. *Journal of Health Disparities Research and Practice*.

Strayhorn, S.M., Carnahan L.R., **Zimmermann, K.**, Hastert, T.A., Watson, K.S., Ferrans, C.E., & Molina Y. (2019). Comorbidities, treatment-related consequences, and health-related quality of life among rural cancer survivors. *Supportive Care in Cancer*. Advance online publication. doi: 10.1007/s00520-019-05005-7

Handler, A., **Zimmermann, K.**, Dominik, B., Garland, C. (2019). Universal early home visiting: A strategy for reaching all postpartum women. *Maternal and Child Health Journal*, 23(10): 1414-1423. doi: 10.1007/s10995-019-02794-5

Carnahan, L.R., **Zimmermann, K.**, Khare, M.M., Paulsey, E., Molina, Y., Wilbur, J., & Geller, S.E. (2018). Physical activity and masculinity in rural men: A qualitative study of men recruited from churches. *Health Education Research*, 33(2):145-154.

Molina, Y., **Zimmermann, K.**, Carnahan, L.R., Paulsey, E., Bigman, C.A., Khare, M.M., Zahnd, W., & Jenkins, W. (2018). Rural women's perceptions about cancer disparities and contributing factors: A call to communication. *Journal of Cancer Education*, 33(4), 749-756.

Zimmermann, K., Carnahan, L., Paulsey, E., & Molina, Y. (2016). Healthcare eligibility and availability and healthcare reform: Are we addressing rural women's barriers to accessing care? *Journal of Health Care for the Poor and Underserved*, 27(4A), 204-219.

Zimmermann, K., Carnahan, L.R., & Peacock, N.R. (2016). Age-associated perceptions of physical activity facilitators and barriers among women in rural southernmost Illinois. *Preventing Chronic Disease*, 13, E138.

Carnahan, L.R., **Zimmermann, K.**, & Peacock, N.R. (2016) What rural women want the public health community to know about access to healthful food: A qualitative study, 2011. *Preventing Chronic Disease*, 13, E57.

Zimmermann, K., Khare, M.M., Wright, C., Hasler, A.C., Moehring, P.A., Kerch, S., & Geller, S.E. (2015). Application of a gender-based approach to conducting a community health assessment for rural Illinois women. *Evaluation and Program Planning*, 51, 27-34. doi:10.1016/j.evalprogplan.2014.12.004

Zimmermann, K., Khare, M.M., Koch, A.R., Wright, C., & Geller, S. (2014). Training intervention study participants to disseminate health messages to the community: a new model for translation of clinical research to the community. *Clinical and Translational Science*, 7(6), 476-481. doi: 10.1111/cts.12239

Khare, M.M., Koch, A., **Zimmermann, K.**, Huber, R., Moehring, P.A., Wright, C., Hasler, A.C., & Geller, S.E. (2014). Heart Smart for Women: a lifestyle change intervention to reduce cardiovascular risk in rural women. *Journal of Rural Health*, 30(4), 359-68.

Zimmermann, K., Khare, M.M., Huber, R., Moehring, P.A., Koch, A., & Geller, S.E. (2012). Southern seven women's initiative for cardiovascular health: lessons learned in community health outreach with rural women. *American Journal of Health Education*, 43(6), 349-355.

Avery, A., **Zimmermann, K.**, Underwood, P.W., & Magnus, J.H. (2009). Confident commitment is a key factor for sustained breastfeeding. *Birth*, 36(2), 141-148.

ORAL PRESENTATIONS

Invited Presentations

Women Climbing Up the Career Ladder at UIC: Discussion Panel. Chancellor's Committee on the Status of Women, University of Illinois at Chicago, November 2016.

Zimmermann, K. & Carnahan, L. Chronic disease in the Southern Seven region. Chronic Disease Prevention in Our Region: "We Are All in this Together," Ullin, IL, April 2016.

Time Management/Work-Life Balance Panel of Experts. Academic Mentoring Program, University of Illinois at Chicago, Chicago, IL, December 2011.

Alumni panel: From Here to There. Beloit College Public Service and Advocacy Day, Chicago, IL, November 2010.

Zimmermann, K. ASIST 2010: Successful community/academic partnerships: Southern Seven Women's Initiative for Cardiovascular Health (SSWICH). Ages and Stages of Women's Wellness: Solutions at Work Conference, Johnson City, TN, June 2010.

Zimmermann, K. BodyWorks: A healthy lifestyle program for girls. UIC College of Nursing Research Day, Chicago, IL, March 2008.

Peer-Reviewed Presentations

Molina, Y., Carnahan, L., Hallgren, E., **Zimmermann, K.**, & Watson, K.S. Characterizing the social environment of rural cancer survivors and caregivers: Preliminary data from the Illinois Rural Cancer Assessment. Society of Behavioral Medicine 40th Annual Meeting and Scientific Sessions, Washington, DC, March 2019.

Carnahan, L., Hallgren, E., **Zimmermann, K.**, Peña, K., Watson, K., Molina, Y. Rural cancer survivors' follow-up healthcare utilization and associations with provider communication quality and caregiver access during treatment: Findings from Wave I of the Illinois Rural Cancer Assessment. American Public Health Association 146th Annual Meeting, San Diego, CA, November 2018.

Zimmermann, K., Khare, M. Weidenbacher-Hoper, V., Calcaterra, H., Beintema, C., MacDowell, M. Implementation, evaluation, and maintenance of community and worksite weight loss groups for rural adults. American Public Health Association 146th Annual Meeting, San Diego, CA, November 2018.

Hallgren, E., Carnahan, L., **Zimmermann, K.**, & Molina, Y. 2018. Financial and work burdens among rural cancer survivors. Medical Sociology Roundtable. American Sociological Association Annual Conference, Philadelphia, PA, August 2018.

Hallgren, E., Molina, Y., Carnahan, L., & **Zimmermann, K.** Financial toxicity among rural cancer survivors. Midwest Sociology Society Annual Meeting, Minneapolis, MN, March 2018.

Zimmermann, K., Carnahan, L., Molina Y. Technology Access and Usage in Rural, Southernmost Illinois: Implications for Health Promotion. American Public Health Association 145th Annual Meeting, Atlanta, GA, November 2017.

Zimmermann, K., Lacson, L., Carnahan, L., Khare, M. WISE WORDS: Development and Process Evaluation of a Text Messaging Program to Support Dietary and Physical Activity Behaviors in Uninsured Women. American Public Health Association 145th Annual Meeting, Atlanta, GA, November 2017.

Zimmermann, K., Carnahan, L., Veldhuis, C., Molina, Y., & Geller, S.E. Evaluation of the "Heart Smart" church-based intervention for cardiovascular disease risk reduction in rural, southernmost Illinois. American Public Health Association 144th Annual Meeting, Denver, CO, November 2016.

Zimmermann, K., Carnahan, L., Paulsey, E., & Molina, Y. Rural women's access to health care: The role of national health care reform. American Public Health Association 144th Annual Meeting, Denver, CO, November 2016.

Zimmermann, K., Carnahan, L., Fisher, S., Molina, Y., & Risser, H. Using CBPR principles to design and pilot a cardiovascular risk reduction intervention evaluation. American Public Health Association 144th Annual Meeting, Denver, CO, November 2016.

Khare, M., **Zimmermann, K.**, Beintema, C., Weidenbacher-Hoper, V., MacDowell, M. Win With Wellness: A collaborative strategy to reduce chronic disease risk in rural adults through community-based weight loss groups. American Public Health Association 144th Annual Meeting, Denver, CO, November 2016.

Zimmermann, K., Wang, Q., Khare, M., Weidenbacher-Hoper, V., MacDowell, M. Informing Rural Healthy Lifestyle Programs: Planning for a Collaborative, Community-Based Intervention Targeting Rural Adults. American Public Health Association 144th Annual Meeting, Denver, CO, November 2016.

Zimmermann, K., Carnahan, L., & Peacock, N. Barriers and facilitators to physical activity in rural, southern Illinois women. American Public Health Association 143rd Annual Meeting, Chicago, IL, November 2015.

Risser, H.J., **Zimmermann, K.**, & Carnahan, L. Applications of a post-hoc cost effectiveness analysis in a community-based intersectoral collaboration to reduce cardiovascular disease. American Public Health Association 143rd Annual Meeting, Chicago, IL, November 2015.

Carnahan, L., **Zimmermann, K.**, & Risser, H.J. Feasibility and acceptability of a community-led health promotion program to reduce cardiovascular disease risk in adults in rural Illinois. American Public Health Association 143rd Annual Meeting, Chicago, IL, November 2015.

Zimmermann, K., Fisher, S., Jones, R., Kapungu, C., Moehring, P., & Williams, D. Engaging churches in health promotion programs for women and girls: Lessons learned from urban and rural partnerships. Community Campus Partnerships for Health 13th International Conference, Chicago, IL, May, 2014.

Zimmermann, K., Khare, M.M., & Carnahan, L. A faith-based collaborative to reduce health disparities for women in rural southern Illinois. Minority Health in the Midwest Conference: Constructing the Foundation for Health Equity, Chicago, IL, February 2013.

de la Cruz, J., **Zimmermann, K.**, Koch, A., Khare, M.M., Huber, R., Moehring, P., Hasler, A., & Geller, S. Southern Seven Women's Initiative for Cardiovascular Health (SSWICH): A collaborative and multi-level approach to improving the cardiovascular risk profiles of adult women living in the seven southernmost counties of Illinois. Building a Healthier Community: Eat Well, Live Well Regional Conference on Nutrition and Fitness, Chicago, IL, January 2009.

Shirk, S. & **Zimmermann, K.** BodyWorks: Recruitment challenges and successes for an urban population. Illinois Women's Health Conference, Oak Brook, IL, November 2007.

Avery, A., Underwood, P., **Zimmermann, K.**, Magnus, J.H., & Haynes, S.G. African American and Caucasian women's anticipation of the impact of work on breastfeeding - a multi-site grounded theory approach. American Public Health Association 133rd Annual Meeting, Philadelphia, PA, December 2005.

Peer-Reviewed Presentations – Accepted for Presentation

Khare, M.M., **Zimmermann, K.**, Beintema, C. Adaptations to increase recruitment and retention in a multi-component heart disease prevention intervention for rural adults. 12th Annual Conference on the Science of Dissemination and Implementation, Arlington, VA, December 2019.

Zimmermann, K., Muramatsu, N., Schoeny, M., Molina, Y., Geller, S. The role of rural church context in participation and attendance in a cardiovascular risk-reduction intervention. 12th Annual Conference on the Science of Dissemination and Implementation, Arlington, VA, December 2019.

PEER-REVIEWED POSTER PRESENTATIONS

Price, J. D., Escobar, S., Amerson, N. L., **Zimmermann, K.**, & Barbour, K. E. Evidence-based chronic disease management interventions in Illinois - Results from the CDC Health Systems Scorecard. National Association of County and City Health Officials Annual Conference, Orlando, FL, July 2019.

Khare, M. M., **Zimmermann, K.**, Weidenbacher-Hoper, V., Calcaterra, H., Beintema, C., MacDowell, M., & Lyons, R. Results from implementing an evidence-based, peer-led, weight-loss groups in two rural Illinois counties. National Rural Health Association Annual Meeting, Atlanta, GA, May 2019.

Carnahan, L.R., **Zimmermann, K.**, Hallgren, E., Peña, K., Nwigwe, L., Watson, K., & Molina, Y. Characterizing the role of multilevel social factors on rural cancer survivors' quality of life: Findings from the Illinois Rural Cancer Assessment. American Society of Preventive Oncology, 43rd Annual Conference, Tampa, FL, March 2019.

Strayhorn, S., Molina, Y., Carnahan, L.R., **Zimmermann, K.**, Hastert, T., Watson, K. Testing the Association between Marital Status and the Quality of Life among Rural Cancer Patients. Society of Behavioral Medicine 40th Annual Meeting and Scientific Sessions, Washington, DC, March 2019.

Zimmermann, K., Carnahan, L., Hallgren, E., Watson, K.S., & Molina, Y. Rurality and health-related quality of life among rural cancer survivors. Society of Behavioral Medicine 40th Annual Meeting and Scientific Sessions, Washington, DC, March 2019.

Zimmermann, K., Carnahan, L., Molina, Y., Muramatsu, N., Geller, S. The role of context in the implementation of a cardiovascular risk-reduction intervention in rural churches. 11th Annual Conference on the Science of Dissemination and Implementation in Health, Washington, DC, December 2018.

Khare, M.M., **Zimmermann, K.**, Weidenbacher-Hoper, V., Beintema, C., Calcaterra, H., & MacDowell, M. Results from a Multi-Component Rural Wellness Program. National Rural Health Association Annual Meeting, New Orleans, LA, May 2018.

Khare, M.M., **Zimmermann, K.**, Weidenbacher-Hoper, V., Bientema, C., Calcaterra, H., Vrtol, J., Youngblut, I., & MacDowell, M. Community-informed Programming: Win With Wellness Food Demonstrations. National Rural Health Association Annual Meeting, New Orleans, LA, May 2018.

Zimmermann, K., Khare, M.M., Weidenbacher-Hoper, V., & MacDowell, M. Effectiveness of a peer-led community-based weight loss intervention for rural adults. Society of Behavioral Medicine 39th Annual Meeting and Scientific Sessions, New Orleans, LA, April 2018.

Carnahan, L., **Zimmermann, K.**, San Miguel, L., Lacson, L., & Khare, M. "WISEWOMAN teaches me to eat right and keeps me off of medicine": Perceptions of a statewide cardiovascular disease risk reduction program for low-income women. American Public Health Association 145th Annual Meeting, Atlanta, GA, November 2017.

Hallgren, E., Carnahan, L.R., **Zimmermann, K.**, & Molina, Y. Cancer-related financial burden, employment, and health among rural cancer survivors. American Association of Cancer Research's The Science of Cancer Health Disparities in Racial/Ethnic Minorities and the Medically Underserved, Atlanta, GA, September 2017.

Khare, M.M., **Zimmermann, K.**, Weidenbacher-Hoper, V., Calcaterra, H., Beintema, C., & MacDowell, M. Results of a group-based weight loss intervention in two rural, northwest Illinois counties. National Rural Health Association Annual Meeting, San Diego, CA, May 2017.

Wang, Q., Khare, M.M., Vrtol, J., & **Zimmermann, K.** Promoting wellness: Social media in rural communities. National Rural Health Association Annual Meeting, San Diego, CA, May 2017.

Carnahan, L., **Zimmermann, K.**, Molina, Y., Paulsey, E., & Khare, M. "I know he'd out lift me": Rural men, masculinity, and physical activity. American Public Health Association 144th Annual Meeting, November 2016, Denver, CO.

Khare, M.M., **Zimmermann, K.**, Wang, Q., & MacDowell, M. Focus groups and stakeholder interviews: informing rural health programs. National Rural Health Association Annual Meeting, Minneapolis, MN, May 2016.

Zimmermann, K., Carnahan, L., & Risser, H.J. Implementation of a church-based model for cardiovascular disease risk reduction in rural, southernmost Illinois. American Public Health Association 143rd Annual Meeting, Chicago, IL, November 2015.

Zimmermann, K., Carnahan, L., & Peacock, N. Physical activity barriers and facilitators among rural women. National Rural Health Association Annual Meeting, Philadelphia, PA, April 2015.

Zimmermann, K., Carnahan, L., & Khare, M.M. How can academic institutions adapt to improve public health partnerships with small organizations? Lessons learned from working with rural churches. American Public Health Association 142nd Annual Meeting, New Orleans, LA, November 2014.

Khare, M.M., **Zimmermann, K.**, Carnahan, L., Moehring, P., Wright, C., Schwartz, S., & Geller, S. Reducing cardiovascular health disparities for women in rural southern Illinois: A collaborative, faith-based health promotion model. National Rural Health Association Annual Meeting, Louisville, KY, May 2013.

Khare, M., **Zimmermann, K.**, & Geller S.E. A gender-based community needs assessment approach to reducing health disparities in rural Illinois women. 2012 Science of Eliminating Health Disparities Summit, National Harbor, MD, December 2012.

Khare, M., **Zimmermann, K.**, & Kerch, S. A Gender-based approach to community health assessment to reduce chronic disease in rural Illinois women. Minority Health in the Midwest Conference: Eradicating Health Inequities: Advancing the Solution-Oriented Discourse, Chicago, IL, February 2012.

Zimmermann, K., Khare, M., & Kerch, S. Strategic planning to reduce chronic disease in rural Illinois women: Efforts of the Southern Seven Coalition for Women's Health. Minority Health in the Midwest Conference: Eradicating Health Inequities: Advancing the Solution-Oriented Discourse, Chicago, IL, February 2012.

Zimmermann, K., Khare, M.M., Huber, R., Wright, C., Hasler, A., Moehring, P., & Akhtar, A. Heart-to-Heart peer educator program: Development, implementation and lessons learned. Community Campus Partnerships for Health Annual Meeting, Portland, OR, May 2010.

Khare, M.M., Koch, A., **Zimmermann, K.**, Poshard, D., & Bushar, J. The Heart Smart Campaign: A media campaign to reduce cardiovascular risk for women and families in the Southern Seven Counties of Illinois. Building a Healthier Community: Eat Well, Live Well Regional Conference on Nutrition and Fitness, Chicago, IL, April 2010.

Shirk, S. & **Zimmermann, K.** BodyWorks health and wellness program for teen girls: Successes and lessons learned in Chicago community sites. Building a Healthier Community: Eat Well, Live Well Regional Conference on Nutrition and Fitness, Chicago, IL, January 2009.

MANUSCRIPT AND ABSTRACT REVIEWS

Ad Hoc Reviewer

American Journal of Preventive Medicine

Health Promotion Practice

Health Education & Behavior

Journal of Health Care for the Poor and Underserved

Journal of Rural Health

Preventing Chronic Disease

Sage Open Medicine

Abstract Reviews

American Public Health Association Annual Meeting, Community-Based Public Health Caucus

American Public Health Association Annual Meeting, Public Health Education and Health Promotion Section

Society of Behavioral Medicine, Social and Environmental Context and Health

PROFESSIONAL ACTIVITIES

- Illinois Women's Health Conference Planning Committee, Office of Women's Health, Illinois Department of Public Health, 2007-2014
- Region V Women's Health Work Group, Office on Women's Health Region V, US Department of Health and Human Services, 2004-2011
- BodyWorks Trainer Advisory Panel, Office on Women's Health, US Department of Health and Human Services, 2010
- Planning Committee, Ages and Stages of Women's Wellness: Solutions At Work Conference, East Tennessee State University, 2010
- Volunteer Coordinator, National Women's Studies Association Annual Conference, 2007
- Local Planning Committee, National Women's Studies Association Annual Conference, 2006-2007

UNIVERSITY ACTIVITIES

- Co-founder and co-chair, Women's Reading and Discussion (WoRD) Book Club, UIC Chancellor's Committee on the Status of Women, 2010-Present
- UIC Chancellor's Committee on the Status of Women, 2006-Present
- Student Representative, Committee on Educational Programs, UIC School of Public Health, 2017-2018
- UIC Women's Leadership Symposium Planning Committee, 2009-2014
- UIC Women's Leadership Symposium Workshops Subcommittee, 2009-2014
- Co-chair, Community Relations Task Force, UIC Chancellor's Committee on the Status of Women, 2011-2013
- Co-chair, Academic Professionals Sub-Committee, UIC Chancellor's Committee on the Status of Women, 2007-2009
- Planning Committee, UIC Women's Heritage Month, 2008-2010
- Marketing Subcommittee, UIC Women's Heritage Month, 2008-2010
- Student Representative, Committee on Educational Programs, UIC School of Public Health, 2001-2002

PROFESSIONAL MEMBERSHIPS

American Public Health Association
 National Rural Health Association
 Society of Behavioral Medicine