

Rationale and Design of the Emory Healthy Kitchen Collaborative: A 12-month Culinary-Based Lifestyle Program

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Abstract

Objective: To present the rationale and design of a comprehensive teaching kitchen-based worksite wellness clinical trial designed to improve health behaviors and chronic disease outcomes of employees through self-efficacy development.

Design: The Emory Healthy Kitchen Collaborative (EHKC) is a 12-month multidisciplinary, skill-building program that begins with a 10-week interactive curriculum followed by continued support and access to health coaching. The self-care curriculum combines didactic, experiential, and group learning in nutrition, culinary arts, exercise, yoga, mindful eating, stress resilience, and ethnobotany.

Setting: Emory University Hospital, part of the largest academic health system in Atlanta, Georgia.

Participants: Forty benefits-eligible employees, with preference given to those with elevated body mass index, co-morbid conditions, and high levels of motivation for lifestyle change.

Results: Data will be collected for evaluation of the interactive curriculum in increasing knowledge, skills, and self-efficacy; feasibility of the program; and changes in health behaviors (through self-assessment surveys) and health outcomes (body composition and blood pressure). Future analysis will include comparative statistics and chi-square tests which will be used to measure intermediate (3- and 6-month) and long-term (1-year) changes in each quantitative variable. We will use qualitative data analysis on free-form participant feedback data.

Conclusions: We believe our multidisciplinary, skill-building, teaching kitchen inter-

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vention is an innovative model for promoting salubrious health behaviors and a culture of health in worksites. This pilot will allow for a thorough assessment of the value of this type of program to employers and employees alike and seeks to aid in development and standardization of future culinary-based comprehensive lifestyle disease prevention and health promotion programs.

Keywords: worksite wellness, teaching kitchen, behavior change, culinary medicine, lifestyle medicine, prevention

Introduction

Chronic diseases are the leading causes of morbidity and mortality in the United States, accounting for 90% of the nation's \$3.5 trillion in healthcare expenditure.^{1,2} The burden of chronic diseases is largely related to modifiable behaviors and risk factors: tobacco use, diets low in fruits and vegetables and high in sodium, cholesterol, and saturated fat, physical inactivity, excessive alcohol use, high blood pressure, and high body-mass index (BMI).¹ The importance of health behaviors as factors in reducing employer healthcare cost and improving employee health, wellbeing, and productivity has led to widespread adoption of worksite wellness programs. Nearly half of all US worksites offered a health promotion or wellness program in 2017.³ Yet, due to the tremendous heterogeneity in the content, quality, and duration of worksite wellness programs, participation rates, efficacy, and cost-effectiveness have varied.^{4,5} Research is needed to determine how health promotion programs should be designed, delivered, and measured for optimal clinical and cost effectiveness.⁶

Worksite wellness programs promote health behaviors by influencing individual factors, such as knowledge, skills, and self-efficacy; interpersonal factors, such as social support and communication; and environmental and cultural factors.⁷ Research has shown knowledge-based (i.e., “cognitive”) interventions are more efficacious when combined with skill-building, or behavioral interventions, specifically in the domains of physical activity⁸ and eating behavior.⁹ Both knowledge and skills contribute to developing self-efficacy—a belief in one's ability to achieve a health-related goal.¹⁰ While self-efficacy has been shown to be a powerful predictor and mediator of health behavior, few studies on workplace health promotion evaluate self-efficacy.^{11,12} A second factor influencing individual motivation to engage in behavior change programs is feasibility; particularly relevant since most worksite wellness programs are voluntary. Understanding barriers and facilitators to employee participation can help guide design and implementation,¹³ particularly among at-risk populations who typically engage less with worksite wellness approaches.¹⁴

The breadth and duration of programming also influence the clinical efficacy of worksite wellness programs. Evidence indicates efficacious programs are comprehensive, integrate specific components into a coherent ongoing program, and are a minimum of 3 to 6 months duration.⁶ In contrast to programs addressing single behaviors, comprehensive programs with simultaneous multiple health behavior change (MHBC) interventions have potentially greater impact because increasing self-efficacy in one lifestyle behavior may increase confidence in others.^{15,16} Teaching kitchens are emerging MHBC worksite wellness models that incorporate culinary skills and teach participants about self-care topics such as nutrition, mindfulness, physical activity, and behavioral health coaching.¹⁷ Although teaching kitchens and culinary-based lifestyle programs are currently being offered across multiple organizations, little is known about their feasibility and health outcomes.¹⁸

In this report, we aim to share the rationale and design of The Emory Healthy Kitchen Collaborative (EHKC), a 12-month culinary-based MHBC clinical trial de-

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signed to improve health behaviors and chronic disease outcomes of Emory employees through self-efficacy development. We present factors contributing to program efficacy in the framework of feasibility outlined by Bowen et al.¹⁹ Key measures are identified for each feasibility focus area: acceptability, demand, implementation, practicality, adaptation, integration (Table 1) and for initial evaluation of efficacy (Table 2).

Table 1. Feasibility measurements

Feasibility focus areas	Measure
Acceptability	Participant satisfaction, perceived utility, and suitability of program material assessed through class surveys and program evaluations (3, 6, and 12 months)
	Attractiveness to program deliverers and organizational leadership assessed through structured interviews
Demand	Number of program applicants
	Demographics and eligibility of applicants
	Self-reported use of select intervention activities
	Survey-assessed use of program resources
Implementation	Participant program & study visit attendance
	Qualitative assessment of successes and challenges of execution (facility, purchased services)
Practicality	Stakeholder interviews
	Cost-benefit analysis
	Participant program evaluation
Adaptation	Program content adaptable to individual preferences and limitations; use in other settings beyond initial scope
Integration	Qualitative assessments of integration with existing worksite wellness benefits and resources and organizational initiatives
Expansion	Engagement and investment of organizations to offer the program
Limited efficacy testing	Primary outcomes
	Secondary outcome

Table 2. Primary and secondary outcome measures

Target outcome	Intervention components	Measure (self-assessment surveys)
<i>Primary outcome: Changes in health-related behaviors</i>		
Improved nutrient intake	Nutrition & ethnobotany didactic sessions (3 hours)	ASA24
		Starting the Conversation
Culinary skills	Chef-led cooking sessions (5 hours)	Modified cooking skills and confidence
Mindfulness-based eating	Didactic session (1 hour)	Mindful Eating Questionnaire
	Eating mindfully sessions (5 half-hour lunches)	
Physical activity	Didactic session (1 hour)	PAVS
	Trainer-led group exercise (1 hour)	
Yoga	Didactic session (1 hour)	PAVS modified question
	Yoga class (1 hour)	
Stress management	Didactic session (1 hour)	PSS

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Conflicts of Interest

None

Financial Disclosures

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Author Contributions

All authors agree to be accountable for all aspects of the work.

Concept and design

All authors

Acquisition, analysis, or interpretation of data

MM, SB, JPB, TR, JM



Table 2 (continued)

Target outcome	Intervention components	Measure (self-assessment surveys)
<i>Primary outcome: Quality of life & presenteeism</i>		
Improved mental and emotional functioning	20-hour curriculum	MOS/RAND 36
	Year-long yoga classes	
	Health coaching support	
	App-based resources	
<i>Secondary outcome</i>		
Clinical biomarkers	20-hour curriculum	BMI
	Year-long yoga classes	Body composition analysis
	Health coaching support	Blood pressure
	App-based resources	

Notes: ASA24, Automated Self-Administered 24-Hour Dietary Assessment Tool; BMI, body mass index; MOS, Medical Outcomes Study; PAVS, Physical Activity as a Vital Sign; PSS, Perceived Stress Scale.

Methods

Intervention overview

The EHKC is a 12-month multidisciplinary, hands-on, comprehensive skill-building lifestyle program beginning with a 10-week interactive curriculum onsite at Emory University followed by continued support and access to health coaching (Figure 1).

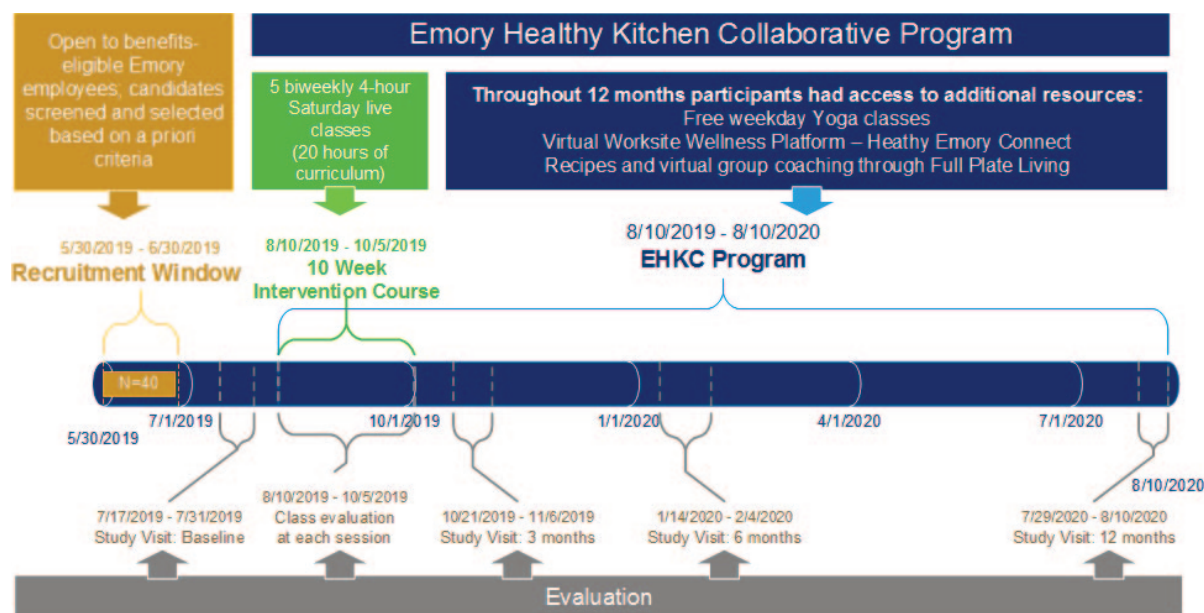


Figure 1. The Emory Healthy Kitchen Collaborative timeline summary

The 10-week curriculum will consist of five 4-hour Saturday classes held every other weekend (totaling 20 hours of instruction). Classes will include didactic and experiential sessions taught by subject matter experts from the Emory University faculty and staff. Didactic instruction will include sessions in the disciplines of nutrition (3 hours), yoga (1 hour), physical activity (1 hour), stress resilience (1 hour), mindfulness-based eating (1 hour), and ethnobotany (1 hour). The didactic sessions will describe the scientific rationale, practical applications, and recommendations for



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Drafting of the manuscript
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Critical revision of the manuscript for important intellectual content

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Ethical Standards Disclosure

This study will be conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Emory Institution Review Board (IRB 00109546) and registered with ClinicalTrials.gov (NCT04005495). Written informed consent will be obtained from all subjects/patients.

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implementing self-care components into participants' daily lives. Experiential learning sessions will include culinary skills training with hands-on cooking demonstrations (5 hours total), mindfulness-based lunch practice (2.5 hours total), a yoga session (1 hour), and a group exercise session (1 hour). Each class will conclude with a 30-minute group session, during which participants will eat a group-prepared, plant-based lunch using mindful eating techniques and engage in discussion regarding successes and challenges of implementing the skills taught during the program.

The remainder of the program year, participants will have access to a group support system through a private Facebook page, periodic events (such as a group potluck), complementary access to nightly yoga sessions on the Emory University campus, health promotion resources through the Healthy Emory Connect (Emory's version of Virgin Pulse App),²⁰ and virtual behavioral and health coaching through the Full Plate Living program (offered by the Ardmore Institute of Health).²¹ The health coaching will consist of (optional) group health coaching sessions (individual coaching will be available at an additional cost to participants) and rely on the participant's initiative (i.e., the health coaches will not proactively engage participants). The evaluations and surveys will be deployed using Qualtrics.

The aim of the EHKC pilot is to assess feasibility components of the culinary-based lifestyle program for worksite wellness promotion among at-risk individuals. We hypothesize that changes in knowledge, skills, and self-efficacy from participation in the intervention curriculum, as assessed by a pre- and post-intervention survey, will mediate program outcomes. The primary outcome measures include self-assessed, survey-measured improvements in 1) health-promoting behaviors (home cooking frequency, quality of nutrient intake, physical activity, yoga, mindfulness-based eating, perceived stress management), and 2) participant quality of life and presenteeism pertaining to physical and emotional functioning. The secondary outcome measures are improvement in clinical biomarkers (BMI, body composition, blood pressure). Understanding the relationships between mediating factors and outcomes could play an important role in the development of novel worksite interventions as a strategy for reducing risk factors for chronic disease.

Intervention—theoretical model

The theoretical framework utilized for behavior change derives from Bandura's Social Learning Theory, in which engagement in a behavior is a function of a person's efficacy beliefs, and an outcome results from the behavior as a function of a person's outcome expectations.²² Development of self-efficacy through the curriculum component of the intervention is proposed to function as a mediating factor for behavior change (Figure 2).

The self-efficacy learning resources utilized include performance accomplishment (experiential sessions), observation (instructor-led demonstrations), and verbal encouragement (group support).²² Behavior change is also facilitated by other well-established behavior change techniques including intrinsic motivation and goal setting²³ (opening session of curriculum), self-regulation²⁴ (weekly skill-implementing homework assignments), and resources (group support, app, virtual health coaching).²⁴ Concepts introduced in the curriculum are further modeled by social ecological theory.²⁵ Rather than being prescriptive, the sessions are structured to inspire self-formulated and personalized alterations in dietary patterns and behaviors to match participants' culture, preferences, and health conditions. Instructor-led group discussions focus on skill implementation in the context of participants' work and home settings.



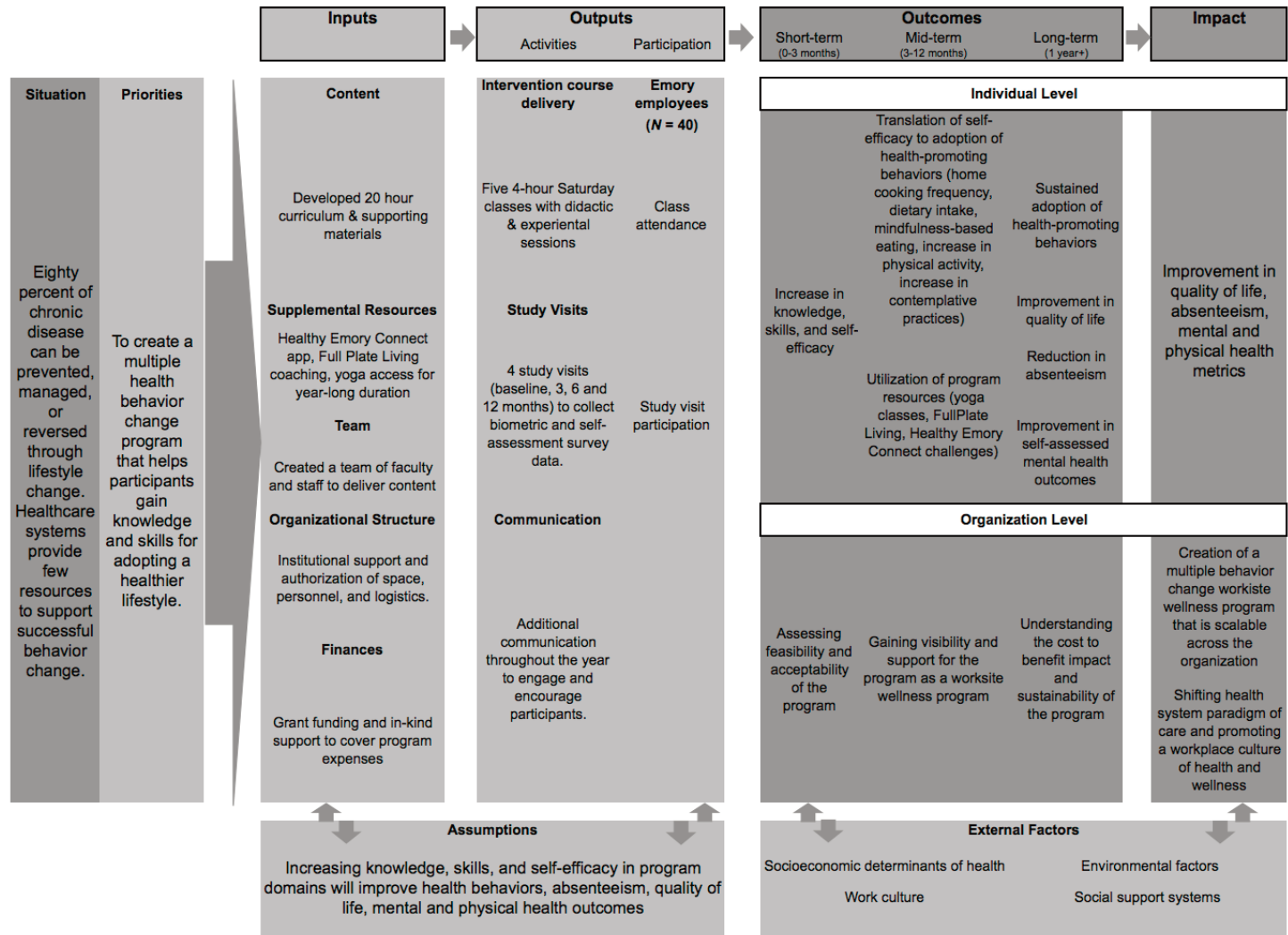


Figure 2. The Emory Healthy Kitchen Collaborative logic model



Study population

Emory University and Emory Healthcare employees will be recruited to participate in the EHKC. The study inclusion criteria include all benefits-eligible employees aged 18 to 65 who can attend all program classes and study visits and consent to appearing in videotapes and photographs taken during the teaching kitchen program. Participants with any health condition that would limit participation or could have a substantial confounding effect on outcome measurements (including bariatric surgery, pregnancy, inability to exercise due to a cardiovascular, pulmonary, orthopedic or neurologic medical problem,²⁶ or food allergies to gluten or nuts) will be excluded.

Recruitment

Recruitment will take place over a 1-month period. Digital flyers and announcements will be posted on the Emory Healthcare Intranet and Emory University Human Resources webpage, within Emory digital newsletters, and in the Healthy Emory Connect wellness app. Physical flyers will be given to department wellness champions for distribution. Candidates will be screened for eligibility with a survey containing inclusion and exclusion criteria deployed through Qualtrics (Provo, UT).²⁷ Among those who qualify, preference will be given, based on an a priori scoring criteria, to those with elevated BMI, co-morbid conditions, high motivation for lifestyle change, and intent to utilize program resources. The 40 people with the highest scores will be selected for the program. A wait list will be created for remaining eligible candidates to serve as alternates. Participants will not be financially compensated. However, the program will be offered at no charge, with meals (5 breakfasts and lunches) and a personal kit of kitchen utensils provided. Participants who complete all program visits and survey assessments will be entered in a draw to win gift cards up to \$300 in value.

Measures

The EHKC data collection includes participant surveys and biometric measurements (Figure 3).

Class surveys

Class surveys, administered at the conclusion of each Saturday class, will solicit feedback about individual sessions using a Likert scale assessing content, speaker's delivery, overall rating, knowledge gained, and intention to make a change because of the session. Satisfaction with overall class quality and duration will also be queried. Additionally, participants will be asked to provide qualitative suggestions for improvement and to describe class components that are most and least helpful. In surveys administered after classes 2 through 5, participants will self-report their level of engagement in behaviors taught during the previous class.

Curriculum evaluation questionnaire

A 49-item questionnaire evaluating knowledge, skills, and self-efficacy will be administered at the start of the first class and the end of the final class. Questions have been developed for each of the disciplines covered in the curriculum: nutrition (including a subcategory of ethnobotany), culinary skills, yoga, exercise, stress resilience, and mindfulness-based eating.

Program evaluation

Program evaluation surveys will be administered at the completion of the interactive curriculum (10 weeks), 6-months, and 12-months. Questions will assess program satisfaction, the ability of the program to help participants meet their goals, the likelihood of participants making changes because of the program, the likelihood of recommend-



Survey Name	Brief Description	Tool Details	Timepoint											
			Initial Inquiry (Pre-Program)	1st Study Visit (Pre-Program)	Class 1 (8/10/2019)	Class 2 (8/24/2019)	Class 3 (9/7/2019)	Class 4 (9/21/2019)	Class 5 (10/5/2019)	2nd Study Visit (3 months)	3rd Study Visit (6 months)	4th Study Visit (12 months)		
Eligibility	Initial survey filled out by participants during recruitment phase	Created by EHKC personnel	X											
Self-assessment surveys	Absenteeism, cooking frequency, nutritional intake, quality of life, mental and physical health self-assessment surveys	SF 36, PSS, Starting the conversation, MEQ, and PAVS used in validated form (additional questions were added to PAVS)		X								X	X	X
ASA24	Dietary recall assessment tool	Automated self-assessment 24 hour diet recall tool by NIH		X								X	X	X
Seca (mBCA) 514	Body composition analysis	Bioelectrical impedance analysis		X								X	X	X
Blood Pressure	Manual measurement	Tracked in Excel spreadsheet		X								X	X	X
Curriculum evaluation questionnaire	Knowledge, behavior, and attitude assessment in lifestyle domains	Created by EHKC personnel			X beginning of first class						X end of last class			
Introductory Goals	What participants hope to get out of the program	Created by EHKC personnel			X beginning of first class									
Class Evaluation	Feedback on each overall class and each of the class sessions	Created by EHKC personnel			X	X	X	X	X					
"Homework" assignments	Recommended applications of knowledge and skills between classes	Created by EHKC personnel				X	X	X	X					
Program Evaluation	Program evaluation and resource utilization surveys appropriate to the queried time periods	Created by EHKC personnel								X 10 week program evaluations		X 6 month program evaluation	X 12 month program evaluation	

Figure 3. The Emory Healthy Kitchen Collaborative data collection inventory

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ing the program, utilization of program resources (i.e., Virgin Pulse App, virtual health coaching, and yoga), and the degree of implementation of tools and skills taught during the program. The evaluations will also solicit perceptions of class timing, size, and space/location; the dollar amount participants would be willing to pay for the program; and suggestions for improvement.

Self-assessment instruments

The following participant self-assessment instruments and biometrics will be completed at baseline, 3-months, 6-months, and 12-months. In addition to the following items, each survey assessment will include a question about the frequency of absence from work.

The MOS/RAND Health 36-Item Short Form²⁸ is a 36-item scale evaluating global health, quality of life, and presenteeism. The items cover 8 health areas: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions.

Starting The Conversation (STC) is an 8-item simplified food frequency instrument designed for use in primary care and health-promotion settings.²⁹

The National Institute of Health's Automated Self-Administered 24-hour (ASA24[®]) is a web-based dietary assessment tool enabling multiple automatically coded, self-administered 24-hour diet recalls.³⁰ Features of the tool include dietary evaluation by macronutrient and micronutrient intake.

Eight questions from a 17-item questionnaire developed by Barton et al (2011)³¹ will be used to assess cooking frequency, confidence in preparing new recipes from basic ingredients, and confidence in reading nutrition labels.

The Physical Activity "Vital Sign" (PAVS) consists of 2 questions, adapted from the Behavioral Risk Factor Surveillance System (BRFSS) and validated³² to screen for inactivity in clinical settings,³³ with an optional third question assessing strength resistance exercise. We will add 3 questions assessing frequency and duration of yoga practice and plans to be more physically active in the next 6 months.

The Perceived Stress Scale is a validated 10-item psychological instrument assessing an individual's perception of stress over the past month and appraisal of the degree to which life situations are stressful.³⁴

The Mindful Eating Questionnaire (MEQ) is a 28-item questionnaire evaluating disinhibition, awareness, external cues, emotional response, and distraction during meal consumption.³⁵

Biometric measurements

We will use multifrequency bioelectrical impedance analysis with the noninvasive medical Body Composition Analyzer (Seca mBCA 514) to obtain weight, BMI, body fat percentage, and visceral adipose tissue (VAT). This device has been shown to be comparable to the validity and precision of the reference standard dual energy X-ray absorptiometry (DEXA).³⁶ Systolic and diastolic blood pressure measurements will be obtained in the seated position using an automated sphygmomanometer (Welch Allyn, Skaneateles Falls, New York). No biological samples will be obtained.

Statistical analysis

Sample size and power

The number of participants is limited to 40 due to funding and physical space limitations within the kitchen. Since this is a pilot without a control group and our primary outcomes do not have established effect sizes, a power analysis was not performed.



Analysis plan

Planned data analysis will be conducted using StataSE 14 (College Station, TX).³⁷ Descriptive statistics (number and percent of responses for categorical variables and mean and standard deviation for continuous variables) will be calculated for all quantitative data collected (participant demographics, survey responses, and biometric data). Graphics (including scatter plots, bar graphs, and time-trend line graphs) will be used to display quantitative data and word clouds will be used to display qualitative data. Participants will serve as their own controls, and appropriate tests (e.g., *t*-tests, Chi squared tests) will be determined based on the distribution of each measure and used to compare differences between study time points, with an alpha of < 0.05 considered to be statistically significant. We will evaluate reliability of curriculum evaluation items by computing Cronbach's alpha for each subcategory of items. We will explore the use of regression analysis tools to determine the impact of independent variables, such as demographic characteristics, on dependent variables of interest, such as change in weight and blood pressure.

Feasibility measures will also include the number of program inquiries received, the number of program applications received, the number of applicants who accepted the invitation to join the program, participants' average class attendance rates, class survey completion rates, and completion rates for each study visit. Additionally, we will perform a cost analysis of the intervention. Acceptability will be assessed by responses to acceptability-related survey questions.

Discussion

Multidisciplinary teaching kitchen-based lifestyle programs represent a potentially novel way to increase knowledge, skills, and self-efficacy surrounding healthy behavior change. However, there remains a lack of evidence regarding their feasibility, acceptability, and impact on behaviors and biomarkers. The lack of standardized assessments and delivery designs limit understanding of their efficacy as a worksite wellness program. This feasibility clinical trial aims to address some of these challenges and provide insight into the design and evaluation of teaching kitchen and culinary medicine programs addressing health behavior change. Strengths of the EHKC intervention are three-fold. First, the multiple behavior change design may be superior in improving self-efficacy over focusing solely on one aspect of wellness. Second, the comprehensive battery of assessments, surveys, evaluations, and biometric data will allow for robust analyses of the feasibility and acceptability of the program, as well as clinically relevant impact on health and behavior change. Finally, the emphasis on combining didactic and experiential activities in a group setting provides interpersonal motivation and engagement for participants.

Limitations

The study results will be limited by the lack of a control group and randomization process. Highly motivated employees with obesity and co-morbidity will be preferentially included, limiting generalizability of the results to other populations. While there are many objective measures, the reliance on self-assessment data introduces recall and participant biases. Due to the nature of the study, our intervention is directed primarily at individual and interpersonal factors rather than environmental and cultural influences on health behavior.

Conclusions

We believe our multidisciplinary, skill-building, teaching kitchen intervention is an innovative model for promoting salubrious health behaviors and a culture of health in worksites. This pilot will allow for a thorough assessment of the value of this type of



program to employers and employees alike. The EHKC program will provide an opportunity to assess self-efficacy as a mediating factor for improving behavioral, functional, and clinical outcomes short-term and over the course of one year. Lastly, we expect to provide valuable insight into the curriculum content for teaching kitchen programs to aid in the standardization of future teaching kitchens and culinary medicine-based lifestyle programs.

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