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ORIGINAL RESEARCH

Predictors of implementation in the Faith, Activity, and Nutrition dissemination and implementation study: application of the Consolidated Framework for Implementation Research (CFIR) in a statewide initiative

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Abstract

Faith-based organizations, with broad reach and trust, are well-positioned to promote health. The purpose of the study was to examine 12-month implementation and its predictors in the statewide Faith, Activity, and Nutrition (FAN) dissemination and implementation (D&I) study. Churches (n = 93; 42% predominantly African American) in the [South Carolina] Conference of the United Methodist Church trained by Community Health Advisors participated in the study. Church FAN coordinators (n = 92) completed implementation surveys regarding opportunities, policies, messages, and pastor support for physical activity (PA) and healthy eating (HE) at baseline and 12 months. FAN coordinators and pastors (n = 93) completed CFIR-based measures at baseline, immediate post-training, and 12 months. Repeated measures ANOVAs tested change in PA and HE implementation composite scores; Cohen's d indicated magnitude of change. Mixed model linear regression tested whether CFIR items predicted 12-month implementation, controlling for baseline implementation. PA (d = 1.42) and HE (d = 2.05) implementation increased significantly over time. PA and HE implementation were significantly greater in predominantly African American (versus White) congregations, and HE implementation was greater in churches with <500 members. FAN coordinators' ratings of the inner setting (networks/communication, culture, tension for change, organizational rewards, readiness, and congregant needs) and implementation process (engaging opinion leaders and champions) domains were most predictive of implementation outcomes. Few pastor ratings related to implementation outcomes. This study identified constructs, guided by CFIR, that may be important for understanding PA and HE implementation in churches. Future studies will need to test them for replication. Greater changes in implementation outcomes among African American churches underscores the potential of promoting health equity through this setting.

Keywords

Faith-based, Churches, Physical activity, Nutrition, Implementation, Dissemination

Implications

Practice: The FAN program, when disseminated broadly, can result in increased implementation of policy, systems, and environmental changes in churches, and implementation outcomes may be enhanced by identifying and targeting factors in the inner setting of the church and in the implementation process.

Policy: Effective faith-based programs that target physical activity and healthy eating must consider inner setting and implementation process factors to increase implementation of policy, systems, and environmental changes.

Research: D&I research is needed in the faith-based setting and should be guided by theoretical models such as the CFIR in order to facilitate broader scale-up of programs.

Faith-based organizations, located in nearly every community regardless of geography or sociodemographic characteristics, have the potential to play an important role in promoting health and managing chronic disease [1–4]. Nearly three-quarters (70.6%) of people report a Christian affiliation, and around 36% of US adults attend religious services at least once per week, and another 33% attend once or twice per month to a few times per year [5, 6]. The percentage of adults who attend religious services weekly is higher among older adults (48%), women (40%), Blacks (47%), and those living in the US South (41%) [5, 6]. The reach of churches in communities, and especially churches located in low resourced communities with high chronic disease burden, is therefore tremendous.

Despite the potential for faith-based organizations to promote health and reduce disease, there are few available evidence-based programs in faith-based settings that could be scaled up for widespread implementation. "Faithful Families" has been widely disseminated in North Carolina and beyond, but many challenges have been reported including data collection, program fidelity, and congregational readiness [7]. The dissemination of "Body & Soul,"

an evidence-based fruit and vegetable intake intervention, was evaluated in 15 predominantly African American churches [8]. In contrast to their efficacy and effectiveness trials, the dissemination study found non-significant 6-month outcomes. The "Body & Soul" dissemination study did not assess implementation of church-wide activities, and the authors hypothesized that their null findings related to suboptimal program implementation. The "WORD" intervention is testing a cultural adaption of the "Diabetes Prevention Program" in 30 churches in the Arkansas Lower Mississippi Delta; adoption and reach results have been published [9].

"Faith, Activity, and Nutrition" (FAN) is a program indexed within the National Cancer Institute's Research-Tested Intervention Programs (RTIPs) database. In a large effectiveness trial, FAN increased fruit and vegetable consumption and physical activity (PA) in church-going adults [10] and was rated high in the RTIPs database for research integrity and dissemination capability [11]. To test wider dissemination and to study factors influencing adoption, implementation, and sustainability, a two-phase dissemination and implementation (D&I) study of FAN was launched in 2014 [12]. This first phase was a county-wide initiative where 42% of churches in the county adopted the program; effectiveness (member-level) and implementation (organizational-level) results were positive and consistent with the earlier effectiveness trial [12, 13], earning FAN a listing in the Rural Health Information Hub's Rural Health Models and Innovations with a "promising" evidence-level [14, 15].

This article had two aims. The first aim was to report the implementation of PA and healthy eating (HE) practices and policies in the second phase of the FAN D&I study, a larger state-wide initiative conducted in partnership with a large religious denomination. The second aim was to identify factors that may influence implementation with the goal of informing future studies in this area. The Consolidated Framework for Implementation Research (CFIR) [16] guided the study of adoption, implementation, and sustainability. A systematic review of the use of the CFIR revealed that most studies have not justified the selection of the CFIR constructs, have not integrated the framework throughout the research process, have not investigated implementation outcomes, and have applied the framework only during or after implementation to identify barriers and facilitators to implementation [17]. Our study followed recommendations by Damschroder et al. [16] and Kirk et al. [17] and was designed a priori to apply the CFIR throughout the research process to better understand implementation in the faith-based setting.

METHODS

Design and setting

The statewide phase of the FAN D&I study was a quasi-experimental study in which churches were enrolled and assessed at baseline, 12 months, and 24 months (baseline and 12 months reported in this article). Because this was a D&I study in which the program was offered to an entire known population, and adoption, implementation, and sustainability were outcomes of interest, an exact sample size was not set a priori. We estimated 80% power with 100 trained churches to detect a correlation coefficient (r) or 0.28 or higher between CFIR items and implementation. The Implementation Science Research Development (ImpRes) tool and guide [18] and the Standards for Reporting Implementation Studies (StaRI) checklist [19] were followed in this article.

The partnered with the Conference of the United Methodist Church (SCCUMC; https://www.umcsc.org/). The SCCUMC is comprised of 12 districts, each led by a district superintendent who is an elder appointed by the bishop of the SCCUMC. Clergy are appointed to local churches by the bishop, in consultation with district superintendents, and appointments are reviewed and subject to change annually. All churches in the SCCUMC (estimated at 985) were invited to participate in the study using multiple recruitment strategies designed to direct clergy and lay members to complete an interest form online or by telephone. Details regarding recruitment and adoption will be reported in a separate paper (manuscript in preparation). In brief, letters, emails, presentations, church publications, and social and online media were used to reach all churches in the conference.

Church leaders who expressed interest in the study completed a telephone screening, and if the church was eligible and the leader remained interested, the church was enrolled. A church was eligible to participate if the pastor and an appointed FAN coordinator within the church were willing to complete evaluations at baseline, 12-months, and 24-months. When a pastor served more than one church wishing to participate, we randomly chose one to include in the evaluation. Thus, fewer churches participated in the evaluation than were trained.

The FAN intervention and implementation strategies

The FAN intervention is described in more detail elsewhere [10, 12, 20]. In brief, the FAN intervention targets policy, systems, and environmental changes within the church, as guided by Cohen et al.'s structural model of health behavior [21]. Each church plans ways to promote PA and HE by addressing four core components: increasing opportunities, setting church guidelines/policies, sharing messages, and engaging pastors [12].

The primary implementation strategies were training, technical assistance, tools, and church committees (see Supplemental Table 1 for more details regarding these strategies and domains). Research staff selected and trained Community Health Advisors (CHAs) [22, 23] (all but one from

UMC churches) to deliver trainings to church committees in how to implement FAN in their respective churches. CHAs were also trained to provide 12 months of technical assistance calls to the church in the form of brief (10–15 min) calls (4 months were to pastors, 8 months were to FAN coordinators). Research staff developed tools that were shared with churches at the church committee training, and they emailed the monthly materials for 12 months as a remind to use those materials. The church committees, each led by a FAN coordinator in their respective church (appointed by the pastor), attended the training, developed a FAN Program Plan for the next 12 months, held a kick-off event, met regularly to plan implementation of their plan, and implemented activities in their church for each of the four FAN components. They also participated in the monthly technical assistance calls delivered by the CHAs [22, 23]. All churches were requested to implement the following activities: distribute bulletin inserts or handouts (provided), share messages during worship services about PA and HE, create a FAN bulletin board and update it with PA and HE materials (provided), share the monthly pastor activity with the pastor (provided), and suggest policies that the pastor can put in place (examples provided). Beyond these core activities, and consistent with "designing for dissemination," [24] churches could choose program activities most likely to succeed in their congregations, as long as they were congruent with study objectives and each of the four core components were targeted. The training integrated scripture and the relevance of physical health from Christian and Methodist traditions.

Conceptual model for factors influencing implementation

Damschroder et al. [16] recognized multiple, overlapping constructs as well as gaps across D&I theories and developed the CFIR, which organized constructs into five domains as a refinement in implementation theory. FAN selected this framework because it was well-suited to the multi-level influences in the church setting. The five domains of the CFIR are: (a) intervention characteristics, (b) outer setting, (c) inner setting, (d) characteristics of the individuals involved with the intervention, and (e) implementation process [16]. Importantly, the FAN D&I study used the CFIR from the beginning to guide the selection of key constructs and corresponding measures.

Development of measures of factors influencing implementation in FAN

We considered the relevance and fit of the five domains and underlying constructs from the full CFIR, as advised by framework developers [16]. This consideration included a review of related implementation models and frameworks [25–27] to determine if any essential constructs were missing from the CFIR, or if a different framework was a better fit. Informed by our team's 17-year history of conducting faith-based interventions [10, 12, 28] and our review of the faith-based literature, we confirmed the choice of the CFIR as the guiding framework, retained all five domains, and selected relevant constructs within each domain. We then identified existing items that captured the desired CFIR constructs and modified wording as needed for the study context (see Supplemental Table 2 for items and sources). To minimize participant burden and telephone survey cost administration, we kept the surveys as brief as possible while still assessing constructs across CFIR domains.

The research team, consisting of study investigators and staff, met regularly for the first year of the study to review, provide input, and suggest revisions to the CFIR measures. The team carefully considered when each construct should be assessed. CFIR items that required no understanding of FAN (e.g., church culture and communication) were administered at baseline, whereas items that required some understanding of what FAN implementation would involve (e.g., cost and compatibility) were assessed immediately after the training, and items that required implementation attempts (e.g., congregation's receptivity to PA or HE) were assessed at the 12-month assessment. A full draft of the survey was distributed to the community advisory committee and the research center advisory committee (including representatives from the SCCUMC) for their input to ensure the appropriateness of the tool for the local church settings. The evaluation team incorporated the suggested minor wording revisions.

Constructs from all domains except outer setting were assessed for FAN coordinators, whereas constructs from all domains except implementation process were assessed for pastors. For most CFIR items, FAN coordinators and pastors rated their agreement on a 4-point scale (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree), and items were reverse-coded when needed so that 4 indicated the most favorable response.

Implementation outcomes: FAN program implementation

Implementation of FAN core components (increasing opportunities, setting guidelines/policies, sharing messages, and engaging pastors) was assessed with the same items at baseline and 12 months through telephone-administered surveys with the FAN coordinator, as reported in a article describing the initial countywide phase of implementation [13]. This instrument, based on Cohen et al.'s model [21], was adapted from scales previously used in the FAN effectiveness trial [29], and included separate subscales for PA core components (11 items) and HE core components (9 items). All items were rated on a 4-point Likert scale reflecting

frequency of conducting each activity, with 1 being the lowest possible rating ("rarely or never" or "not at all" depending on the item) and 4 being the highest possible rating ("about weekly" or "almost all of the time" depending on the item). Mean scores were calculated for multi-item scales. A score is reported for each core component separately, along with PA and HE composite implementation scores.

Data collection procedures

The SCCUMC provided church information, including the number of members, average weekly attendance, and predominant race of the congregation. Research staff documented pastor changes over the 12 months of implementation that were publicly reported by the SCCUMC.

FAN coordinators and pastors completed telephone screenings conducted by research staff before enrollment, which included assessments of duration of pastor tenure and whether the church had a health ministry. FAN coordinators from enrolled churches completed baseline (prior to FAN training) and 12-month interviewer-administered surveys to assess program implementation. The baseline and 12-month surveys included items to assess CFIR constructs, as did a questionnaire administered at the end of the church committee training session (see earlier rationale for timing of administration).

Telephone-administered surveys were conducted by Survey Research Laboratory interviewers at the University of South Carolina who had completed specialized training. Baseline surveys with 92 FAN coordinators and 93 pastors were conducted from February to May of 2017. FAN coordinator and pastor calls lasted an average of 31 and 26 min, respectively. Twelve-month calls were conducted from April to July of 2018. For FAN coordinators, 80 surveys, lasting an average of 27 min, were completed by telephone, 1 via an online survey, and 3 via a paper-and-pencil format, yielding a sample of 84 (90.3%). For pastors, 74 surveys, lasting an average of 27 min, were completed by telephone, 2 via an online survey, and 2 via a paper-and-pencil format, yielding a sample of 78 (83.9%).

Statistical analyses

All analyses were conducted using SAS version 9.4. To assess whether implementation changed from baseline to 12 months, a repeated measures analysis was conducted (using PROC MIXED) for the overall PA and HE implementation composite scores and for the components within. To assess magnitude of effect, Cohen's d was calculated by taking the 12-month least square mean minus the baseline least square mean divided by the baseline standard deviation. Effect sizes of $d = 0.20$ were considered small, $d = 0.50$ medium, and $d = 0.80$ large [30].

The relationships between each of the CFIR items (or composite index) and the PA or HE implementation composite scores were examined using individual multiple linear regression models. Models were conducted separately for FAN coordinators and pastors. For each model, FAN coordinator-reported 12-month implementation was the dependent variable, and the CFIR item (or composite index) was the independent variable, controlling for baseline policies and practices. A standardized regression coefficient (β) was computed for each model; effect sizes of $\beta = 0.10$ were considered small, $\beta = 0.30$ medium, and $\beta = 0.50$ large [30].

The focus of this article was to identify candidate variables for future studies (i.e., exploratory rather than confirmatory). Results focus on effects that were between small and medium in size or greater ($\beta \geq 0.25$, comparable to ≥6.25% explained variance); all of which also had p values < 0.05. Multivariate modeling was considered inappropriate at this exploratory stage due to the large number of CFIR constructs, collinearity among them (high variance inflation factor/low tolerance for a sizeable number of variables), and small sample sizes for models (churches, rather than individual members, were the focus of study). These issues would render multivariate model uninterpretable for the purposes of distinguishing between constructs associated versus not associated with implementation in this setting.

RESULTS

A total of 115 churches and 286 people were trained [23], and 93 churches participated in the evaluation (as described earlier, when a pastor served more than one church wishing to participate, we randomly chose one to include in the evaluation). Of these 93 churches, 42% had predominantly African American congregations, 25% had congregations with 500 or more members, 45% reported the presence of a health ministry, and the average tenure of the pastor at baseline was 3.01 years. Over the course of the 12-month period, 34% of churches experienced a change in pastor. No adverse events were reported.

Implementation of physical activity and healthy eating policies and practices

As shown in **Table 1**, at baseline, average implementation of PA program components was 1.43 (out of 4), and average implementation of HE program components was 1.85 (out of 4). At 12 months, these scores increased to 2.06 and 2.62, respectively. The average implementation scores and all components for PA and HE, except opportunities for vegetables, which was high at baseline (3.71 out of 4), were significantly higher at 12 months than baseline (p values < 0.0001), and most effect sizes were large in magnitude (range: $d = 0.49–2.05$; see **Table 1**).

CFIR associations with 12-month implementation: FAN coordinator models

Results of FAN coordinator models by domain, construct, and item are shown in **Table 2**. Sample sizes

Table 1 | Change in physical activity and healthy eating implementation from baseline to 12 months

	Church n	Baseline LSM (SE)		12 months LSM (SE)		Baseline SD	Effect size (*d*)	Time effect (*p*)
Physical activity								
Composite score	92	1.43	(0.05)	2.06	(0.06)	0.44	1.42	<.0001
Opportunities-combined	92	1.80	(0.07)	2.42	(0.08)	0.72	0.76	<.0001
Programs	92	1.79	(0.10)	2.26	(0.10)	0.96	0.49	<.0001
Incorporated into events	92	1.82	(0.08)	2.59	(0.08)	0.76	1.01	<.0001
Policies	88	1.45	(0.09)	2.11	(0.10)	0.62	1.05	<.0001
Messages	92	1.26	(0.06)	1.99	(0.06)	0.45	1.63	<.0001
Pastor support	90	1.21	(0.07)	1.70	(0.07)	0.52	0.93	<.0001
Healthy eating								
Composite score	92	1.85	(0.05)	2.62	(0.05)	0.37	2.05	<.0001
Opportunities-combined	92	3.40	(0.05)	3.73	(0.05)	0.52	0.64	<.0001
Fruit	92	3.09	(0.07)	3.70	(0.08)	0.81	0.76	<.0001
Vegetables	92	3.71	(0.05)	3.75	(0.05)	0.50	0.09	0.4305
Policies-combined	89	1.46	(0.10)	2.53	(0.10)	0.66	1.60	<.0001
Fruit	87	1.44	(0.10)	2.56	(0.10)	0.68	1.66	<.0001
Vegetables	88	1.49	(0.10)	2.47	(0.10)	0.71	1.39	<.0001
Messages	92	1.27	(0.06)	2.22	(0.06)	0.46	2.05	<.0001
Pastor support	90	1.27	(0.08)	2.00	(0.08)	0.56	1.32	<.0001

Notes: Results are from a repeated measures analysis. Possible scores for each area of implementation can range from 1 to 4, with 4 indicating greater implementation. Cohen's *d* calculated as 12-month least square mean minus baseline least square mean divided by baseline standard deviation.
LSM, least square mean. SE, standard error.

ranged from 73 to 84 across models. Detailed model statistics are shown in Supplemental Table 3. Within the "intervention characteristics" domain, only relative advantage had meaningful associations with PA and HE implementation ($\beta \geq .25$). Mean scores were near or above 3 (out of 4) for all items in this domain, indicating that FAN coordinators rated the adaptability, complexity, cost, and relative advantage of FAN favorably.

Within the "inner setting" domain, PA and HE implementation were greater in churches with predominantly African American (vs. White) congregations (structural characteristics). PA and HE implementation were greater in churches where the FAN coordinators reported that the health ministry is as important as the spiritual ministry in their church (implementation climate-relative priority); felt recognized for implementing the PA and HE parts of FAN (implementation climate-organizational incentives/rewards); believed that their pastor encouraged congregants to embrace the PA and HE parts of FAN (readiness for implementation); and reported that the PA and HE parts of FAN were well-received by most congregants (congregant needs). In addition, PA (but not HE) implementation was greater in churches where the FAN coordinator reported more positive church networks and communications and that new ideas are readily accepted (implementation climate–tension for change). HE (but not PA) implementation was greater among churches with fewer than 500 members (structural characteristics) and in churches where the FAN coordinator believed they received enough training for the HE parts of FAN (readiness for implementation).

Within the "FAN coordinator characteristics" domain, PA and HE implementation were higher among churches where the FAN coordinator more strongly agreed that they want to perform to the best of their ability for their church (individual identification with organization).

Within the "implementation process" domain, PA and HE implementation were greater in churches where the FAN coordinator reported that leaders were actively involved in PA program activities (opinion leaders) and where there was at least one champion for the PA parts of FAN (champions).

CFIR associations with 12-month implementation: pastor models

Pastor models (**Table 2**), had sample sizes that ranged from 81 to 84 for baseline predictors, 51–53 for post-training predictors, and 71–72 for 12-month predictors. HE implementation was lower in churches where the pastor reported that the HE parts of FAN require a great deal of time (cost) and greater in churches where the pastor more strongly agreed that the health ministry is as important as the spiritual ministry in their church (relative priority). No pastor items were meaningfully related to PA implementation.

DISCUSSION

At baseline, prior to FAN training, churches reported infrequent activities consistent with FAN

Table 2 | FAN coordinator and pastor scores for each item, by domain and construct of the Consolidated Framework for Implementation Research (CFIR), and associations with 12-month physical activity (PA) and healthy eating (HE) implementation

	FAN coordinators				Pastors			
	Physical activity		Healthy eating		Physical activity		Healthy eating	
CFIR domain, construct, and item	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]
INTERVENTION CHARACTERISTICS								
Adaptability (PT)								
Can be adapted to fit church	3.09 (0.42)	0.11	3.11 (0.41)	0.08	3.18 (0.43)	0.03	3.27 (0.45)	0.04
Complexity (PT)								
Easy to use	3.11 (0.41)	0.12	3.14 (0.48)	0.03	3.13 (0.47)	0.25	3.11 (0.50)	0.06
Clear and understandable	3.29 (0.46)	0.14	3.37 (0.48)	0.01	3.33 (0.47)	0.17	3.39 (0.49)	-0.06
Cost (PT)								
Expensive (reverse)	2.94 (0.53)	0.08	2.78 (0.67)	0.08	3.23 (0.43)	-0.04	2.89 (0.71)	-0.19
Great deal of time (reverse)	2.76 (0.59)	0.12	2.64 (0.68)	0.20	2.98 (0.56)	0.18	2.86 (0.59)	0.29*
Relative advantage (12M)								
More effective than other programs	2.99 (0.59)	0.29*	2.99 (0.59)	0.39***	--		--	
OUTER SETTING								
External policies & incentives (BL)								
Leaders of denomination expect participation	--		--		2.70 (0.73)	-0.02	2.70 (0.73)	-0.06
Peer pressure (12M)								
Helps you keep up with other churches	--		--		2.79 (0.69)	0.11	2.79 (0.69)	0.14
INNER SETTING								
Structural characteristics (C or BL)								
Presence of health ministry, % (BL)	45.16	0.01	45.16	0.10	45.16	0.01	45.16	0.10
500+ members, % (C)	24.73	-0.15	24.73	-0.26*	24.73	-0.15	24.73	-0.26*
Predominantly African American, % (C)	41.90	0.26*	41.90	0.29*	41.90	0.26*	41.90	0.29*
Pastor change in past year, % (C)	34.44	-0.10	34.44	-0.05	34.44	-0.10	34.44	-0.05
Tenure of pastor, years (BL)	3.01 (3.17)	0.01	3.01 (3.17)	-0.04	3.01 (3.17)	0.01	3.01 (3.17)	-0.04
Culture (BL)[b]	3.40 (0.49)	0.23*	3.40 (0.49)	0.16	3.31 (0.46)	0.08	3.31 (0.46)	0.04
Networks & Communications (BL)[c]								
Composite	3.26 (0.42)	0.27*	3.26 (0.42)	0.23*	3.47 (0.43)	0.13	3.47 (0.43)	0.09
Little tension/conflict	2.89 (0.54)	0.12	2.89 (0.54)	0.06	3.01 (0.61)	0.04	3.01 (0.61)	-0.16

Table 2 | Continued

	FAN coordinators				Pastors			
	Physical activity		Healthy eating		Physical activity		Healthy eating	
CFIR domain, construct, and item	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]
Implementation climate								
Tension for change (BL)								
New ideas readily accepted	2.65 (0.60)	0.28**	2.65 (0.60)	0.07	2.76 (0.50)	0.08	2.76 (0.50)	0.03
Leaders like traditional ways (reverse)	2.21 (0.67)	0.06	2.21 (0.67)	0.13	2.24 (0.60)	0.00	2.24 (0.60)	-0.14
Compatibility (PT)								
Matches church priorities	3.10 (0.60)	0.08	3.10 (0.60)	0.19	3.29 (0.50)	0.23	3.29 (0.50)	0.07
Fits with way you work	3.33 (0.47)	-0.02	3.33 (0.47)	0.01	3.09 (0.65)	0.11	3.09 (0.65)	0.05
Relative priority (12M for coordinators, BL for pastors)								
Health ministry as important as spiritual ministry	3.02 (0.68)	0.29**	3.02 (0.68)	0.32**	2.68 (0.74)	0.10	2.68 (0.74)	0.26*
Organizational incentives/rewards (12M)								
Recognized for implementation	2.95 (0.58)	0.46***	3.11 (0.58)	0.42***	–		–	
Readiness for implementation (12M)								
Received enough training	3.12 (0.45)	0.18	3.20 (0.58)	0.27*	–		–	
Pastor encouraged congregants to embrace	3.06 (0.61)	0.36***	3.12 (0.65)	0.30**	–		–	
Congregant needs (12M)								
Well received by most congregants	2.73 (0.71)	0.47***	2.88 (0.69)	0.36***	2.85 (0.69)	0.14	3.14 (0.68)	0.10
CHARACTERISTICS OF THE INDIVIDUAL								
Beliefs about the intervention (PT)								
Valuable for church	3.39 (0.49)	0.04	3.48 (0.50)	0.11	--		--	
Self-efficacy (PT)								
Have skills to make changes	3.10 (0.37)	0.03	3.16 (0.45)	0.01	--		--	
Confident can make changes	3.08 (0.44)	0.22*	3.08 (0.49)	0.07	--		--	
Perceived benefits (PT)								
Church will benefit from changes	3.43 (0.50)	0.00	3.57 (0.50)	-0.02	--		--	
Worthwhile for me if church makes changes	3.42 (0.50)	0.01	3.58 (0.52)	0.11	--		--	
Individual identification with organization (BL)								
Want to perform to best of ability	3.60 (0.49)	0.37***	3.60 (0.49)	0.25*	--		--	

Table 2 | Continued

	FAN coordinators				Pastors			
	Physical activity		Healthy eating		Physical activity		Healthy eating	
CFIR domain, construct, and item	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]	Mean (SD) or %	Model β[a]
Feel strong sense of commitment	3.72 (0.45)	0.23*	3.72 (0.45)	0.12	--		--	
Other personal attributes (BL)								
Church membership >3 years, %	82.61	0.23*	82.61	0.11	--		--	
Health promotion efforts (led for coordinator, held at church for pastor), %	54.35	0.17	54.35	0.16	60.22	-0.07	60.22	-0.06
Age, years	56.16 (13.1)	0.05	56.16 (13.1)	0.16	55.22 (10.33)	0.07	55.22 (10.33)	0.01
College degree, %	89.13	-0.03	89.13	-0.13	100	n/a	100	n/a
Women, %	94.57	0.14	94.57	0.07	40.86	0.16	40.86	0.18
Meets PA (F&V) recommendations, %	62.64	-0.08	27.47	0.07	45.16	-0.02	45.16	0.06
Self-rated health (5=excellent)	3.61 (0.94)	0.11	3.61 (0.94)	-0.09	3.44 (0.73)	-0.01	3.44 (0.73)	0.10
Body mass index, kg/m^2	27.76 (5.41)	0.10	27.76 (5.41)	0.16	30.02 (5.81)	0.14	30.02 (5.81)	0.05
IMPLEMENTATION PROCESS								
Engaging opinion leaders (12M)								
Leaders actively involved	2.69 (0.68)	0.44***	2.84 (0.76)	0.34**	--		--	
Engaging champions (12M)								
At least one person is champion	3.17 (0.56)	0.30**	3.24 (0.58)	0.35**	--		--	

Notes: For FAN coordinators, sample sizes ranged from 73 to 84 across individual models. For pastors, sample sizes ranged from 81 to 84 for baseline predictors, 51 to 53 for post-training predictors, and 71 to 72 for 12-month predictors. The exact wording of items is available in Supplemental Table 1. Time of item administration is noted by: C, reported from church conference prior to starting study, BL, reported at baseline (pre-training), PT, reported immediate post-training, 12M, reported 12 months.

[a]β represents the standardized regression coefficient for each CFIR item predicting 12-month PA and HE implementation, adjusted for baseline policies and practices.

[b]Culture score was an average of 2 items: pastor has a sense of personal responsibility for improving congregant health, pastor is open to changes in practices that impact congregants. Coefficient alpha = 0.74 (FAN coordinator) and 0.78 (pastor).

[c]Composite score for networks and communication was an average of 3 items: pastor and church leaders share information and knowledge, church leaders involve members in decision making, and pastor has good working relationships with other church leaders. Coefficient alpha = 0.69 (FAN coordinator) and 0.78 (pastor).

*$p < 0.05$.

**$p < 0.01$.

***$p < 0.001$.

PA core components. Specifically, existing church events had few PA opportunities for members and few PA programs were offered at the church. Policies, messages, and pastor support for PA were also infrequent. Similar baseline scores were seen for HE, except in the area of opportunities, where churches reported that they frequently had fruits, and especially vegetables, available when food was served. The frequency of activities for all core components increased significantly from baseline to 12 months, except for opportunities for vegetables. Furthermore, the magnitude of effects were large [30]. Most effects were larger for HE than PA, likely because many churches include food as part of church events, and thus have an existing infrastructure in which to make FAN-related modifications whereas PA requires building new infrastructure. Few faith-based studies have focused on implementation; Yeary et al. [31] found that only 9% of faith-based studies reported implementation fidelity. Another innovation of our study was the assessment of and control for baseline implementation, allowing us to be more confident that associations with CFIR constructs were related to FAN implementation and not simply to pre-existing practices.

Two previous FAN studies had similar patterns of implementation outcomes [13, 29] and reported parallel findings in member reports of implementation-associated outcomes as well as member reports of health behavior change [10, 12]. These and the earlier countywide results [12] of the FAN D&I study indicate that FAN appears to maintain its effectiveness when delivered by trained lay leaders and disseminated more widely [10]. These promising findings have positioned us for an even larger implementation study that will extend beyond South Carolina.

An innovative aspect of this study was to identify CFIR constructs that may predict 12-month implementation. Using a combination of the research team's experience with faith-based research, literature reviews, and stakeholder input, we identified constructs from the five CFIR domains most relevant for this setting and mapped items onto the constructs for pastors and FAN coordinators. We carefully considered when to assess each item, which added to the study complexity but was important, as some CFIR items can easily be assessed before exposure to the program, others cannot be accurately assessed without some basic knowledge of the program, while still others require implementation attempts to evaluate. Our process of selecting domains, constructs, and items was consistent with Damschroder et al.'s recommendations [16]. Furthermore, our study addresses gaps in the literature. Kirk et al.'s [17] systematic review of studies that applied the CFIR reported no studies in the faith-based setting. Very few D&I studies exist within the faith-based literature, and implementation frameworks are rarely cited. The FAN D&I study appears to be the largest faith-based study conducted to date, and the only to systematically and comprehensively examine predictors of implementation outcomes.

Our study identified constructs that should be subject to future replication studies. These constructs may be important to consider when recruiting, training, and providing technical assistance to churches. Due to the number of analyses we conducted, and the risk of type I error, we focused on variables that related to implementation in a meaningful way ($\beta \geq 0.25$) as these variables are likely the most promising candidate variables for future study. Within the "intervention characteristics" domain, FAN coordinators and pastors reported that the PA and HE components of FAN were adaptable to their church, clear and easy to use, not expensive, had relative advantage, and did not require a great deal of time. These ratings underscore the importance of stakeholder involvement from the beginning stages of implementation research [18, 32, 33]. FAN was originally developed in partnership with the faith community using a community-based participatory process, and issues of feasibility were important considerations for intervention development and evaluation [10, 20]. Only pastors' perceptions of time related to implementation—churches had lower implementation when the HE parts of FAN were time consuming.

Constructs within the "inner setting" domain of the CFIR were most predictive of implementation outcomes, consistent with Damschroder and Lowery's qualitative analysis of the "MOVE!" weight management study [34]. Several constructs showed moderate to large associations with FAN PA and/or HE implementation, highlighting characteristics of churches most likely to succeed with programs like FAN: having a predominantly African American congregation, having <500 members, positive and inclusive communication between leaders and members, a church where new ideas are accepted, and viewing the health ministry as important as spiritual ministry. FAN was developed in collaboration with a predominantly African American denomination, but all FAN D&I study materials were adapted to be more racially inclusive. The greater implementation in African American churches may relate to program origin, or it may relate to a more holistic view in the African American community where the church addresses social injustice, health disparities, and other topics beyond spiritual health [35]. Greater implementation of HE components in churches with fewer than 500 members might relate to having less bureaucracy to make changes, closer relationships between leaders and members, and more receptivity to "free" programs due to fewer available resources. Church communication is likely a critical determinant of the success of health-related programs, as programs such as FAN require

the church to make adaptations to existing practices or create new practices which are facilitated by an openness to change and a culture that places importance on the church's role in promoting health. It is unclear to what extent these characteristics could be modified by a program.

Other constructs within the "inner setting" domain associated with implementation are likely more malleable in interventions. Churches with FAN coordinators who reported being recognized for implementing PA/HE components, who believed they received enough training, and whose pastors encouraged congregants to embrace the PA/HE components had greater implementation. Trainings and technical assistance with pastors and church committees should emphasize these factors and provide tangible resources to facilitate them such as building in explicit recognition for their efforts. Furthermore, implementation was greater in churches where the FAN coordinator reported that core components were well received by congregants. Training and technical assistance should emphasize adaptations that can be made to address the unique needs, interests, and concerns of members to increase relevance/receptivity.

Within the "implementation process" domain, implementation was greater in churches where FAN coordinators reported active church leader involvement and the presence of at least one champion for PA/HE. The pastor's role and influence cannot be underestimated. Identifying strong program champions, either the FAN coordinator or others, should also be emphasized when recruiting and training churches.

Few constructs within the "characteristics of FAN coordinators" domain of the CFIR related to implementation. However, program implementation was greater in churches where FAN coordinators reported that they wanted to perform to the best of their ability for their church. This information could be useful to share with pastors who are often involved in selecting individuals to lead efforts such as FAN.

CFIR items assessed in FAN coordinators were more predictive of implementation than items assessed in pastors. Pastors, as organizational leaders, likely have a different perspective than lay leaders and may be removed from day-to-day activities. In contrast, the FAN coordinators were charged with organizing committees responsible for implementing program activities. Therefore, their perception of the program and church-level issues may be more important in determining program implementation success. This finding does not diminish the importance of the pastor's support of the program.

Several limitations of this study must be considered. First, although this study includes perhaps the largest number of churches reported to date to test a faith-based intervention, the sample size was relatively small. Because of the small sample, combined with our emphasis on identifying candidate variables for future studies rather than identifying which variables were independent predictors, we conducted a series of bivariate analyses rather than multivariate analyses. This approach increases the risk for type I error. As a result, we focused on effect sizes rather than p values when interpreting findings. Second, we did not pre-test items or conduct reliability and validity assessments of CFIR items, although wherever possible, we adapted items from previously validated instruments. Psychometric studies like the one by Fernandez et al. [36] and Kegler et al. [37] are needed in the faith-based area. Third, we relied on self-reported implementation and did not conduct on-site observations, which would have been challenging given the large number and geographic spread of churches. Fourth, other aspects of implementation might be important to assess. For example, churches reported frequent offerings of vegetables when food was served, but we do not know whether preparation of vegetable dishes was consistent with the dietary goals of FAN (e.g., low in sodium and fat). Fifth, because the focus of this phase of our study was implementation of FAN within the organizational setting (i.e., churches), we did not assess member outcomes like we have in previous studies [10, 12, 13, 29]. Sixth, regarding generalizability, this study focused only on one denomination within one state. The structure of the UMC might impact the specific predictors of implementation, although FAN has had comparable effects on churches from other denominations.

Despite these limitations, this study provides a model for applying the CFIR in the faith-based setting and provides practical information regarding factors that may influence implementation. Kirk et al.'s [17] systematic review of the use of the CFIR identified only 26 studies conducted to date, and of these, only 3 were quantitative and another 13 mixed methods. None were reported in the faith-based setting. Further, our study addressed additional methodological gaps in implementation science by carefully selecting the CFIR domains and constructs to study through a comprehensive process that included stakeholder input, by using the CFIR throughout the entire research process, by controlling for baseline policies and practices when using the CFIR to predict 12-month implementation, and by carefully considering the timing of CFIR items relative to implementation outcomes. The FAN D&I study is the largest study of a faith-based intervention to address PA and HE to date and is one of very few D&I studies in this setting.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Translational Behavioral Medicine* online.

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Compliance With Ethical Standards

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Authors' Contributions: S.W., R.P.S., A.T.K., and B.H. were involved in the initial grant application. S.W., D.E.J-S., R.P.S., and D.K. chose study measures. B.H. and S.W. conducted data analyses and interpretations. All authors participated in study design and methods, drafting of the manuscript, and critical revisions. All authors read and approved the final manuscript.

Ethical Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The University of South Carolina Institutional Review Board reviewed this study and granted it exempt status. This article does not contain any studies with animals performed by any of the authors.

Informed Consent: Those who participated in the study provided oral consent to take part in interviews. Written consent was not deemed necessary by the Institutional Review Board.

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