Group Dynamics in Physical Activity Promotion: Research, Theory, & Practice

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

In

Human Nutrition, Foods and Exercise

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June 27, 2012

Blacksburg, Virginia

Keywords: group dynamics, physical activity, community programs, lif*es*tyle interventions

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| Abstract |

The use of group dynamics principles such as group goal-setting, distinctiveness and cohesion has been the basis of a burgeoning area of physical activity (PA) promotion. Recent reviews of literature suggest that these interventions are robust and increase PA in a wide variety of populations. Still, a number of questions remain unanswered in the areas of theory development, intervention implementation, and translation of research into practice. This dissertation includes a series of manuscripts that focus on research, theory, and practice of group dynamics interventions intended to promote PA. Within *research*, a systematic review of literature explores group dynamics-based PA interventions in terms of generalizability (through RE-AIM evaluation) and the degree to which the interventions use research techniques that are more pragmatic (reflect typical practice) or more explanatory (testing under optimal conditions). This exploration is based on an initial review of 17 interventions that employ group dynamics strategies to increase PA, fitness, and/or adherence. The results suggest that this body of literature includes a range of pragmatic and explanatory trials, but still has gaps in reporting related to external validity. Embedded within the context of a PA promotion program for minority women, the second manuscript addresses a *theory*-based question—to what degree do group-interaction variables (cooperation, communication, and competition) differentially predict group cohesion over time. The results suggest that friendly competition is the strongest and most consistent predictor of different dimensions of group cohesion while task and socially related communication are consistent predictors of task and socially related cohesion, respectively. Two manuscripts are included in addressing the use of group dynamics principles within practice settings. The first *practice* manuscript details a small pilot study in which obese, limited income women successfully ($p<0.05$) limited gestational weight gain to the Institute of Medicine (2009) recommendation of 11-20 pounds. This study attempted to integrate a group dynamics approach into a group visit model for pregnant women. The quantitative findings were promising, but qualitative findings indicated a number of difficulties in implementation. The purpose of the final manuscript was to determine the attributes of the program agents consider when deciding to adopt a PA and fruit and vegetable promotion program and their understanding of key strategies related to group dynamics theory. Delivery agents were able to identify key underlying principles and propose adaptations that align with those principles.

| Dedication |

To Linda and Dennis Downey for ...***everything***.

And in memory of Johnny: for all that you were and all that you will always be.

| Acknowledgements |

I would like to first and foremost acknowledge my family. Especially my husband, Cole, who has edited countless manuscripts and listened to every complaint and praise of graduate research. Thank you for being the half that makes me whole and letting me know that I will 'always have you and we will always have us.' To my immediate family (the best parents, sister, niece, and in-laws in the world)- for the love, encouragement, and support throughout my whole life to get me to this step in academia! To my dear friends who have known the trials and tribulations of doctoral work in HNFE (Courtney and Carmen!), and those who haven't (Christa, Kelly G., Michelle, Heather, Rebecca, Kelly L., Terri, Hillary, Danielle) but have leant their support and love, always.

And, to my dear advisor Paul A. Estabrooks… From day one, I knew your humor, success, and multitasking skills would push me through to the end. We have, what has been said to be, the perfect mentor-mentee relationship: a little bit of fear, a lot of respect, and the collaborative production of sound research. Four years as your student have been filled with worksite madness, group dynamics-based opportunities, and many invaluable lessons.

I would like to acknowledge: Serena, who has been here from the first day at "plastics" with a kind heart and wise words, Kacie for all the worksite car rides and story sharing, my cubicle mate, Ashley, for being such a comfort in a time of need… and for having an illegal space heater.

Drs. Beauchamp, Davy, You, and Zoellner for being an integral part of this academic journey. For your support and for priming me to be successful in your footsteps. Thank you to all co-authors and anyone who has given me permission to use their hard-earned data sets.

A special acknowledgement to the American Heart Association for bestowing upon me the Pre-Doctoral Fellowship, and to Carilion Clinic staff (especially Stephanie Phillips & Ellen McConnell!) for their support and engagement in our partnership. To my collaborators, Amanda, Brian, and Edie for assisting in this research endeavor. To all the women who participated in the program and changed my life, thank you.

To all other collaborators and participants who made every study happen: I thank you for your time and energy.

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Paul A. Estabrooks was a principal investigator on the Walk Kansas program implementation, developed survey tools, and assisted in manuscript preparation.

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| Introduction |

Group Dynamics in Physical Activity Promotion: Research, Theory & Practice

Background

There are 10,080 minutes in a week, spending 1.3% (or 150 minutes) of that time engaged in physical activity (PA) can save your life. To maintain weight status and receive health benefits of physical activity, it is recommended that Americans spend at least 150 minutes engaged in moderate to vigorous PA and to incorporate two days of strength training (Westcott, 2009). These recommendations reduce the risk of cardiovascular disease, type II diabetes, and obesity- some of the leading causes of death in the United States (Warburton, Nicol, Bredin, 2006). Additional global benefits of PA include weight control, improved mental health, added years and quality of life (CDC, 2012).

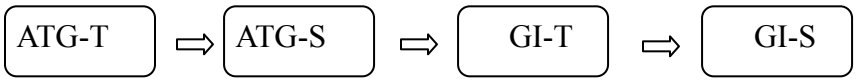
Considering the above information, a wide array of PA promotion interventions exist across a number of settings (e.g., school-based (Langille & Rodgers, 2010), worksite-based (Pronk, 2009)); including both individual and group-based interventions. However, there is limited concrete evidence on what strategy (or the combination of strategies) is most effective to have a public health impact. The evidence does support that group-based PA promotion programs tend to be more effective than individually tailored programs (Burke, Carron, Eys, Ntoumanis, Estabrooks, 2006). Interventions that aim to increase PA through the use group dynamics-based principles such as interaction, group goal setting, and group structure are more likely to achieve desired PA, fitness, or adherence related outcomes as seen in various populations (e.g., worksites (Green, Cheadle, Pellegrini, Harris, 2007), women of color (Lee et al., 2011), and communities (Estabrooks, Bradshaw, Dzewaltowski, Smith-Ray, 2008)).

Group dynamics encompasses the study of the nature of groups, individual relationships within groups, and facilitated interactions with others (Harden, Estabrooks, Mama, Lee, Under Review). True groups are open and complex systems that interact within other systems (i.e., interactions among community members to interpersonal relationships; McGrath, 2000). This definition is based on Kurt Lewin's seminal work, which determined that, in order to integrate the study of the natural interactions of the group into a social science perspective, one must study a broad range of factors that influence a group, with the primary goal of enhancing group cohesion (Lewin, 1947).

Group cohesion is defined as "a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs" (Carron, Brawley, Widmeyer, 1998, p. 213). There are four dimensions of group cohesion: the individuals' attraction to the group's task (ATG-T), the individuals' attraction to the group's social aspects (ATG-S), the perception of the group's unity around the task (GI-T), and the perception of group integration socially (GI-S; Carron, Widmeyer, Brawley, 1998). These four dimensions provide a predictive model of cohesion which, if present, determine whether a group (i.e., work group, walking group) will achieve its task. That is to say, when cohesion is present, or enhanced, in a PA program, the behavior change is more likely to be adopted. Further, cohesion within a group leads to improved performance, productivity and achievement within that group (Gammage, Carron, Estabrooks, 2001; McGrath, 1984).

Overall, strong perceptions of group cohesion tend to influence attendance, timeliness, greater exercise outcomes, improved attitudes towards PA, and stronger self-efficacy (Estabrooks, 2000). Figure 1 illustrates the predictability of the 4 dimensions of cohesion.

Figure 1. Predictability of group cohesion components.



Estabrooks (2000) found all four dimensions are related to adherence in groups that vary in age, exercise setting, and length of intervention. The four dimensions of cohesion have been recognized as a mediator of group formation, maintenance, productivity, influence, power, satisfaction and performance (Bollen & Hoyle, 1990; Gammage, Carron, & Estabrooks, 2001). Additionally, social influence has a positive impact on exercise behavior, including adherence and compliance, cognitions about exercise (intentions and efficacy), and attitudes towards exercise behavior (Carron, Hausenblas, Mack, 1996). The desire to complete the task presented to the group motivates participants' performance. With the extant literature in support of group dynamics-based PA promotion, this dissertation provides further support for intervention work, fills gaps in the current literature, and poses research questions related to the theoretical framework.

Overview

This dissertation includes a series of manuscripts that focus on the research, theory, and practice of group dynamics interventions intended to promote physical activity. Within *research*, a systematic review of literature is conducted to explore group dynamics-based PA interventions in terms of generalizability (through RE-AIM evaluation) and the degree to which the body of literature uses research techniques that are more pragmatic, and therefore reflect typical community or clinical practice, or more explanatory reflecting testing under optimal conditions. The second manuscript in the dissertation addresses an unanswered *theory*-based question—to what degree do group-interaction variables (cooperation, communication, and competition) differentially predict and group cohesion over time? This study was embedded within the context of a PA promotion program for minority women. Two manuscripts are included in addressing the use of group dynamics principles within practice settings. The first *practice* manuscript details Cardiovascular Health in Maternal Obstetrical Care (*c*MOC). *c*MOC was a group dynamics PA promotion program in which obese, limited income women attempted to limit gestational weight gain to the Institute of Medicine (2009) recommendation of 11-20 pounds. This study attempted to integrate a group dynamics approach into a group visit model for pregnant women. The purpose of the final study was to determine the attributes of the program agents consider when deciding to adopt a group dynamics based PA and fruit and vegetable promotion program and their understanding of key strategies related to group dynamics theory.

Research

Given the success of group dynamics-based interventions (Estabrooks, Harden, & Burke, 2012), it is also important to translate the extent to which these PA promotion programs have been tested in typical community or clinical contexts and report on factors that address the potential generalizability of the findings. To balance both the measure of internal and external validity of an intervention, the RE-AIM framework may be employed (Glasgow, Vogt, Boles, 1999). RE-AIM stands for: Reach, Effectiveness, Adoption, Implementation, and Maintenance (system and individual level; Glasgow, Vogt, Boles, 1999). One way to determine the "fit" of an intervention within a system is through the Pragmatic–Explanatory Continuum Indicator Summary (PRECIS) evaluation (Thorpe et al., 2009). PRECIS evaluation determines the level (on a 5-point Likert scale) of pragmatic versus explanatory study design, in which explanatory

means ‘Can this intervention work under ideal conditions?’ while pragmatic means ‘Does this intervention work under usual conditions?’ (Tunis, Stryer, Clancy, 2003; Tunis, 2005). While RE-AIM and PRECIS are both tools that examine issues related to internal and external validity they have distinct functions in describing a body of literature. RE-AIM provides outcome measures across internal and external validity factors while PRECIS provides a description of the processes used within a given trial that are related to these factors. Therefore, the first manuscript presented addresses the results of a systematic review that calculated a composite score of RE-AIM and PRECIS for group dynamics-based PA promotion programs.

RE-AIM Components. *Reach* is the absolute number, proportion, and representativeness of individuals who participate in a given program (i.e., who decided to participate and if their results may be generalizable to that specific population; Glasgow, Vogt, Boles, 1999). In general, systems-based approaches address the multilevel components that interact and determine if an individual accepts or declines an invitation to participate in an intervention (Estabrooks & Glasgow, 2006). A systems-based approach is consistent with social-ecological models of health behavior (Estabrooks & Glasgow, 2006) and integrates the knowledge, skills, and needs of the community.

The next dimension of RE-AIM is *effectiveness*- the impact of an intervention on important outcomes (i.e., increase of PA, 5-A-Day recommendations; Glasgow, Vogt, Boles, 1999). Determining the most effective measure of desired outcomes is a key component to robust scientific inquiry. It may be beneficial to combine both self-report (i.e., 7-day PA recall) and an objective measure (i.e., accelerometers, VO_2 max testing). Mediator and moderator analyses may also be important at this stage in order to describe relationships between independent and dependent variables and the strength of those relationships (Baron & Kenny, 1986). Rich qualitative data can provide additional feedback. One way to accomplish this is to conduct focus groups or one-on-one interviews, code for meaning units, and eventually develop themes that examine variations in perceptions among participants (Patton, 2002). A theoretical framework is often helpful for communicating the effectiveness of an intervention (e.g., group dynamics, social cognitive theory, theory of reasoned action).

Adoption is the absolute number, proportion, and representativeness of settings (i.e., facilities) and staff who are willing to offer a program. In the planning stages of the intervention, it is important to consider Rogerian characteristics of an intervention for effective dissemination. These characteristics include relative advantage, compatibility, observability, complexity, and trialability, which speed or impede the rate of adoption (Rogers, 2003). Relative advantage is whether the proposed program is perceived as better than the current practice. Rabin and colleagues expand upon this definition of relative advantage to include the cost-efficiency of one intervention over another (Rabin, Brownson, Haire-Joshu, Kreuter, Weaver, 2008). For adopting agents, compatibility refers to the interventions ability to align with the values, experiences, and needs of individuals, communities, and organizations. Observability is the actual degree to which results of the program are visible (i.e., adherence, behavior change). The complexity of the intervention describes the intervention's degree of difficulty to use or understand. Trialability is the degree to which an intervention can be experimental. In order to increase the positive perceptions of these Rogerian characteristics, it would be beneficial to create a replicable program manual and have training sessions for those who will ultimately deliver the program (Glasgow, 2010).

The *implementation* phase of RE-AIM refers to how closely staff members follow the program as intended (i.e., treatment fidelity and costs; Glasgow, Vogt, Boles, 1999). This again considers adopting agents, or implementers, of the intervention. There may be a strong participation from implementers at the initial phases of the program if using a systems-based approach. However, if implementers have not been involved already, in this dimension, it would be important to determine the compatibility of the intervention within implementers' typical responsibilities (i.e., compatibility). In order to increase treatment fidelity, a pragmatic approach to implementation (prior to or during the intervention), it would be important to seek feedback on potential adaptations that would increase the outcomes of the program (RE-AIM.org). Analyses of implementation include determining the extent to which the protocol was delivered as intended, whether through interviews or survey measurements. An additional component would be to record and report on adaptations implementers initiated in the field. This adds a dimension

to outcome analyses to determine if participants received all program components as intended (RE-AIM.org).

Maintenance (system and individual level) is the final dimension of RE-AIM. Capturing the extent to which a program or policy becomes part of the routine organizational practices and policies describes maintenance (Glasgow, Vogt, Boles, 1999). A sufficient follow-up period should most certainly be considered in the study design. An example strategy is to include booster sessions in the design of the intervention. Then, analyses can include comparison of characteristics between those who complete follow-up and those who do not. It is also important to determine which settings continue to implement the program beyond the intervention to measure sustainability and whether or not adaptations were made.

PRECIS Components. The PRECIS tool has 10 distinct domains, all measured on a 5-point Likert scale (4 being most pragmatic; 0 being most explanatory). The first domain aims to determine whether participants were a highly motivated sample or representative of typical people with the targeted condition. If an intervention is more pragmatic, it will have broad inclusion criteria, while an explanatory intervention may have run-in periods to determine eligibility. Next, the PRECIS is used to investigate the flexibility of both the control and intervention conditions. These domains determine whether the intervention has a strict protocol or is highly based on principles- a little more flexible for delivery agents. The next factor is the degree of practitioner expertise required to deliver and monitor the experimental and comparison conditions. Here, the continuum would range from monitoring highly trained expert staff to the use of a full range of staff members to deliver the treatment, with little measures for practitioner adherence. PRECIS also allows researchers to evaluate the intensity of the follow-up and the nature of the primary outcome measure. A more pragmatic study would use intervention sessions to obtain follow-up measures (i.e., no additional participant burden/visits), while a more explanatory study may have multiple follow-up visits and measures. The intensity of participant compliance (i.e., strategies to enhance and monitor compliance) is also evaluated. In an explanatory study, may have more obtrusive measurements and rescue strategies, and a pragmatic study would have little to no measurement of participant compliance. Finally, PRECIS captures the degree to which the intervention measured agent-level adherence. To this extent,

more explanatory studies would, for example, include monitoring the fidelity to a manual of procedures while pragmatic studies would have no measures of practitioner adherence. Significantly, while RE-AIM measures *reported* outcomes within the manuscript, PRECIS allows inferences on the domains to gather a comprehensive look at the process by which the program was developed and conducted.

Theory

The manuscript included that focuses on theory explores the predictability of group-interaction variables on perceptions of group cohesion. Carron and Spinks' model (1993) of group dynamics approaches for PA includes the use of group interaction in the form of communication, cooperation, and competition to promote group cohesion. However, to date, no study has examined these potential relationships. As evidenced in a systematic review of group dynamics-based PA promotion interventions (Estabrooks, Harden, Burke, 2012), there are many strategies and principles that underlie group dynamics interventions. Determining the relationship of group-interaction variables and cohesion over time helps fill the gaps in the literature as to what strategies need to be implemented in order to have the maximum effect on group cohesion. The Health is Power randomized controlled trial (Lee et al., 2011) provided an opportunity to collect information on group interaction and cohesion within the context of a group dynamics based PA program for minority women.

Practice

Targeting behavioral change through systemic structures is another effective methodology to increase reach and representativeness. The Cardiovascular Health in Maternal Obstetrical Care (*c*MOC) pilot study is a first attempt at integrating a group dynamics approach within the flow of healthcare for pregnant low-income women. *c*MOC was a two group randomized control trial founded on group dynamics and a group visit model. A group visit model is when multiple patients attend a medical visit at once (Scott et al., 2004). This is usually practiced in diabetes management care, and *c*MOC was to determine if this model could be translated into the prenatal care system. *c*MOC successfully limited excessive gestational weight gain for obese, limited income, pregnant women. Reasons attributed to this weight control were interaction and communication with other group members, portion awareness, engaging in PA,

and a bit of friendly competition. However, through qualitative inquiry (i.e., two semi-structured one-on-one interviews and one focus group), it was determined that while the group dynamics-based sessions were highly enjoyable, the participants and care providers felt that the sessions in conjunction with the prenatal check-up seemed disjointed. For example, a patient would be called out of the group-based session for 15 minutes and miss the dialogue or activities within the group. Perhaps the combination of group dynamics constructs with the group visit model was not ideally matched, informing future work in this area. Still, the research design and outcomes of *c*MOC show promise for having an influence on prenatal weight gain.

The Cooperative Extension System (CES), which is a non-credit educational network associated with land-grant universities, is one such collaborative structure. Integrating a wellness program with the support and high reach of CES can have a public health impact. Manuscript four determines the degree to which agents within CES understand the principles of group dynamics that influence the program's effectiveness. The purpose of this final study was to determine the attributes of a community PA program that Kansas State Research and Extension System agents considered in the adoption decision-making process (DMP) and their understanding of evidence-based program principles. Ninety-nine percent of the eligible agents completed a survey that included quantitative and qualitative assessments of program attributes, delivery, and adaptations. The community PA program's effectiveness, compatibility within the system, high reach, and ease of delivery most influenced the DMP. Success in other counties was also indicated as influential in the DMP by those who decided to deliver the program after its initial year. Concepts of group dynamics were accurately identified and adaptations were consistent with these principles. The results indicate that agents consider multiple factors during the adoption DMP for a PA program and are able to articulate and propose adaptations that align with the evidence-based principles. While group dynamics is pieced apart into three separate entities, it is evident within this dissertation that the integral role of theory, research, and practice will have a sustainable and translatable impact on physical activity promotion, and ultimately, public health.

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| Manuscript One |

Generalizing the Findings from Group Dynamics-Based Physical Activity Research to Practice Settings: What do we know?

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Abstract

According to a recent systematic review, there are 18 independent studies that align with Carron and Spink's (1993) multidimensional conceptual model on group-based physical activity promotion programs. The purpose of this study was to determine the degree to which these studies 1) report on each dimension of RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) by assigning a quality score and 2) are designed to be effective under the optimal parameters (explanatory design) or are designed to be translated into more real settings (pragmatic design). It was hypothesized that these studies would receive high ratings on reach and effectiveness, yet lack robust reporting on adoption, implementation, and maintenance. Further, it was hypothesized that there would be a range of studies along a continuum of pragmatic to explanatory trials. Both RE-AIM quality scores and pragmatic-explanatory continuum index summaries (PRECIS) were computed on the group dynamics-based physical activity promotion literature. As predicted, reporting on some measures (i.e., inclusion criteria, outcomes) were more robust while others (i.e., adoption rate, intent-to-treat analyses) were less consistent. Interestingly, cost for both implementation and maintenance were not reported in a single study. However, 94% of the interventions scored at least moderate on the RE-AIM quality assessments. As for PRECIS, there were trials that were very explanatory and others that were very pragmatic. Overall, the studies fell more towards the pragmatic classification in terms of the settings where the studies were conducted and more towards the explanatory classification when considering the target population. Using these two evaluation metrics to determine the extent to which each of the interventions align with research process and outcomes related to internal and external validity may speed the rate of translation; the ultimate goal for physical activity promotion research.

Introduction

The wealth of knowledge related to the benefits of physical activity across populations and the lifespan continues to be the basis for a goal to develop interventions that can promote and sustain physical activity (HP 2020, 2011). Over the past two decades a number of researchers have used group-dynamics-based interventions to achieve that goal and have demonstrated an ability to increase physical activity (Estabrooks, Harden, Burke, 2012). The findings seem generalizable across populations and contexts. For example, group-dynamics-based interventions have successfully increased physical activity in younger and older adults (Carron & Spink, 1993; Hughes, Seymour, Campbell, Pollak, Huber, Sharma, 2004), in healthy adults and those with chronic diseases (Dishman, DeJoy, Wilson, Vandenberg, 2009; Focht, Brawley, Rejeski, Ambrosius, 2004), across randomized controlled trials and quasi-experiments (Cramp & Brawley, 2006; Kim, Linnan, Campbell, Brooks, Koenig, Wiesen, 2008), and across a variety of structures (e.g., weekly meetings focusing on group interaction and monthly meetings focusing on group goals; Estabrooks et al., 2012). Despite this evidence, there is limited data available that suggests group-dynamics interventions have been translated into regular practice. It could be that the evidence-though seemingly generalizable across this wide variety of audiences, research designs, and program characteristics-is not generalizable to typical community or clinical contexts where the interventions could ultimately be delivered and sustained.

In response to the lack of translation of behavioral intervention research, including those focusing on physical activity, into clinical and community practice, Glasgow and colleagues developed the RE-AIM (**R**each, **E**fficacy/**E**ffectiveness, **A**doption, **I**mplementation, **M**aintenance) framework to provide a balanced focus on internal and external validity while also promoting transparent reporting across individual and organizational level outcomes (Glasgow, Vogt, & Boles, 1999). Specifically, individual level outcomes from the framework include Reach (the number, proportion, and representativeness of participants), Efficacy/Effectiveness (the degree to which changes occur in the primary outcome, quality of life, and potential negative outcomes), and Maintenance (the degree to which effects are sustained 6 or more months beyond the completion of the intervention). Organizational outcomes from the framework include

Adoption (the number, proportion, and representativeness of the organizations and staff who agree to deliver the intervention), Implementation (the degree to which the intervention is implemented as intended or adapted and its cost), and Maintenance (the degree to which an intervention is sustained in an organization over time).

It is proposed that the RE-AIM framework can be applied across an array of trial types and, that if the model is operationalized appropriately, the information across these outcomes can better inform their potential translation from research into practice (Kessler, Purcell, Glasgow, Klesges, Benkeser, Peek, 2012). For example, in an efficacy trial (i.e., testing the intervention under optimal conditions), reporting on the representativeness of the participants in comparison to the target population and an explicit delineation of inclusion and exclusion criteria can improve a practitioner's interpretation of the data as it may or may not relate to his or her clientele. Further, in an effectiveness trial (i.e., testing the intervention under typical conditions), reporting the characteristics, training, and expertise of those delivering the intervention can provide an organization with the information necessary to determine if their setting has the appropriate staff to implement the intervention

In addition to focusing on a broad range of outcomes (e.g., RE-AIM), it has been suggested that the preponderance of efficacy trials in behavioral research has limited the degree to which practice professionals can determine if a given intervention will generalize to their settings (Bull, Gillette, Glasgow, Estabrooks, 2003). However, it is often difficult to determine if a given trial is an efficacy or an effectiveness trial. For example, a study that uses strict inclusion criteria and run-in period for participants (i.e., efficacy characteristics), but implements the intervention through the staff from an existing community health center (i.e., effectiveness characteristics) could be considered either an efficacy or an effectiveness trial. Recently, Thorpe and colleagues developed the Pragmatic-Explanatory Continuum Indicator Summary (PRECIS) to allow for a more nuanced evaluation of trial type (Thorpe et al., 2009) that will improve the likelihood of the translation of knowledge from research to practice. Rather than suggesting that a given trial is either *pragmatic* (i.e., "Does an intervention work under usual conditions?") or *explanatory* (i.e., "Can an intervention work under ideal conditions"), through PRECIS, Thorpe and colleagues (2009) proposed that studies often fall on a continuum between the two.

In recognition of the importance of such a classification, a PRECIS tool was developed by an international group of researchers between 2005 and 2008. The tool identifies ten domains that must be considered in the classification of a trial on the pragmatic-explanatory continuum and also serves as a useful tool in the recording of key elements that answer questions related to the *who*, *what*, and *why* of an intervention. The PRECIS domains are: 1) the eligibility criteria for trial participants; 2) the flexibility with which the experimental intervention is applied; 3) the degree of practitioner expertise in applying and monitoring the experimental intervention; 4) the flexibility with which the comparison intervention is applied; 5) the degree of practitioner expertise in applying and monitoring the comparison intervention; 6) the intensity of follow-up of trial participants; 7) the nature of the trial's primary outcome; 8) the intensity of measuring participants' compliance with the prescribed intervention, and whether compliance-improving strategies are used; 9) intensity of measuring practitioners' adherence to the study protocol, and whether adherence-improving strategies are used; and 10) the specification and scope of the analysis of the primary outcome.

Both RE-AIM and PRECIS are valuable approaches to understanding the potential for group-dynamics-based physical activity interventions to be translated into practice. RE-AIM provides a set of metrics to assess while PRECIS provides a tool to determine the degree to which a trial is pragmatic or explanatory across 10 dimensions. The primary objectives of this paper are to determine where on the continuum of pragmatic and explanatory the literature on group-dynamics-based physical activity interventions lie and to report the degree to which the literature reports across RE-AIM dimensions. Understanding how this body of literature aligns with research processes and outcomes that are more likely to facilitate the translation of research into practice should provide evidence for the potential for these interventions to be disseminated across typical community and clinical organizations.

Methods

This current study was conducted to determine the degree to which the group dynamics-based physical activity promotion literature included reporting on the dimensions of RE-AIM (by assigning a quality rating score; Allen, Zoellner, Motley, Estabrooks, 2011) and to determine where these interventions fall on the Pragmatic-Explanatory Continuum using Glasgow and

colleagues (2011) methodology. In order to identify group dynamics-based physical activity promotion literature, scholarly search engines of PubMed and Web of Science were utilized; search terms included outcomes of interest (adherence, fitness, physical activity, exercise) as well as group dynamics key words (i.e., group cohesion, group processes). The research team also referred to citations of previous reviews to exhaust the search for eligible articles. The search yielded 20 articles with 18 independent interventions (see Estabrooks, Harden, Burke, 2012 for more details). These 18 articles were distinctively group dynamics-based as they aligned with Carron and Spink's (1993) conceptual model for physical activity promotion.

Data extraction and synthesis.

RE-AIM. Key components of each dimension of RE-AIM were identified and included in a master-coding document in order to determine an overall RE-AIM quality score (Akers, Estabrooks, Davy, 2010; Allen, Zoellner, Motley, Estabrooks, 2011; Dzewaltowski Estabrooks, Klesges, Bull, Glasgow, 2004; Estabrooks, Dzewaltowski, Glasgow, Klesges, 2002; Glasgow, Klesges, Dzewaltowski, Bull, Estabrooks, 2004). Each study was scored (1=yes, 0=no) on reporting of each of the RE-AIM components. Two members of the research team independently coded each article, based on the dimension descriptions below. Every article coding was then compared in the presence of the third researcher. When there was a rare discrepancy, discussion ensued until consensus was reached. Quality scores were set at low, moderate and high quality as reflected by scores of 0-6, 7-12, 13-19, respectively (Allen, Zoellner, Motley, Estabrooks, 2011).

The five components of **R**each were coded based on reporting the method to identify the target population, inclusion criteria, exclusion criteria, participation rate, and representativeness of the sample (race, gender, health status). The quality of reporting on **E**fficacy/ **E**ffectiveness was determined by reporting on measures for at least one follow-up, identifying analysis (i.e., intent-to-treat analyses), quality of life measures, and reporting on the attrition rate.

At the setting level, **A**doption was measured by the description of the location, inclusion/ exclusion criteria specific to the setting, description of the staff (i.e., ethnicity, education, gender), level of expertise required, and the adoption rate (i.e, how many settings were offered the intervention and how many delivered). **I**mplementation was measured by the extent to which the manuscript reported on the intervention type, frequency, and intensity. Further,

Implementation meant to gather information on the degree to which the intervention was delivered as intended and any costs associated with delivery. Finally, **M**aintenance measured reporting of outcomes at least 6 months post-program and reporting on the sustainability of the program.

PRECIS. Based on the recommendations of Thorpe et al., (2009) a "wheel" of the pragmatic–explanatory continuum indicator summary (PRECIS) tool was used to demonstrate the degree to which each domain of PRECIS was either pragmatic or explanatory. Spokes on the wheel were the 10 PRECIS domains: flexibility of the comparison and experimental intervention conditions, eligibility criteria, participant compliance, practitioner expertise (both comparison and experimental conditions), practitioner adherence, primary analysis, follow-up intensity, and outcomes. As each component was measured on a 5-point scale, each line (spoke) of the wheel was divided into 4 sections (the number 4 being closest to the center; 0 being farthest away); where 0 was "*completely pragmatic*" and 4 was "*completely explanatory.*" A dot was placed on the corresponding number from the coding of each component. This meant that if a component was indicated as a 0, it would be at the outermost edge of the line, if it were a 4, it would be on the inner circle of "E" for explanatory. The tighter the web on the wheel, the more explanatory the intervention; the wider the web was, the more pragmatic the intervention.

In order to code for the 10 specific domains, and replicate wheels for each of the 18 studies, we used the previously proposed methodology (Glasgow et al., 2011; Thorpe et al (2009); http://ww.support-collaboration.org/precis.pdf). The measure of participant eligibility was designed to determine the representativeness and flexibility in the sample, where 0 represented no exclusion criteria and 4 represented participant run-in periods (i.e., involved a screening process before the intervention was conducted). Both the experimental and comparison intervention flexibility was measured. A program that was based on principles, but highly adapted, received a 0, whereas a rigid protocol with no deviations received a 4. PRECIS measured the expertise required by the staff for both the experimental intervention and comparison, where a 0 was assigned to studies that utilized a full range of staff members to deliver the treatment, whereas a 4 was assigned to studies that involved the close monitoring of highly trained, "expert" staff/practitioners that were responsible for treatment delivery.

Flexibility was also coded for the comparison intervention, where 0 represented "usual practice" and 4 represented a placebo control with little or no flexibility.

Follow-up intensity was also assessed; 0 indicating no additional visits and 4 indicating additional visits and data collection. With regard to the primary trial outcome, a 0 was assigned to studies that contained a primary outcome that was objectively (and readily) measured under usual conditions; a 4 was assigned to studies that contained a primary outcome that required explicit research expertise to assess. Coding was also conducted to determine the degree to which participant compliance was monitored and whether specific strategies were utilized to increase compliance to program components. Similarly, the extent to which delivery agents maintained treatment fidelity was assessed, whereby 0 represented studies that contained no measure of practitioner adherence, and 4 represented studies that involved close monitoring of practitioner adherence to the study protocol. Finally, analysis was addressed through intention-to-treat methods (i.e., under usual conditions [0] versus those supplemented with additional analyses/restrictions [4]).

Results

RE-AIM

Of the five dimensions of RE-AIM, effectiveness and reach were most reported at 60.0 and 60.9 percent, respectively (see Table 1). Adoption, implementation, and maintenance followed; 49.9% of the articles reported on adoption components, 38.6% reported on implementation, and 40.8% reported on maintenance. There were components within each dimension that were consistently reported (i.e., methods to identify target population [reach], measures of at least 1 follow-up [efficacy/effectiveness]) and some components that were often reported (e.g., description of staff delivering intervention [adoption]). None of the studies reported on the exclusion criteria that may have applied to the delivery setting (e.g., space allocation or geographic location [adoption]). Interestingly, no study reported on measures of costs related to neither implementation or maintenance.

Table 1. Reported components of each RE-AIM dimension for all studies (N=17).

Dimension	*Percentage*
Reach	
Method to Identify Target Population	100.0
Inclusion Criteria	70.6
Exclusion Criteria	70.6
Participation Rate	41.2
Representativeness (gender, age, health status)	17.6
Average Reach Components Recorded	60.0
Efficacy/Effectiveness	
Measures/Results for at Least 1 Follow-Up	100.0
Intent-to-Treat	44.0
Quality of Life	17.6
Percent Attrition	82.3
Average Efficacy/Effectiveness Components Recorded	60.9
Adoption	
Description of Intervention Location	76.4
Inclusion of Setting	17.6
Exclusion of Setting	0.0
Description of Staff	88.2
Level of Expertise	94.1
Adoption Rate	23.1
Average Adoption Components Reported	49.9
Implementation	
Intervention Type, Frequency, and Intensity	74.5
Extent Protocol Delivered as Intended	41.2
Measures of Cost	0.0
Average Implementation Components Reported	38.6
Maintenance	
Assess Outcomes ≥ 6 Months	47.0
Sustainability of Program	88.2
Program Still in Place?	28.0
Measures of Cost of Maintenance	0.0
Average Maintenance Components Reported	40.8

PRECIS

The 17 interventions were also evaluated on the 10 domains of the PRECIS tool. Of the 17 studies evaluated, 16 documented the level of practitioner expertise in regard to experimental conditions. The level of training among the reported practitioners ranged from highly trained, expert staff to moderate training where there was some range in staff expertise. Only one study did not report on the practitioners involved in the intervention. The comparison conditions also varied with regard to the level of practitioner expertise reported. Eight studies reported some level of expertise among practitioners (i.e., expert/highly trained with some variation in expertise level), while eight studies did not report on expertise levels of those delivering the comparison condition. Some examples of trained staff were exercise counselors, exercise leaders, physical therapists, and rheumatologists.

In regard to practitioner adherence to the program/protocol, 13 of the 17 studies did not report any measures of adherence. Three studies did, however, report close monitoring and attention to detail. For example, Annesi (1999) controlled the extent to which exercise leaders were available during exercise sessions. Finally, two studies fell in the middle of the continuum. In Wilson and colleagues' (2010) study, committees led by site supervisors were developed to post physical activity prompts as well as create and manage program activities. Subsequently, these committees were able to hand program development responsibility down to the team captains. While various roles were evident, the extent to which those particular roles contributed to the development of program development varied.

While eight of the 17 studies did not report any measurement of participant compliance, studies by Estabrooks and colleagues (2008) and Amundson et al. (2009) reported strategies to measure and increase compliance. Amundson and colleagues (2009) assessed physical activity and dietary changes via multiple motivational interviewing tools and required that participants sign a "commitment contract" (p. 213) stating that they were ready to make the appropriate changes to meet weight loss goals. Annesi (1999) and Rejeski and colleagues (2002;2003), on the other hand, incorporated close monitoring and strategies to ensure participant adherence. For example, Annesi (1999) increased self-efficacy for equipment use at a private fitness center via an orientation session, and monitored both attendance and drop out rates. Lastly, five of the 17

studies fell in the middle of the continuum; these authors utilized minimal strategies (rather than more explicit ones) to increase participant adherence.

Eligibility criteria for participants in the 17 studies ranged from completely pragmatic to completely explanatory (containing run-in periods). Six of the studies were categorized as completely pragmatic. Examples of pragmatic studies include those of Amundson et al. (2009) and Estabrooks et al. (2008). Participants in these studies were eligible if they were 18 years of age or older and contained one risk factor for diabetes (Amundson, Butcher, Gohdes, Hall, Harwell, Helgerson, Vanerwood, 2009), or if they were a participant in a congregate meal study (Estabrooks, Fox, Doerksen, Bradshaw, King, 2005). On the other hand, six of the 17 studies demonstrated a completely explanatory approach. For example, participants in Annesi's (1999) study were eligible if they were members of a specific, private fitness center. Five studies did not fall neatly into either the completely pragmatic or explanatory categories, but instead fell in somewhere in between. Having some exclusionary criteria or using the "most typical" patient may be reasons for this.

Follow-up procedures were not reported in nine of the 17 studies. Studies by Rejeski and colleagues (2002;2003) and Annesi (1999), though, included more frequent visits, data collection, and follow-up time points overall. Rejeski et al. (2002;2003) included 3 screening visits before randomization and included both 3- and 12-month follow-ups, which indicates a more explanatory intervention protocol. Six studies fell within the middle of the continuum. In one of these studies, Hughes, Seymour, Campbell, Pollak, Huber, and Sharma (2004) included a single screening before an 8-week intervention and performed quarterly phone call follow-ups as well as in person interviews at 2, 6, 12, 18, and 24 months.

Seven total studies including those from Ard and colleagues (2008), Annesi (1999), Boyette, Sharon, and Brandon (1997) and Hughes and colleagues (2004) developed rigid protocols with no deviations in regard to their experimental interventions. For example, the intervention in the Hughes et al. (2006) study consisted of 90-minute exercise sessions led by 1 of 3 physical therapists 3 days per week for 8 weeks. To ensure treatment fidelity, instructor and participant manuals were developed, regular meetings with physical therapists and research team members were held, and research team participation in the exercises classes took place. Four

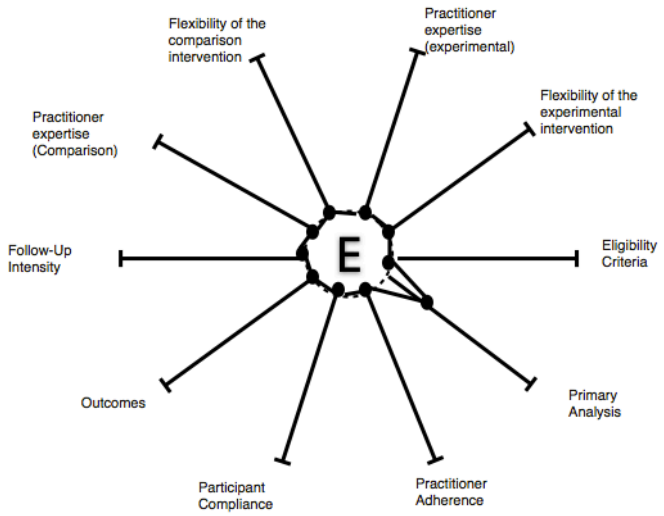
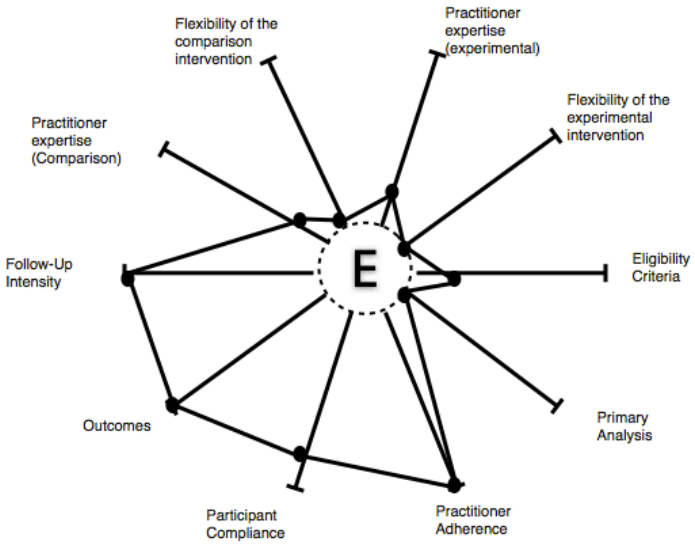
studies were less strict about protocol and allowed some adaptations to guidelines throughout the intervention. For example, in Wilson et al.'s study (2010), weekly meetings were held to with site coordinators to discuss the level of implementation in the *Move to Improve* worksite physical activity program. One study (Green, Cheadle, Pellegrini, & Harris, 2007) was based on principles and therefore, allowed for high adaptation. Ten sites delivered the same program, with team captains and nominal prizes, but the structure of physical activity varied in each. Five out of the 17 studies fell within the continuum of the examples listed above.

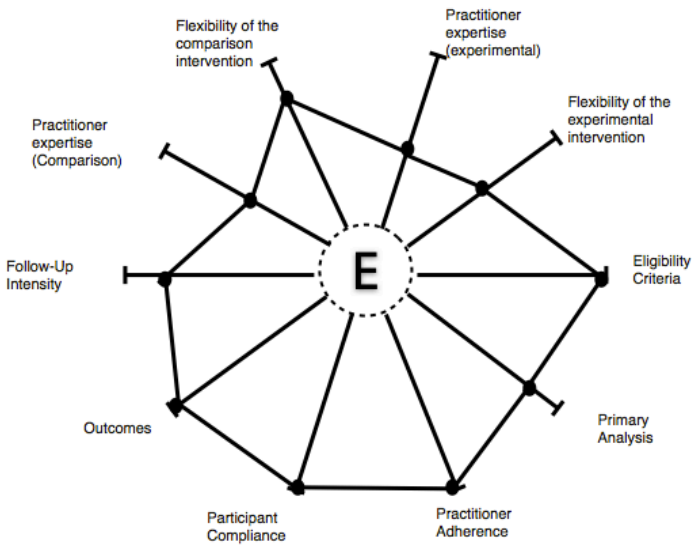
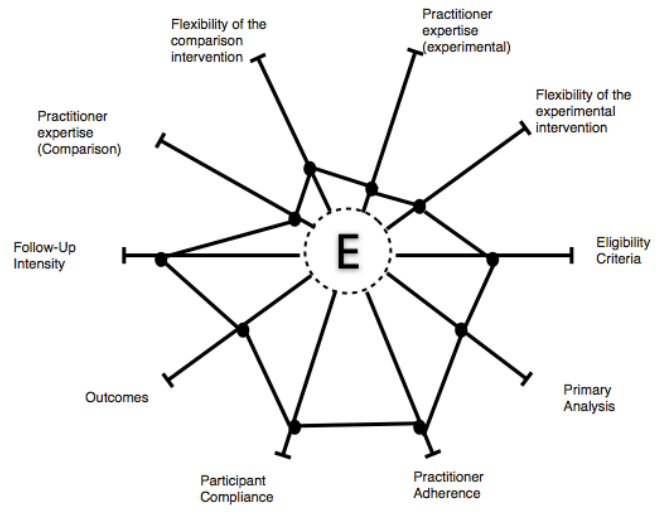
Seven of the 17 studies did not specify a comparison group. Two studies (Focht, 2004; Wilson, Basta, Bynum, DeJoy, Vandenberg, Dishman, 2010) incorporated "usual practice." For example, one of the intervention groups in the study participated in a standard cardiac rehabilitation program while the other group participated in a group mediated cognitive behavioral physical activity program. The remaining six studies contained comparison groups that were placebo controlled with no flexibility.

Five studies reported primary outcomes that were objectively measured under usual conditions. For example, Amundson et al. (2009) reported the number of participants that enrolled in the Diabetes Prevention Program lifestyle intervention as well as the percentage of those participants who completed the program. Associations between demographics and session attendance as well as means and standard deviations were also reported. Five studies contained primary trial outcomes that were largely objective and readily measured. For example, Dishman and colleagues (2009) assessed number of steps, minutes of physical activity, and means and standard deviations across three different time points during the 12-week workplace physical activity intervention. Three studies reported outcomes that were directly related to the independent variable. For example, within a university-based fitness center setting, Annesi (1999) encouraged group cohesion among exercisers in the treatment condition and found that attendance rates increased and drop-out rates decreased for those participants when compared to exercisers in the control condition. Four studies fell within the continuum of the examples listed above.

Table 2 provides examples of typical pragmatic, explanatory, and mixed PRECIS figures as well as their RE-AIM quality scores.

Table 2. Example PRECIS and RE-AIM Scoring.

Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Annesi (1999)		8	Moderate
Ard (2008)		11	Moderate

Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Estabrooks (1999)		13	High
AVERAGE FOR ALL STUDIES (N=17)		10.67	Moderate

All PRECIS figures and RE-AIM quality scores for the 17 articles are available in Appendix C. As discussed previously, the PRECIS column indicates the pragmatic-explanatory continuum while RE-AIM determines the extent to which authors reported on internal and external validity

factors to increase the generalizability of the intervention. Three studies (17.6%) would be categorized as highly pragmatic (Estabrooks et al., 2008; Estabrooks & Carron, 1999; Green et al., 2007). Four studies (23%) were mostly explanatory (Annesi, 1999; Hughes et al., 2004; Perry et al., 2007; Rejeski et al., 2002/3). The remaining studies were a combination of pragmatic and explanatory across the 10 domains (Amundson et al., 2009; Ard et al., 2008; Boyette et al., 1997; Cramp & Brawley, 2006/9; Dishman et al., 2009; Estabrooks et al., 2005; Focht et al., 2004; Kim et al., 2008; Leermakers et al., 1999; Wilson et al., 2010). Only one study (Wilson et al., 2010) scored at a low RE-AIM quality. Thirteen studies (76%) scored within the moderate range for RE-AIM quality assessments. Three studies were noted as having high quality for RE-AIM reporting (Estabrooks & Carron, 1999; Estabrooks et al., 2008; Kim et al., 2008). Within the moderate range, Hughes et al. (2004), Focht et al. (2004) Estabrooks (2005), and Green et al. (2007) were all at a 12, which is just on the cusp of a 'high' RE-AIM quality score.

Discussion

The data presented here provide insight to group dynamics-based physical activity intervention design and the degree to which researchers have reported on areas of internal and external validity. The authors of the 17 studies represented in this review have reported on actual numbers of participants, but have less rigorously described the representation of the studies' reach and adoption. One critique of the RE-AIM framework is that the practicality of measuring and monitoring each dimension is often difficult (King, Glasgow, & Leeman-Castillo, 2010), which can be witnessed in the lack of consistent reporting across all dimensions.

These findings suggest that across the physical activity intervention literature, we cannot glean adequate information about differences between individuals who participate and those individuals who choose not to. This is highlighted in critiques presented in the literature, pointing specifically to how those who often need behavioral interventions the most are not those who receive the intervention components (Akers, Estabrooks, & Davy, 2010; Dzewaltowski, Estabrooks, Klesges, Bull, & Glasgow, 2004).

Furthermore, key issues related to external validity reporting are evident in the lack of consistent reporting on setting-level maintenance and cost (Akers, Estabrooks, & Davy, 2010). One finding in this review that is inconsistent with previous reviews (e.g., Akers, Estabrooks, &

Davy, 2010), is that none of the 17 studies presented here reported on cost; while Akers et al. had found interventions to report on cost approximately 11% of the time.

From a PRECIS standpoint, the literature shows a nice range of explanatory trials that look at the efficacy of intervention components as well as trials that are more pragmatic for translation into real world contexts. The results are also in alignment with the idea that interventions are typically not either explanatory nor pragmatic, but more-so falling along the continuum proposed by Thorpe and colleagues (2009). The shapes represented in the PRECIS figures can be considered semi-circle, narrow, or broad wheels. Three of the 17 studies were broad wheels indicating that they were more pragmatic than explanatory across the 10 domains of PRECIS. Four studies were narrow and, therefore, highly explanatory. The remaining 10 studies were semi-circles, with varying levels of pragmatism across the 10 domains.

One of our initial hypotheses was around the concept that more pragmatic trials would have higher RE-AIM scores. Contradictory to our hypothesis, there is no strong relationship between where an intervention falls on the pragmatic-explanatory continuum and the degree to which the intervention reports on the 5 dimensions of RE-AIM. As we saw in the results, all of the explanatory studies also scored moderately on the RE-AIM quality assessments; leading to the conclusion that pragmatic does not necessarily correlate to a better RE-AIM quality assessment. Finally, as seen in interventions that score higher on the RE-AIM quality assessment, studies that are more controlled on the intervention side can still be open on the bottom of the diagram for a more pragmatic approach to representativeness. For example, Rejeski (2002;2003) was considered more tightly controlled on the PRECIS domains, however, the manuscript also received a rather high RE-AIM score (quality score of 10). As seen in Appendix A, 41% (*n*= 7) of the studies are broad at the bottom of the wheel and more narrow on the top, *and* have a moderate score for RE-AIM quality (quality score of 11). The domains that are more pragmatic across the group dynamics physical activity promotion literature are follow-up intensity, outcomes of interest, and practitioner and participant compliance. On the other hand, the studies were more explanatory on the expertise required to deliver the intervention components and the flexibility of the protocol for both the intervention arm and the comparison condition.

Conclusion

There are 17 studies that have utilized group dynamics to increase physical activity behaviors. Only one of those studies had a low RE-AIM quality score, while the rest were of moderate (n=13) or high (n=3) in quality. As hypothesized, the level of pragmatism varied across this specific body of literature. This current study continues the call for more rigorous reporting on all dimensions of RE-AIM, specifically on costs, in order to speed the rate of translation, and clearly indicates that interventions can combine both tight/explanatory (run-in periods) domains as well as pragmatic (broad inclusion criteria) domains and still be effective and ready to translate into practice.

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| Manuscript Two |

Predicting minority women's perceptions of group cohesion: The role of cooperation, communication, and competition

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Abstract:

Interaction in the form of cooperation, communication, and friendly competition theoretically precede the development of group cohesion—an important factor in physical activity (PA) groups. The purpose of this paper was to determine cross-sectional and longitudinal relationships among dimensions of group cohesion and group-interaction variables. Ethnic minority women who completed a group-dynamics-based PA intervention (N=103; 73% African American; 27% Hispanic/Latina; m_{age}=47.89±8.17 years; m_{BMI}= 34.43± 8.07 kg/m^2) provided assessments of group cohesion and group-interaction variables at baseline, 6 months (post program), and 12 months (follow-up). All four dimensions of group cohesion (the individual's attraction to the task and social components of the program as well as the perception that the group was integrated around the task or as a social unit) had significant (*p*s<.01) relationships with the group-interaction variables. More specifically, and contrary to popular opinion, competition was a consistently strong predictor of cohesion in a PA environment for women while cooperation did not demonstrate consistent patterns of prediction.

Introduction

Group dynamics includes the study of the nature of groups, individual relationships within groups, and facilitated interactions with others. Kurt Lewin's seminal work suggested that the degree to which a group was cohesive would determine the degree to which individuals within the group were successful as a collective (Lewin, 1947). Group cohesion has a long history as an important predictor of performance and outcomes in work, military, and sport groups (e.g., Golembiewski, 1962; Lott & Lott, 1965). It is also an important outcome in its own right as it reflects a fundamental human need—the need to belong (Baumeister & Leary, 1996).

Group cohesion has been defined in many ways (Festinger 1950; Gross & Martin, 1952; Mudrack 1989; Mullen & Cooper, 1994), but Carron and colleagues' definition has been used consistently in physical activity promotion and research. Group cohesion is a process that groups undergo in gaining cohesion and unity which leads to shared pursuit of common objectives to satisfy member needs (Carron, Brawley, & Widmeyer, 1997, p. 213). Group cohesion can be operationalized as individual (1) attraction to the group's task-based activities (ATG-T), (2) attraction to the group's social activities (ATG-S), (3) perceptions of the group's integration around task activities (GI-T), and (4) perceptions of the group's integration around social activities (GI-S). These individual perceptions influence whether the participant positively assesses the intended outcomes of the group (i.e., increased physical activity, weight loss) and finds the group to be an engaging social unit.

Over the previous two decades a large body of literature has also documented the positive relationship between group cohesion and physical activity adoption and maintenance (Beal, Cohen, Burke, McLendon, 2005; Carron, Shapcott, Burke, 2008; Estabrooks & Carron, 1999; Estabrooks, 2000; Hivert, Langlois, Be'rard, Cuerrier, Carpentier, 2007). Participants who have strong perceptions of group cohesion attend group sessions more often, are late less often, and drop out less frequently (Carron, Shapcott, Burke, 2008). Group cohesion also has demonstrated a consistent relationship with positive attitudes toward physical activity and enhanced perceptions of self-efficacy and personal control (Estabrooks, 2000).

A number of intervention trials have been conducted to test interventions that target improved group cohesion through group interactions (Estabrooks, Harden, & Burke, 2012).

Most of these trials were based on a model developed by Carron and Spink (1993) that focused on the importance of group interaction in the form of cooperation, communication, and friendly competition. Two recent reviews provide support for this model in physical activity promotion. For example, in a review of studies targeting physical activity promotion for older adults, interventions that were based on developing group cohesion through the implementation of structured group-interaction strategies were superior at increasing physical activity than programs that were delivered to group of people who may not interact (e.g., drop-in fitness classes) or social support interventions delivered to individuals (Burke et al, 2006). A second review of 17 intervention studies that included at least one component of the Carron and Spink model found that all studies that incorporated group interaction in the form of communication, cooperation, or competition demonstrated significant increases in physical activity (Estabrooks, Harden, & Burke, 2012). However, to date there have been no investigations that have examined the relationship between group cohesion in physical activity groups and group member perceptions of communication, cooperation, and competition (Beal, Cohen, Burke, McLendon, 2005). Understanding such relationships could aid in developing stronger strategies to enhance group cohesion within physical activity groups.

Recently, Lee and colleagues (2011) promoted group cohesion among minority women enrolled in the Health is Power (HIP) trial. The intervention increased opportunities for women to cooperate around class activities, engage in friendly competition around group goals, and join in ongoing discussions related to physical activity, and for the participants to engage at a social level. Similar to previous studies, the HIP trial demonstrated that the multi-dimensional components of group cohesion were significantly changed by the intervention and mediated the relationship between the intervention and program adherence (Smith-Ray, Mama, Reese-Smith, Estabrooks, Lee, 2011).

The HIP trial provides a unique opportunity to examine the relationships among the dimensions of group cohesion and communication, cooperation, and competition in a physical activity promotion intervention. The purpose of this paper was to determine the cross-sectional and longitudinal relationships among group cohesion and group-interaction variables over the 6-month HIP physical activity intervention and at 6-months following intervention completion

(i.e., 12 month follow-up). It was hypothesized that each group-interaction variable would contribute to a large proportion of explained variance in group cohesion at each time point and over time. Because of the implicit task focus of cooperation and friendly competition, it was hypothesized that these group interaction variables would have the largest relationship with the task aspects of group cohesion. It was also hypothesized that social communication would be related to the social aspects of cohesion. Last, it was hypothesized that perceptions of group cohesion and group interaction would increase over the course of the program, but decrease from program completion to the 12-month follow-up.

Method

African American and Latina women were recruited to participate in a study to test a 6-month intervention designed to promote physical activity (see Lee et al., 2012 for details on recruitment). Women were randomly assigned to the physical activity intervention or a fruit and vegetable promotion matched contact control group. Only participants randomly assigned to the physical activity intervention group were included in this study. The intervention was 24 weeks in duration and included six sessions. Each session was comprised of group dynamics strategies and principles based on the model developed by Carron and Spink (1993). Opportunities for communication were provided in the form of small group discussions related to barrier identification and resolution, group walking, and social time before and after each session. To facilitate cooperation participants engaged in peer problem solving activities and collaborative group goal setting. Last, competition was instilled through documenting individual contributions to group goals as well as providing information on progress towards goals and feedback on group goals over time.

Participant perceptions of physical activity group cohesion, communication, cooperation, and competition were assessed at baseline, post intervention, and 6-months after the intervention was completed. All program components were approved by the University of Houston's Committee for the Protection of Human Subjects.

Sample

As the focus of this study was to determine the effect of group communication, cooperation, and competition on cohesion, only data from the 103 participants randomly

assigned to the physical activity group who completed baseline and post-program measures was used (see Smith-Ray et al., 2011 for details). Of those women, 73% identified as African American and 27% identified as Hispanic or Latina. The participants were 47.89 years of age (± 8.17) with an average BMI of 34.43 kg/m^2 (± 8.07). Eighty-three participants completed the 12-month follow-up assessment.

Measures

Group Cohesion. The Physical Activity Group Environment Questionnaire (PAGEQ; Estabrooks & Carron, 2000) is a group cohesion inventory for physical activity groups and was used in the HIP trial. The PAGEQ is a 21-item measure of the four dimensions of ATG-T, ATG-S, GI-T, GI-S with 6, 6, 5, and 4 items, respectively. All 21 items are on a 9-point Likert scale ranging from 'strongly agree' to 'strongly disagree' (Estabrooks & Carron, 2000). ATG-T was assessed by having participants respond to items such as 'I like the amount of physical activity I get with this group'. ATG-S was operationalized through statements such as 'I enjoy my social interactions with this group.' The group integration dimensions of cohesion were assessed using items such as 'members of our group often socialize together' (GI-S) and 'our group is united in its beliefs about the benefits of regular physical activity' (GI-T). This questionnaire has demonstrated content, predictive, and concurrent validity (Estabrooks & Carron, 2000).

Group-Interaction Variables. To measure the group-interaction variables of interest (i.e., communication, cooperation, and competition) additional items were embedded within the PAGEQ. Like cohesion, communication was operationalized as having a task and social focus and was measured through 6 items that can be further divided into task communication (e.g., 'members of our group talk about how often they should do physical activity') and social communication (e.g., 'people of this group talk about things that are happening in our lives'). Cooperation and competition were not conceptualized as having relevant social components and focused on task outcomes. Cooperation was measured through 3 items (e.g., 'we all cooperate to help this group's program run smoothly') as was competition (e.g., 'There is friendly competition within the members to stay as healthy as possible'). Internal consistencies for the group-interaction variables were all acceptable: task communication (α = .94), cooperation (α = .91), friendly competition (α = .81), and social communication (α = .65).

Analysis

Descriptive statistics, paired sample t-tests, and multiple regressions were conducted with a priori significance set at $p < .05$. Results from the modified PAGEQ (i.e., to include group-interaction variables) were entered into IBM SPSS 19.0. Within participant t-tests were conducted to determine changes in the group cohesion and interaction variables over time. Logistic regressions were conducted to detect which group-interaction variables predicted group cohesion over the course of the program and at 12-month follow-up. Cross-sectional analyses of all group-interaction variables (social communication, task communication, friendly competition, and cooperation) with each dimension of cohesion were also conducted for each time-point using regression. Longitudinal change scores (from baseline to post-program and post-program to follow-up) were computed for each group-interaction variable and dimension of cohesion for use in the regressions.

Results

First, a correlations matrix has been presented in Table 1 to indicate the Table 2 includes the descriptive data across time for the group cohesion and group interaction variables. As can be noted in the Table, all 4 group-interaction variables (task and social communication, cooperation, competition), as well as 3 dimensions of cohesion (ATG-T, ATG-S, GI-T), significantly increased from baseline to post-program ($p < .05$), and the magnitudes of the changes were moderate to large (e.g., Cohen's d ranging from 0.5-0.89). GI-S significantly decreased from baseline to post-program, and the magnitude of change was moderate (Cohen's d=0.64). With the exception of GI-S (which decreased, but not significantly), all variables had a significant decreased from post-program to 12-month follow-up in the range of small to moderate effect sizes (Cohen's d ranging from 0.27-0.53).

Table 1. Correlation Matrix for the Four Group-Interaction Variables Over Time.

	Baseline				**Post-Program**				**Follow-Up**			
	Coop	**FC**	**S. Comm**	**T. Comm**	**Coop**	**FC**	**S. Comm**	**T. Comm**	**Coop**	**FC**	**S. Comm**	**T. Comm**
ATG-T	**0.44***	**0.59***	**0.46***	**0.49***	0.01	**0.33***	**0.50***	**0.55***	**0.49***	**0.54***	**0.44***	**0.48***
ATG-S	**0.54***	**0.70***	**0.73***	**0.49***	-0.05	**0.30***	**0.78**	**0.51***	**0.58***	**0.58***	**0.67***	**0.56***
GI-T	**0.74***	**0.47***	**0.61***	**0.81***	**0.77***	**0.55***	**0.67***	**0.83***	**0.73***	**0.60***	**0.64***	**0.82***

	Baseline				Post-Program				Follow-Up			
	Coop	FC	S. Comm	T. Comm	Coop	FC	S. Comm	T. Comm	Coop	FC	S. Comm	T. Comm
GI-S	**0.53***	**0.31***	**0.52***	**0.57***	**0.52***	**0.40***	**0.47***	**0.46***	**0.52***	**0.36***	**0.50***	**0.51***
Coop	--	**0.52***	**0.77***	**0.87***	--	0.47	**0.59***	**0.76***	--	**0.45**	**0.67***	**0.77***
FC	**0.52***	--	**0.57***	**0.49***	**0.44***	--	**0.58***	**0.54***	**0.45***	--	**0.36***	**0.56***
S. Comm	**0.77***	**0.57***	--	**0.70***	**0.59***	**0.59***	--	**0.71***	**0.67***	**0.52***	--	**0.70***
T. Comm	**0.87***	**0.49***	**0.70***	--	**0.76***	**0.54***	**0.71***	--	**0.77***	**0.56***	**0.70**	--

* Pearson Correlation p <.05

ATG-T= Individual's Attraction to the Group Task
GI-T= Group Integration towards the Task
Coop= Cooperation
S. Comm = Social Communication
ATG-S= Individual's Attraction to the Group Socially
GI-S= Group Integration Socially
FC= Friendly Competition
T. Comm = Task Communication

Table 2. Descriptive Statistics of Group-Interaction Variables Over Time.

Group-Interaction Variable	Baseline *M* (n= 103)	Post-Program *M* (n= 103)	Follow-Up *M* (n= 83)
ATG-T	6.24 ($SD \pm 1.08$)	7.19* ($SD \pm 1.37$)	6.53** ($SD \pm 1.57$)
ATG-S	6.09 ($SD \pm 1.30$)	6.81* ($SD \pm 1.41$)	6.25** ($SD \pm 1.46$)
GI-T	5.64 ($SD \pm 1.46$)	6.86* ($SD \pm 1.27$)	6.21** ($SD \pm 1.48$)
GI-S	5.17 ($SD \pm 1.27$)	4.16* ($SD \pm 1.77$)	3.92 ($SD \pm 1.64$)
Cooperation	5.77 ($SD \pm 1.64$)	6.94* ($SD \pm 1.41$)	6.28** ($SD \pm 1.74$)
Friendly Competition	6.29 ($SD \pm 1.28$)	6.97* ($SD \pm 1.38$)	6.44** ($SD \pm 1.52$)
Social Communication	5.83 ($SD \pm 1.33$)	6.71* ($SD \pm 1.56$)	6.28** ($SD \pm 1.60$)
Task Communication	5.66 ($SD \pm 1.49$)	7.00* ($SD \pm 1.47$)	6.32** ($SD \pm 1.75$)

*Significant change ($p < .05$) between baseline and post-program
** Significant change ($p < .05$) between post-program and follow-up

The proportion of explained variance in the group cohesion dimensions and the related standardized beta coefficients for each regression are presented in Table 3 (cross-sectional results) and Table 4 (longitudinal results). Results by group cohesion dimension are presented below. The amount of explained variance in ATG-T ranged from 44 to 71 percent when considering cross-sectional data at each time point and was approximately 30% for each of the longitudinal regression analyses. Participant perceptions of competition and task communication were consistent contributors to the variance explained in the cross-sectional and longitudinal regressions. The group interaction variables seemed to explain a slightly higher amount of the variance in GI-T when considering both the cross-sectional (i.e., 60 to 80% of explained variance) and longitudinal data (i.e., approximately 60% of the variance). Task communication and friendly competition were again significant contributors to the explained variance across the cross-sectional and longitudinal regressions.

Table 3. Cross-sectional proportion of variance in each dimension of group cohesion at each time point explained by perceptions of communication, cooperation, and competition.

	ATG-T			**ATG-S**			**GI-T**			**GI-S**		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
R^2	0.44	0.64	0.71	0.64	0.71	0.64	0.62	0.77	0.81	0.36	0.29	0.38
β Cooperation	0.13	-0.19	0.15	0.10	0.02	**.16***	0.00	**.23***	**.21***	-0.13	**.38***	0.17
β Friendly Competition	**.43***	**.32***	**.35***	**. 37***	**.36***	**.30***	**.11***	0.08	**.20***	0.05	0.11	0.09
β Social Communication	-0.05	-0.05	**.02***	**.49***	**.59***	**.44***	-0.04	**.11***	0.02	**.17***	**.24***	**.39***
β Task Communication	**.21***	**.63***	**.19***	0.08	**-.11***	-0.09	**.77***	**.44***	**.47***	**.53***	-0.01	0.06

* ($p < .05$)[1]

[1] ATG-T (Attraction to the Group's Task); ATG-S (Attraction to the Group Socially), GI-T (Group's Integration towards the Task); GI-S (Group's Integration Socially)

Table 4. Longitudinal regression results predicting each dimension of group cohesion.

	ATG-T		ATG-S		GI-T		GI-S	
	T1-T2	T2-T3	T1-T2	T2-T3	T1-T2	T2-T3	T1-T2	T2-T3
R^2	0.31	0.33	0.59	0.43	0.61	0.63	0.30	0.21
β Cooperation	-0.01	0.13	0.10	**0.20***	0.08	**0.18***	0.06	0.18
β Friendly Competition	**0.19***	**0.31***	**0.44***	**0.33***	**0.16***	**0.23***	0.07	**0.24***
β Social Communication	-0.13	-0.01	**0.42***	**0.28***	0.04	**0.20***	**0.28***	0.19
β Task Communication	**0.41***	**0.26***	-0.13	-0.04	**0.56***	**0.34***	**0.27***	0.34

*($p < .05$)[2]

The regression analyses used to examine ATG-S showed a significant amount of explained variance across the cross-section (i.e., 64 to 71 percent) and longitudinal (i.e., 43 to 59 percent) approaches. Social communication and friendly competition were significant contributors to the explained variance across the cross-sectional and longitudinal regressions of ATG-S. A somewhat lower proportion of variance was explained using the group interaction variables with GI-S (i.e., 29 to 38 percent cross-sectionally; 21 to 30 percent longitudinally). Further, only social communication seemed to contribute consistently to the explained variance.

Discussion

Communication, cooperation, and competition are key variables in the prediction of group cohesion (Carron & Spink, 1993; Estabrooks, Harden, Burke, 2012). We were able to support the propositions from Carron and Spink's model that some of these variables are significantly related to group cohesion. We extended the findings of previous literature to show that friendly competition predicted nearly all of the dimensions of group cohesion at all time points using both cross-sectional and longitudinal analyses. We also found that social and task forms of communication have more consistent patterns of relationships with the social and task dimensions of group cohesion—supporting the hypothesis that different group interaction

variables would predict different dimensions of group cohesion. Contrary to our hypotheses, perceptions of cooperation did not demonstrate a consistent relationship with any dimension of group cohesion or across time-points.

One of the more interesting and perhaps unexpected findings was the degree to which friendly competition was consistently and positively related across group cohesion dimensions, with the exception of GI-S. There is evidence when groups set a goal based upon the summing of individual progress it results in a perceived conjunctive task, where the success is based upon not only the expertise of the highest performing members, but is also limited by the progress of the lowest performing members (Feltz, Kerr, Irwin, 2011; Lount & Phillips, 2007). Feltz and colleagues (2011) also found that members of groups working on a conjunctive task become motivated to ensure that they are not the rate-limiting factor on performance. It is possible that participants are motivated to complete tasks so they would not be the one holding back the team (Dunlop, Beatty, Beauchamp, 2011).

Perhaps a less abstract explanation for the potentially predictive role of friendly competition is simply that participants like to try and be the best in their own groups. For example, Green and colleagues (2007) successfully harnessed this idea of friendly competition in their study of group-dynamics based physical activity promotion in worksites, where worksites had team-based competitions. Recognition for successful competition was achieved with nominal awards, such as displaying the "winning" team of the week on the board or providing winners with physical activity or healthy eating based awards (i.e., water bottles)—this competitive, feedback, and reward approach also resulted in significant increases in physical activity (Green, Cheadle, Pellegrini, Harris, 2007).

Our findings around task-communication and the task aspects of group cohesion should not be surprising given the use of a number of strategies that encourage participants to engage in discussions about physical activity. Communication around the task at hand can be facilitated through mechanisms such as group problem-solving as has been used successfully in other studies (Leermakers et al., 1999; Perry et al., 2007). Our findings contribute new information to this body of literature—that group interactions may not only result in applicable plans for

participants to achieve a goal, but may also foster a sense of cohesion that can increase motivation toward the goal (Carron & Spink, 1993).

It was surprising that cooperation was not consistently predictive of group cohesion over the course of this study. Our initial belief was that cooperation would be strongly related to the task aspects of group cohesion because of the previous findings that control beliefs, often developed through vicarious learning and support, are predictive of the task forms of group cohesion (Estabrooks & Carron, 1999). There are a number of possible explanations for this. First, the classes may not have included activities that the participants considered cooperative. This seems unlikely given the significant increase in participant perceptions of cooperation over the course of the program. Further, cooperative activities are a consistently reported aspect of group-based programs for physical activity (Estabrooks, Harden, Burke, 2012). Second, it could be that communication and friendly competition account for the role of cooperation within a physical activity environment. We did not propose such an indirect relationship prior to completing our analyses, but suggest this may be an interesting area of future investigation.

This was the first study to test these group-interaction variables and to determine their predictive relationship of group cohesion. First, the measures for group-interaction variables were developed specifically for this project and, although they demonstrated internal consistency and predictive validity, further validity and reliability testing is warranted. Additionally, the analyses were limited to participants who had both the baseline and follow-up assessments for group interaction and cohesion variables resulting in findings that cannot be generalized broadly. Nevertheless, the investigation of these relationships in a large minority population and over time, provided the opportunity to speak more definitively about the consistent relationships that were found.

Conclusion

These results helps to decrease the paucity in the literature around the relationship between group-interaction variables and group cohesion. In a recent systematic review of group dynamics-based physical activity interventions it was concluded that more research is needed to determine what mechanisms lead to the robust effect of these interventions (Estabrooks, Harden, Burke, 2012). Group-interaction variables are a direct way in which to influence the perceptions

of cohesion. Strategies that foster friendly competition will be the most likely to improve participant perceptions of group cohesion and cooperation lacked a consistent pattern of prediction. This is of particular interest as females are seen as the more cooperative and collective gender (Singelis & Brown, 1995; Vandello & Cohen, 1999), yet competition was a greater, and more consistent, predictor of cohesion. Therefore, future research endeavors are needed to see if these findings are generalizable to other all-female physical activity groups. If so, revamping the competitive nature of physical activity might help women to engage in and sustain positive physical activity behaviors.

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| Manuscript Three |

Conceiving a translatable standard for obese, maternal, obstetrical care: Influences of Group Dynamics in a Group Visit Model

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Abstract

Obecjtives: To (1) determine the effectiveness of an intervention to limit excessive gestational weight gain, and (2) evaluate the feasibility of continuing this program in typical prenatal health care. Methods: Medicaid eligible women (n=14) participated in a mixed-methods pilot study comparing standard care prenatal treatment (n=8) to a group dynamics enhanced group visit (n=6). The program was designed to promote regular physical activity and improve dietary intake recommendations over the course of a 24-week period. Results: At the completion of the program, women in the intervention gained significantly less weight than those in the control condition (11.67±11.76lbs. v 19.05±8.56lbs., ES *d*=-.73). Qualitative results suggested that reduced weight gain could be attributed to group cohesion and improved self-efficacy. Unfortunately, feedback from the staff and participants indicate that a group visit model may not be a feasible delivery method to combine physical activity with the activities included in a typical prenatal visit. Discussion: The results from this study suggest the program was successful in reducing excessive weight gain but qualitative feedback suggests the need to investigate alternative strategies for integrating prevention of excessive weight gain strategies within the current prenatal pathway of care for this population.

Introduction

Based on the 2002 National Survey of Family Growth (NSFG), one in three women of childbearing age in the United States was obese. Further, the prevalence of obesity is even higher in women with lower levels of education, income, and health insurance coverage (Borodulin Fang, Herring, Benson, 2008). The combination of the relationship between obesity during pregnancy and maternal complications (Vahratian, 2009), fetal congenital abnormalities (Stotland , 2008; Stothard, Tennant, Bell, Rankin, 2009; Wax, 2009), increased risk of childhood obesity (Thornton et al., 2006), and extra expenses accrued from greater use of inpatient and outpatient health care services (Chu, Kim, Bish, 2009) suggests that interventions to address obesity during pregnancy are urgently needed (Phelan, 2010).

Despite recommendations for pregnant women to be physically active, studies show there is still an overall decrease in physical activity throughout pregnancy (Vahratian, 2009). Additionally, pregnant women, when compared to non-pregnant women, pay less attention to body weight and caloric intake (Johnson, Burrows, Williams, 2004). Current evidence-based guidelines for gestational weight gain for overweight (i.e., pre-pregnancy BMI 25 to 29.9) and obese (i.e., pre-pregnancy BMI $\geq$ 30) women include recommendations to gain between 15 to 25 and 11 to 20 pounds, respectively, over the course of pregnancy (IOM, 2009). Overall, the literature denotes that physical activity and healthy eating habits will have beneficial results for prenatal women and their developing fetus (Artal, Catanzaro, Gavard, Mostello, Friganza, 2007; Badrawi, Hassaneie, Badroui, Wafa, Shawky, Badrawi, 1993; Borodulin Fang, Herring, Benson, 2008; Brockelsby & Dresner, 2006; Claesson et al., 2008; Gray-Donald, Robinson, Collier, David, Renaud, Rodrigues, 2000; Kiel, Dodson, Artal, Boehmer, Leet, 2007; Mumford et al., 2008; Olson, 2008; Thornton, Smarkola, Kopacz, Ishoof, 2009; Vahratian, 2009) however adherence to regular physical activity has been problematic (Chu, Kim, Bish, 2009; Cramp & Brawley, 2006) in this population.

Although assertions can be made from the current literature that physical activity and healthful eating can significantly reduce congenital abnormalities or maternal risks, there are many misconceptions related to physical activity, eating, and weight gain during pregnancy. For

example, it is common for women to believe that physical activity during pregnancy is risky, and as a result they subsequently reduce activity further (Fell, Joseph, Armson, Dodds, 2009). Similarly, women often believe that excessive weight gain is a typical outcome of pregnancy and does not have significant health consequences for the fetus or mother (Johnson, Burrows, Williams, 2004).

Physicians and other healthcare professionals play an important role in addressing misconceptions and ensuring that a pregnant patient participates in safe physical activity and healthful eating practices (Kuehn, 2009; Phelan, 2010). While the literature on the efficacy of physicians' advice to promote physical activity, healthful eating and weight loss is equivocal (Eden, Orleans, Mulrow, Pender, Teutsch, 2002; Phelan, 2010; Pignone et al., 2003; Tsai & Wadden, 2009), it may be a necessary, but insufficient component of any intervention targeting the avoidance of excessive weight gain during pregnancy. That is, during pregnancy, a woman's physician provides expert advice and is perceived to be credible when providing activity, eating, and weight gain recommendations (Ockene et al., 2007; Phelan, 2010; van Gerwen, Rosman, Le Vaillant, Pelletier-Fleury, 2009). Yet, physicians often feel they lack the time necessary to deliver this information. However, healthful eating and physical activity information can be provided in a group visit model, where multiple patients receive care simultaneously (Clancy, Dismuke, Magruder, Simpson, Bradford, 2008). Furthermore, specific benefits for the clinic (i.e., reduced delivery costs and time) and to the patient (i.e., improved health outcomes; satisfaction with their care) have resulted from group visits (Coleman, Geller, Rosenkranz, Dzewaltowski, 2008; Noffsinger, 1999; Scott, et al., 2004). Klima and colleagues' (2009) work indicates that women were more satisfaction with their interactions in group-based visits when compared to individual prenatal care.

Group visits provide an opportunity to enhance cohesion within the prenatal care group. Group cohesion is defined as the "dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives and/or the satisfaction of member affective needs" (Carron, Widmeyer, & Brawley, 1985, p.213). As one of the most important small group variables (Golembiewski, 2006; Lott & Lott, 1965) group cohesion can lead to improved performance, productivity and achievement within a group

(Gammage, Carron, Estabrooks, 2001). Specific to physical activity, a recent meta-analysis demonstrated that group-dynamics interventions (i.e., those that target increased group cohesion through group goal setting, peer sharing, collective incentives) were more effective in changing physical activity across a variety of populations when compared to individually delivered interventions (Burke et al., 2006). To date there have been no studies, to our knowledge, that have focused on using group-dynamics strategies within a group-visit model. In addition, no study has implemented a prenatal group visit model with the goal of limiting gestational weight gain for women identified at high risk of excessive weight gain (i.e., low income, obese women). As such, there is a need to investigate the practicality of group visit models that would promote physical activity and healthy eating for obese pregnant women. Therefore, the specific purpose of this study was to determine the feasibility and effectiveness of a group visit model that provides healthful eating and physical activity guidance to avoid excessive weight gain through group dynamics-based activities.

Methods

Setting

Due to the broad reach of pre-natal care and perceived credibility of physicians for pregnant women, patients were recruited through an obstetrics and gynecology clinic in Virginia. The clinic and healthcare professionals provide care for approximately 200 new prenatal patients per month. The typical payer mix is 58% government assisted Medicaid/ Medicare, 31% Self Pay, 7% Anthem (local health insurance provider), and 4% other. The recruitment procedures were embedded in the initial prenatal care visit. That is, women were referred to the study by their physician and met with a study recruiting agent (i.e., research assistant) prior to completing the visit. The program, outlined below, was conducted in an adjacent facility, owned and operated by the clinic, which had the necessary space and accessibility for the group visit.

Study Design

This mixed-methods study included a small randomized controlled pilot trial followed by participant and healthcare staff interviews to provide information on potential program effects, mechanisms of effect, and feasibility. The recruiting agent was blinded to condition allocation. Condition allocation was created using a random numbers generator, sealed envelopes with

consent forms and study information were opened with each potential participant. The Carilion Clinic Institutional Review board approved this research project.

Intervention: The intervention was developed based upon previous group visit research (Scott et al., 2004) and group-dynamics theory as outlined by Carron and Spink (1993) as a method to increase participation in physical activity. This model has been used to develop a number of interventions that target physical activity and healthful eating and, as a broad guiding principle, focuses on the development of group cohesion (Estabrooks, Bradshaw, Dzewaltowski, Smith-Ray, 2008; Martin, Burke, Shapiro, 2009). All group visits were planned for one hour and included physical activity, nutrition education and demonstrations, and group dynamics based activities (e.g., group goal setting). Patients also completed their individual prenatal check-up during the group visit. To ensure adequate opportunities for interaction between group members, the intervention was delivered over a 6 month period; beginning at 12 weeks of gestation and concluding at week 36. This frequency was also selected to align with the standard-care visit frequency during pregnancy and included 6 group visits over the 6 month period. Table 1 provides a list of evidence-based group dynamics principles that were used across the course of the intervention and examples of activities that address each principle (Estabrooks, 2008; Sénecal, Loughead, Bloom, 2008). The overall goal of the class was to support the women to adhere to the recommended guidelines for weight gain by promoting physical activity (e.g., 150 minutes of moderate physical activity per week ACOG, 2002) and healthful eating based on United States Department of Agriculture recommendations for pregnant women (MyPyramid.gov). To ensure that there was enough activity space for all participants each session was completed in a large room in a building adjacent to the clinic with access to all medical supplies needed for the check-ups. The market value of the facility was approximately $75 per hour; with 2 separate conditions and 6 total sessions, the total was $900. The leader, who had expertise in group dynamics and prenatal care and a Bachelor's degree, dedicated 2 hours per month for 6 months, at $50 an hour, for a total of $600 for the duration of the program. Other nominal expenses (i.e., scrapbook supplies, diaper bags) totaled $2,000. The Carilion Clinic Institutional Review board approved this research project.

Table 1: Group-Dynamics Based Strategies by Session.

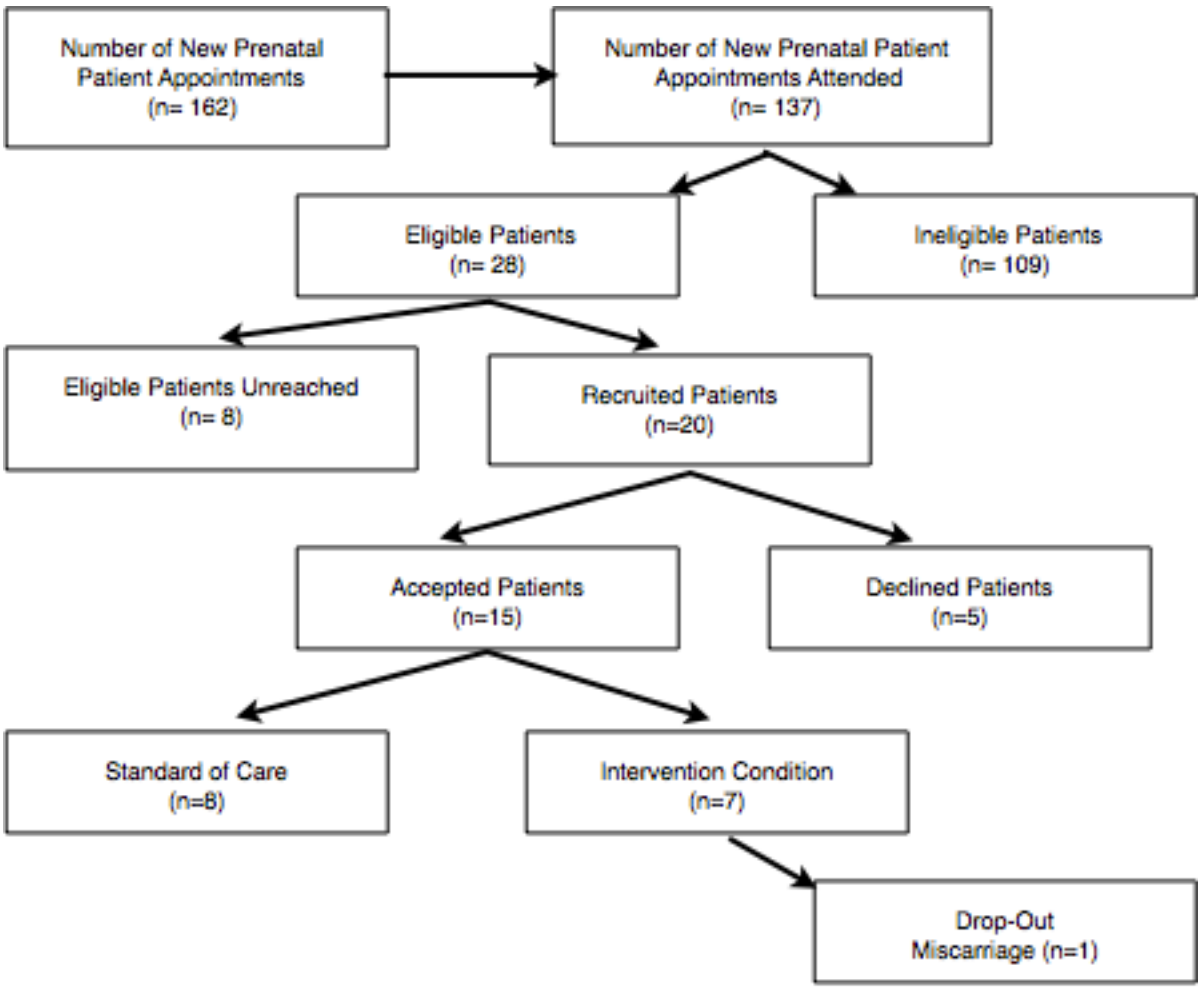
Session 1	Introduction session · Introduction of staff and explanation of study, timeline of program discussed, details, Q & A · Name circle: sit in circle, everyone says an alliteration of their name with a word they would use to describe themselves. Then the next participant would introduce herself then repeat the previous woman's name and so on. (i.e. , Sensitive Samantha, Creative Catherine, etc.) · Journal distribution; introduction of food guide recommendations; set individual goals
Session 2	· Active Team Building Exercise - Reestablishment of Group: Name Circle and one challenge and success they faced over the last month - Participants share their physical activity histories in the context of childhood, young and early adulthood, prior to joining the group - Creation of team name, establishment of team goals - Set weekly group goals.
Session 3	· Active Team Building Exercise - Reveal team progress report on discussion board - Kickball; say one positive, unexpected pregnancy feeling/experience, etc. then kick the ball over to a fellow mother-to-be. - Set weekly group goals.
Session 4	· Active Team Building Exercise - Follow the leader: participants share what their favorite at home work out exercise is and pick a song to coincide with the motion. - Set weekly group goals.
Session 5	· Active Team Building Exercise - Food (models, real, or pictures TBD) will be on the table, and participants must place them in the appropriate food category (i.e., yogurt in the milk category) - Set weekly group goals.
Session 6	· Active Team Building Exercise - Progress report for team - Evaluation of team progress. Roadmap creation…who were you 38 weeks ago, how did you see yourself as part of the group? Create a collage.

Control: The study was initially designed as a three-armed trial with the intervention condition (as described above), alongside a standard care control and a matched-contact group visit control without group dynamics strategies. However, due to the need to start group sessions with women at the same gestational point lead to the collapsing of participants randomly assigned to the matched-contact control and standard care, prior to the completion of any control group visits (i.e., all control participants received standard care). The standard of care arm was designed to follow women through the standard pathway of care which included the same number of visits as the intervention group.

Sample

Women who were obese prior to presenting at the partnering clinic for obstetrical (prenatal) care were eligible to participate in the study. The sample eligibility criteria included being a clinic OB/GYN patient, pre-pregnancy BMI ≥ 30, physician clearance for attendance, 21-35 years of age, less than 21 weeks gestational age. Those patients who were either currently diagnosed with medical complication or were Non-English speaking were not eligible as sessions and materials were only available in English. Fifteen prenatal women were recruited from the obstetrics and gynecology clinic. The mean age of the participants was 21.9 years (+ 4.84yrs.). The sample was 61.5% white/Caucasian, 23% black/African American, 7.6% multiracial, and 7.6% unknown. Twenty-five percent (n=4) of the women were first time mothers, and 12.5% (n=2), 25% (n=4), 10% (n=1), and 10% (n=1) were pregnant with their second, third, fourth, and fifth child, respectively. Four women (25%) did not report on their number of children. One participant dropped out of the intervention condition prior to the first session due to miscarriage and was not included in the analyses. The recruitment and retention is presented in Figure 1. Of the 137 women who presented for care, 28 had a BMI ≥ 30, and were potentially eligible for the program. There were 5 women who declined the invitation to participate due to lack of transportation (n=2), their busy schedule (n=2), or being uninterested in group prenatal care (n=1).

Figure 1: Recruitment of New Prenatal Clinic Patients.



Measures

Weight. Gestational weight gain was measured throughout the study at every prenatal check-up. Baseline measurements were conducted at the initial prenatal visit (≤12 weeks of gestation). Participants wore a standard hospital gown for body weight and height for each measurement. Body mass was also assessed to the nearest 0.1 kg using a digital scale calibrated for accuracy prior to each assessment period using standard weights of a known quantity. BMI was calculated as weight (kg)/height(m)^2. The final body weight assessed prior to giving birth was used to determine weight gain during pregnancy.

Evaluation of Program. Qualitative procedures included use of semi-structured interviews and focus groups. Perceptions of the study physician and nurse were gathered through semi-structured one-on-one interviews to determine the feasibility of the group dynamics based

program (e.g., adoption), the fidelity to protocol (e.g., implementation), and potential sustainability in the current healthcare system (e.g., system-level maintenance). Similarly, we gathered perceptions of the women randomly assigned to the intervention group through a post-program focus group to determine program feasibility and acceptability.

Data Analysis

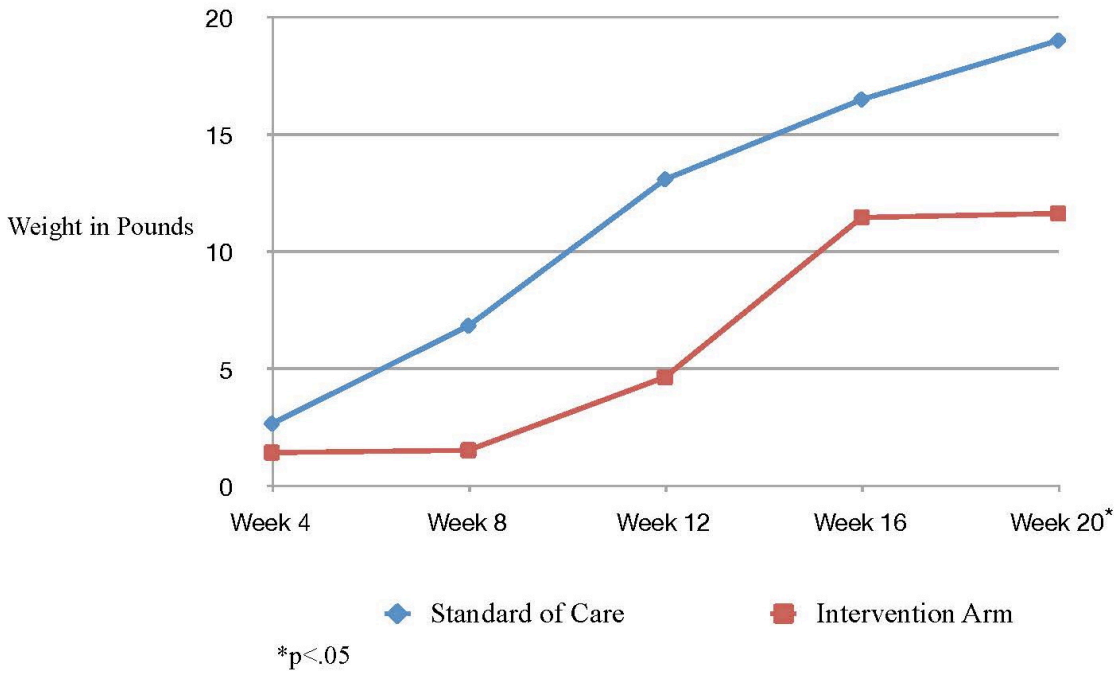
Descriptive statistics were completed on study variables. Between group intention to treat ANOVAS were conducted to compare intervention and control participants on mean gestational weight gain after 4, 8, 12, 16, 20, and 24 weeks of intervention contact. We also computed standardized effect sizes for each time point to provide a sense of the potential magnitude of effect using Cohen's *d* and a pooled standard deviation. A semi-structured interview was developed to obtain information on program components and inform future implementation efforts. Specific topics discussed were: 1) physical activity within the program, 2) if the participants would continue with a program like *c*MOC post-partum, 3) feedback on the healthy eating information addressed in class, 4) goal setting, 5) overall class sessions, 6) how *c*MOC effected exercising habits throughout pregnancy, 7) opinions about limiting gestational weight gain, 8) prenatal eating habits 9) perceptions of evidence-based program features (i.e., reminder calls), 10) suggested program adaptations, 11) location of the intervention, 12) overall experience, 13) financial aspects of a program like *c*MOC and finally the focus group allowed women to share any final thoughts about the program. Four participants attended the focus group. In addition, the nurse and physician that were assigned to assisting with *c*MOC were interviewed one-on-one. Audio and written recordings of focus group discussions and semi-structured interviews were transcribed verbatim. An inductive interpretation of the transcriptions lead to a narrative based on the semi-structured format of the interview (i.e., major responses under a specific question). The narratives were member-checked by participants for validity. Four pregnant patients and two providers (nurse and physician) provided data for this qualitative inquiry.

Results

Gestational Weight Gain

On average, the women were recruited by 11weeks, 5 days (±2.7 days) of gestation; specifically by 12 weeks, 1 day (±2.29 days) of gestation in the intervention group and 11 weeks, 3 days (±3.14 days) gestation in the control. On average participant weight at baseline was 213.3±30.8 pounds and the weight of women assigned to the intervention and control groups did not differ significantly. All women had a BMI over 30, with an average of 37.64 BMI (± 6.56). Figure 2 depicts the weight gain data by condition over the course of the study. After the 6 month intervention, the participants in the intervention condition had limited weight gain at every time point when compared to those in the control condition: week 4 (1.47±3.07lbs. versus 2.70±5.67 lbs, ES *d*= -.28); week 8 (1.57±3.79 lbs v. 6.88±6.28, ES *d*=-1.05); week 12 (4.68±7.78lbs. v 13.13±8.39lbs., ES *d* = -1.05); week 16 (11.50±7.9lbs. v. 16.53±7.9lbs., ES *d*= -.64); week 20 (11.67±11.76lbs. v 19.05±8.56lbs., ES *d*=-.73). While there was a moderate to large effect size at all measurement points except baseline to 4 weeks, only the differences in weight gain at 20 weeks were significant (F(1,12)=11.87, p<.01).

Figure 2. Average gestational weight gain for both conditions over 24 week intervention.



Qualitative Results- Participants

Feedback about the physical activity (PA) portion of the class meetings. The women were in agreement that the exercises were easy (n= 3). They also commented that with this program, you

can do the exercises anywhere, and feel confident that you won't be uncomfortable or in any pain. One participant also mentioned that the exercises helped relieve back pain. The frequency and intensity of PA were supported, but one suggestion was made to offer the class more often to encourage continued increase in PA. Yet, one reported that the drive to the location would be a barrier to coming to the class more often.

The women felt that the exercises were fully demonstrated and explained in class. The only barriers to the exercise plan was the growing inability to bend, laziness and feeling tired. However, participants reported a number of meaning units (n=4) that they have increased amounts of energy after exercising. Soreness from lack of muscle use was reported (n=1), and sometimes feeling the need to take a nap after exercising (n=2).

When asked if they would recommend this program to other women they know, all women said yes. While one participant added that meeting as a group is encouraging. Autonomy (i.e., phone trees) received mixed results. The participants believed that after getting to know one another, they would feel comfortable calling each other, but they prefer the leader to make all the initial contact.

> "It was easy enough for you to do while you're pregnant because a lot of times you think about exercise when you're pregnant and it's like 'it's going to be uncomfortable and it's going to hurt' but the exercises weren't uncomfortable, and they didn't hurt."

> "I was laying in bed last night and my back was hurting, so I started doing the exercises and then I felt better."

<u>Continue with a program (like cMOC) postpartum?</u> All participants would like to participate, but have a few barriers to overcome. Reported barriers were: driving distance, feelings after the baby, and lack of time. Posing that daycare may be offered still had barriers such as credibility of the daycare provider and child location (in regards to class location). Notably, two women reported, that the interactions would be the major incentive to return.

> "As far as the interactions and stuff, ya, the time is what I'm worried about afterwards."

<u>Feedback on healthy eating information addressed in class.</u> Participants most enjoyed the portion booklets that were brought into class. Eleven meaning units reflected how the portion sizes

helped them when making decisions, cooking for the family, and dining out. One comment was that the journal provided things that seemed like "common sense," while one enjoyed learning the nutritional value of different foods. This has lead to a reduction in portion sizes and an increase in fruits and vegetables for all.

> "I'm only supposed to have this much, but you have THIS much on your plate, so you just think about it."
>
> "I don't think there's anything I would change."

Goal setting. Goal setting was supported by one participant who felt that they helped keep her on track as well as created a bit of competition within herself when reporting back to the group.

> "I can spout off information about things I'm supposed to eat but actually setting a goal that pertained to something I do, was helpful."

Feedback on the class sessions. The frequency was supported by one participant, who did not want to have to make extra trips, yet all other participants desired meeting more frequently. All participants enjoyed the reduced waiting period for the physician appointment. However, the participants did not prefer the group visit model (n=8) for reasons such as: missing out on information and repetition when participants returned. Therefore, it was suggested that we continue to have the sessions on healthy eating and PA, but to have the appointments before or after class (n=2).

> "I didn't like having the doctor visits with it because people are constantly getting up and leaving and you miss stuff."

Effect on exercising habits throughout pregnancy. Three participants mentioned that they increased their physical activity from before joining the program. They all also appreciated being told what is safe to do during pregnancy. One barrier a participant faced was beginning a new job, which requires activity all day, but makes her tired by the end of the day. Motivation to continue with an exercise regime after pregnancy was also considered throughout the program (n=2). Competition and checking back in with weight every month was encouraging for one participant as well. Positive feedback from others (i.e., 'You look amazing'), the scale, and the group were also encouraging for weight status.

> "It helped out 100% because before I was doing 0 [PA]. And now, I do it [PA] several times a week."

Limiting Gestational Weight Gain. Comments from friends, family, and coworkers gave rise to doubt for one patient, she worried as people would say "is it ok for your baby?" She was reassured, though, through every physician check-up. Another patient said people were encouraging about limiting gestational weight gain. The class also provided the patients with the knowledge to support their recommended amount of gestational weight gain. Wanting to lose weight prior to pregnancy helped them cope with the recommendation.

> "It puts that doubt there, but every time I go to the doctor, the baby measures right and you know she's healthy"

Effect on eating habits during pregnancy. The class prompted participants to be aware of how much and what they are eating. These concepts produced eight meaning units ranging from eating smaller meals throughout the day and thinking about portion sizes. These changes made the participants feel confident about maintaining these behaviors postpartum.

> "I think about portions every time I eat."

> "I eat smaller meals, and I eat more frequently versus I used to eat one gigantic lunch and then I'd be hungry again at 9 o'clock at night and things like that."

Program Features. Phone calls were thought to be convenient and help participants keep on track. The journal, however, was not used (n=2) or just used as a quick reference for the activities (n=1). Therefore, no participants enjoyed the journal tracking or recipes. The reading seemed a bit superfluous as a participant mentioned that she already reads this type of information from other sources (e.g., What to Expect When You're Expecting, *Parenthood*). Participants did enjoy the "Tip of the Month" and that they had somewhere to put them, but they typically did not refer back to them. Specifically, discussion and hands-on experiences were said to be more helpful than the journal.

> "I think (the phone calls) helped me keep on track, and the reminder of the appointment."

> "I did like the journal because things that I didn't quite remember from class, I could look back- like the exercises and things like that.

"I didn't really write a whole lot in (the journal). I just forget about it."

Program Adaptations. A suggestion for increasing the frequency to 4x a month. Also, food preparation demonstrations produced six meaning units. Some of which included:

> "I think it's a good idea, and it's kinda a hands on, because I didn't use the recipes in the back very much just because I don't know, I'm not very much of a cook."

> "The portion book is really good, but it's only one dimensional. So, maybe if we could actually see it on a plate?"

> "You know, showing us actually what ingredients, I know we get told in the book, but actually having the hands on stuff- that's huge for me."

Location. All participants did not enjoy the varying locations. However, one participant mentioned that once we were in the same place, she felt comfortable there and with the doctor. The other two participants thought the location was much better than the standard of care because of the reduced weight time and the personal attention.

> "It just felt more personal, and less being shuffled so much and things like that."

> "Location was fine, doctor was fine. Everything was fine."

Overall Experience. Participants were asked to share openly about their overall experience. This produced 10 meaning units. There was also mention that prior to attending the program, expectations of it were low and that throughout the program their expectations were well exceeded. All of the women mentioned that the sessions initiated behavior changes they hope will last the rest of their lives. Specifically, that exercise would be thought of in a more positive light and needing to watch portion sizes. The positive interactions from class were most enjoyed. There is continued motivation for postpartum as they saw the benefits (i.e., increased energy, limited weight gain) of the program. Their motivations for participating was certainly weight status, all expressing the desire to not gain excessive weight and to be able to lose weight postpartum.

> "It sounds kinda dramatic, but life changing because it makes you change the way you live."

> "It kinda gave you ideas of how to do that exercise while incorporating it while you're sitting in the waiting room or standing, preparing dinner."
>
> "When you get pregnant you think 'Oh God, I'm gonna gain all this weight and then I'm never going to be able to lose it.'"
>
> "This was a way to keep me on track, but then it was so much more positive once we started."

Cost. For program adoption, participants were asked if the program was associated with a cost, would they join? All participants expressed that they would not have initially joined, yet that they would be willing to now that they know what the program offers.

> "Cause I woulda been like 'Oh well, it's gonna cost me extra money, I'll be ok.' That kinda thing. I think the fact that it was included was a huge- because I truly think I would have said no."

Share openly. When asked to share openly, the participants expressed gratitude for the program. They enjoy hearing positive feedback from people (e.g. 'You look like you're 6 months pregnant instead of 8 1/2'). One participant also mentioned she was glad the program was offered as early as her first OB/GYN visit.

Qualitative Results-Providers

The one-on-one interviews with the providers addressed various components of implementation. First, the research team gathered insight to the recruitment procedure and its ability to recruit eligible patients for this study. The physician felt that she was not involved directly in the recruitment procedure, as she was mostly there in a supervisory capacity. While participating nurse felt that the procedure fit within the prenatal care flow and was well organized. The nurse stated that this year there weren't as many eligible patients, during the recruitment procedure as previous years. The physician did not hear any feedback (positive or negative) from other physicians, yet she does feel that some patients may have been overlooked for recruitment. Both implementation staff members thought the cMOC participants were representative of the Clinic's population.

> Nurse: "Fit in the flow, it worked out really good....It was pretty simple, it was pretty well organized."

> Physician: “I think it’s possible or perhaps likely that some patients fell through the cracks who would have been included in the study.”

When asked about the perceived effectiveness of *c*MOC, the nurse felt that this program was effective- especially in one participant who was “really into it.” The provider felt that the patients she saw were able to do a better job at controlling their weight. However, she felt that she hadn’t reviewed an entire spectrum of the charts in order to determine if the patients restricted weight gain, globally. The nurse felt that the weight gain was limited, but attendance was still an issue. She suggested that participants meet more often then they may “do something” (i.e., physical activity) everyday. As far as whether or not the patients were increasing their physical activity levels, neither provider said patients shared feedback on that, nor did they complete any tests that would indicate if their fitness levels had changed. However, the nurse felt that the participants enjoyed themselves and tried. Both providers felt that the patients benefited, health-wise, from this study.

> Nurse: “I know the one patient we had did really well- she was really into it. I think it was effective, if they just woulda stayed compliant.”

> Physician: “Of the patients that I saw, I would say they did [increase PA and decrease excessive gestational weight gain].”

Both providers felt that the study fit within the current prenatal pathway at the site we conducted the program. There were no addition responsibilities or resources required. The staff felt that it would be necessary to have someone to lead the educational/ physical activity portion aside from the nurses or providers.

> Nurse: “I mean, you were there to do your piece of the education. If that were the responsibility of the provider and nurse, then that would be a significant additional use of resources and physician and nurse time.”

When asked whether this program could be adopted at other clinics, the nurse believed that if resources were available, the program could be sustainable. The provider stated that the way a program similar to cMOC would be delivered would be dictated by the population being

served. She felt that the focus of the education for the patient population at the Clinic would be different from private practice standpoint.

> Physician: "That patient population [private practice] would have probably been very motivated to participate in any kind of education about nutrition and activity but their questions and the concerns they would have had would be very different from the questions and concerns that we associate with the Clinic population here."

As far as frequency of the program, the providers had divergent opinions. The nurse felt that the program could be offered every couple of weeks to assist in establishing a routine, while the physician felt that every other month may help observe trends as there would be more time between measurements. Both providers felt that more than 4 patients could be seen within the hour, especially if the patients are not high risk. In order for sustainability, the nurse suggests an increase in the staff available at the clinic. Otherwise, the program required no addition time or resources. The physician, however, felt that with the no-show rate experienced with this population in the program, resources may have been wasted.

> Physician: "I think if you are seeing all prenatal patients, and they are not high risk prenatal patients, and if the main issue they have relates to wanting to control weight gain and manage obesity during pregnancy, then you can probably see more than 4 in an hour."

The providers were also asked about the potential sustainability of the program. The nurse was in full support of adopting the content of *c*MOC. The physician expressed that there were space constraints that would need to be addressed from a feasibility standpoint.

> Physician: "Well, specific to this organization and our clinic, there are space constraints ...But, you know, that's going to be true for most practices, but I think a lot of offices have some sort of designated space that is an office or a conference room or something like that that's more readily available. We just don't have very much space in the OB clinic for very much to happen."

The nurse enjoyed both assisting with the program and seeing how the patients responded to it. She felt that she was able to get to know them a bit better as well, since you're seeing fewer

patients in the hour. This, then, assists in getting to know the staff which helped motivate them to "do things." The physician felt that it was a generally positive experience, and she felt she could say the same for the participants. Finally, when prompted, neither provider made suggestions for program improvements.

Discussion

The results contribute to the current body of literature by demonstrating the effectiveness and feasibility of a program that assists obese women in limiting excessive gestational weight gain. Group dynamics interventions have been successfully integrated within a clinical referral structure and lead to large effects on behavior change (Estabrooks, Almeida, Smith-Ray, Schriner, Van den Burg, Gonzales, 2011). Our work provides preliminary evidence that group dynamics-based strategies used in these other contexts (Carron & Spink, 1993; Estabrooks, Bradshaw, Dzewaltowski, Smith-Ray, 2008; Martin, Burke,Shapiro, 2009) may also be successful in preventing excessive weight gain in obese pregnant women.

Our qualitative results also supported the conclusion that developing a sense of cohesion amongst participants was an outcome that was valued by the women. The focus group and semi-structured interviews explored the perceptions of the program participants as well as the delivery staff (e.g., provider). The major themes that emerged reflected specific program components, theoretical constructs, and feedback on the group visit model in prenatal care. The focus group collected varying opinions about program components (i.e., disliking journal, enjoyed ease of exercises). Group dynamics constructs such as friendly competition and interaction and communication resonated in the participants' candid responses. Social Cognitive Theory's (SCT) constructs of expectations and actual benefits were evident. Feedback from the staff and participants indicate that a group visit model may not be a feasible delivery method for this particular population.

Program Components

Participants enjoyed the intimate, secluded location of the sessions, which elevated the location to an incentive. The implementation staff also supported the off-site location as it

provided a means to deliver the intervention without any added complications (e.g., questions from other patients in the waiting room). However, the location did provide some barriers, such as separation of nurse and provider. Reducing staff burden, especially in the healthcare arena, may increase the likelihood of adoption (Grandes et al., 2008), so an optimal location must be chosen.

The physical activity (PA) portion of the intervention was seen as beneficial by both the staff and the patients. Often times, women have unwarranted fears of physical activity during pregnancy (Clarke & Gross, 2004; Fox, Gelber, Chasen, 2008), however, there is no evidence that links PA and maternal complications (ACOG, 2002). The patients who participated in this study felt that the exercises were easy and safe, which increased their self-efficacy towards PA during pregnancy. The staff was impressed with the participants' willingness to increase physical activity.

Healthful eating was another major component of the program. Education on portion control was valued by all participants. Expanding portion sizes, and therefore increase of caloric intake, is a major contributor to the obesity epidemic (Wansink, 1996; Rolls, Engell, Birch, 2000; Swinburn, Caterson, Seidell, & James, 2004). Yet, there is a gap in the literature on interventions that educate specifically on portion size (Swinburn, Caterson, Seidell, & James, 2004). Additionally, while portion sizes are too large, food choices are poor as prenatal and postpartum women are not meeting dietary recommendations (George, Hanss-Nuss, Milani, Freeland-Graves, 2005). Participants suggested interactive components around their new food knowledge (i.e., bringing in items and cooking together). An intervention component, such as a pot luck, has the potential increase their knowledge, experience, and social aspects of their food choices (Toobert, Strycker, Glasgow, Barreta, & Angell, 2005).

The reminder phone calls were seen as convenient. Rogers (2003) posits that compatibility may increase the rate of a program's adoption. The women in this pilot group confirmed that reminders help keep them on track, and that they were brief. Previously, reminder phone calls increased attendance with a similar target population (Damron, Langenberg, Anliker, Ballesteros, Feldman, Havas, 1999).

The participants valued the physical activity, healthy eating, phone calls, and location. However, they felt the informational, interactive journal was unnecessary; the participants preferred the in class interaction. This recommendation could save on time and expenses of the intervention.

Theoretical Constructs

Principles of group dynamics, the underlying principles of this intervention, were sited often by the participants as reasons for adherence, attendance, and maintenance. This is consistent with the existing body of literature (Brawley, Rejeski, Lutes 2000; Estabrooks, Carron, 1999; Rejeski, Brawley, Brubaker, Amrosius, Focht, and Foy, 2003; Watson, Ginis, Spink, 2004; Cramp & Brawley, 2006). The participants valued the interactions that the sessions provided; interaction was said to be a specific reason for compliance and expanding their knowledge base. Group goal setting and feedback were seen as reasons to challenge oneself and to comply with the recommendations.

Furthermore, it is recommended for interventions to focus on self-efficacy and outcome expectations (Ferrier, Dunlop, & Blanchard, 2010), yet participants indicated low, initial outcome expectancy. Therefore, it would be vital to the initial interest, and potential success of the program, to communicate the purpose of the study and enhance outcome expectancy of their behavior change. Initial low expectations of the program itself also have implications for cost. The patients indicated that an initial cost would have been a deterrent for participation. Notably, everyone enjoyed and benefited (i.e., increased self-confidence, limited gestational weight gain) more than they anticipated.

Group Visit Model

The implementation staff confirmed that the group visit model did not require any addition time or resources to deliver than standard prenatal care. The reduced time and cost of a group visit model has been seen elsewhere (Scott et al., 2004). However, the staff felt that it would be necessary to have a separate area for this program; it would take training, time, money, and space to implement as planned, which could delay the translation of the pilot's findings into practice. The patients enjoyed the shorter wait time and knowing the women in the "waiting room," but felt that the group visit did not have a smooth delivery. There were continuous

interruptions (i.e., patients leaving for appointments), which broke their concentration and/or their ability to connect with the women in the session. One benefit of group visit model is the fidelity to treatment protocol (Clancy et al., 2008), which may not have applied here as the women had to leave the sessions intermittently.

Future Research

The major exemplar of divergence is based on the frequency of sessions. While the provider thought that meeting less frequently may allow time to measure weight changes, the nurse and most of the participants wanted to meet more frequently. One patient thought transportation to more frequent sessions would be an issue.

Therefore, implications for future research is to address the appropriate dosage of the intervention. The aim would be to find generalizable results about what frequency is enough to enhance cohesion, increase the likelihood of behavior change, and maintain compatibility within the participant's lifestyle. Group dynamics principles assert that meeting more frequently would be beneficial as it would increase the frequency of group processes which may increase cohesion (Estabrooks & Carron, 1999). Addressing the adherence of this high risk population with more frequent visits is recommended.

Our findings also suggest that using specific targets for individual and group goal setting related to gestational weight gain may result in achievement of the Institute of Medicine recommendation 11-20 pounds for obese women. This aligns with other counseling programs that include exercise programs which have effectively aided participants in weight loss (Dodd, Crowther, Robinson, 2008). While there are disparate findings on what specific techniques effectively limit excessive gestational weight gain (Streuling, Beyerlein, von Kries, 2010), our study provides session-by-session strategies and evidence-based components that show promise and could be replicated in other settings.

Conclusions

The 24 week program was able to significantly limit gestational weight gain for low-income, obese, prenatal women. Furthermore, four participants in the intervention arm (66%) and the two providers (100%) found portions of the program to be feasible and helpful. A consistent theme, however, was to disentangle the group sessions from the prenatal physician

visit to allow more time to address important physical activity and healthy eating issues without interruptions. Possible future models of the intervention would include active sharing and follow-up on patient progress in sessions with their physician. While the program ultimately demonstrated a large effect in limiting weight gain in intervention program participants the small sample size and need for alternative models to integrate the intervention within clinical settings points towards the need for future research. The pattern of results also suggests that there may be varying challenges in the different trimesters for women to limit their weight gain, even when they are provided with intervention strategies. Future models should also prepare women for the potential that initial success may not lead to final success if they don't maintain their attention to physical activity and healthful eating throughout the course of the intervention.

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| Manuscript Four|

Adoption decisions and implementation of a community-based physical activity program: A mixed methods study

Downey SM, Wages JS, Flaming-Jacksons S, Estabrooks PA. (2012). Delivery agent adoption decisions related to physical activity programs. *Health Promotion Practice.* 13: 175-182 DOI: 10.1177/1524839910380155

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Abstract

The purpose of this study was to determine the attributes of a community physical activity (PA) program that Kansas State Research and Extension System agents considered in the adoption decision-making process (DMP) and their understanding of evidence-based program principles. Ninety-nine percent of the eligible agents completed a survey that included quantitative and qualitative assessments of program attributes, delivery, and adaptations. The community PA program's effectiveness, compatibility within the system, high reach, and ease of delivery most influenced the DMP. Success in other counties was also indicated as influential in the DMP by those who decided to deliver the program after its initial year. Concepts of group dynamics were accurately identified and adaptations were consistent with these principles. The results indicate that agents consider multiple factors during the adoption DMP for a PA program and are able to articulate and propose adaptations that align with the evidence-based principles.

Introduction

The public health benefits of physical activity (PA) are abundant: PA reduces the risk of premature death, coronary heart disease, diabetes, and high blood pressure (Center for Disease Control, 1996; Macera, Hootman, & Sniezek, 2003). At the population level, a relatively small change in PA for sedentary individuals can produce large reductions in disease risk (Blair, LaMonte, & Nichaman, 2004). Still, relatively few adults participate in the recommended amount of PA (<50%) (Brownson, Boehmer, & Luke, 2005). The combined influence of the risk reduction properties of PA and the low prevalence has resulted in a large number of intervention studies that target increased PA. For example, the Community Guide for Preventive Services reviewed the body of work on PA interventions and strongly recommended community-wide interventions that include social support strategies to increase PA (Kahn et al., 2002). Yet, there is little evidence that these programs have been translated into sustained practice (Glasgow, Klesges, Dzewaltowski, Bull, & Estabrooks, 2004).

It has been suggested that the information necessary to determine efficacy of a PA intervention may not be the same information that is used by community health professionals when deciding what programs, policies, or practices are implemented (Estabrooks & Glasgow, 2006). Indeed, there is a paucity of literature that examines the factors that could facilitate PA program adoption and delivery. Although there is some information on personal characteristics of those who adopt versus those who do not adopt PA programs (Estabrooks, Bradshaw, Fox, Berg, & Dzewaltowski, 2004) there is no information, to our knowledge, that documents the attributes of PA interventions that could either facilitate or discourage adoption.

Roger's diffusion of innovations theory describes general attributes of interventions (i.e., innovations) that can either speed or slow adoption (Rogers, 2003). These characteristics include relative advantage, ease of implementation, compatibility with the systemic structure, mission, and values, and observability. While these attributes may be important during the decision making process, understanding the underlying functioning principles of any evidence-based program is critical to ensure that any adaptations considered during implementation do not have the unintended consequence of reducing effectiveness (Rogers, 2003). As defined by Rogers, a

program's underlying functioning principles refers to the processes by which the program achieves its effect.

The purpose of this study was to determine (1) the perceptions of the attributes of an evidence-based PA program held by those who are intended to deliver the program (i.e., Cooperative Extension Agents); (2) which attributes were considered in the decision making process (DMP) to deliver the program; (3) potential differences between early adopters and those who adopted the program after its initial year; and (4) adopting agents' understanding of the underlying principles of the program and if proposed adaptations aligned with those principles.

Methods

Design

This mixed methods study was completed within the Cooperative Extension System (CES) associated with land-grant universities. CES is available in every U.S. state and territory and provides a diffusion system with the potential to reach a large proportion of the population (Cooperative Extension office or the Department of Agricultural Education and Communication). Kansas State Research and Extension introduced a PA program called Walk Kansas in 2002 (Estabrooks, Bradshaw, Dzewaltowski, & Smith-Ray, 2008). Approximately 50 percent of the counties in Kansas offered the program during the first year of implementation, and by 2006 over 90 percent of the counties offered the program (Estabrooks, Bradshaw, Dzewaltowski, & Smith-Ray, 2008). Family and Consumer Science (FCS) agents were responsible for adopting and implementing the 8-week walking program. At the conclusion of Walk Kansas 2007, county agents were given a study description and asked to complete a brief survey. The survey assessed perceptions of Walk Kansas, the characteristics of the program that lead to the adoption decision, and understanding of the underlying functioning principles of the program. The study was approved by the Kansas State University IRB.

Program

Walk Kansas was developed using principles from group dynamics and social cognitive theory (Estabrooks, Bradshaw, Dzewaltowski, & Smith-Ray, 2008). Specifically, the program was developed based on Carron and Spinks' (1993) team-building model, which proposes that PA participation is increased through improving group cohesion, targeting group processes such

as interaction and communication, cooperation and friendly competition, developing a sense of distinctiveness within groups, and facilitating a group structure that includes norms and goals for participation (Estabrooks, 2008). Walk Kansas recruitment involved inviting teams, rather than individuals, to participate in the program. Volunteer team captains recruited 5 other team members with the group goal to collectively walk the distance of Kansas over an 8-week period. To achieve the group goal the participants, on average, would complete 30 minutes of moderate PA 5 days per week—the recommended guidelines at the time of program development. Goal setting theory-based principles used in program development include the provision of health education information (weekly newsletters) and weekly feedback on goal achievement (Estabrooks, Bradshaw, Dzewaltowski, & Smith-Ray, 2008).

Sample

In 2007 there were 97 FCS agents serving 105 counties in the state of Kansas who had the responsibility of addressing health-related needs of the population. Ninety-six out of the 97 FCS agents within the Kansas State University Research and Extension System completed the study. All had delivered Walk Kansas at least once. Thirty-five agents delivered the program for 6 years and were considered early adopters, while the remainder of the agents began delivery after the initial year of the program. Only a small minority had delivered the program only 1 or 2 years (<10%). All agents were women aged, on average, between 40 and 50 years old, and over 95% of the extension agents were Caucasian.

Measures

Years of Program Delivery. Agents were asked to indicate the years that they had delivered Walk Kansas. The range of possible responses was 0 to 6 years. Agent reports were confirmed by archival participant enrollment records that demonstrated all agents reported accurately.

Program Characteristics Attributed to Walk Kansas. Six attributes were presented in a checklist format (Appendix I). Agents were encouraged to select all attributes that applied when considering the Walk Kansas program. The characteristics were based on Rogers' proposed attributes and included: (1) Walk Kansas is easy to deliver (i.e., ease of delivery), (2) Walk Kansas is better than most other community PA programs (i.e., relative advantage), (3) Walk Kansas helps people start being more active and stick with it even after the program is finished

(i.e., observability of effectiveness), (4) Walk Kansas fits the mission of Kansas State Research and Extension (i.e., compatibility with mission), (5) Walk Kansas attracts more county residents than any other Extension program (i.e., relative advantage related to reach), and (6) Walk Kansas was adapted from other programs to work specifically in Kansas (i.e., compatibility with structure).

Program Characteristics used in the Decision Making Process. The six attributes were again presented in a checklist format. Agents were encouraged to select all attributes that they considered when making the decision to offer Walk Kansas. A seventh category was added to this checklist: if the impact of the program in other counties influenced their DMP.

Understanding Functioning Principles. Both quantitative and qualitative questions were used to determine agent understanding of the program's functioning principles. Quantitative questions included asking agents if the program would work as well at increasing PA without the newsletter (i.e., no feedback), as individuals without the team (i.e., no group dynamics principles), and when increasing the team size to 8 or greater (i.e., altering the goal of meeting PA recommendation through equal distribution of walking the state of Kansas). In addition, agents were asked to indicate how frequently they provided feedback and by what method they provided feedback to participants. Questions to elicit open-ended responses were: in your opinion, what is it about Walk Kansas that helps people to do more PA? And, please list suggestions that you have to make Walk Kansas a better program. These questions were used to assess agent understanding of the functioning principles and to determine if proposed changes were consistent with those principles.

Analysis

The proportion of agents who indicated the presence of a given attribute within Walk Kansas and who considered a given attribute in the DMP were calculated. Chi squared analyses were used to determine if any proportional differences existed between agents who adopted Walk Kansas in the initial year when compared to those who began delivering it in subsequent years. Responses to the open-ended questions examining the understanding of functioning principles were reduced to meaning units (a word, phrase, or paragraph with a single meaning). Meaning

units were grouped into categories, which were then grouped into themes. The emergent themes assessed what aspects of Walk Kansas increase PA (i.e., functioning principles) and suggestions for improving the program.

Results

The median number of characteristics attributed to Walk Kansas was 4, while the median number of characteristics used in the DMP was 3. The most endorsed characteristic of the program was that it was effective at increasing and maintaining PA (89%) and this is also the factor which the highest proportion of agents considered when deciding to deliver the program (77%).

The compatibility of the program for Extension was the next most frequently selected attribute of Walk Kansas (83%) and this was also used in the DMP 73 percent of the time. Ease of delivery and a strong reach were identified as attributes of Walk Kansas by 70 and 69 percent of agents, respectively. In addition about 60 percent considered both of these attributes in the DMP. Only the general relative advantage of the program (i.e., better than most other PA programs) and the specific adaptation for the geographic region were not considered by the majority of agents during the adoption DMP (40% and 25%, respectively).

Figure 1: Extension Agent perceptions of Walk Kansas attributes by early and later adopters.

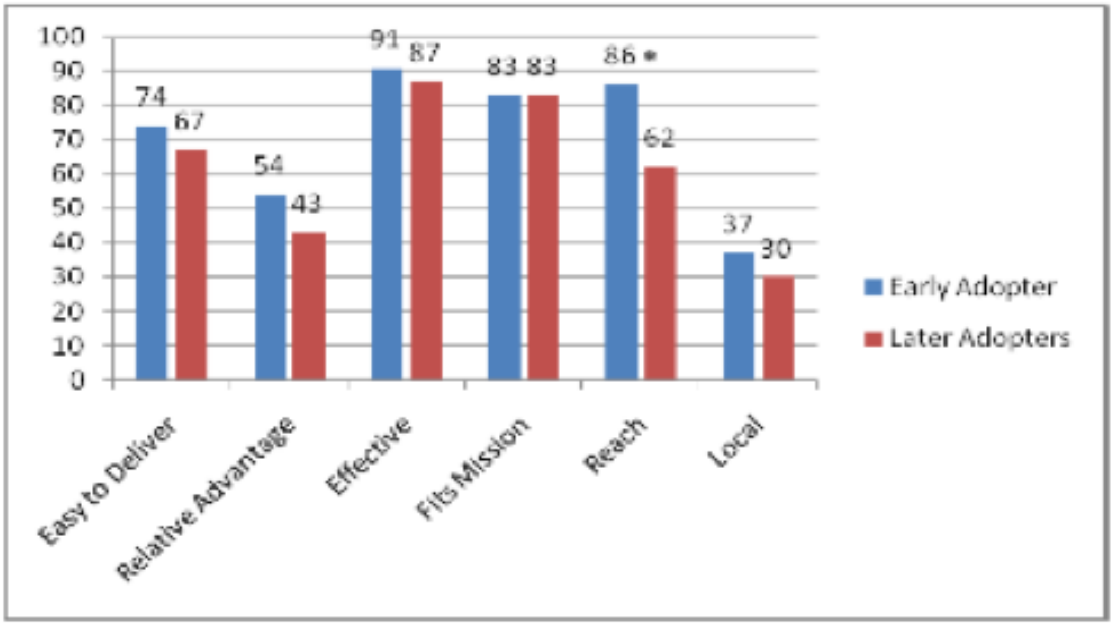
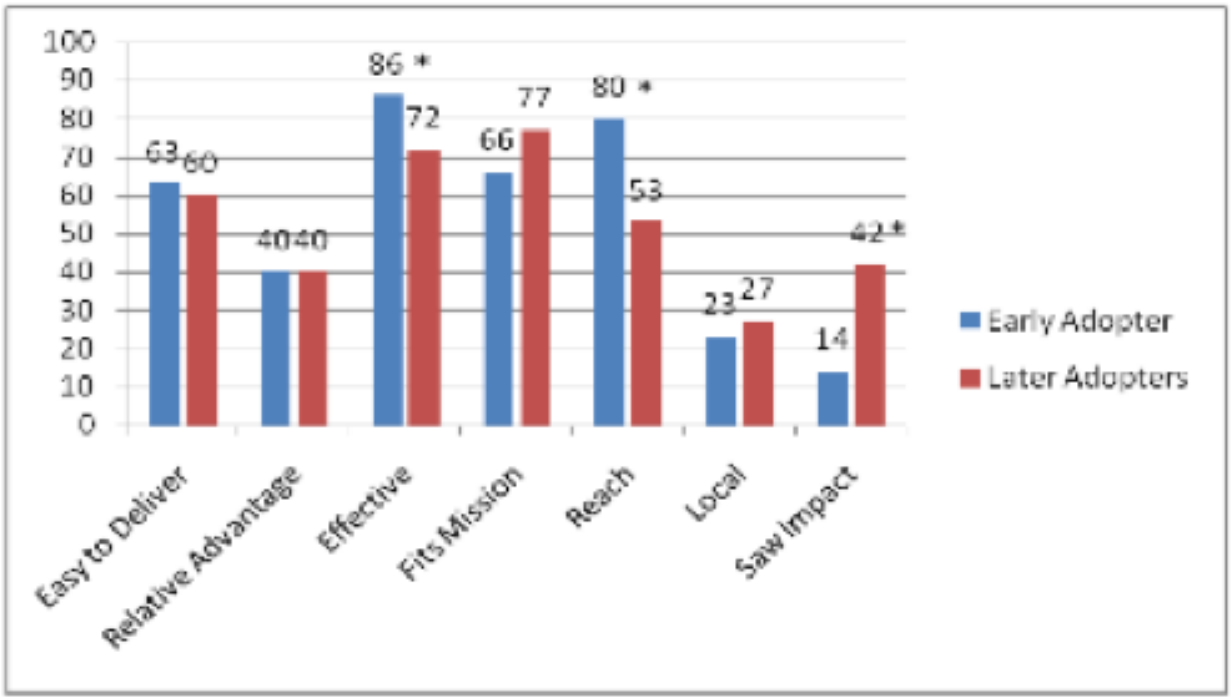


Figure 1, above, depicts attributes that the agents felt were indicative of Walk Kansas comparing early adopters to those who adopted after the first year. The figure demonstrates that a higher proportion of early adopters perceived that most of the attributes were present when compared to later adopters; however, only the proportion that identified that Walk Kansas had superior reach was significant (X^2=6.15, p=.01).

Figure 2 depicts the proportion of early versus later adopters that considered each attribute as part of the adoption DMP. In this case, a significantly higher proportion of early adopters considered the reach of the program (X^2=6.76, p<.01) and its effectiveness (although, this proportional difference was only marginally significant; X^2=2.45, p<.10). In contrast, but perhaps not surprisingly, a higher proportion of those who adopted the program after the first year indicated that seeing the impact in other counties influenced their decision (X^2=7.67, p=.01).

Figure 2. Attributes of Walk Kansas used in the decision making process by early and later adopters.



When agents were asked if the program would work as well at increasing PA without the newsletter, as individuals without the team, and increasing the team size to 8 or greater, 26%, 16%, and 38% of the agents agreed, respectively. Sixty-three percent of the agents provided

weekly feedback, and the highest proportion of agents provided that feedback through email and regular mail. Agents were asked about the mode of delivery for the newsletters and an overwhelming majority sent both hard copies and electronic versions (73%). Only 4% of the agents did not send newsletters. In terms of feedback on the teams' progress, the modes used were email or regular mail (50%), email only (7%), regular mail only (5%), and website only (38%). However, some agents who indicated website only, also indicated "provided no feedback" (20%). The mode by which agents gave feedback (i.e., website or email) was significantly related to the frequency in which they gave their feedback (X^2=43.45, p<.001). If an agent simply directed participants to the website the frequency of "delivery" was low; however, if an agent provided hard copies or electronic versions, they were typically more frequent (i.e., weekly).

Agents provided 223 meaning units in response to the question of factors that lead to Walk Kansas increasing participant PA. Of those, 164 responses referred to group concepts such as group cohesion, team goals, interactions and communication, competition, and norms. The remaining meaning units reflected aspects of the program that were related to specific program features, compatibility with busy participant lifestyles, and advertising. Table 1 includes the derived themes and categories with the number of meaning units provided for each and includes example meaning units for each category.

Table 1. Extension Agent perceptions of program feature that increases PA.

Theme	Categories	Example Meaning Units
Group Cohesion (n=76)	Accountability (n= 25)	· As team members, they are accountable to others for their PA.
	Team Concept (n= 41)	· The competition is not as much as forming a team.
	Camaraderie (n= 10)	· The camaraderie with teams and team members is great.
Team Goals (n=15)	Group Goals (n= 11)	· The team goal of getting across Kansas.
	Achievable Goals (n= 4)	· Small weekly goals can be achieved.
Interactions and Communication (n=23)	Interpersonal Communication (n= 3)	· The incentive to walk with friends, visiting while walking
	Social Support (n= 13)	· Team members to rely on for support and motivation.
	Enjoyment (n= 7)	· Whether family or friends...it's more fun to exercise together.
Cooperation and Competition (n=17)	Competition (n= 17)	· They become competitive with their other team members etc.

Theme	Categories	Example Meaning Units
Norms (n=33)	Social Norms (n = 10)	· People like being a part of something positive and can identify with the 'Walk Kansas' program
	Peer Pressure (n = 4)	· Have 'positive' peer pressure to do some type of PA.
	Self-Monitoring (n = 15)	· Have it (reporting) repeat for 8 weeks helps people get in the habit of daily PA.
	Personal Commitment (n= 4)	· When someone has to report miles to someone else, PA becomes more of a priority in their lives.
Program Features (n=21)	Newsletter (n = 7)	· We also had positive feedback regarding the tips and recipes.
	Incentives (n= 5)	· Also all the incentives included with the program: newsletters, t-shirts, Walk Kansas prizes and gifts given during the eight-week program.
	Feedback (n= 9)	· I think people become more aware of how much PA they are getting each week.
Fits within Participant's Lifestyle (n=36)	Easy (n= 5)	· It is easy.
	Convenience (n= 3)	· It can be done anytime.
	Low Cost/No Equipment (n= 7)	· Nothing else required of them (no special equipment, etc.)
	Seasonality (n= 13)	· Many people become less active in the winter, so look forward to Walk Kansas as a kick-off to spring and the return of outdoor activities.
	Program Duration (n= 4)	· The 8 week program is not overwhelming.
	Activity Type (n= 4)	· Walking is something most people can do regardless of size, facilities, income and etc.
Advertising (n=2)	Media Support (n = 2)	· Our businesses and newspaper are huge supporters in the program and when our supporters believe in what we do it is easier to get folks interested.

The theme of group cohesion included the two most frequently identified categories—that participants felt accountable to the team and that the general team concept lead to the program's success in changing PA. While providing regular feedback was a key feature of the program, only 9 meaning units explicitly identified this as a key feature for increasing PA.

Agents also provided 76 meaning units in response to the question of potential adaptations that could make the program better (Table 2). There were a number of general and specific responses related to ensuring that the program was dynamic and changed with the times to ensure continued relevance in the community (n=30) such as changing the newsletter materials regularly, increasing media support, and adding new program features. In terms of adaptations, the primary area identified was the improvement of tools that helped speed or ease the effort of implementation (n=22), such as reducing the time to deliver the program and improve automated features for tracking and feedback. There were also a small number of

responses that highlighted program features that should be maintained (n=11) which included the ease of program delivery and program t-shirts. Finally, there were a number of minor adaptations suggested (n=13) that included both shortening and lengthening of the program, the addition of strength training more explicitly, and adding incentives.

Table 2. Extension Agent suggestions for Walk Kansas program improvements.

Theme	Category	Example Meaning Unit
Ensure Dynamic Program (n=30)	Keep Materials Fresh (n= 13)	· Needs to be kept fresh for the agents so it doesn't seem like the same old thing over and over again.
	Increase Media Support (n= 8)	· I think we ought to get the BIG TV stations in on this program
	New Program Features (n= 7)	· Incorporate 'feature destinations' telling history, cultural information, etc. of communities or landmarks.
	Integrate with other program (n= 1)	· I am going to try to offer the Small Steps to Health and Wealth, and try to promote exercise in a slightly different way.
	Legislation (n= 1)	· Do some kind of promotion to the Kansas legislature.
Improved Delivery Tools (n=22)	Easier access to newsletters (n= 2)	· The information in the newsletters is so helpful; I think easier access would be better.
	Program materials out to agents earlier (n= 6)	· Materials are provided in Feb. does not allow sufficient time to prepare packets, brochures, flyers, put announcements in bi-monthly newsletter.
	Reduce time to deliver (n= 10)	· I had several not participate due to the significant paper trail
	Create Automated Feature (n= 4)	· Work with the website so that it will print out the county results that we need to put in our newsletters on a weekly basis.
What to Maintain (n=11)	Maintain Ease of Delivery (n= 3)	· The simpler it is the better.
	Maintain program champion (n= 1)	· State extension specialist should NOT LEAVE. Ever. Period.
	Maintain T-Shirt (n= 5)	· Great to see Extension on shirts during year- advertising us!
	Maintain Fee (n= 2)	· If we raise our registration price, we would lose our numbers.
Minor Adaptations (n=13)	Communication with Staff (n= 2)	· A short interview with an Extension staff member to check with their county offices about Walk Kansas
	New Program Features (n= 7)	· Incorporate 'feature destinations' telling history, cultural information, etc. of communities or landmarks.
	Incentives (n= 3)	· Give out podcasts to accompany walks.
	Focus on PA (n= 3)	· Like to see some weight training supplement to the program which would not be a part of the miles but an addition like the F&V
	Program Duration (n= 3)	· Offer it more than once a year
	Reduce team size (n= 2)	· I feel teams of 4 would work better than teams of 6.

Discussion

The quantitative findings of our investigation demonstrated that the majority of cooperative extension agents believed that Walk Kansas was effective at increasing and maintaining PA, compatible with the mission of Kansas State Research and Extension, easy to deliver, and able to reach a large number of participants. In addition, information on each of these attributes was used by a majority of the agents in the decision making progress. Perhaps surprisingly, the general relative advantage of the program (i.e., better than most other PA programs) and the fact that the program was adapted for the geographic region were not considered by the majority of agents during the adoption DMP. Further, early adopters were significantly more likely to consider the programs' potential reach when deciding whether or not to deliver the program. Finally, based upon the quantitative responses on the frequency and delivery of feedback it appears as though a high percent of the agents provided some level of feedback to the participants and only a minority did not. Similarly, the qualitative responses suggest that the agents understood the basic functioning principles of the program and identified more program aspects that increase activity when compared to areas in need of improvement.

These findings lead to a number of generalizations. First, delivery agents consider a number of program attributes in addition to the degree to which the program is effective; however, effectiveness is a prevalent consideration across agents suggesting that evidence is an important, but perhaps insufficient criteria for adoption. Second, early adopters are more likely to use evidence of reach in addition to effectiveness in the DMP while those who adopt later are more likely to be convinced by observing the success of the program in other counties. Third, the proportion of agents that perceived a given attribute as consistent with Walk Kansas was always higher than the proportion of agents that used a given attribute in the decision making process, thus the perceived presence of a program attribute, even those that are thought to speed adoption, may not be influential during the DMP for all agents.

The results suggest that the following attributes may enhance the likelihood that a PA intervention will be adopted within a community setting such as Cooperative Extension. One, an overwhelming majority of agents considered the effectiveness and potential reach of the program when making the adoption decision—indicative of a public health view. From a research

perspective, this finding adds validity to the school of thought that both reach and effectiveness are critical indicators of translation of research into practice (Glasgow, Klesges, Dzewaltowski, Bull, & Estabrooks, 2004). Further, our finding that differences in attributes considered in the DMP by early adopters and later adopters indicates that different marketing strategies to encourage agent adoption should be used at different times during the adoption process. Two, communicating information on the compatibility of the program to the organizational mission of potential delivery agencies and the ease of delivery may also be important indicators of adoption. These results reflect the characteristics that adopters found important in other behavioral intervention studies ranging from smoking cessation to nutritional interventions (Brownson et al., 2007; DeCherney, 1999; Levine et al., 2006; Schrijvers, Oudendij, & de Vries, 2003; Israel et al., 2006; Tripp-Reimer & Doebbeling, 2004; Hoelscher et al., 2006).

Once a program is adopted, fidelity to the underlying functioning principles is necessary to ensure that the program is effective (Green, 1995). Our findings suggested that the agents were likely to identify group-based principles as key in the effectiveness of the program, but only about two thirds used the frequency of feedback prescribed for the program. From the group dynamics perspective, many of the meaning units aligned closely with Carron and Spink's framework for PA interventions (Carron & Spink, 1993). Further, only two meaning units were provided that suggested changes to the program that would be inconsistent with the group dynamics approach (e.g., make the program available for individuals without teams). However, this request, while inconsistent with the Walk Kansas framework could indicate the need for an integration of an individually targeted evidence-based PA program that could be used to enhance the reach of the program.

Adaptations to the program, while covering many disparate areas, also aligned with some of the characteristics identified by Rogers that would enhance adoption. Specifically, many of the comments were related to mechanisms that would make the program easier to deliver and appear to have an advantage in content over the previous year. This suggests that while the delivery of Walk Kansas includes substantially less time and effort to implement than many other evidence-based PA programs (Wilcox, 2008), there are still opportunities to reduce delivery agent workload to improve satisfaction and sustained delivery.

We conducted this study to provide preliminary information on agent perceptions of a PA program, their DMP, and understanding of key functioning principles and, therefore, this study is not without limitations. First, the results are specific to a Cooperative Extension System and may not be generalizable to other program delivery systems. However, even with different structures across states it is likely that these results could be generalized to other Cooperative Extension Systems (Israel et al., 2006). Further, as most community and clinical health care setting providers and practitioners have similar responsibilities (Eakin, Glasgow, & Riley, 2000; Eakin, Lawler, Vandelanotte, & Owen, 2007), it is likely that the decision to adopt new programs, policies, or practices would follow a similar decision making process. Second, the study included retrospective recall of a decision making process that occurred, for some agents, a number of years previously and could be influenced by the success of the program in Kansas. Third, the attributes were identified using simple dichotomous response sets and it is likely that consideration of these variables and relative weighting are not clearly reflected by the proportion of agents that indicate an attribute was used in the DMP. Future studies should examine attributes using measures that can detect the degree to which each piece of information contributed to the adoption decision.

Conclusions

The results provide an indication of the broad range of program characteristics important in the adoption of community based PA programs and demonstrate that marketing to delivery agents for early adoption of community PA programs may include a focus (e.g., highlight effectiveness and reach) different from when marketing in years after a program has been initially implemented (e.g., focus on results of peer implementation). Also, within the cooperative extension system, agents are able to communicate the underlying principles of a group-dynamics based intervention and are unlikely to make adaptations that are inconsistent with those principles. In order to better assess and predict characteristics that will facilitate PA program adoption, future studies should assess delivery agent perceptions of program characteristics at the beginning and periodically throughout the adoption DMP. These assessments could then be used to develop predictive models for program adoption, thereby

informing the program development process focusing on potential mediators of the adoption process.

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| General Conclusions |

Physical inactivity is a modifiable health behavior. Indeed, physical inactivity is the fourth leading risk factor for global mortality, accounting for approximately 3.2 million deaths globally (WHO, 2012). The past two decades have been witness to the fact that exercising in groups is not only effective but enjoyable; perhaps even enjoyable enough to be sustained and have a public health impact. This dissertation provides further support for group dynamics-based physical activity (PA) promotion interventions by 1) determining the degree to which the current body of group dynamics-based PA promotion literature is generalizable and pragmatic, 2) exploring the relationship of group-interaction variables and group cohesion over time, 3) demonstrating an effective PA promotion program to limit excessive gestational weight gain for obese women within prenatal care, and 4) determining the extent to which adopting agents can identify key underlying principles of a group dynamics-based intervention and whether they would propose adaptations that align with those principles.

Group dynamics-based PA promotion programs have had success in a multitude of populations, yet still some of these effective evidence-based programs are slow to translate into the desired system (i.e., clinical, worksite). Ultimately, to speed the rate of translation some changes within scientific inquiry must be made. Glasgow and Chambers (2012) specifically propose to: advance our scientific perspective towards systemic-level approaches, shift research goals towards pragmatism rather than efficacy trials with high robustness, to be more flexible, and finally, for research methodology to be integrative and adaptive. *c*MOC and the systematic review provide support for these changes: designing a study within a RE-AIM framework (rather than simply evaluating through this framework), interdisciplinary research teams, and highlighting the need to test methodology in "real-world" settings.

Further, the conceptual model of group dynamics proposed by Carron and Spink (1993) over 20 years ago provides strategies and principles to engage and sustain participation in PA groups. As seen in Manuscript 4 of this dissertation, Walk Kansas utilizes these strategies on a large-scale, requiring few programmatic resources, and minimal time commitment from

participants. Individuals sign-up year after year and new recruits continue to join. They become a part of something and have renewed motivation for their lifestyle goals.

As evident in the systematic review of Manuscript 1, interventions that are group dynamics-based are both generalizable and pragmatic. In fact, future research may indicate that these strategies and principles of group dynamics can improve upon many other health behaviors as well. Being part of a true group provides countless ways to integrate an individual within the group (i.e., interaction and communication, competition, goal setting) to improve their own health behaviors.

Indeed group dynamics-based PA programs impact PA promotion. One area of growing interest is obesity prevention and management during the pregnancy. Intervening during pregnancy is a feasible mechanism with the potential to have a large effect on reducing postpartum weight retention and reducing the risks for obesity and cardiovascular disease (for both mom and baby). A recent systematic review of interventions that analyze dietary and PA recommendations demonstrate that oral or written recommendations (typically delivered through personal counseling) and a weight monitoring component were successful at limiting gestational weight gain (Streuling, Beyerlein, von Kries, 2010). Even so, no particular strategies such as exercise program or individual counseling, was particularly successful. Two additional reviews on intervening during pregnancy were released in 2011, one systematic (Gardner, Wardle, Poston, Croker, 2011) and one meta-analysis (Tanentsapf, Heitmann, Adegboye, 2011) were released; again calling for further research to sort through the mixed results that the literature has shown for the last few decades. Specifically, it is important to determine which features of effective interventions are achieving the outcomes of interest (i.e., reducing excessive gestational weight gain; Gardner, Wardle, Poston, Croker, 2011). Momentum is building in this area of research. *c*MOC lays the foundation for follow-up studies that still consider a rapid translation into the existing prenatal care system, having a broad reach, and a strong effect at reducing excessive gestational weight gain.

While a systems-level approach for group dynamics-based PA promotion for obese pregnant women has proven effective, there are a plethora of unanswered questions for group dynamics-based interventions. The data presented about group-interaction variables is novel for

two reasons. First, it is the first study, to our knowledge, to test group dynamics theoretical constructs within a sample of women of color. Black and Hispanic populations are more collectivist than individualist (Singelis & Brown, 1995; Vandello & Cohen, 1999), which may influence the sample of minority women's perceptions of cohesiveness. Notably, initial high levels of efficacy (and collective efficacy) have a strong effect on long-term performance; harnessing a sense of belonging, competence, and willingness to contribute to the task (Casey-Campbell & Martens, 2009). Secondly, this study is the first to explore the cross-sectional and longitudinal relationships of the group-interaction variables (i.e., cooperation, competition, communication) over time. The items on the survey that explicitly measured the 4 group-interaction variables were the first to do so. Combining these findings with the recently articulated data on principles and strategies currently being employed in the PA promotion literature (Estabrooks, Harden, Burke, 2012), the field can better determine the minimal intervention needed to achieve the robust effect group dynamics-based interventions are known to have.

Finally, a consistent theme that emerged across all 4 manuscripts is the lack of reporting on cost dimensions. Physical activity and healthful eating interventions are abundant, yet those that use an economic evaluation are less abundant (Barber, Thompson, 2000; Glasgow & Emmons, 2007), and this influences their translation into practice (Glasgow & Emmons, 2007). Cost analyses provide potential adopters, decision makers, and researchers alike with the ability to compare the effectiveness of various programs. In the RE-AIM/ PRECIS manuscript, cost was not reported in any of the 17 group dynamics-based physical activity interventions for neither implementation nor maintenance. Unfortunately, costs for Health is Power, Walk Kansas, *c*MOC were also not closely monitored in order to provide cost-benefit ratios. While this dissertation does not fill the gaps in the literature on cost, it does highlight the importance of reporting and tracking measures of cost.

Our interconnected society provides a wealth of knowledge at our fingertips, yet the ability to balance caloric input and output has somehow slipped through our grasp. On the output side of the scale, the obesity problem is underscored by the issues of sedentary lifestyles and lack of PA. Groups are dynamic and complex, but not without conceptual models to understand the

interplay among individuals and their environments. This dissertation highlights that the study of group dynamics is not only generalizable and pragmatic, but continuously effective, attractive, and sustainable.

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Appendix A

Coding Sheet for RE-AIM Components for Manuscript 1

Column 1: COUNT: Country or general Locale in which research was conducted

- USA (1)
- Canada (2)
- South America (3)
- UK (4)
- Norwegian Region (5)
- Western Europe (6)
- Eastern Europe (7)
- Africa (8)
- Middle-East (9)
- Asia (10)
- Australia (11)

Column 2: REV: Reviewer

- Samantha Downey (1)
- Shauna Burke (2)
- Paul Estabrooks (3)

Column 3: AUTHOR: Authors and year of the study (alphabetic)

Column 4: STDYNO: Running total on the number of studies

Column 5: ESNO: Running total on the effect size from a particular study

Column 6: PUBLIC: The source of the study (i.e., type of publication)

- Refereed journal (1)
- Non-refereed journal (2)
- Conference proceeding (3)
- Thesis (4)
- Dissertation (5)
- Unpublished manuscript (6)
- Other (7)

Column 7: TARPOP: The group to which you wish to generalize. Usually described in terms of age, race, sex, risk factor profile, and/or disease status.

- University students (1)
- Older adults (2)
- Adults (3)
- Cardiac Rehab patients (4)
- Fitness Center (5)
- Postnatal Women (6)
- Minority/ African American (7)

At risk or has chronic disease (8)
With chronic disease (9)
Low Income (10)
Not specified (999)

Column 8: R_METH_TARPOP: Method to identify target population: the actual recruitment protocol is described.
Yes (1)
No (2)

Column 9: TARPOP_ID_LIST: Method to ID target population
Mixed approach (1)-- Leaving in since our numbers will be off!
Mass Media (2)
Word of mouth (3)
Physician referral (4)
Flyers (5)
Center- based (6)
Newspaper Article (7)
Employer's worksite (8)
Faith-based (9)
Targeted Mailings/ Newsletters (10)
Presentations/ Seminars (11)
Target Contact (to eligible participants) (i.e., phone calls) (13)

Column 10: EXCRIT: Reported exclusion criteria
Yes (1)
No (2)

Column 11: EXCRIT_LIST: Exclusion criteria list reported
Gender (1)
Physical Health conditions (2)
Conditions worsened by exercise (3)
Age (4)
Mental/Cognitive Health Conditions (5)
Activity level (6)
Substance abuse (7)
Language (8)
Participation in another study or incomplete baseline data (9)
Pregnant (10)
None (11)
Judgement of Staff (13)

Column 12: INCCRIT: Reported inclusion criteria

Yes (1)
No (2)

Column 13: INCCRIT_LIST: Inclusion criteria list reported
Low income (1)
Minority (2)
Sedentary (3)
Age (4)
Chronic/disability disease (5)
Pregnancy (6)
Physician approval (7)
Activity level (8)
Healthy (9)
Gender (10)
Postnatal (11)
None (13)
Mixed (12)
Risk factors (14)
BMI/Weight (15)
Willing to Make Changes (i.e., weight, increase PA) (16)
Association with Faith-Based Location (17)
Residence in community (18)
Occupation (19)?
Live in Rural Area (20)
Language (21)
Have a Phone (22)
Other (23)
Member of a new class (24)
N/A (999)

Column 14: R_SAMP_SZ: Sample Size
Actual #

Column 15: R_DENOMINATOR: Defined the denominator for use in calculating participation rate for over all study (those that agree to participate/the total number of eligible participants contacted for participation).
Yes (1)
No (2)

Column 16: R_DENOMINATOR_No: The number provided for the denominator (total number of eligible individuals contacted for participation or exposed to recruitment materials).
Actual #

Column 17: R_PART_RATE: Participation Rate
Actual %

Column 18: R_PART_RATE_CAL: Participation rate calculated by the review team.

Column 19: R_PART_NON_COMP: Characteristics of both participants and eligible non-participants. If the study provides demographic comparison of those that decline to those that accept participation.
Yes (1)
No (2)

Column 20: R_PART_NON_COMP_LIST: Which characteristics of both participation and non-participation are reported:
Gender (1)
Age (2)
Demographics (3)
Activity level (4)
BMI (5)
Self-Related Health (6)
Substance use (smoking, alcohol) Status (7)
Year diagnosed with chronic condition (8)
Meal Site Use? (9)

Column 21: R_PART_NON_COMP_Diff: Significant difference between participants and non participants on any variable.
Yes (1)
No (2)

Column 22: GENDER: The gender of the participants
Male (1)
Female (2)
Mixed (3)
Not specified (999)

Column 23: AGEX: Mean age of participants
Actual value (numerical)
Not specified (999)

Column 24: AGESD: Standard deviation of the age of participants

(SE = SD/square root of (sample size))
Actual value (numerical)
Not specified (999)

Column 25: FIT: Fitness status of participants
Previously sedentary (1)
Previously active (2)
Mixed (3)
Previously insufficiently active (4)
Not specified (999)

Column 26: HEALTH: Health of participants
Healthy (1)
At Risk (2)
Currently have chronic condition (3)
Not specified (999)

Column 27: REFER: clinical referral status. Were they referred from a physician or health professional?
Yes (1)
No (2)
Not specified (999)

Column 28: SELECT: Protocol for selection of participants. This is different from method to identify the target population. Selection reflected in convenience sample, random selection, or a specifically targeted population. Method to ID reflected by mass media, search of medical record, going to location where population resides for recruitment.
Convenience Sampling (1)
Random (2)
Targeted (3)
Volunteer (4)
Not specified (999)

Column 29: I_THRY_INT: Theoretical Framework for intervention (List)
Group-Dynamics (1)
Social-cognitive (2)
GMCB (GD & SCT) (3)
Stages of Change (4)
Social Support Model (5)
Goal-Setting Theory (6)
Management Theory (7)
SET (8)
Not specified (999)

Column 30: I_THRY_CON: Theoretical Framework for control (List)

Group-Dynamics (1)
None (2)
Not specified/Not applicable (999)

Column 31: STRATEGY_1: The type of group dynamics strategies used in the intervention condition. (Reviewer defined rather than explicitly stated.

Group Structure (1)
Location within the group-individual positions (11)
Status of group members (12) – a team captain or other hierarchy not including formal paid/research instructors.
Group roles (13)
Group norms (14)
Group Environment (2)
Distinctiveness/Team Identity (21)
Group Size (22)
Leadership (23)
Image Management (231)
Relationship development (232)
Resource deployment (233)
Individual sacrifices (24)
Proximity (25)
Group Processes (3)
Group goals (31)
Cooperation (32)
Competition (33)
Interaction and communication (34)
Group problem solving (341)
Information sharing (342)
Collective efficacy (35)
Feedback on group goals (36)

Individual Strategies (4)
Goal setting (41)
Action planning (42)
Problem solving (43)
Feedback (44)
Tailoring (45)
Self-monitoring (46)
Social Support—things that can't fit one of the group strategies above (5)

Column 32: STRATEGY_2: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 33: STRATEGY_3: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 34: STRATEGY_4: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 35: STRATEGY_5: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 36: STRATEGY_6: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 37: STRATEGY_7: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 38: STRATEGY_8: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 39: STRATEGY_9: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 40: STRATEGY_10: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 41: STRATEGY_11: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 42: STRATEGY_12: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 43: STRATEGY_13: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 44: STRATEGY_14: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 45: STRATEGY_15: The type of group dynamics strategies used. Use list described under STRATEGY_1.

Column 46: SPAN_I: Total time span of the intervention (wks)

Actual value (numerical)
Not specified (999)

Column 47: SPAN_C: Total time span of the intervention (wks)
Actual value (numerical)
Not specified (999)

Column 48: FOLLOW-UP_I: # of weeks post intervention
Actual value (in weeks)
Not specified (999)

Column 49: FOLLOW-UP_C: # of weeks post intervention
Actual value (in weeks)
Not specified (999)

Column 50: I_INT_FREQ: Total frequency of intervention contacts (with or without physical activity)
Actual value (numerical)
Not specified (999)

Column 51: I_INT_DUR: Intervention duration total time of all intervention contacts combined TOTAL hours
Actual value (numerical)
Not specified (999)

Column 52: I_CON_FREQ: Total frequency of control contacts (with or without physical activity) per week
Actual value (numerical)
Not specified (999)

Column 53: I_CON_DUR: Control duration. TOTAL.
Actual value (numerical)
Not specified (999)

Column 54: INFOCONT: Intervention contacts that do not include actual participation in physical activity (e.g., telephone support calls; # of times per week) per week.
Actual value (numerical)
Not specified (999)

Column 55: INFOCON_TYPE: Method in which the information contacts are delivered.
Electronic (1)
O Computer (11)
O Hand-held (PDAs) (12)

O Internet (13)
O Radio (14)
O TV (15)
O Video (16)
Face-to-face (2)
Mass media (3)
Multimedia (4)
Print (5)
O Brochures (52)
O Magazines (53)
O Newsletters (54)
Telephone (6)
Boosters (7)
None (8)
Not reported (999)

Column 56: INFOCON_DUR: The duration of each information contact TOTAL.
Time in hours.

Column 57: FREQPRESI: Activity frequency prescribed – INTERVENTION (# of times per week)
Actual value (numerical)
Not specified (999)

Column 58: FREQPRESC: Activity frequency prescribed – CONTROL (# of times per week)
Actual value (numerical)
Not specified (999)

Column 59: DURPRESI: Activity duration prescribed – INTERVENTION (# of minutes per session)
Actual value (numerical)
Not specified (999)

Column 60: DURPRESC: Activity duration prescribed – CONTROL (# of minutes per session)
Actual value (numerical)
Not specified (999)

Column 61: PROG: Type of activity program
Aerobic (1)
Aerobic light intensity (11)
Aerobic moderate intensity (12)
Aerobic vigorous intensity (13)
Strength training (2)

Flexibility (3)
Functional (4)
Range of Motion (ROM) Exercises (41)
Mixed (5)
Not specified (999)

Column 62: DESIGN: Study design
Randomized Clinical (1)
Quasi experimental with control (2)
Quasi experimental without control (3)
Pre-post design (4)

Column 63: E_Efficacy or effectiveness?
Efficacy (1)
Effectiveness (2)
Not reported (3)

Column 64: A_LOC. Description of study setting.
Yes (1)
No (2)

Column 64: LOCCON: Location/facility for control group
Medical Center (1)
Community Center (2)
Fitness facility (3)
University (4)
Home (5)
Other (6)
Residential (Nursing) Home (7)
Workplace (8)
Congregate Meal-Site (9)
Not specified (999)

Column 65 LOCEXP: Location/facility for experimental group
Medical Center (1)
Community Center (2)
Fitness facility (3)
University (4)
Home (5)
Other (6)
Residential (Nursing) Home (7)
Workplace (8)
General community (9)

Faith Based Location (10)
Congregate Meal-Site (11)
Not specified (999)

Column 66: I_DEL_INTND: Extent protocol delivered as intended (%)
yes (Actual %)
no (999)

Column 67: I_PART_REC_COMP: Participant receipt of intervention components
Yes (1)
No (2)

Column 68: I_COST: Measures of ongoing implementation cost
Yes (1)
No (2)

Column 69: I_EMBEDED_FNL_REPRT: Embedded in sustainable delivery system
Yes (1)
No (2)

Column 70: A_SET_INC_CRT: Inclusion criteria for setting
Yes (1)
No (2)

Column 71: A_SET_INC_CRT_List: (may be redundant to above)
Clinics for Medicaid eligible families (1)
Community centers in low income areas (2)
Cooperative Extension (3)
Willingness to maintain fidelity (4)
BBH program (5)
Sites within an organization (6)

Column 72: A_ SET_EXC_CRT: Exclusion criteria for setting
Yes (1)
No (2)

Column 73: A_SET_EXC_LIST
GUESSING!! Large room not available (1)

Column 74: A_ ID_SET: Method to identify target delivery agent. Do they describe the recruitment of delivery sites?
Yes (1)
No (2)

Column 75: A_ SET_SAMPLE_SIZE. The number of settings involved in delivering the intervention.

Number

Column 76: A_SET_DENOM. Do they provide a denominator of the total number of eligible settings?

Yes (1)
No (2)

Column 77: A_SET_AR. Provide the adoption rate among eligible settings.

Number (%)

Column 78: A_STAFF: Description of staff who delivered intervention. Does the study provide information on the training and expertise of the staff who delivered the intervention?

Yes (1)
No (2)

Column 79: A_STAFF2: List the type of delivery agent.

Trained research assistant (1)
Health professional (2)
Extension agent (3)
Group exercise leader (4)
Community leader (5)
On-site coordinator? (6)
Bachelor's Degree (7)

Column 80: STAFF_SAMPLE_SIZE. The number of staff involved in delivering the intervention.

Number

Column 81: STAFF_DENOM. Do they provide a denominator of the total number of staff eligible to deliver the program?

Yes (1)
No (2)

Column 82: STAFF_PR.1 Did they provide the participation rate among eligible staff?

Number (%)

Column 83: A_COST: Measures of cost to adopt the program in similar settings (i.e., provides info on start-up costs).

Yes (1)
No (2)

Column 84: CONCOND: The nature of the control condition
- Baseline (1)
- Collection of individuals (2)
- Home based Isolation (3)
- Home based Contact (4)
- Other (5)
- Control (6)
- Alone (7)
- Wait list control (8)
- None ??
- Not specified (999)

Column 85: EXPCOND: The nature of the experimental group
- True group (1)
  - With fewer than 3 face to face meetings (11)
- Collection of individuals (2)
- Other (3)
- Not specified (999)

Column 86: E_ FLLW_UP: Type of follow-up analytic procedure.
- Intent to treat (1)
- Present (2)

Column 87: E_ IMP_PRO: Imputation procedures included
- Yes (1)
- No (2)

Column 88: E_ QOL: Quality of life measure
- Yes (1)
- No (2)

Column 89: E_ PERT_ATTR: Percent attrition
- Actual %

Column 90: E_ MED_ANALY: Mediation analyses
- Yes (1)
- No (2)

Column 91: E_POT_MED_VARS_1 (Potential mediation variables).
- ATGT (1)
- ATGS (2)
- GIT (3)

GIS (4)
Social Integration (5)
General Group (6)
Self-efficacy (7) --- All types
Outcome expectations (8)

Column 92-100: E_MED_VARS_2-10

Column 101: E_ POT_MOD_ANALY: Potential moderation analyses
Yes (1)
No (2)

Column 102: E_ MOD_VARS_1: Moderation analyses
Gender (1)
Age (2)
Baseline PA status (3)
Self-Monitoring (4)
Member diversity (5)
Implementation (6)
Education (7)
Perceived Health (8)

Column 103-106: E_ MOD_VARS_2

Column 107: M_6MO_POST. Was the primary outcome assessed at least 6 months after the program was complete?
Yes (1)
No (2)

Column 108: M_SUSTAIN. Was the program sustained beyond the duration of the study?
Yes (1)
Yes, but adapted (2)
No (3)

Appendix B

PRECIS Coding Sheet for Systematic Review for Manuscript 1

0 = Completely explanatory 4 = Completely pragmatic

1. **Participant Eligibility** (exclusions, only include motivated)

0	1	2	3	4
Completely Pragmatic				Completely Explanatory
No exclusions		Some exclusions Most “typical” patients included		Run-in periods

2. **Experimental Intervention—Flexibility** (of application; amount of leeway)

0	1	2	3	4
Completely Pragmatic				Completely Explanatory
Based on principles; highly adapted		Some adaptation Guidelines		Rigid protocol, no deviations

3. **Experimental Intervention—Practitioner Expertise** (Range of practitioners vs. only expert staff; degree to which intervention “dose” monitored)

0	1	2	3	4
Completely Pragmatic				Completely Explanatory
Full range staff deliver treatment Little to no attention to side effects		Some range in staff expertise Moderate training		All expert staff; highly trained, closely monitored

4. **Comparison Intervention—Flexibility** (Usual practice; amount of leeway; vs. placebo control)

0	1	2	3	4
Completely Pragmatic				Completely Explanatory
Usual practice, much leeway		Same leeway		Little or no flexibility; placebo control

5. **Comparison Intervention—Practitioner Expertise** (experience of delivery staff)

0	1	2	3	4

Completely Pragmatic				Completely Explanatory
Full range staff deliver		Some Range in Practitioner Experience		Only expert practitioners

6. **Follow-up Intensity** (how much more than normal follow-up)

0	1	2	3	4
Completely Pragmatic				Completely Explanatory
No additional visits outside usual clinic follow-up		Some added visits		Much more frequent visits, data collection and follow-up

7. **Primary Trial Outcome** (clinically meaningful; outcome can be assessed in usual care)

0	1	2	3	4
Completely Pragmatic				Completely Explanatory
Objectively measured under usual conditions		Largely objective and readily measured; some specialized outcomes		Direct consequence of IV May need specialized training

8. **Participant Compliance** (obtrusiveness of measurement, degree adherence is monitored, rescue strategies)

0	1	2	3	4
Completely Pragmatic				Completely Explanatory
No measurement of patient compliance; no strategies to increase		A few strategies to measure and increase compliance		Close monitoring + actions to maximize compliance

9. **Practitioner Adherence to Study Protocol**

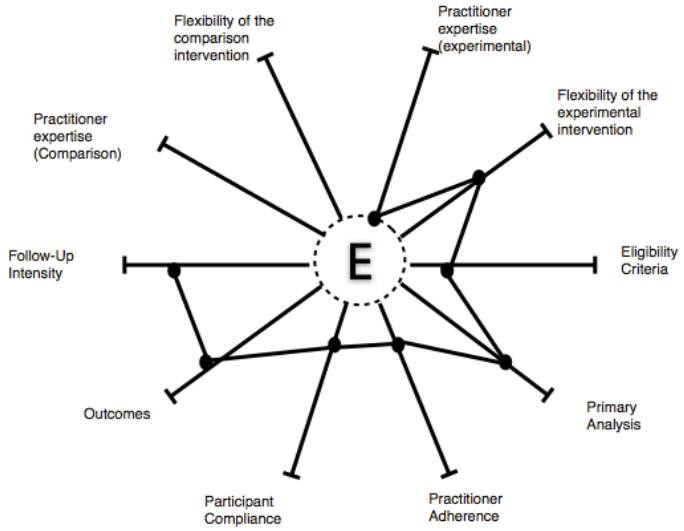
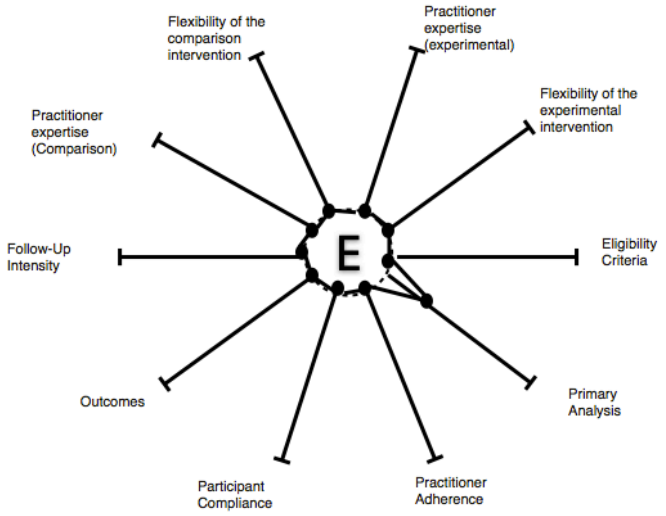
0	1	2	3	4
Completely Pragmatic				Completely Explanatory
No measures of practitioner adherence; no strategies to increase		Some strategies to monitor and increase		Close monitoring and action—attention to details and “MOP”

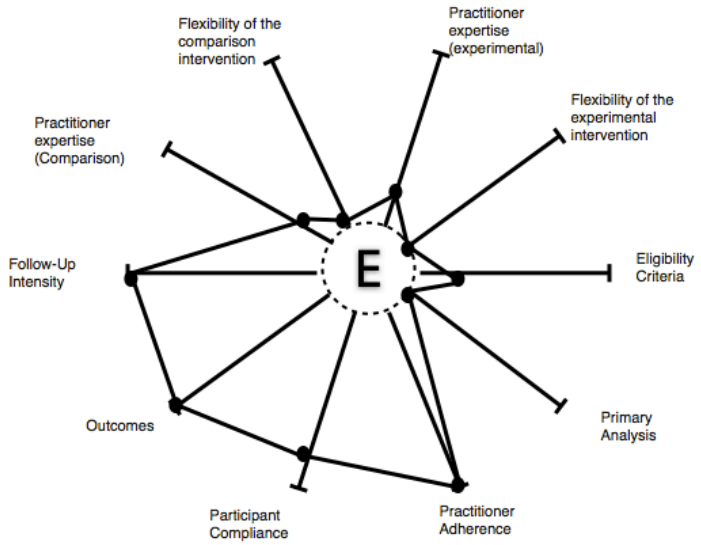
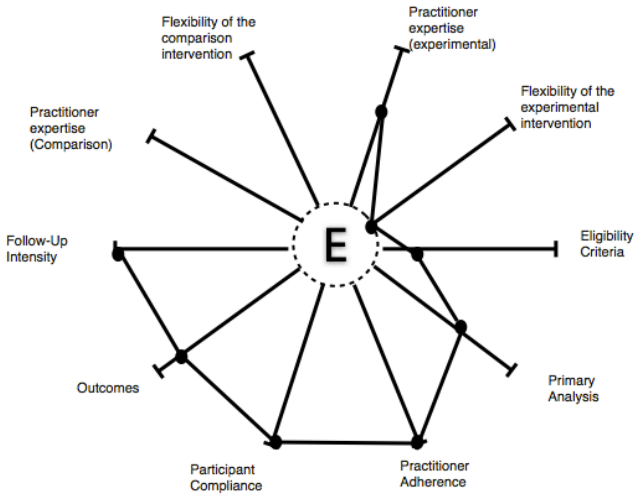
10. **Analysis** (ITT; vs. supplemented by per protocol)

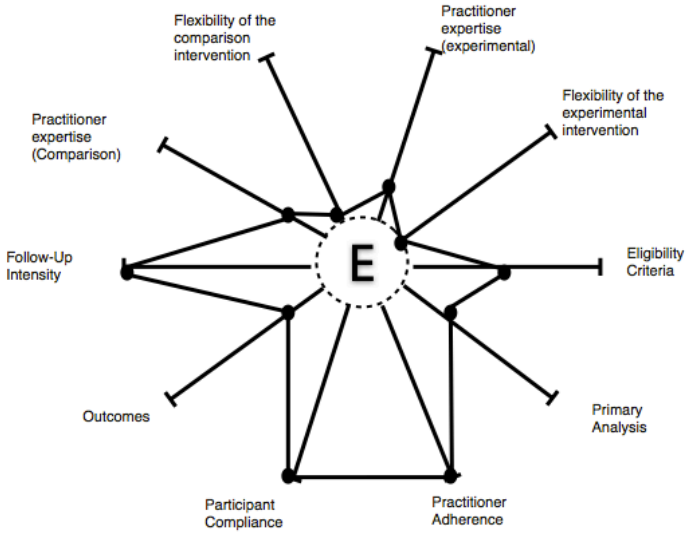
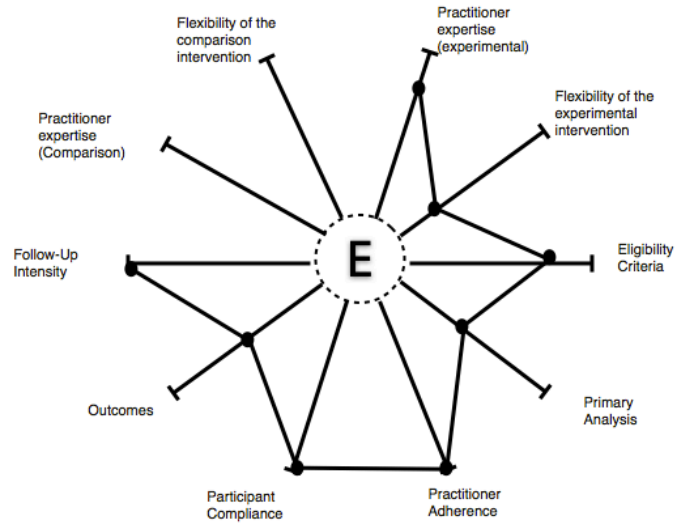
0	1	2	3	4
Completely Pragmatic				Completely Explanatory
ITT under usual conditions		Some selection or “dose” analyses		ITT supplemented by compliers’ analyses answer mechanism questions in primary outcome

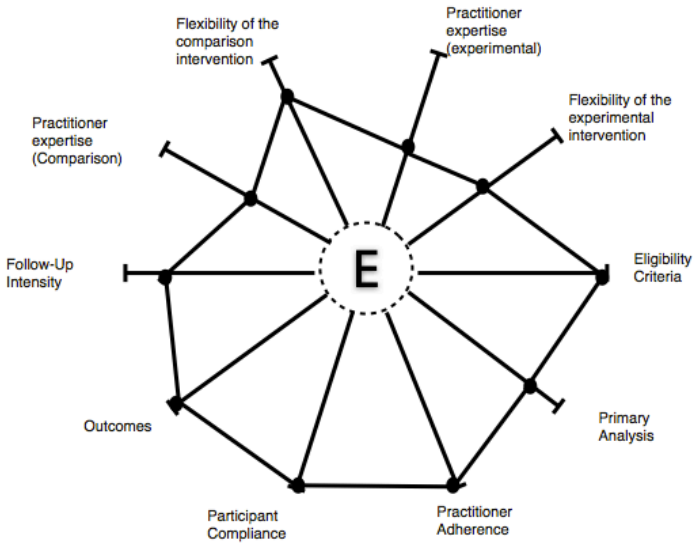
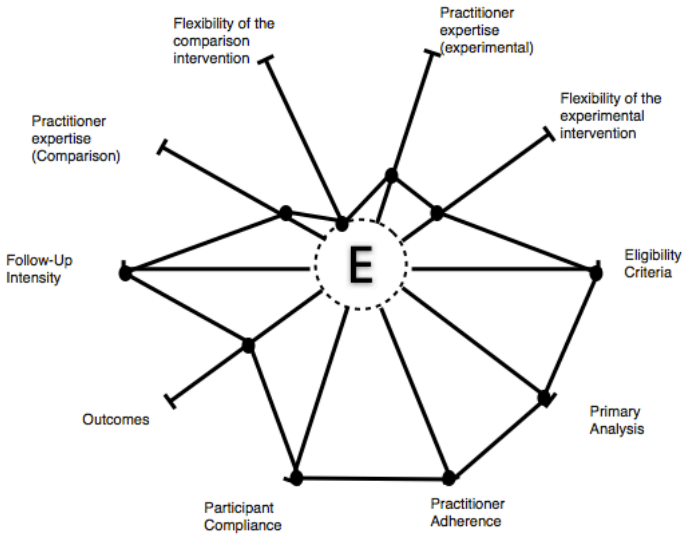
Appendix C

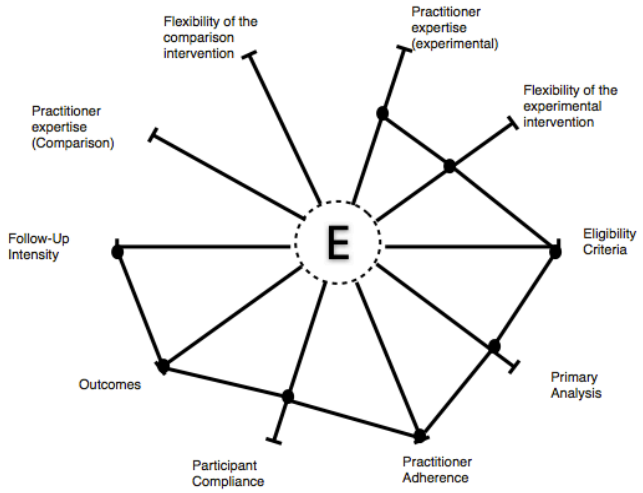
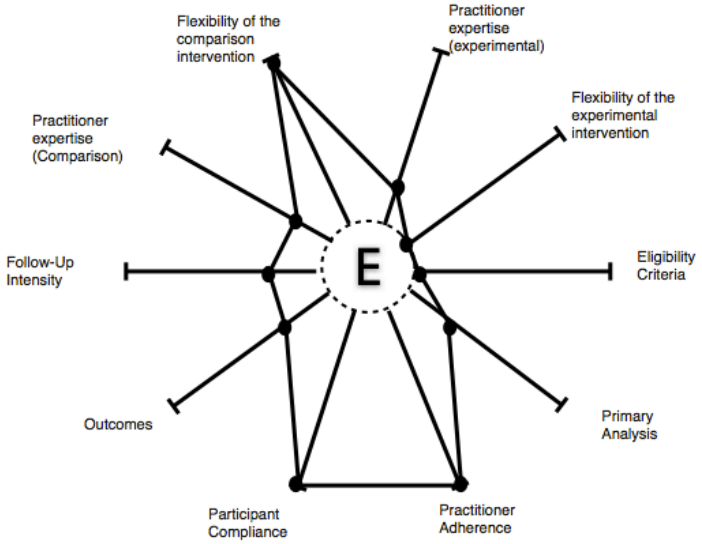
PRECIS/ RE-AIM Scores for all Articles in Systematic Review of Manuscript 1

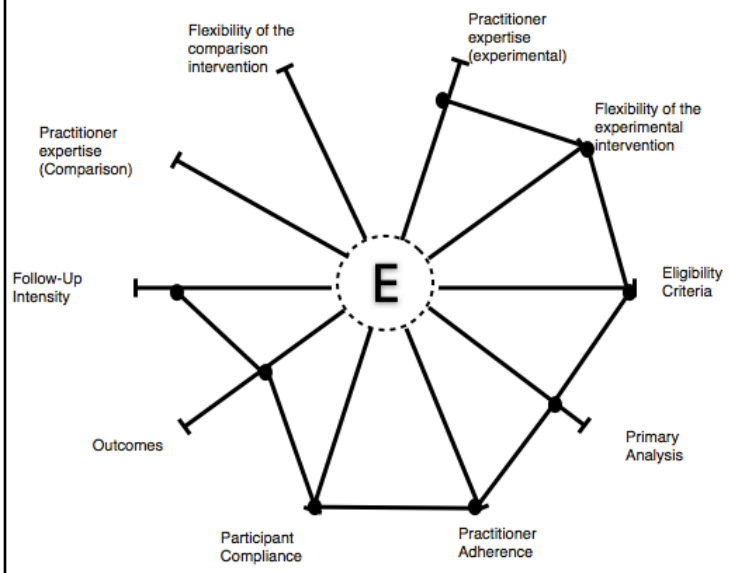
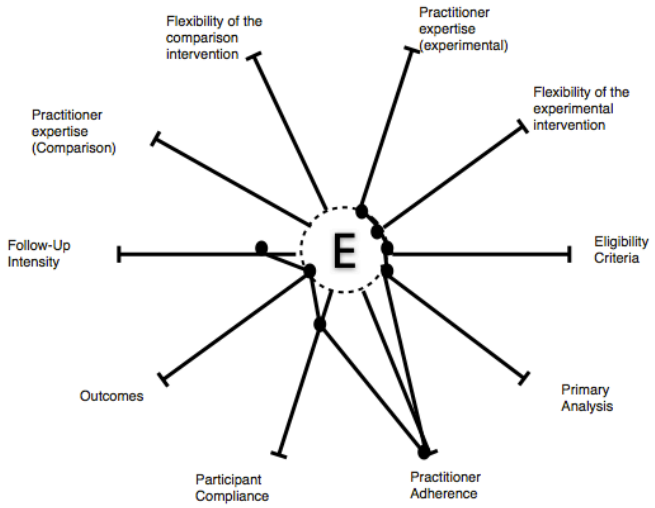
Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Amundson (2009)		10	Moderate
Annesi (1999)		8	Moderate

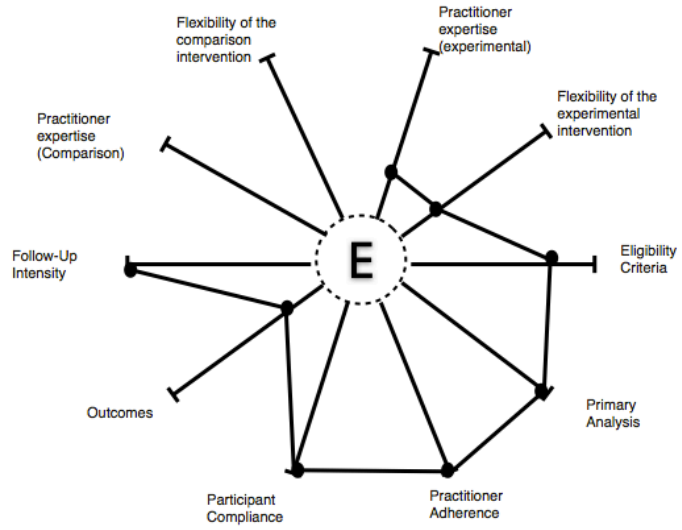
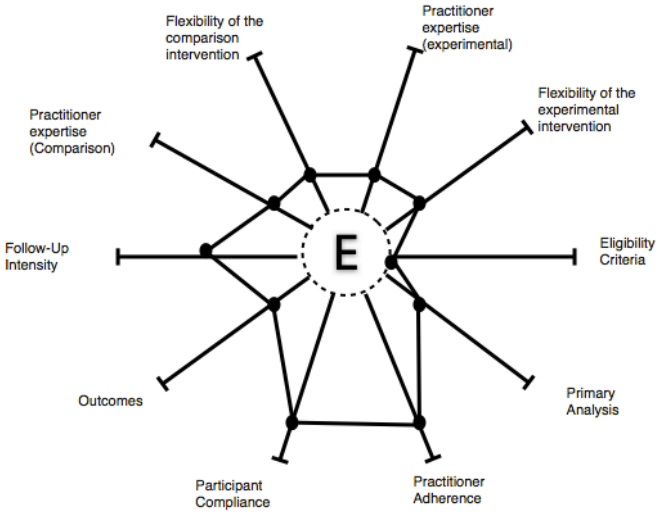
Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Ard (2008)		11	Moderate
Boyette (1997)		7	Moderate

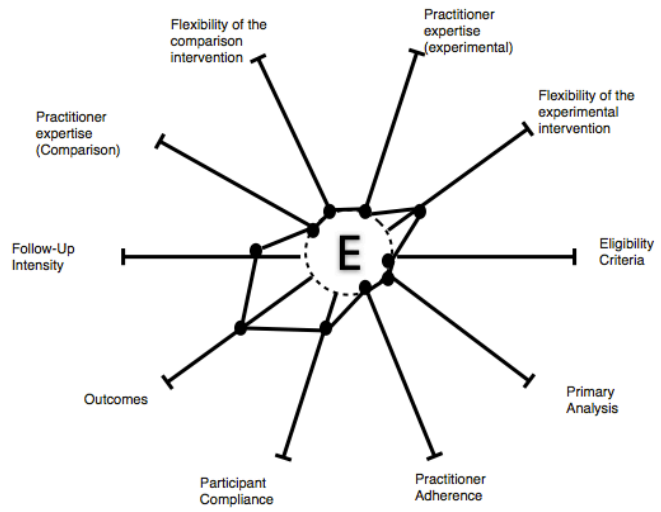
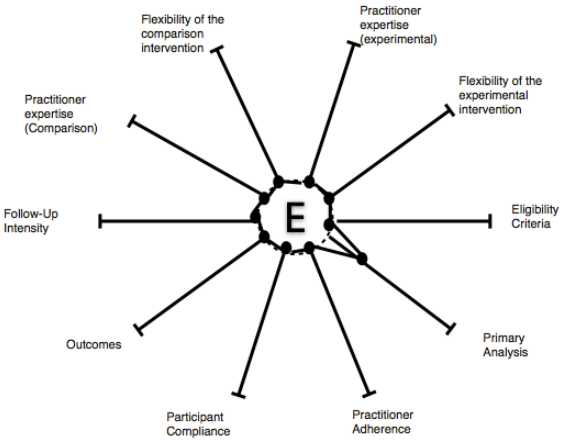
Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Cramp & Brawley (2006; 2009)		10	Moderate
Dishman (2009)		10	Moderate

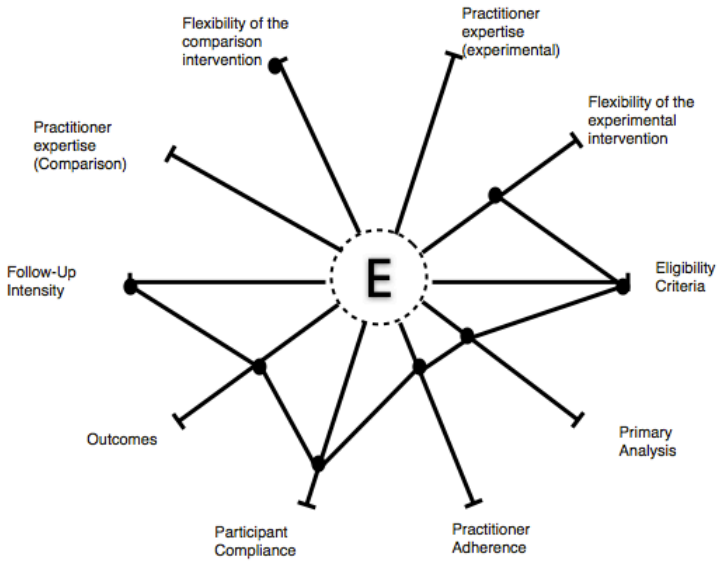
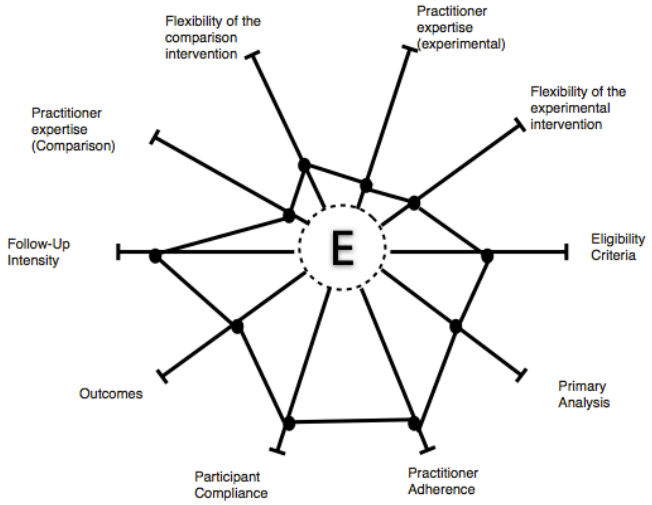
Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Estabrooks & Carron (1999)		13	High
Estabrooks (2005)		12	Moderate

Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Estabrooks et al. (2008)		14	High
Focht (2004)		12	Moderate

Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Green (2007)		12	Moderate
Hughes (2006)		12	Moderate

Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Kim (2008)		13	High
Leermakers (1999)		10	Moderate

Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Perry (2007)		11	Moderate
Rejeski (2002/2003)		10	Moderate

Study First Author (Date)	**PRECIS**	**RE-AIM Score**	**RE-AIM Quality Assessment**
Wilson (2010)		6	Low
AVERAGE ACROSS ALL STUDIES (N=17)		10.67	Moderate

Appendix D

*c*MOC Modified Health Beliefs Survey

Virginia Tech/ Carilion
Cardiovasuclar Health Maternal Obstetrical Care (*c*MOC) Study
Health Beliefs Survey

Age:_____ Sex:_____ Height: _____Weight_____

What racial group do you consider yourself? CHECK ALL THAT APPLY.

O American Indian or Alaskan Native
O Asian
O Black or African American
O Native Hawaiian or Pacific Islander
O White
O I don't know
O Other, PLEAE TELL US _____

Please indicate which of the following best describes your ethnicity:

O Latino, Hispanic, Chicano, Mexican or Mexican-American, Central American, or other Latin American
O Not Latino, Hispanic, Chicano, Mexican or Mexican-American, Central American, or other Latin American
O I don't know

Country of birth: _____
Number of years in the U.S. _____
Language usually spoken at home: _____

Will this be your 1st, 2nd, 3rd, 4th, child (or other.....)?_____

Food Beliefs

Healthier Food Strategies

Please, tell us what you have done in the past 1 month to eat healthier foods.

Use this scale to tell us how often in the past month you did the following:				
1 Never	**2 Seldom**	**3 Occasionally**	**4 Often**	**5 Repeatedly**

In the past month how often did you:	**How Often (1-5)**
1. Remind yourself that larger portions slow down weight loss.	
2. Tell yourself that every portion counts.	
3. Remind yourself that “fat-free” does not mean “calorie-free.”	
4. Eat more vegetables.	
5. Avoid going to restaurants where you eat too much.	
6. Plan to eat smaller portion sizes at meals.	
7. Eat more fruit.	
8. Pay closer attention to serving sizes.	
9. Choose healthier options in fast-food and other restaurants.	
10. Eat smaller portions.	
11. Keep track of the servings of protein that you eat.	
12. Eat 5 to 6 smaller meals a day.	
13. Keep track of how many servings of fruits and vegetables you eat each day.	
14. Plan to eat only a certain number of servings each day.	
15. Plan to eat at least 5 servings of fruits and vegetables each day.	

Use this scale to tell us how often in the past month you did the following:				
1 Never	**2 Seldom**	**3 Occasionally**	**4 Often**	**5 Repeatedly**

In the past month how often did you:	**How Often (1-5)**
16. Plan to drink fewer sodas and other sugared beverages.	

Food Beliefs

Healthier-Foods Efficacy

These questions ask how CERTAIN you are that you can do different things to eat healthier foods.

You will be asked to decide how certain or how sure you are that you can do these things on most days and in lots of different situations.

Think about times when it will be easy to do these things and when it will be harder.

When deciding how sure you are you can do these things, we want you to think about doing them:

ALL or MOST of the time, not just once or twice.

For a long time…until next year…or even longer!

In a lot of different situations – like when you are…

- deciding what to eat when at home, alone, watching TV or doing chores…
- eating with your family…
- eating out with friends or at a party …
- at a fast-food restaurant…
- buying food at the grocery store

Food Beliefs

Healthier-Foods Efficacy

Use any number from 0 to 100 on the following scale to tell how certain you are that you can – all or most of the time:

.

0 Certain I CAN NOT	**----------**	**50 Somewhat certain I can**	**----------**	**100 Certain I CAN**

	KEEPING TRACK	
	How certain are you that you can, every day, *keep track* **of the…**	**How certain? (0-100)**
	1. the number of servings of fruit that you eat?	
	2. the number of servings of vegetables that you eat?	

0 Certain I CAN NOT	----------	50 Somewhat certain I can	----------	100 Certain I CAN

3. the number of servings of protein that you eat?	
4. the regular sodas or other sweet beverages you drink?	
5. what you need to eat 5 to 6 healthy meals?	
How certain are you that you can, every day…	**How certain? (0-100)**
FRUITS AND VEGETABLES	
1. bring fruit to work or school for snacks every day?	
2. eat at least 5 servings of fruits and vegetables every day?	
3. eat vegetables (like carrot or celery sticks) for a snack?	
4. eat fruit for a snack?	
5. have a side salad instead of French fries when dining out?	

Please, tell us what strategies you have you used in the past month to make sure you get some exercise in.

Use this scale to tell us how often in the past month you did the following:

1 Never	2 Seldom	3 Occasionally	4 Often	5 Repeatedly

In the past month how often did you:	**How Often (1-5)**
1. Set aside time each day to do exercise?	
2. Do planned exercise?	
3. Write down in your calendar your plans to exercise?	

Use this scale to tell us how often in the past month you did the following:				
1 Never	**2 Seldom**	**3 Occasionally**	**4 Often**	**5 Repeatedly**

In the past month how often did you:	**How Often (1-5)**
4. Plan to do strength training?	
5. Keep track of the number of days you exercised each week?	
6. Keep track of how long your exercise sessions were?	
7. Plan to exercise 5 days a week?	
8. Set goals for how hard you exercise?	
9. Get together with someone else to exercise?	
10. Plan to do aerobic exercise?	

Physical Activity Beliefs

Physical Activity Strategies

These questions ask how CERTAIN you are that you can do different things to make sure you:

exercise most days of the week under lots of different conditions.

Think about times when it will be easy to exercise and when it will be harder.

When deciding how sure you are, we want you to think about exercising

most days of the week, not just once or twice, but

for a long time…until next year …or even longer!

In a lot of different situations …

·when the weather is bad …
·when you are feeling stressed or depressed …
·when you can't find someone to exercise with you …
·when you are busy.

Physical Activity Beliefs

Physical Activity Strategies

Use any number from 0 to 100 on the following scale to tell how certain you are that you can – all or most of the time:

	0 Certain I CAN NOT	**----------**	**50 Somewhat certain I can**	**----------**	**100 Certain I CAN**

	How certain are you that you can …	How certain? (0-100)	
	1. get up early during the week to exercise?		
	2. get together with someone else to exercise?		
	3. exercise most days of the week?		
	4. keep track of when and how long you exercise?		
	5. begin exercising again if you miss a day or two?		
	6. make a plan to do strength training?		
	7. make a plan to do aerobic exercise?		
	8. find a place to exercise during bad weather?		
	9. change your normal routine to exercise?		
	10. stay up later to make time for exercise?		
	How certain are you that you can exercise when …		
	1. you are feeling stressed?		
	2. you are tired?		
	3. your muscles might be a little sore?		

Use any number from 0 to 100 on the following scale to tell how certain you are that you can – all or most of the time:					
	0 Certain I CAN NOT	**----------**	**50 Somewhat certain I can**	**----------**	**100 Certain I CAN**
	How certain are you that you can …				How certain? (0-100)
	4. you get busy with work, school, etc.?				
	5. you have social activities?				
	6. you have work to do at home?				
	7. you are feeling depressed?				

Now we are going to assess norms for physical activity and healthy eating in your family and your Baby Steps group. Please show us how you feel about the class; 1 being strongly disagree and 5 being strongly agree

	Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
1. Someone teases a family member for trying to manage her weight when she is pregnant	**1**	**2**	**3**	**4**	**5**
2. No one says anything to a family member for trying to manage her weight when she is pregnant	**1**	**2**	**3**	**4**	**5**
3. Someone says something encouraging when a family member tries to manage her weight when she is pregnant	**1**	**2**	**3**	**4**	**5**
4. Someone teases a family member for exercising when she is pregnant	**1**	**2**	**3**	**4**	**5**
5. No one says anything to a family member for exercising when she is pregnant	**1**	**2**	**3**	**4**	**5**
6. Someone says something encouraging when a family member exercises when she is pregnant	**1**	**2**	**3**	**4**	**5**

7. Someone teases a family member for eating healthfully when she is pregnant	**1**	**2**	**3**	**4**	**5**
8. No one says anything to a family member for eating healthfully when she is pregnant	**1**	**2**	**3**	**4**	**5**
9. Someone says something encouraging when a family member eats healthfully when she is pregnant	**1**	**2**	**3**	**4**	**5**
10. Someone teases a group member for trying to manage her weight when she is pregnant	**1**	**2**	**3**	**4**	**5**
11. No one says anything to a group member for trying to manage her weight when she is pregnant	**1**	**2**	**3**	**4**	**5**
12. Someone says something encouraging when a group member tries to manage her weight when she is pregnant	**1**	**2**	**3**	**4**	**5**
13. Someone teases a group member for exercising when she is pregnant	**1**	**2**	**3**	**4**	**5**
14. No one says anything to a group member for exercising when she is pregnant	**1**	**2**	**3**	**4**	**5**
15. Someone says something encouraging when a group member exercises when she is pregnant	**1**	**2**	**3**	**4**	**5**
16. Someone teases a group member for eating healthfully when she is pregnant	**1**	**2**	**3**	**4**	**5**
17. No one says anything to a group member for eating healthfully when she is pregnant	**1**	**2**	**3**	**4**	**5**
18. Someone says something encouraging when a group member eats healthfully when she is pregnant	**1**	**2**	**3**	**4**	**5**

Appendix E

PsychosocialAssessment for Exercise and Healthy Eating and Group Context Questionnaire for *c*MOC

SUBJECT ID #_____
DATE_____

PLEASE PRINT

1. In this Baby Steps class, I believe that group members are similar to me in terms of:

	Very Strongly Disagree	Strongly Disagree	Dis-agree		Neither Agree nor Disagree		Agree	Strong-ly Agree	Very Strong-ly Agree
Age	1	2	3	4	5	6	7	8	9
Education	1	2	3	4	5	6	7	8	9
Attitudes	1	2	3	4	5	6	7	8	9
Personal values	1	2	3	4	5	6	7	8	9
Personal beliefs	1	2	3	4	5	6	7	8	9
Life Experiences	1	2	3	4	5	6	7	8	9
Physical condition	1	2	3	4	5	6	7	8	9
Ethnicity	1	2	3	4	5	6	7	8	9

2. Overall, I feel that I am similar to other members of this group

Strongly Disagree								Strongly Agree
1	2	3	4	5	6	7	8	9

3. How many members of the class do you feel that you are similar to? _____

4. Please show us how you feel about the class; 1 being strongly disagree and 9 being strongly agree:

	Very Strongly Disagree	Strongly Disagree	Dis-agree		Neither Agree nor Disagree		Agree	Strongly Agree	Very Strong-ly Agree
1. Members of our group enjoy helping if work needs to be done to prepare for the activity sessions.	1	2	3	4	5	6	7	8	9
2. I like the amount of physical activity I get in class.	1	2	3	4	5	6	7	8	9

3.	**We spend time socializing with each other before and after our class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
4.	**I am satisfied with the intensity (difficulty) of the physical activities in class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
5.	**Our group is in agreement about the benefits of healthy eating taught in this class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
6.	**The healthy eating information in class helps me improve areas of health I consider important.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
7.	**The physical activities in the class help me improve in areas of my health that I consider important.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
8.	**I like the program of physical activities done in the class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
9.	**I am satisfied with the type of healthy eating information taught in class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
10.	**I enjoy when new exercises in class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
11.	**This class helps me improve my health.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
12.	**I like the MyPyramid approach to healthy eating taught in class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
13.	**This class is an important social unit for me.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
14.	**Our group is in agreement about the benefits of physical activities offered in this class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
15.	**We encourage each other in order to get the most out of the class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
16.	**I like the amount of healthy eating information I get in class.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
17.	**Our group is in agreement about the healthy eating information that should be offered.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

18. I enjoy my social interactions in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
19. Members of our group are satisfied with the intensity (difficulty) of the physical activity in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
20. I liked meeting the women in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
21. Members of our class often socialize during exercise time.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
21. In terms of social experiences in my life, this class is very important to me.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
22. The social interactions I have in this class are important to me.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
23. Members of our group are satisfied with the MyPyramid approach to healthy eating taught in class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
24. When the class ends, I will miss the other women in the class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
25. Our group is in agreement about the program of physical activities that should be offered.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
26. Members of our group sometimes socialize together outside of activity time.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
27. Members of our group enjoy discussing the MyPyramid healthy eating plan.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
28. Members of our class would likely spend time together when the program ends.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

Appendix F

*c*MOC Focus Group Guide

Introductory Comments: Thanks for coming to our focus group today. Our goal for the day is to get feedback from you on the structure of Baby Steps as well as the content. As we go through the questions, I will remind you to think about the things you like about the different aspects of the program and things you might consider changing to make it more appropriate or fun for future participants.

First, I would like to talk about the exercise and eating plans in the program we'll take about 20 minutes on this topic.

1. What feedback do you have about the physical activity portion of the class meetings? Think about the things you like about it and things you might consider changing to make it more appropriate or engaging.[Wrap up by 10 minutes]
    - Prompts if necessary:
        - ☒ Do you feel like exercises were fully explained and demonstrated?
        - ☒ Barriers to this exercise plan
        - ☒ Things you like about the exercise plan
        - ☒ How do you feel after you exercise?
        - ☒ How do you think this is affecting your pregnancy?
        - ☒ Would you recommend this program to other women you know?
        - ☒ If offered, would you continue with a program like this one after delivery?
2. What feedback do you have about the healthy eating information addressed in class? What do you like about it and what things might you consider changing to make it more appropriate or engaging for future participants? [Wrap up by 20 minutes]
    - Prompts if necessary:
        - ☒ Did the initial list of recipes help you introduce the right serving sizes into your diet?
        - ☒ Did the journal help you create new goals?
        - ☒ Barriers to eating in as taught by the MyPyramid
        - ☒ Things you like about this meal plan

Thanks, next week would like to get feedback on the information and structure of the monthly sessions and telephone calls. We'll take about 20 minutes on this topic.

3. What feedback do you have on the class sessions? What do you like about them and what things might you consider changing to make it more appropriate or engaging for future participants? [Wrap up by 30 minutes]
    - Prompts if necessary:
        - ☒ What do you think about the frequency?
        - ☒ What do you think about the length of the classes?
        - ☒ How do you think the classes affected your exercise throughout pregnancy?
        - ☒ How do you think the classes affected your eating patterns throughout pregnancy?
        - ☒ What was your favorite part of class?
4. What feedback to you have about the phone calls? [Wrap up by 40minute]
    - Prompts if necessary:
        - ☒ Did you enjoy the reminders?
        - ☒ Do you think they helped keep you on track?
        - ☒ How did you feel about their length and frequency?

Thanks for your responses, now I would like to ask you some more specific questions about features and materials of the program.

5. How do you like the journal?
6. What things might you consider changing to make it more appropriate or engaging for future participants?

[wrap up by 45 minutes]

7. What feedback do you have about the location? What do you like about it and what things might you consider changing to make it more appropriate or engaging for future participants? [Wrap up by 54 minutes]

- Prompts if necessary:
  - ☒ Do you think holding the class at the Clinic made it more convenient?
  - ☒ How do you feel about the overall environment?

Thanks again for the discussion, in the last 5 minutes we would like to get a feel for your overall experience with the program, any additional improvements we could make to the program that we haven't already talked about, and if you have noticed any changes throughout the first 5 sessions of following the program. I will open it up for feedback now. [Wrap up at 60 minutes]

Appendix G

Guide of Approved Physical Activity for Obese Pregnant Women

	Exercise
Core	Trunk Flexing; Place hands on hips. Lean gently to the right and hold for 15 seconds. Then lean gently to the let and hold for 15 seconds. Repeat 2 times.
Core	Modified Sit-Ups: Facing straight ahead with fingertips on the back of neck and elbows to the side, press upper body forward until you're at about a 45 angle to your hips, or as far as comfortable.
Core	Stand against a wall. Pull in abdomen. Pull pelvis under. Do this until your lower back flattens against the wall. Hold and count to 5. Repeat 3 to 5 times.
Core	Wrap arms around shoulders and hug "yourself." Gently lower chin to chest and drop shoulders. Hold for 15 to 30 seconds. Bring head up, then gently press ear toward shoulder. Roll head forward and around to other ear. Then roll forward to opposite ear. Roll head from side to side 5 to 10 times.
Upper Body	Arm Circles: Move arms about 6 inches from the sides. Begin arm circles and move arms upward to shoulder height then move down again. Repeat 2 times.
Upper Body	Hold arm out to side with your palm facing back. Keeping arm straight, bend elbow until knuckles point down. Bend elbow 10 times and relax.
Upper Body	Hold arm down with your palm forward. Keeping arm tight, curl arm up so the weight touches your shoulder. Curl arm up 10 times and relax.
Upper Body	Hold arm straight out from side of body with your palm down. Keeping arm tight, bend elbow until the weight touches your chest. Bend elbow 10 times and relax.
Lower Body	Knee raise. Sit up straight with both feet resting on the floor. Raise one knee so that foot rises 3 or 4 inches from the floor. Hold for 5 to 10 seconds. Lower knee. Perform 5 times with each leg.
Lower Body	Kick back. Bend knee to move foot backwards under the chair. Hold for 5 to 10 seconds. Return to the starting position. Repeat with other leg.

Lower Body	Leg raise. Raise left foot until leg is as straight as possible.Hold. Slowly lower foot to the floor. Repeat with other leg.
Lower Body	Push back. Place feet on the floor with the back of left heel against the left front leg of chair. Push back against the chair leg with left foot. Hold. Repeat with other foot.
Lower Body	CalfRaises: Hold on to the back of the chair with both hands for support. Stand on your tip toes then back down. Repeat 10 times. Can also be performed sitting.

Quick at Home Tips:

_ Walk instead of drive
_ Take stairs instead of lift
_ Get off bus before usual stop and walk
_ Take the children to play in the park
_ Get a “walking buddy” to take regular walks with
_ Borrow exercise videos or DVDs from the local library

Appendix H

Modified PAGEQ for Group-Interaction Variables

PAGEQ

Data Field	Questionnaire	Question	Answer Key							
			Using the following scale, please bubble in a number from 1 to 9 to indicate your level of agreement with each of the statements. If you neither agree nor disagree respond by using the number '5'.							
			Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Very Strongly Agree	
PAGEA1	PAGEQ	1. I like the amount of physical activity I get with this group.	1	2	3	4	5	6	7	8	9
PAGEA2	PAGEQ	2. This group is an important social unit for me.	1	2	3	4	5	6	7	8	9
PAGEA3	PAGEQ	3. I enjoy my social interactions with this group.	1	2	3	4	5	6	7	8	9
PAGEA4	PAGEQ	4. This group's program provides me with a good opportunity to improve in areas of fitness I consider important.	1	2	3	4	5	6	7	8	9
PAGEA5	PAGEQ	5. I like meeting the people who come to this group's program.	1	2	3	4	5	6	7	8	9
PAGEA6	PAGEQ	6. I am happy with the intensity of the physical activity offered by this group.	1	2	3	4	5	6	7	8	9
PAGEA7	PAGEQ	7. I like the program of physical activities done by this group.	1	2	3	4	5	6	7	8	9
PAGEA8	PAGEQ	8. If this program were to end, I would miss my contact with the other participants.	1	2	3	4	5	6	7	8	9
PAGEA9	PAGEQ	9. I enjoy new exercises done by this group.	1	2	3	4	5	6	7	8	9

Data Field	Questionnaire	Question	Answer Key							
			Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Very Strongly Agree	
PAGEA10	PAGEQ	10. In terms of the social experiences in my life, this group is very important.	1	2	3	4	5	6	7	8	9
PAGEA11	PAGEQ	11. This program provides me with good opportunities to improve my personal fitness.	1	2	3	4	5	6	7	8	9
PAGEA12	PAGEQ	12. The social interactions I have with this group are important to me.	1	2	3	4	5	6	7	8	9
PAGEA13	PAGEQ	13. I try to do the same things the healthiest people of this group are doing.	1	2	3	4	5	6	7	8	9
PAGEA14	PAGEQ	14. I would like to be the healthiest person of this group.	1	2	3	4	5	6	7	8	9
PAGEA15	PAGEQ	15. There is friendly competition within the members to stay as healthy as possible.	1	2	3	4	5	6	7	8	9
PAGEA16	PAGEQ	16. I have a significant role within this group.	1	2	3	4	5	6	7	8	9
PAGEA17	PAGEQ	17. I feel some responsibility to this program.	1	2	3	4	5	6	7	8	9

PART B.

The following questions are designated to assess your feelings about YOUR GROUP AS A WHOLE.
Using the following scale indicate your level of agreement with each of the statements.
If you neither agree nor disagree respond by using the number '5'.

Data Field	Questionnaire	Question	Answer Key								
			Very Strongly Disagree	Strongly Disagree	Disagree		Neither Agree Nor Disagree		Agree	Strongly Agree	Very Strongly Agree
PAGEB1	PAGEQ	1. Members of our group often socialize during meals.	1	2	3	4	5	6	7	8	9
PAGEB2	PAGEQ	2. Our group is united in its beliefs about the benefits of regular physical activity.	1	2	3	4	5	6	7	8	9
PAGEB3	PAGEQ	3. Members of our group would likely spend time together if the program was	1	2	3	4	5	6	7	8	9
PAGEB4	PAGEQ	4. Our group is in agreement about the types of physical activity that we should do.	1	2	3	4	5	6	7	8	9
PAGEB5	PAGEQ	5. Members of our group are satisfied with the physical activity opportunities available.	1	2	3	4	5	6	7	8	9
PAGEB6	PAGEQ	6. Members of our group sometimes socialize together outside of meal times.	1	2	3	4	5	6	7	8	9
PAGEB7	PAGEQ	7. We spend time socializing with each other before and after meals.	1	2	3	4	5	6	7	8	9
PAGEB8	PAGEQ	8. Members of our group enjoy helping out with things of the group.	1	2	3	4	5	6	7	8	9
PAGEB9	PAGEQ	9. We encourage each other in order to get the most out of the program.	1	2	3	4	5	6	7	8	9
PAGEB10	PAGEQ	10. People of this group talk about things that are happening in our lives.	1	2	3	4	5	6	7	8	9

Data Field	Questionnaire	Question	Answer Key								
			Very Strongly Disagree	Strongly Disagree	Disagree		Neither Agree Nor Disagree		Agree	Strongly Agree	Very Strongly Agree
PAGEB11	PAGEQ	11. Our group discusses the importance of regular physical activity.	1	2	3	4	5	6	7	8	9
PAGEB12	PAGEQ	12. Members of our group talk about how often they should do physical activity.	1	2	3	4	5	6	7	8	9
PAGEB13	PAGEQ	13. Members of our group discuss the appropriate type of physical activity we should do.	1	2	3	4	5	6	7	8	9
PAGEB14	PAGEQ	14. Members of our group talk about exercise and physical activity a lot.	1	2	3	4	5	6	7	8	9
PAGEB15	PAGEQ	15. We all cooperate to help this group's program run	1	2	3	4	5	6	7	8	9
PAGEB16	PAGEQ	16. If people want to do different things at the program we cooperate to satisfy everyone.	1	2	3	4	5	6	7	8	9
PAGEB17	PAGEQ	17. Members of our group cooperate well together.	1	2	3	4	5	6	7	8	9

Appendix I

Checklist of Walk Kansas attributes and attributes considered in the decision making process.

Thinking about Walk Kansas, please check all that apply.	Why did YOU decide to offer Walk Kansas? Check all that apply.
1=Compared to other physical activity programs it is easy to deliver.	1=Compared to other physical activity programs it is easy to deliver.
2=It is better than most other community physical activity programs.	2=It is better than most other community physical activity programs.
3=It helps people start being more active and stick with it even after the program is finished.	3=It helps people start being more active and stick with it even after the program is finished.
4=It fits the mission of Kansas State Research and Extension	4=It fits the mission of KSRE
5=It attracts more county residents than any other Extension program.	5=It attracts more county residents than any other Extension program.
6=It was adapted from other programs to work specifically in Kansas.	6=It was adapted from other programs to work specifically in Kansas.
	7=I saw the impact it was having in other counties.