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# Increasing Physical Activity to Improve Health Through Primary Care Clinics in Rural Nebraska

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# INCREASING PHYSICAL ACTIVITY TO IMPROVE HEALTH THROUGH PRIMARY CARE CLINICS IN RURAL NEBRASKA

by

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**Dedication**

This work is dedicated to my family who allowed me to pursue another degree after I swore I would never take more classes after completing my doctorate.

# INCREASING PHYSICAL ACTIVITY TO IMPROVE HEALTH THROUGH PRIMARY CARE CLINICS IN RURAL NEBRASKA

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University of Nebraska Medical Center, 2018

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Addressing the lack of physical activity (PA) in rural adults is vital because of the role it plays in the risk for many chronic diseases. The purpose of the study was to explore the feasibility of conducting a 12-week intervention to increase PA behavior in inactive rural adults recruited from a primary care clinic. Subjects were randomized to the intervention (n=30) or control (n=29) group and wore a Fitbit to track PA. The intervention group completed action plans and received weekly motivational text messages to improve PA behaviors. Semi-structured interviews were conducted with study participants (n=10) and a focus group with nurses (n=7) from the primary care clinic. T-tests, Signed rank tests and Wilcoxon were used to look at changes within and across groups. Qualitative data were analyzed using the process of immersion/crystallization. All individuals improved their total PA, however, no significant differences between groups in active minutes or steps was found. There were no statistically significant differences between groups on any of the theoretical variables. Participants and nurses both felt the program had a positive impact on PA and a community program was needed. Study participants most often reported their favorite part of the study was being able to track their PA. However, participants reported barriers to continued participation in PA related to a lack of time and ability to be active in cold weather. Nursing staff reported barriers related to lack of resources (staffing and money). These barriers need to be examined further and addressed to implement a sustainable PA program that can be maintained through a primary care clinic.

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# Chapter 1

The purpose of the study was to explore the feasibility of conducting a 12-week intervention to increase physical activity (PA) behavior in inactive rural adults recruited from a primary care clinic. The long-term goal of this research is to demonstrate a practical way to promote sustained PA in rural adults recruited through primary care clinics.

The write-up of this study is organized as follows. Chapter 1 provides the purpose, aims, background, significance and conceptual framework. Chapter 2 addresses the research methods and results of the physical activity program in this rural sample. Chapter 3 provides the qualitative analysis of the study. This includes results of participant interviews and the focus group with nurses from the primary care clinic where recruitment occurred. Chapter 4 provides a summary of the study, implications for clinical practice and conclusions. The manuscripts presented in Chapters 2 and 3 were submitted for publication.

## Introduction

The American Heart Association and the World Health Organization recognize physical inactivity as the fourth leading risk factor of global morbidity and premature mortality (Kraus et al., 2015; World Health Organization, 2014). Greater levels of PA and fitness are directly related to improvements in health status (Warburton, D. E., Nicol, & Bredin, 2006). While the benefits of regular PA have been established, PA in the United States has significantly declined over the past 2 decades (Burke, L. E. et al., 2015). Only 20% of American adults (18-65 year old) meet PA guidelines of at least 30 minutes of moderate level aerobic activity five days per week (Centers for Disease Control and Prevention, 2014).

## Purpose and Aims

### Purpose

The purpose of the study was to explore the feasibility of conducting a 12-week intervention to increase physical activity behavior in inactive rural adults recruited from a primary care clinic.

### Aims

1. To examine the effectiveness of using the 5A's model for brief PA counseling to improve rural subjects' PA behaviors (including active minutes and daily steps), perceptions of attitude, perceived behavioral control, subjective norms, and intention, and self-regulatory strategies of planning, goal setting, and tracking.
2. To complete selected participant interviews and interviews with clinical staff to determine acceptability (satisfaction, intent to continue use), demand (actual use, perceived demand), implementation (degree of use, success or failure of use, factors affecting use), and practicality (effects, ability of individuals to continue activities) of the PA program.

## Background and Significance

### Physical Activity Issues and Statistics

The problem of physical inactivity is increasing and becoming a worldwide problem (Andersen, Mota, & Di Pietro, 2016; Hallal et al., 2012; Kohl 3rd et al., 2012; Tremblay et al., 2017). The American Heart Association (AHA) and the World Health Organization (WHO) recognize physical inactivity as the fourth leading risk factor of global morbidity and premature mortality (Kraus et al., 2015; World Health Organization, 2014). It is estimated that approximately 31% of the world's population is not meeting PA guidelines and are classified as being physically inactive (Hallal et al., 2012). In the United States (U.S.), 80% of adults (18-65 year old) are not meeting PA guidelines of at least 30 minutes

of moderate level aerobic activity five days per week (Centers for Disease Control and Prevention, 2014).

Those who are physically inactive are at increased risk for non-communicable diseases such as cardiovascular disease, type 2 diabetes, some types of cancer and several other diseases and ultimately premature death (Alwan, 2011; Biswas et al., 2015; Ding et al., 2016; Kyu et al., 2016; Lee, I. et al., 2012; Proper, Singh, Van Mechelen, & Chinapaw, 2011; Wilmot et al., 2012). It is estimated that being physically inactive is also associated with a 20 to 30% increased mortality risk (Biswas et al., 2015). Because physical inactivity is a risk factor for multiple chronic diseases, it is important to address inactivity in all adults, particularly those living in rural areas.

**Rural Individuals**

Geographic disparities also compound the issue as rural adults are at a greater risk of physical inactivity when compared to adults living in urban areas (Centers for Disease Control and Prevention, 2017). The geographic disparities that impact PA may be related to environmental factors in rural communities that limit opportunities to be active. These factors may include limited availability and inadequate access to recreational facilities, as well as geographic features that may inhibit active living in rural communities (Anderson, T. J., Saman, Lipsky, & Lutfiyya, 2015; Rural America at a Glance, 2016). Rural communities also have characteristics relevant to the built environment that set them apart from more urbanized areas (Barnidge et al., 2013; Umstattd Meyer et al., 2016). These include lack of public transportation, longer distances between destinations, more dispersed populations, and different social norms and cultural practices (Lo et al., 2017). Additionally, rural communities have higher poverty rates and lower income levels than urban areas which can also impact ability to partake in PA (USDA: Economic Research Service, 2014). When developing strategies to enhance PA participation in rural settings, special

consideration should be given to these individuals due to the unique physical and contextual challenges faced by rural communities (Umstattd Meyer et al., 2016).

Rural adults also have higher rates of preventable conditions and chronic diseases such as obesity and diabetes that result from physical inactivity (Befort, Nazir, & Perri, 2012; Trivedi et al., 2015). The body of evidence has clearly shown great health disparity between rural versus non-rural residing adults in the U.S. (Hart, 2016). With 46 million Americans currently living in rural areas (Centers for Disease Control and Prevention, 2017) finding strategies to engage rural adults in PA and change PA behavior is crucial.

**Physical Activity Behavior Change**

The greatest potential to reduce premature death, decrease the rate of non-communicable disease and ultimately extend the lifespan is through increased levels of PA (Arem et al., 2015). However, it remains difficult to assist physically inactive people to change their PA behaviors (McDermott, Oliver, Iverson, & Sharma, 2016; Murray et al., 2017; Samdal, Eide, Barth, Williams, & Meland, 2017).

Several different techniques can be used when changing PA behavior. Self-monitoring, a cornerstone of behavioral therapy (Burke, Lora E., Wang, & Sevick, 2011), is one technique that has been shown to be effective in changing PA behavior (Michie, Abraham, Whittington, McAteer, & Gupta, 2009; Murray et al., 2017; Samdal et al., 2017). This is true especially when combining self-monitoring with at least one of the following behavioral change techniques: intention formation, setting specific goals, giving performance feedback and reviewing behavioral goals (Direito et al., 2014; Michie et al., 2009).

Lifestyle change counseling is a technique that has been shown to be effective for various health behaviors, including PA, and should be an integral part of clinical health care encounters (Berra et al., 2015). Health professionals play a vital role in motivating behavior change, (Berra, Rippe, & Manson, 2015) however, physicians discuss the benefits of PA

with less than half of their patients (Levi, Segal, St Laurent, Lang, & Rayburn, 2012). The lack of PA counseling in clinical settings represents a lost opportunity to improve the health and well-being of patients (Berra et al., 2015). Finding practical, effective ways of incorporating PA counseling into primary care is paramount.

One counseling strategy that could be utilized to assist individuals in setting PA goals is the 5A's model (Estabrooks, Glasgow, & Dzewaltowski, 2003). This model consists of **A**ssessing behaviors, providing **A**dvice on possible changes, collaboratively **A**greeing on a plan of action, **A**ssisting individuals in the identification of strategies to overcome personal barriers to PA behavior change, and **A**rranging for follow-up. The 5A's model has been shown to be effective for smoking cessation counseling (Quinn et al., 2009) and has been adopted by the US Preventive Services Task Force (USPSTF) because of the high degree of empirical support (Whitlock, Orleans, Pender, & Allan, 2002). While prior research has shown PA interventions utilizing the 5A's approach can lead to successful behavior change, there remains a need to determine the usefulness in rural areas and to achieve successful translation of these programs into practice (Estabrooks & Glasgow, 2006).

By using the 5A's, multiple areas that can play a role in an individual participating in PA or not were addressed. Many individuals do not engage in sufficient PA due to high-perceived barriers and low perceived benefits (Lovell, El Ansari, & Parker, 2010). Common barriers for PA included costs of travelling to the gym (Jones, Furlanetto, Jackson, & Kinn, 2007), community safety, cost of facilities, weather and family responsibilities (Juarbe, Turok, & Pérez-Stable, 2002) while benefits of PA included improved personal appearance, health, physical fitness and weight loss (Chang, Nitzke, Guilford, Adair, & Hazard, 2008; Juarbe et al., 2002; Tergerson & King, 2002). Motivation is a critical factor in supporting regular PA, which in turn is associated with important health outcomes, such as decreasing the occurrence of multiple chronic diseases (Teixeira, Carraça, Markland, Silva, & Ryan,

2012). Using a PA tracking device is one possible way to increase motivation and improve PA behaviors.

**Physical Activity Trackers**

The use of PA trackers has increased in popularity with many adults. Commercially available activity monitors, such as the Fitbit (Fitbit Inc., San Francisco, CA), designed for use by individuals interested in fitness, health, and weight control offer a user-friendly tool for enhanced self-monitoring of PA (Lee, J. M., Kim, & Welk, 2014; Wang et al., 2015). These accelerometry-based monitors provide individuals with the ability to estimate PA and energy expenditure and track data over time on websites or through mobile applications (apps) (Lee, J. M. et al., 2014; Wang et al., 2015). Advances in the device and smartphone technology, such as activity trackers and PA smartphone applications, have led to an exciting opportunity for delivering PA interventions (Sanders et al., 2016).

One advantage of the use of this type of technology is that it provides an easy and attractive way to self-monitor PA and provides an immediate tracking response for individuals to view (Ball, Bice, & Adkins, 2015; Bice, Ball, Hollman, & Adkins, 2018; Rabin & Bock, 2011). The feedback from the PA tracker is especially important as it pertains to PA goal attainment (Bice et al., 2018). If individuals have not met their PA goals, they can assess their current behavior by looking at the data from the PA tracker and decide what modifications need to be achieved to help met their goals (Dallinga, Mennes, Alpay, Bijwaard, & de la Faille-Deutekom, Marije Baart, 2015). Although many adults are using this technology, there is a scarcity in published literature on the usability of these devices and their effects on increasing PA (Wang et al., 2015), especially in rural dwelling adults. Consequently, large-scale, randomized trials of diverse populations need to be conducted to test the efficacy of this technology in increasing PA (Burke, L. E. et al., 2015).

## Implementation Science and the RE-AIM Framework

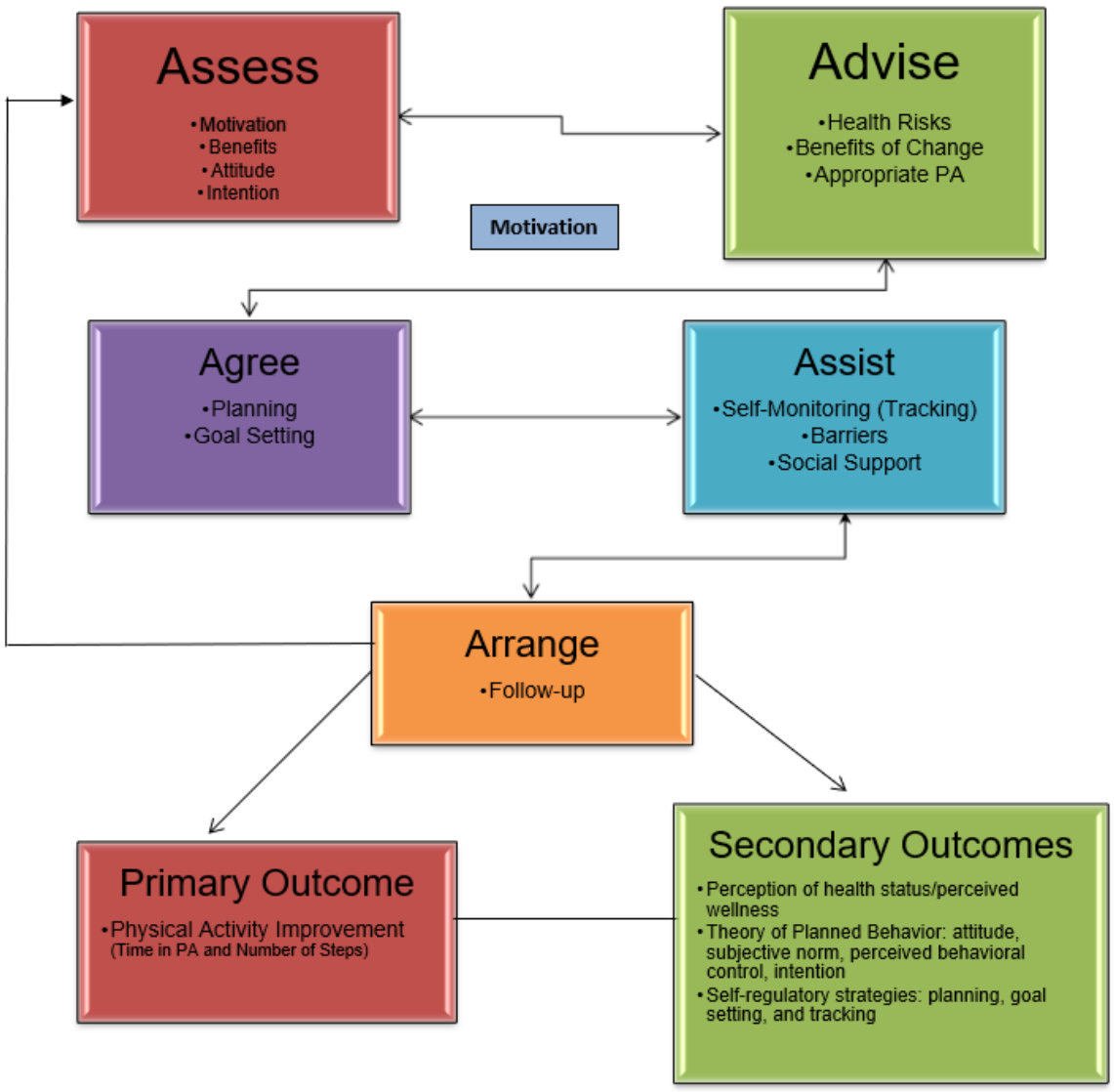
Implementation science is the study of methods to promote the adoption and integration of evidence-based practices, interventions and policies into routine health care and public health settings (NIH, 2018). RE-AIM is one framework used within implementation science. RE-AIM is an acronym that consists of five elements, or dimensions, that relate to health behavior interventions and stands for Reach, Effectiveness, Adoption, Implementation, and Maintenance which together determine public health impact (RE-AIM, 2018). The RE-AIM framework has been used to assess internal and external validity of interventions focused on PA promotion, thus, providing comprehensive evaluation of the reach, efficacy, adoption, implementation and maintenance of research and programming (Lee, R. E. et al., 2017). Reach and effectiveness are the two primary categories from the RE-AIM framework that leant itself to examination in the study. Future work will continue to utilize the RE-AIM framework incorporating all dimensions while implementing healthy lifestyle behavior change interventions in rural adults.

## Conceptual Framework

Interventions focusing on health behavior change are more likely to be effective if they are based on health behavior change theories (Foster, Richards, Thorogood, & Hillsdon, 2013; Noar & Mehrotra, 2011; Webb, Joseph, Yardley, & Michie, 2010). The underlying theories guiding this study were Theory of Planned Behavior (TPB) (Ajzen, 1991) and Self-Regulation Theory (SRT)(Carver & Scheier, 2000). The TPB proposes that an individual's behavioral intentions are shaped by the person's attitude toward behavior, subjective norms, and perceived behavioral control. Behavioral achievement depends on both motivation (intention) and ability (behavioral control) (Ajzen, 1991). SRT proposes that setting goals, self-monitoring behavior, receiving feedback and reviewing goals following feedback are central to behavioral self-management (Carver & Scheier, 2000). The identified concepts chosen from these theories fit nicely within the 5A's framework,

which allows subjects to actively participate in the decision-making process as they work on changing behavior (Whitlock et al., 2002). See Figure 1.

Figure 1
Relationship of Study Concepts and 5As



**Chapter 2: Manuscript #1**

Submitted to Journal of Physical Activity and Health

# Effectiveness of the 5A's Model for Improving Physical Activity Behaviors in Primary Care Clinics

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## Abstract

**Background:** Most rural adults do not meet current guidelines for physical activity (PA). A 12-week feasibility study tested the effectiveness of using the 5A's model for PA counseling on rural adults' PA behaviors.

**Methods:** Inactive rural adults recruited from a primary care clinic were randomized to the intervention (n=30) or control (n=29) group. All subjects wore a Fitbit to track steps and active minutes. The intervention group completed action plans to improve self-regulatory PA strategies and received weekly motivational text messages to improve PA behaviors. Theory of Planned Behavior constructs and self-regulatory strategies of planning, goal setting, and tracking (steps and active minutes) were measured with both groups.

**Results:** All individuals improved their total PA score, however, no significant differences between groups in active minutes or steps was found. All subjects regardless of group increased steps ($p>.05$). There were no statistically significant differences between groups on any of the theoretical variables.

**Conclusions:** While no significant differences were found between groups, it is vitally important to continue to find ways to make PA a priority to improve the overall health and well-being of rural adults. Future research warrants adjusting intervention dose and strategies to increase PA that can be maintained long term.

# Effectiveness of the 5A's Model for Improving Physical Activity Behaviors in Primary Care Clinics

The American Heart Association and the World Health Organization recognize physical inactivity as the fourth leading risk factor of global morbidity and premature mortality (Kraus et al., 2015; World Health Organization, 2014). Greater levels of physical activity (PA) and fitness are directly related to improvements in health status (Warburton, D. E., Nicol, & Bredin, 2006). While the benefits of regular PA have been established, PA in the United States has significantly declined over the past 2 decades (Burke, L. E. et al., 2015).

Only 20% of American adults (18-65 year old) meet PA guidelines of at least 30 minutes of moderate level aerobic activity five days per week (Centers for Disease Control and Prevention, 2014). Number of steps taken can also be used in place or in addition to number of minutes (Tudor-Locke, Catrine et al., 2011). In terms of steps, 10,000 steps/day is one of the commonly used physical activity indices to assist adults in achieving adequate amounts of PA (Tudor-Locke, Catrine et al., 2011). To be considered a true translation of public health guidelines' focus on time in either moderate or vigorous PA, however, these steps should be of at least moderate intensity (i.e., be ≥100 steps/minute), accumulated in at least 10 minute bouts, and should be taken over and above some baseline level of steps/day indicative of sedentarism (Tudor-Locke, Catrine et al., 2011) where a value of ≤5,000 steps/day has been proposed as a being sedentary (Tudor-Locke, Catrine & Bassett, 2004; Tudor-Locke, C., Ainsworth, Thompson, & Matthews, 2002; Tudor-Locke, C., Hatano, Pangrazi, & Kang, 2008). Previous studies support the idea that 3,000 steps in 30 minutes is approximately equivalent to at least moderate intensity walking in adults (Abel, Hannon, Mullineaux, & Beighle, 2011; Beets, Agiovlasitis, Fahs, Ranadive, & Fernhall, 2010; Marshall et al., 2009; Rowe et al., 2011; Tudor-Locke, Catrine, Sisson, Collova, Lee, & Swan, 2005).

Regular PA is important in improving overall health and fitness, especially cardiovascular health, and reduces the risk for many chronic diseases (Burke, L. E. et al., 2015; Sallis et al., 2015). Routine PA is also associated with improved psychological well-being through reduced stress, anxiety and depression (Dunn, Trivedi, & O'Neal, 2001; Warburton, Darren ER, Gledhill, & Quinney, 2001a; Warburton, Darren ER, Gledhill, & Quinney, 2001b). Because physical inactivity is a risk factor for multiple chronic diseases, it is important to address inactivity in all adults, particularly those living in rural areas. Rural communities have higher rates of preventable conditions and chronic diseases such as obesity and diabetes (Befort et al., 2012) and higher rates of related high-risk health behaviors such as physical inactivity and poor diet (Trivedi et al., 2015). The body of evidence has clearly shown great health disparity between rural versus non-rural residing adults in the U.S. (Hart, 2016). With 46 million Americans currently living in rural areas (Centers for Disease Control and Prevention, 2017) finding strategies to engage rural adults in PA is crucial.

Health professionals play a vital role in motivating behavior change (Berra et al., 2015) however, physicians discuss the benefits of PA with less than half of their patients (Levi et al., 2012). The lack of PA counseling in clinical settings represents a lost opportunity to improve the health and well-being of patients (Berra et al., 2015). Finding practical, effective ways of incorporating PA counseling into primary care is paramount. One strategy that could be utilized is the 5A's model to assist individuals in setting PA goals (Estabrooks et al., 2003). The 5A's model has been shown to be effective for smoking cessation counseling (Quinn et al., 2009) and has been adopted by the US Preventive Services Task Force (USPSTF) because of the high degree of empirical support (Whitlock et al., 2002). This model consists of **A**ssessing behaviors, providing **A**dvice on possible changes, collaboratively **A**greeing on a plan of action, **A**ssisting individuals in the identification of strategies to overcome personal barriers to PA behavior change, and

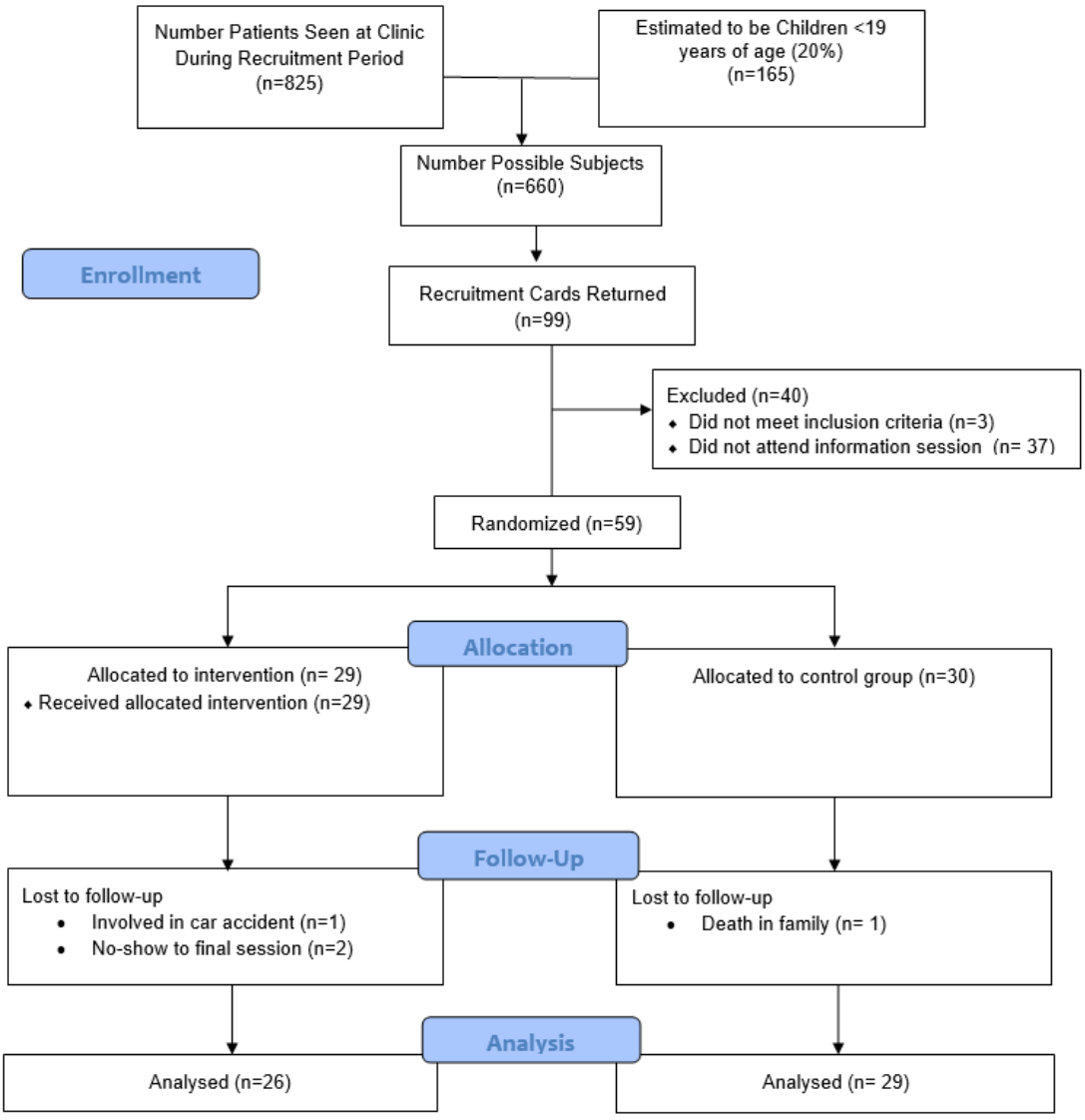
**A**rranging for follow-up (Estabrooks et al., 2011). While prior research has shown PA interventions utilizing the 5A's approach can lead to successful behavior change, there remains a need to determine the usefulness in rural areas and to achieve successful translation of these programs into practice (Estabrooks & Glasgow, 2006).

The purpose of this study was to examine the effectiveness of using the 5A's model for brief PA counseling to improve rural subjects' PA behaviors (including active minutes and daily steps), perceptions of attitude, perceived behavioral control, subjective norms, and intention, and self-regulatory strategies of planning, goal setting, and tracking.

## Methods

This study used an experimental, randomized, two-group repeated measures design. Institutional Review Board approval was obtained from the University of Nebraska Medical Center prior to the study initiation. A convenience sample of adults (n = 59, Figure 1) was recruited from a primary care clinic in a rural Midwestern community. The population of the town is 5,495 which fits the definition of a small rural area (population between 2,500 and 9,999) as classified by the Office of Rural Health Policy's Rural-Urban Commuting Area (RUCA) codes. Clinic staff assisted each adult patient in filling out a brief questionnaire asking about their current PA behaviors along with contact information granting permission for research staff to contact the patient about study participation. If the person was currently exercising < 150 minutes/week, the clinic staff referred the subject to the research staff for potential inclusion into the study. Research staff screened according to inclusion/exclusion criteria via the telephone or through text messaging for participation in the study. To be eligible for the study, subjects needed to be between 19-65 years of age, not currently meeting recommended levels of PA/week (≤150 min/week of moderate/vigorous PA), a resident of a rural community, access to a smart phone, and able to read and write English.

Figure 1
Study Flow Diagram




Subjects met with the research staff at a private meeting room at the clinic where informed consent was completed. Demographic information was obtained during this visit. The Charlson Comorbidity Index was included on the demographic questionnaire to assess the degree of comorbidity in the sample.

Individuals were randomly assigned to either the intervention group or the control group using a statistically generated random assignment schedule. To provide more balanced groups, block randomization was used for covariates Gender and Age group (<50, 50+ years of age). Regardless of study assignment, all subjects were provided with a Fitbit to track PA. Fitbits have been shown to be reliable and valid activity monitoring devices (Adam Noah, Spierer, Gu, & Bronner, 2013; Sasaki et al., 2014). Subjects were taught functions of the Fitbit (e.g., charging the tracker, wirelessly uploading data, and navigating the Fitbit Web site and/or app). The research staff set up the Fitbit account with ID and password for each participant. Study individuals wore the device on the non-dominant wrist at all times during the day except for showering and could remove it at night if they chose.

In addition to receiving the Fitbit, the intervention group completed a PA action plan through a technology platform 3 separate times (at monthly intervals). PA behavioral counseling embedded in the 5A's model was the basis for the action plan (See Table 1).

Table 1
Components of 5As Model for PA Behavioral Counseling

| 5As component | Intervention |
|---|---|
| **Assess** | Assessed their current PA levels, physical abilities, beliefs and knowledge. |
| **Advise:** | Advised on health risks, benefits of change, appropriate amount and intensity of PA. |
| **Agree:** | Collaboratively developed a personalized action plan, set specific PA goals in behavioral terms based on patient's interest and confidence to perform behavior. |
| **Assist:** | Assisted the subject to increase PA through the use of self-monitoring tools (Fitbit), identified barriers and strategies to overcome barriers and identify social support systems. |
| **Arrange:** | Specified a plan for follow up visits, telephone calls, and provided support through text messaging. |

Through the action plan, subjects set their PA goals, confidence to achieve these goals, examined motivation, barriers to PA and strategies to overcome these barriers and social support for PA. Individualized feedback and support, also embedded in the 5As model, was sent weekly via text messages through Remind.com, a HIPAA compliant platform. Prior studies have shown that individually tailored feedback is more likely to be effective than general information about PA (Foster et al., 2013; Kreuter, Strecher, & Glassman, 1999; Lustria et al., 2013; van den Berg, Schoones, & Vliet Vlieland, 2007). By texting subjects, this allowed them to read the message when it was convenient for him/her. In addition, subjects received a letter from their health care provider on a monthly basis, for a total of 3 letters, providing encouragement and support to continue being physically active. The intervention was delivered by a nurse practitioner with expertise in health promotion, including physical activity.

The control group completed the same baseline questionnaires as the intervention group but did not receive specific advice through the 5A's framework to set goals to increase their PA levels. Subjects in the control group received usual care of advice from a health care provider and were provided with a Fitbit to track daily PA.

**Measures**

Physical activity data was collected with a Fitbit Charge 2. The amount of time spent in PA measured as active minutes (activities at or above 3 metabolic equivalents [METs]) and steps was collected. Fitbit data was downloaded weekly in both groups into an Excel file. Active minutes were summed over 7-day intervals to compute the total active minutes per week for each week of the 12-week study. All other measures were collected at week 1 and week 12 (completion of the study).

***The Godin Leisure Time Exercise Questionnaire (GLTEQ)***, a valid and reliable measure of self-reported PA, is a 4-item measure of self-reported frequency of leisure-time mild, moderate, and strenuous activities over the past week (Godin, GCOMMENTARY,

2011; Godin, G. & Shephard, 1985). An adapted version of the GLTEQ was used which assesses both frequency and duration (Amireault & Godin, 2015). Using established scoring protocol, the GLTEQ was scored by computing average weekly minutes of moderate-vigorous physical activity (MVPA) and total PA as well as using the more traditional leisure time exercise index. Averages were computed from the self-reported frequency and duration of these activities. Participants who reported ≥150 minutes of MVPA are classified as meeting recommendations. The GLTEQ assigns a score based off individuals' self-reported average weekly physical activity over the past month. A score of 24 or more indicates the subject is active and would likely be meeting the public health recommendations for PA. A score of 23 or less is indicative of insufficient activity.

The ***Theory of Planned Behavior (TPB) Tool for Exercise*** is a 13-item tool which assesses attitude, subjective norm, perceived behavioral control and intention toward exercising over the next week. Subjects are asked to indicate from 0-7 the number of exercise bouts that would be beneficial to their health. The tool has demonstrated internal consistency previously (Rhodes & Courneya, 2005).

***Health Beliefs Survey for Self-Regulatory Skill Use*** assesses the degree to which participants set goals, plan, and track PA. The 22-item survey includes questions related to self-regulatory skills and social support-related regulatory skills. It is a valid and reliable measure that has been used in PA studies previously (Anderson, E. S., Winett, Wojcik, & Williams, 2010).

The ***PROMIS Short Form v1.1 – Global Health Scale*** is a 10-item tool that measured each subject's perception of their general health status. This scale asks subjects to rank their general health on a 5-point Likert scale from (1) poor to (5) excellent. Reliability and construct validity have been reported (Cella et al., 2010).

## Data Analysis

Missing data and data normality was evaluated. Data was analyzed using descriptives (means and standard deviations) for data meeting the assumptions of normality and medians and interquartile ranges for the non-normal data. SAS version 9.4 was used for data analyses and R version 3.3.1 to make profile plots. T-tests were used for the normally distributed data to look at changes within and across groups. Signed rank tests and Wilcoxon tests were used for non-normal data to examine paired comparisons and group comparison, respectively. A linear mixed model was used to model the natural log of minutes of physical activity and the number of weekly steps. Correlations were used to examine the degree to which change in PA was related to the changes in perception of health status, attitude, perceived behavioral control, subjective norm and possible self-regulatory (i.e., goal setting, planning, and self-monitoring) mediators of PA change.

## Results

Subjects in both groups were on average 48 years of age (intervention group: SD = 11.9, range 22-64; control group: SD = 11.07, range 24-63). Subjects in both groups were well educated with 58.6% in the intervention group and 63.4% in the control group completing college or graduate classes. Subjects in both groups were primarily Caucasian females who were employed with an annual household income less than $100,000. For chronic medical conditions, 18.6% had diabetes mellitus, 16.9% had hyperlipidemia and 28.8% were hypertensive. The remaining baseline characteristics of the sample by group can be found in Table 2. There were no differences between groups in any demographic variable. Of the participants in the intervention condition (n=29), all received the 3 letters from their primary care provider and weekly text message support as planned. However, 3 completed the action plan once, 7 completed it twice and 15 completed all 3 times. At follow-up, one participant reported the Fitbit stopped working during the course of the study and one participant lost the Fitbit. At baseline the intervention groups' average activity score

Table 2
Demographic Characteristics of Physical Activity Participants by Group

| | Intervention Group (N=29) | Control Group (N=30) | Statistical Test |
|---|---|---|---|
| **Variable** | **Mean (SD, Range)** | **Mean (SD, Range)** | **t- test** |
| Age (in years) | 48.04 (11.9, 22-64)) | 47.5 (11.07, 24-63) | 0.276 |
| Weight (lbs) | 203.96 (50.21, 135-330) | 200.24 (41.1, 148-295) | 0.127 |
| | **N (%)** | **N (%)** | **$\chi 2$** |
| Female | 23(79.3%) | 24(80%) | 0.004 |
| Married | 22(75.9%) | 24(82.8%) | 3.355 |
| Race | | | |
| Caucasian | 27(93.2%) | 30(100%) | 2.142 |
| Asian | 1(3.4%) | - | |
| Hispanic | 1(3.4%) | - | |
| Education | | | 5.527 |
| High school | 4(13.8%) | 4(13.3%) | |
| Some college | 7(24.1%) | 7(23.3%) | |
| Completed college | 12(41.4%) | 17(56.7%) | |
| Graduate classes or more | 5(17.2%) | 2(6.7%) | |
| Work status | | | 0.536 |
| Yes | 24(82.8%) | 25(83.3%) | |
| No | 2(6.9%) | 1(3.3%) | |
| Retired | 2(6.9%) | 3(10%) | |
| Income | | | 2.715 |
| < $50,000 | 10(34.5%) | 6(20%) | |
| $50,000-75,000 | 7(24.1%) | 10(33.3%) | |
| $75,000-100,000 | 5(17.2%) | 9(30%) | |
| > $100,000 | 5(17.2%) | 4(13.3%) | |
| Daily Medication Use | 19(65.5%) | 18(60%) | 0.262 |
| Chronic Medical Conditions | 6(20.7%) | 5(16.7%) | |
| Diabetes | 7(24.1%) | 6(20%) | |
| Hyperlipidemia | 11(37.9%) | 8(26.7%) | |
| Hypertension | 3(10.3%) | 1(3.3%) | |
| MI | | | |

Note: Not all percentages total 100% due to missing data.

from the GLTEQ was 4.5 (SD = 7.06) while the average for the control group was 9.9 (SD = 14.3). After the 12-weeks, the intervention group improved to an average of 16.73 (SD = 11.89) and the control group was at 14.07 (SD = 11.93). Both groups were still considered insufficiently active (<23) at the end of the study, but had greatly increased their activity, with a greater change noted in the intervention group. For number of steps, the intervention group averaged 7,034 (SD = 2,342) and increased slightly to 7,261 (SD = 2,755) by the end of the study with the control group decreasing from 7,072 (SD = 2,896) to 6,033 (SD = 2,300) (Figure 2). The same pattern was seen with active minutes, with the intervention showing better PA than the control group. The intervention group averaged 204 (SD = 217) minutes and decreased to 186 (SD = 231) minutes while the control group decreased more dramatically from an average of 177 (SD = 228) minutes to 117 (SD = 150) minutes at the end of the study (Figure 3).

There was no evidence of a time by treatment interaction ($p = 0.85$) for the number of active minutes spent in PA and it was dropped from the model; leaving only the main effect of time ($p = 0.11$) and treatment ($p = 0.29$), neither of which were significant. For steps, the time by interaction was determined not to be significant (p-value = 0.44) and was dropped from the model. Based on this model, there was a borderline detectable difference between intervention and control ($p = 0.09$), along with a main effect of time ($p < 0.01$).

There were no statistically significant differences between groups on any of the self-regulatory (planning, tracking and goal setting) or Theory of Planned Behavior (TPB) variables (See Table 3). However, a Signed-rank test determined there was a statistically significant increase in all self-regulatory variables (planning, tracking and goal setting) within subjects in both the intervention and control groups. For overall global health, subjects' physical health ($M = 2.85$, $t = 3.58$, $p = 0.001$; $M = 2.23$, $t = 3.32$, $p = 0.0025$) and mental health ($M = 2.48$, $t = 2.54$, $p = 0.017$; $M = 2.33$, $t = 2.89$, $p = 0.007$) had statistically

Figure 2
Average Weekly Steps by Group as Measured by Fitbit

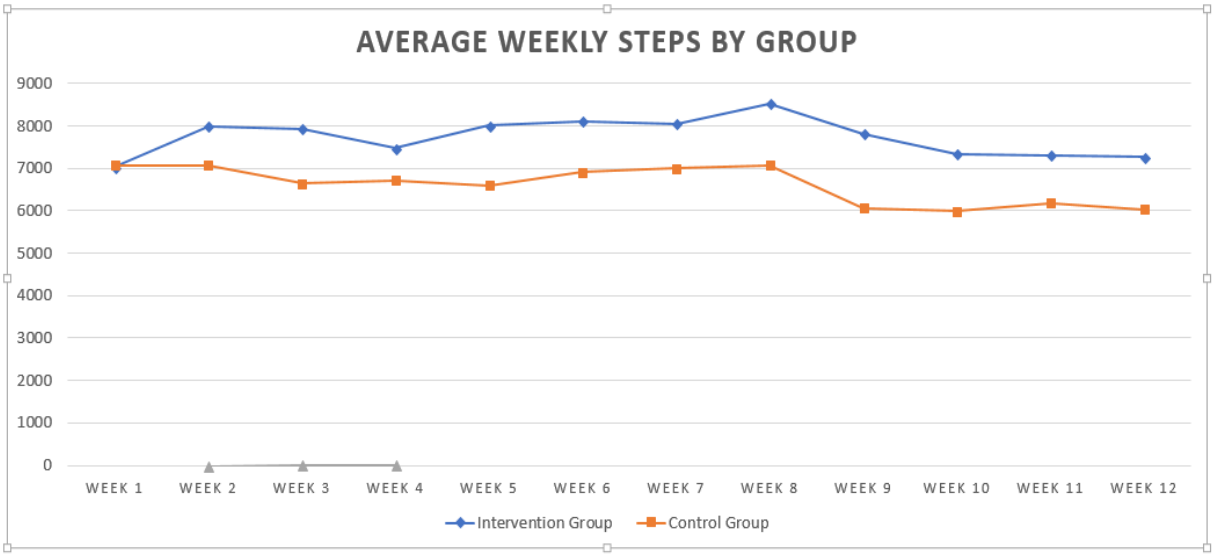



Figure 3
Average Weekly Active Minutes by Group as Measured by Fitbit

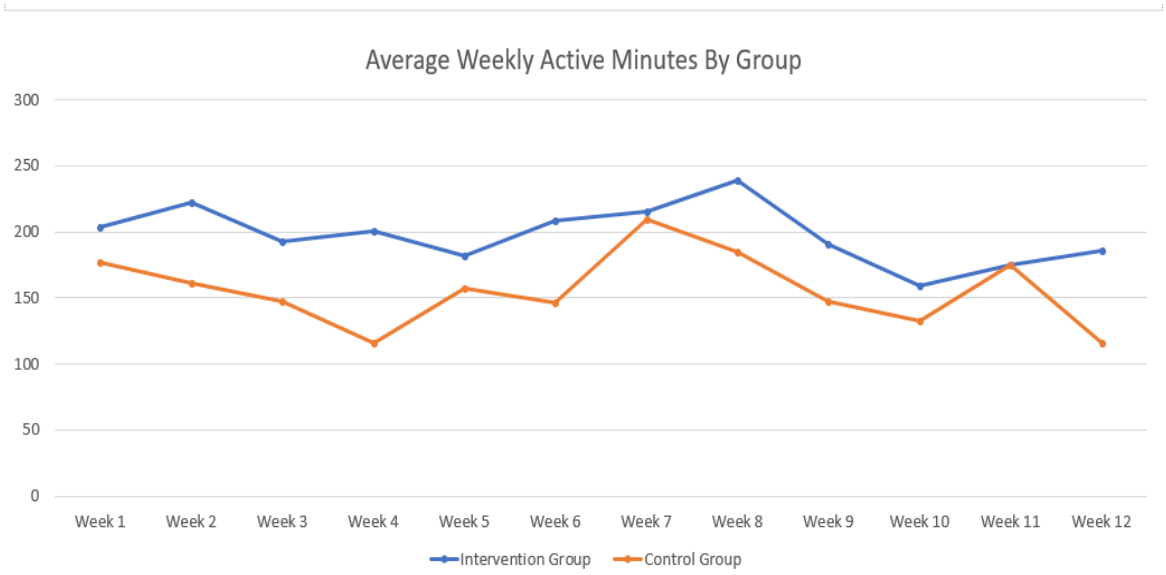


Table 3
Group Comparison of Baseline and Post Scores on Theory of Planned Behavior and Self-Regulatory Variables

| Variable Name | Intervention (n = 29) Median (IQR) | Control (n = 30) Median (IQR) | p-value [a] |
|---|---|---|---|
| Attitude | | | |
| Baseline | 4(1) | 4(2) | 0.91 |
| Post | 5(1) | 4(1) | |
| Subjective Norm | | | |
| Baseline | 3(2.5) | 3(3) | 0.91 |
| Post | 4(2) | 3(2) | |
| Perceived Behavior Control | | | |
| Baseline | 4(1) | 5(2) | 0.32 |
| Post | 5(2) | 5(1.5) | |
| Exercise Intention | | | |
| Baseline | 4(2) | 3(2) | 0.51 |
| Post | 4(1) | 3(2) | |
| Planning | | | |
| Baseline | 2(1.4) | 1.6(1.2) | 0.47 |
| Post | 3.3(1.2) | 3(1.6) | |
| Tracking | | | |
| Baseline | 1.5(1.25) | 1.13(0.75) | 0.21 |
| Post | 3.88(1) | 3.25(1) | |
| Goal Setting | | | |
| Baseline | 1.75(1.5) | 1(1) | 0.94 |
| Post | 3.5(1.5) | 3(2) | |

[a] = Wilcoxon Signed Rank Test

significant changes within subjects for the intervention and control group, respectively, as well. No changes in TPB variables were observed.

TPB variables (attitude, subjective norm, perceived behavioral control and intention) at baseline all positively correlated with baseline amount of time spent in moderate physical activity, but not amount of time spent in strenuous physical activity (See Table 4). Only intention to exercise correlated with amount time of time spent in strenuous physical activity at the end of the study ($r = .27$, $p = <0.05$). For the self-regulatory variables, baseline minutes spent in moderate physical activity was significantly related to baseline planning ($r = .40$, $p = <0.001$), and goal setting ($r = .28$, $p = <0.05$) and post minutes spent in physical activity with planning ($r = .36$, $p = <0.001$) and goal setting ($r = .33$, $p = <0.05$). Changes in goal setting was significantly related to changes in the amount of time spent in moderate PA ($r = .36$, $p <0.01$) and the PA Score ($r = .28$, $p <0.05$). Changes in perceived behavioral control was related to changes in the PA Score ($r = .36$, $p <0.01$).

## Discussion

This study examined the effectiveness of using the 5A's model for brief PA counseling to improve rural subjects' PA behaviors (including active minutes and daily steps), perceptions of attitude, perceived behavioral control, subjective norms, and intention, and self-regulatory strategies of planning, goal setting, and tracking. There were no statistically significant differences between groups for either minutes of PA or number of steps taken.

We have several potential explanations for the lack of change in physical activity. First, the intervention may be unsuccessful at changing the theoretical variables that are proposed to mediate behavior change. We developed an intervention to change TPB variables that may impact physical activity behaviors, but none of these theoretical variables changed for the subjects. All subjects had significant pre-post differences with respect to the

Table 4
Pearson Correlations between Godin Physical Activity, Theory of Planned Behavior and Self-Regulatory Variables (N = 59)

| | Godin BL Minutes Moderate PA | Godin Post Minutes Moderate PA | Godin BL Minutes Strenuous PA | Godin Post Minutes Strenuous PA | Godin BL PA Score | Godin Post PA Score | Godin PA Score Change |
|---|---|---|---|---|---|---|---|
| BL Attitude | 0.30* | 0.16 | 0.11 | 0.01 | 0.24 | -0.12 | |
| Post Attitude | 0.17 | 0.24 | -0.06 | 0.08 | 0.18 | 0.16 | |
| BL Subjective Norm | 0.30* | -0.17 | -0.06 | 0.08 | 0.18 | 0.16 | |
| Post Subjective Norm | 0.24 | -0.17 | 0.04 | 0.24 | 0.22 | -0.01 | |
| BL PBC | 0.29* | 0.04 | 0.10 | 0.16 | 0.31* | -0.15 | |
| Post PBC | -0.09 | 0.04 | -0.03 | 0.23 | 0.04 | 0.19 | |
| BL Exercise Intention | 0.33* | 0.18 | 0.13 | 0.01 | 0.31* | 0.04 | |
| Post Exercise Intention | 0.16 | 0.20 | 0.01 | 0.27* | 0.21 | 0.25 | |
| BL Planning | 0.40** | 0.22 | 0.08 | 0.05 | 0.44** | 0.01 | |
| Post Planning | 0.21 | 0.36** | 0.19 | 0.02 | 0.18 | 0.20 | |
| BL Tracking | 0.16 | -0.02 | 0.08 | 0.11 | 0.34** | 0.11 | |
| Post Tracking | 0.16 | 0.23 | 0.15 | 0.14 | 0.05 | 0.22 | |
| BL Goal setting | 0.28* | -0.05 | 0.06 | 0.07 | 0.36** | -0.01 | |
| Post Goal setting | 0.10 | 0.33* | 0.17 | -0.06 | 0.01 | 0.17 | |
| Attitude Change | | | | | | | 0.25 |
| Subjective Norm Change | | | | | | | 0.07 |
| PBC Change | | | | | | | 0.36** |
| Exercise Intention Change | | | | | | | 0.25 |
| Planning Change | | | | | | | 0.24 |
| Tracking Change | | | | | | | 0.24 |
| Goal setting Change | | | | | | | 0.28* |

Note. The change score was calculated by subtracting baseline scores from end of study scores.
PA = Physical Activity; BL = Baseline, PBC = perceived behavioral control
*$p < 0.05$; **$p < 0.01$

self-regulatory variables (planning, tracking and goal setting), but we did not see difference between groups. The more people self-regulated their behavior through planning, tracking or setting goals, the more time they spent engaged in PA. The positive correlations between the change in goal setting and amount of time spent in PA indicates that being more intentional with setting goals helped individuals to achieve those goals and increased PA time. While the control group did not receive the 5As intervention, it is possible the Fitbit itself provided enough opportunities for motivated participants to engage in self-regulatory strategies to be physically active, diminishing the differences between the groups.

Second, the intervention worked to change the theoretical constructs, but not enough to see a difference between the groups. The stronger correlations we saw with the TPB constructs (attitude, subjective norm, perceived behavioral control and intention), the more time subjects spent engaged in moderate physical activity at baseline, but this diminished over time. Interestingly, as intent to exercise improved, so did time spent in strenuous PA at the end of the study, but not at baseline. A previous study in overweight/obese adults found that completing a TPB questionnaire has a significant positive impact on subsequent participation in physical activity. Thus, asking subjects to complete such a questionnaire is a simple, inexpensive and easy strategy to increase the level of PA (Godin, Gaston, Bélanger-Gravel, Amireault, Vohl, & Pérusse, 2011).

Third, there may be a potential effect, but the study does not have the power to detect a significant difference. Statistical significance was seen over time in the number of steps taken ($p = 0.0015$) and a borderline effect of time was seen for minutes of PA ($p = .10$) for all subject regardless of study assignment. A larger sample size may have yielded significant results for PA changes over time, especially between groups. Although the increase in steps for the intervention group was not statistically significant, it may be clinically significant as increased PA can lead to improved health. Individuals taking > 5,000 steps/day have a substantially lower prevalence of a number of adverse

cardiometabolic risk factors than those taking less steps/day (Schmidt, Cleland, Shaw, Dwyer, & Venn, 2009). In line with public health guidelines' focus on time in moderate/vigorous PA, primary care providers should encourage their patients to incorporate at least 30 minutes, or approximately 3,000-4,000 steps, of brisk walking into their daily routine (Tudor-Locke, Catrine et al., 2011). The intervention group had more active minutes and steps at each time point throughout the 12-week study in comparison to the control group. This demonstrated the intervention was effective enough to show separation between the groups, however, it was not intensive enough to achieve statistical significance.

Theory-driven diet and physical activity interventions have shown self-regulatory strategies such as self-monitoring (including planning and tracking) and goal setting, are effective and foundational in lifestyle behavioral change strategies (Burke, Lora E. et al., 2011; Lyons, Lewis, Mayrsohn, & Rowland, 2014; Michie et al., 2009; Michie et al., 2011). Activity trackers, such as the Fitbit, when used within a theory-driven intervention, may provide an efficient way to enable participants to improve self-regulatory strategies that focus on improving self-monitoring and goal setting and adopt healthy behaviors, including increased daily PA (Cadmus-Bertram, Marcus, Patterson, Parker, & Morey, 2015). Our study utilized a theoretical approach, however, the intensity of the intervention may have been insufficient to change participant PA. Future work to improve PA behaviors should focus on more participant support to enhance these important self-regulatory strategies. Anderson, Wojcik, Winett and Williams (2006) found that PA interventions should focus on increasing self-regulatory behaviors such as planning, scheduling and adding PA into the daily routine. It is possible the frequency of our intervention components was not enough support to improve PA to an acceptable level.

## Limitations

Because this was a feasibility study, the study was underpowered to detect significant differences and the results must be interpreted with caution. A larger sample size and a longer follow-up period are needed to more definitively test the effects of the intervention versus control group in improving physical activity behavior in rural dwelling adults. The main limitation of the study was that the control group also received a Fitbit at baseline which could have served as a motivator to improve physical activity. Subjects in this group were able to self-monitor their PA although they did not receive individualized counseling through the 5As framework. This may have affected outcomes and it is likely we would have seen greater effects of the 5As intervention group with a true control group. There was also limited racial/ethnic diversity in the sample; however, the sample was representative of the racial diversity in the rural area where the study was conducted. In addition, selection bias may have been operating in that we may have attracted individuals who were already interested in increasing their PA, limiting the generalizability of the findings.

## Conclusions

In summary, individuals in both groups improved their total physical activity score, however both groups were still classified as insufficiently active. In addition, we found no significant differences between groups in active minutes or steps. All subjects, regardless of group did increase the numbers of steps taken during the course of the study. While no significant differences were found between groups, it is vitally important to continue to find ways to make PA a priority to improve the overall health and well-being of rural adults. Future research warrants adjusting intervention dose and strategies to increase positive PA that can be maintained long term. Providing a Fitbit or wearable PA monitor may be a good way to get started.

## Chapter 3: Manuscript #2

Submitted to Health Promotion Practice

# Feasibility of Implementing a Physical Activity Program in Rural Primary Care

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## Abstract

Addressing the lack of physical activity (PA) in rural adults is vital because of the role it plays in the risk for many chronic diseases. The purpose of the study was to explore the feasibility of conducting a 12-week intervention utilizing a Fitbit to increase PA behavior in inactive rural adults recruited from a primary care clinic. Semi-structured interviews were conducted with study participants (n=10) and a focus group was held with nurses (n=7) from the primary care clinic. Data were analyzed using the process of immersion/crystallization. Participants and nurses both felt the program had a positive impact on PA and that the program was needed in the community. Study participants most often reported their favorite part of the study was being able to track their activity as well as the goal setting. However, study participants reported barriers to continued participation in PA related to a lack of time and ability to be active in cold weather. Further, nursing staff reported barriers in regard to a lack of resources (staffing and money) These barriers need to be examined further and addressed in order to implement a sustainable PA program that can be maintained through a primary care clinic.

Feasibility of Implementing a Physical Activity Program in Rural Primary Care

## Introduction

Physical activity (PA) has numerous benefits including improved psychological well-being through reduced stress, anxiety and depression, (Dunn et al., 2001; Warburton, Darren ER et al., 2001a; Warburton, Darren ER et al., 2001b) improved cardiovascular health, and reduced risk factors for many chronic diseases (Burke, L. E. et al., 2015; Sallis et al., 2015). Currently, 80% of American adults (18-65 year old) do not meet PA guidelines of at least 30 minutes of moderate level aerobic activity five days per week (Centers for Disease Control and Prevention, 2014).

Addressing the lack of physical activity in all adults, particularly those living in rural areas, is vital because of the role lack of PA plays in the risk for many chronic diseases. Rural communities have higher rates of preventable conditions and chronic diseases such as obesity and diabetes (Befort et al., 2012) and higher rates of related high-risk health behaviors such as physical inactivity and poor diet (Trivedi et al., 2015). Greater health disparities between rural and non-rural residing adults in the U.S. has been demonstrated (Hart, 2016); however, finding strategies to engage rural adults in PA is crucial as 46 million Americans are currently residing in rural areas (Centers for Disease Control and Prevention, 2017)

Lifestyle change counseling has been shown to be effective for various health behaviors, including PA, and should be an integral part of clinical health care encounters (Berra et al., 2015). Interventions focusing on health behavior change are more likely to be effective if they are based on health behavior change theories (Foster et al., 2013; Noar & Mehrotra, 2011; Webb et al., 2010). One such model is the 5As model which has been adopted by the US Preventive Services Task Force (USPSTF) because of the high degree of empirical support (Whitlock et al., 2002). Prior research has shown PA interventions utilizing the 5A's approach can lead to successful behavior change; however, there remains

a need to determine the usefulness of the approach in rural areas and to achieve successful translation of these programs into clinical practice (Estabrooks & Glasgow, 2006). Thus, we developed and tested an intervention using the 5A's in a clinic setting. The purpose of the study was to explore the feasibility of conducting a 12-week intervention to increase PA behavior in inactive rural adults recruited from a primary care clinic.

## Method

### Study Design and Participants

This qualitative study consisted of semi-structured interviews with study participants (n=10) and a focus group with the clinic nurses (n=7) who conducted the recruitment for the study.

Interview participants were randomly selected from a randomized controlled trial (RCT) that examined the amount of time rural adults spent in PA. Participants were eligible to participate in the RCT if they were between 19-65 years of age, not currently meeting recommended levels of PA/week (≤150 min/week of moderate/vigorous PA), a resident of a rural community, had access to a smart phone, and able to read and write English.

In the RCT, the intervention group completed three PA action plans through a technology platform monthly. The 5A's model for behavioral counseling was embedded in each of the actions plans in which participants set PA goals, rated perceived confidence to achieve these goals, examined PA motivation, described barriers to PA, created strategies to overcome the identified barriers and identified potential social support for PA. Weekly text messages providing individualized support and feedback was also sent to each intervention participant. Lastly, participants received three separate letters (monthly) from their health care provider providing encouragement and support to continue being physically active. While the RCT was primarily researcher led, we foresee implementing a PA program in the future where the clinic would take over and integrate it into routine clinical practice.

Following the completion of the RCT, participant interviews were conducted along with a focus group of clinic nurses to determine perceptions of the PA intervention and feasibility of implementing future interventions to change PA behavior in rural adults. The only inclusion criterion for participant interviews was assignment to the intervention arm of the RCT. All nurses (n=7) working on a pre-set date determined by the clinic manager participated in the focus group. The nurses all worked at the same primary care clinic where participant recruitment occurred. The town is classified as a small rural area according to the Office of Rural Health Policy's Rural-Urban Commuting Area (RUCA) codes. Institutional Review Board approval was obtained from the University of Nebraska Medical Center prior to the study beginning.

**Interview/Focus Group Guide and Protocol**

Interviews and focus group questions were developed based on Bowen and colleagues (2009) framework for designing feasibility studies. Specifically, we developed questions to address: 1) demand: exploring need for and use of the program overall and each particular component; 2) implementation: identifying factors that influenced engagement with the program; 3) acceptability: one's satisfaction with the program and their intent to continue using it; and 4) practicality: understanding the impact of the program and participants ability to continue these activities (Tables 1 and 2). Questions were open-ended and including probing questions to elicit responses that would aid in the ability to design a larger-scale intervention that could be sustainable in routine clinical care.

**Participants.** All 10 participants who were selected completed the phone interview. Semi-structured interviews were conducted via phone by an experienced qualitative researcher (DD) at the end of the 12-week study. The interviews were audio recorded and were on average 30 minutes long.

**Nurses.** The focus group with nurses was hosted in a private conference room at the primary care clinic study site after the 12-week intervention ended. The lead author led the

Table 1
Interview Questions for Intervention Participants (n=10)

| | |
|---|---|
| **Demand (actual use, perceived demand)** | * How did you hear about the research study?<br>* What was your experience at the informational meeting?<br>* How was the communication with the research staff prior to the study?<br>* Please describe your overall experience with the program.<br>* What part(s) of the program did you find you used the most?<br>* Please describe your experience with using the action plan.<br>* How did you feel about the letter you received from the provider?<br>* Please describe your experience with goal setting through the action plan.<br>* Please describe your experience with the motivational text messages.<br>* Please describe your experience with the Fitbit.<br>* Who do you think would benefit the most from this program?<br>* Did this program change your perception of the health care team? |
| **Implementation (degree of use, success or failure of use, factors affecting use)** | * What were the things about the program that led to your engagement of the program?<br>* During the program, did you use anything else to help you be physically active? |
| **Acceptability (satisfaction, intent to continue use)** | * What parts of the physical activity program were the most helpful? Why?<br>* What parts of the physical activity program were challenging? Why?<br>* How was your communication with the research staff during the program?<br>* What could have the research staff done to improve your experience with the program?<br>* What did you think about the amount of information you received from the physical activity program to help change your physical activity behavior?<br>* What do you think about the length of the physical activity program?<br>* What would you change to make this physical activity program better in the future?<br>* Now that the program has ended, what are your future plans for physical activity? |
| **Practicality (effects, ability of individuals to continue activities)** | * How has participation in the program either positively or negatively impacted you?<br>* What have you learned in this program?<br>* What (if any) impact has this program had on you?<br>* Would you participate in the program again? Why or why not?<br>* Is there anything else you would like to share in regards to this physical activity program? |

Table 2
Focus Group Semi-Structured Questions for Clinic Staff

| | |
|---|---|
| **Acceptability (satisfaction, intent to continue use)** | * How do you feel about continuing this program within the clinic?<br>* Prior to this program, how did your facility promote physical activity behaviors in patients?<br>* In an ideal world, how do you think your facility should promote physical activity behaviors in patients? What was your motivation for helping with the study?<br>* Please describe your experience with helping recruit patients for the study.<br>* How much flexibility was there in terms of which staff did the recruitment?<br>* Please describe the view of the leadership about the importance of recruiting for this study.<br>* Please describe your experience assessing physical activity in patients during the study.<br>* Describe how you were kept informed on progress towards recruitment goals. |
| **Demand (actual use, perceived demand)** | * Do you feel a physical activity intervention like this is needed within your clinic? Why or why not?<br>* What do you think are your patients' preferences for physical activity programs?<br>* What do you see as your role in improving patients' physical activity levels?<br>* Have you spoken with any patients enrolled in the study?<br>* How much do you think your patients who enrolled in the program actually used it to improve their physical activity?<br>* What do you see as pros to implementing a consistent physical activity program with all patients during clinic visits?<br>* What do you see as the cons to implementing a consistent physical activity program with all patients during clinic visits?<br>* How does implementing a physical activity program fit with your current organizational priorities? Where would it be on a list of things that need to be done? |
| **Implementation (degree of use, success or failure of use, factors affecting use)** | * Based on the results of this study, do you view this program as a success or failure? Why?<br>* What do you think impacted patients use of this program?<br>* What do you think you would need to implement a physical activity program for different patient groups? For example, men vs women; older vs younger adults? |
| **Practicality (effects, ability of individuals to continue activities)** | * How would a program like this fit with your existing services?<br>* Based on the results of this study, do you think you will continue with this program (or something similar) at the clinic?<br>* What additional information would you need from this study to consider using this physical activity program at your facility?<br>* To what extent does your clinic have the resources necessary to deliver a physical activity program like this one?<br>* Who do you think would implement a program like this in your clinic (as far as staff)?<br>* What would you need to consider doing this program on your own? |

session and a doctoral student served as assistant moderator by taking notes during the session. The audio-recorded focus group was 45-minutes in length.

## Analysis

Interview and focus group audio files were transcribed verbatim. Analysis began following the completion of the transcription process. Data were analyzed using the process of immersion/crystallization (Borkan, 1999). First, the lead author and a graduate student read through each transcript. Second, they met to discuss and then develop a list of codes. Third, the graduate assistant then uploaded all transcripts into NVivo 11 software and coded the data based on these developed codes. The lead author reviewed all coding and met with the student to review and come to a consensus on all coding.

Codes and overall themes were developed based on the four major topics of the interview and focus group guides following Bowen et al. feasibility guidelines of demand, implementation, acceptability, and practicality. Data were validated through the process of peer debriefing and thick description (Creswell, 2007).

## Results

The 10 intervention group participants who completed the interviews were on average 46 years of age, Caucasian, 70% females, 80% married, 50% had a bachelor's degree or higher and all worked full-time. Of those being interviewed, 50% submitted all three action plans, 30% submitted two actions plans. All had received the weekly motivational text message from the research staff and all received a monthly letter from their health care provider encouraging them to continue being physically active.

While a specific demographic form was not collected from the nurses participating in the focus group, all nurses were female and had worked at the clinic for a minimum of 1 year.

**Demand**

**Participants.** When asked about their experience participating in the PA program and the various individual components that were implemented, most participants responded favorably. The most common response was how much participants liked being able to track their activity. One participant said, "I guess I never really thought about, you know, how much you walk in a day." Another commented "Just being more conscious of how active I'm being. I really have enjoyed being able to track and monitor that" and "You can actually see how much you're doing. Otherwise, it'd be easy to say, 'Oh, I've done plenty,' but when you can actually see it, I think it goes a lot further."

Most of the individuals had positive feedback about using the Fitbit and saw the benefit of setting goals and tracking activity with the device. One participant said, "I think it made me more aware, you know, of days I do get plenty of exercise – or, not plenty of exercise, but, you know, at least hitting your steps, and then other days when not motivated." Another participant said "I had no clue how many steps most people got in in a day. I knew I sat a lot, [to track PA] that made a difference." In addition, several of the participants felt the program, and the Fitbit itself provided motivation to become or stay physically active. One explained, "I guess it was as challenging as you wanted to make it. You know, however motivated you were to actually try to be active or to try to get up and move around and increase your activity." Another person said, "I think I actually got more encouragement from the actual Fitbit because it was like a daily or even hourly thing."

Several participants thought the action plan helped them – especially as it related to setting monthly goals for PA. Specifically, one participant noted: "it [the action plan] helped to have suggested goals, because I didn't know what else to do." Another person acknowledged the importance of goal setting with "I can kind of track and see where I've slipped and whether I've stayed with my goal." However, not everyone felt the goal setting was useful. One individual said "I've never found setting goals to be helpful at all for me. I

could say, 'Yeah, I'd like to do X, Y, and Z, ….there's so many things I can't control, and that's what decides if you get to do your goals or not.'" Interestingly, several participants had no recollection of using the action plan and instead referred to goal setting in terms of the Fitbit itself as one participant noted "I reassessed where I was at and what I should be doing."

Regarding the weekly text messages, one subject commented "I liked them, because, like I said, it was somebody else checking up on me and keeping me in check." Another said, "I know most of us are responsible adults and everything, but just having that cheerleader on your side, saying, 'Hey, you need to get out there and do a little bit more,' or whatever – that type of thing."

**Nurses.** When exploring the nurses' perceptions of the need for a physical activity program, in general the nurses felt some type of physical activity program would be beneficial in their clinic. However, they were concerned with how something could realistically be implemented considering time and staffing constraints. One said, "They're probably not gonna hire anybody" and another said it would not be feasible unless it was "funded from somewhere else." They also felt their role in a program would be to "promote health, because that's why we're here." Another explained, "I think it'd be cool to see, like, their progress; because, even if we had that in our chart, if they came back in, we could even say, "Oh, hey, good job," or, "Maybe bump up your steps." You know, maybe that would also encourage them, or, you know, we could actually see how much they do."

**Implementation**

**Participants.** For most, the reason that they were engaged in the program was a desire for weight loss or wanting to become healthier. The participants either knew that being physically active is important, or their health care provider told them participation in the program would be good for them. One person commented "…if you want to lose weight, you've gotta be active. You can't just be stationary all the time and expect for

changes to happen. You're in control of your own health. Nobody else can do it for you." Another acknowledged "just to see that extra activity does have positive health benefits" and "I feel better energy wise and stress wise when I get my workout in, so I guess that is a health benefit."

**Nurses.** The nurses in the focus group felt overall the program made a positive impact with their patients. One said, "I'd say it was successful. More awareness." They all said they would continue a program like this but would be cautious of the timing. "I think it would be good to do it intermittently, but, I mean, if it was something that was a continuation thing, I think…..there'd be a big drop-off…..It would just become too routine."

**Acceptability**

**Participants.** Overall, participants seemed satisfied with the program. The most common comment related to usefulness of the program was people felt they were being held accountable for being physically active. One person said, **"**I think it just helps having somebody there to try and encourage me and push me to do it. I think just having the expectations that I needed to do those things helped push me to do it." Another said, "it helps me to be accountable. There's something about it that helps knowing someone's watching and that you've set a goal and someone else can actually encourage you and say, 'Hey, you're gonna make it.'"

The program also made participants aware of the barriers they encounter when it comes to being physically active. One person found time to be a barrier, **"**I don't have time or really the resource to hit a gym. I live in a very rural part of Nebraska, and you know, the closest gym is 30 minutes one direction and 45 minutes the other." Another comment about time was "Yes, I'd like to exercise three times a week, but I don't have time. You can plan all you want and life still takes precedence over what you say you're gonna do – of what you'd like to do, I should say." Another commonly cited barrier by many was the weather.

One subject said, “Now with the weather, I don’t get out as much, you know, when it’s cold and windy, so I think the winter’s gonna be really tough.”

**Nurses.** All the nurses felt helping with recruitment was easy and not a burden on their time. They all felt they had support from the leadership team at the clinic which made the process easier. One said, “I wouldn’t mind doing it again if it’s a short, like, we only had to get, you know, so many. I wouldn’t want to do it every day.” They also said the communication with the research staff was good and they felt they were kept informed on the recruitment process and achieving the needed recruitment numbers.

**Practicality**

**Participants.** All participants who completed the interview said they would participate in the program again if it was offered. Some felt they gained more benefit than others, but overall the experience was positive. One said, **“**I think it’s a great program.” Another said, “It’s definitely been positive…. I know I need to do a lot more, but even 30 minutes a day is more than I was getting.”

Only one person felt that more interaction from the research team would have been beneficial by stating, “having more of a one on one interaction with action planning and goal setting, …..would have been a lot more helpful.” The rest of the participants felt the amount of time and interaction from the research team was appropriate. Most thought once a week texting was appropriate while a couple felt every other week would have been good. Only one person felt texting multiple times a week would have been a benefit.

**Nurses.** The focus group of nurses felt a similar program would fit within their clinic, however, issues relate to resources (staffing and money) to continue a program would be a barrier. Regarding who would run a program one said, “they’re probably not gonna hire anybody.” In order to finance a PA program, it was felt the money would have to come from an outside source. The key outcomes they would be interested in looking at would be medication usage and chronic disease management. One said, “there’s so much more than

just exercise" and another said "preventative maintenance, so to speak. You know, or health."

## Discussion

The purpose of the study was to explore the feasibility of conducting a 12-week intervention to increase PA behavior in inactive rural adults recruited from a primary care clinic. Data from the current study provides insight to PA interventions for both rural and clinical application.

Participants report the current PA program brought more awareness to the need for increasing personal PA levels. Participants expressed how much they liked being able to track their PA. Many of them had never tracked their PA before and saw the benefits of being aware of their activity and felt more accountable to being physically active. Participants were also able to identify potential benefits of increased PA as well as barriers and issues that interfered with being physically active.

While participants did report in the interviews being more physically active during the 12-week study, results in Reed et al (2018, submitted manuscript) showed no significant differences between groups in active minutes or number of steps taken over the course of the study. This tells us perhaps a more intense intervention or more contact with research staff is needed to increase and maintain PA at levels recommend by public health agencies. One individual indeed said more contact with research staff during the study would have been helpful and another thought more text messaging would have been helpful also.

Being healthier or the desire to lose weight was a common reason stated for wanting to participate in the study. Many of the participants said they knew being more active was important for their health or they had been told by their health care provider previously this was something that was necessary. Despite this knowledge, many said it was still difficult to be more active and surprising how inactive they actually were. "I mean, it's been an eye opener how sedentary I am and how much exercise I need to do." Interestingly, several of

them thought they had to go to a gym to be active and lack of access to a gym facility was a barrier, especially in winter months. This is an important aspect to concentrate on in future interventions in order to help participants focus efforts on identifying ways to be active at home.

It was encouraging that all participants interviewed would participate again in a PA study and felt it would be beneficial for their family and friends. This is vital as rural adults are at a greater risk of physical inactivity when compared to adults living in urban areas (Centers for Disease Control and Prevention, 2017) and also have higher rates of preventable conditions and chronic diseases such as obesity and diabetes that result from physical inactivity (Befort et al., 2012; Trivedi et al., 2015).

The clinic nurses provided positive feedback on participating in recruiting participants for the PA study. They also believed this would be something important to potentially incorporate in routine clinical care as the benefits of improved chronic disease management could be a substantial outcome of increased physical activity. However, resource issues in terms of financial and staff support would need to be addressed in order to determine how best to implement a PA program long term in primary care clinics given limitations in resources.

## Limitations

There are limitations to the findings of this study. The interview participants were a subsample of the intervention participants who were randomly selected to participate in the interview. Therefore, not all intervention participant views were reflected in this analysis. Findings may have been impacted by social desirability as the participants may have provided information they thought the researchers wanted to hear. The clinic staff focus group was completed during their lunch break which may not have been enough time for an in-depth examination of the program. Another limitation was having the PI lead the focus group. Knowing the PI, who is from the same rural community may have influenced

participants to be either overly complimentary or less critical than if an unknown person led the focus group.

## Conclusions

This study demonstrates the feasibility and acceptability of developing and implementing PA programs in rural primary care clinics. While both the study participants and nurses saw value in improving PA, barriers exist that need to be examined further and addressed in order to implement a PA program. This has implications for the future development, implementation and long-term sustainability and maintenance of a PA health promotion program through a primary care clinic.

# Chapter 4

## Summary

The purpose of the study was to explore the feasibility of conducting a 12-week intervention to increase physical activity behavior in inactive rural adults recruited from a primary care clinic. Other study goals included (1) to examine the effectiveness of using the 5A's model for brief PA counseling to improve rural subjects' PA behaviors (including active minutes and daily steps), perceptions of attitude, perceived behavioral control, subjective norms, and intention, and self-regulatory strategies of planning, goal setting, and tracking; and (2) to explore the feasibility of implementing a PA program through selected participant interviews and interviews with clinical staff to determine acceptability (satisfaction, intent to continue use), demand (actual use, perceived demand), implementation (degree of use, success or failure of use, factors affecting use), and practicality (effects, ability of individuals to continue activities).

The quantitative results of the study were presented in Chapter 2. At the end of the study both groups were still considered insufficiently active, but had increased their activity, with a greater change noted in the intervention group. For number of steps, the intervention group increased slightly during the 12 weeks while the control group decreased during the same time frame. The same pattern was seen with active minutes, with the intervention group spending more time in PA than the control group. There were no statistically significant differences between groups on any of the self-regulatory (planning, tracking and goal setting) or Theory of Planned Behavior (TPB) variables (attitude, intention, subjective norm, perceived behavioral control).

The purpose of Chapter 3 was to qualitatively explore the feasibility of conducting a 12-week intervention to increase PA behavior in inactive rural adults recruited from a primary care clinic. Data from the study provides insight to PA interventions for both rural and clinical application. The study also demonstrated the feasibility and acceptability of

developing and implementing PA programs in rural primary care clinics. While both the study participants and nurses saw value in improving PA, barriers exist that need to be examined further and addressed in order to implement a PA program. This has implications for the future development, implementation and long-term sustainability and maintenance of a PA health promotion program through a primary care clinic.

## Discussion

Theory-driven diet and physical activity interventions have shown self-regulatory strategies such as self-monitoring (including planning and tracking) and goal setting, are effective and foundational in lifestyle behavioral change strategies (Burke, Lora E. et al., 2011; Lyons, Lewis, Mayrsohn, & Rowland, 2014; Michie et al., 2009; Michie et al., 2011). This study utilized a theoretical approach to change PA behaviors in this group of rural adults. However, the intensity of the intervention may have been insufficient to significantly change participant PA. The more people self-regulated their behavior through planning, tracking or setting goals, the more time they spent engaged in PA, nonetheless no differences between groups was observed. It is also possible the frequency of the intervention components was not enough support to improve PA to an acceptable level.

Because effective PA counseling in primary care is hampered by limited time and competing demands, health care providers should tailor the intensity of their counseling based on patient characteristics (Alexander et al., 2011). One way to tailor counseling is with the use of the 5As, an evidence-based clinical tool for health behavior counseling, which was the basis for the PA counseling and action plans completed in this study. A study using the 5As for weight loss found use of the 5As seemed to influence patients to be more motivated to change, more confident to change, and more likely to change their behavior in order to lose weight (Alexander et al., 2011). This has important implications as the 5As can also be used effectively for PA counseling, especially when all 5 steps are utilized. Assess (Ask) and Advise are more commonly done in the clinical setting. The problem with mainly

using two behaviors without completing the other three behaviors (Agree, Assist Arrange) is they do not help health care providers learn what patients are actually willing to do. Thus the health care provider may not be able to help patients formulate an action plan for change. From a population perspective, increasing the prevalence of health care provider counseling about PA could greatly affect productivity, quality of life, mortality, and health costs in the U.S. (Carroll, Fiscella, Epstein, Sanders, & Williams, 2012).

Reach, one component of the RE-AIM framework, can be determined by the number and proportion of patients that were screened for physical inactivity. The number of adult patients seen for all types of visits at the clinic during the recruitment period was 660. A total of 99 subjects' information sheets was returned and contacted by the research staff, a 15% yield. Only 59 individuals (11%) ended up participating in the study. The use of a framework like RE-AIM allows for the possibility of achieving a public health impact, however, there definitely is work to do to increase the reach of a PA intervention program in this community.

This study did find effectiveness of the PA program in the rural community as participants did moderately increase the number of steps and amount of time spent in PA. However, individuals were still not meeting recommended PA guidelines so a more vigorous intervention is necessary to assist participants in achieving the needed PA levels. Participants of the program and nurses who helped with recruitment at the clinic all liked the program and felt a similar PA program would be good to adopt and implement long term through the primary care clinic. However, barriers exist that could hamper the adoption of a PA program. More work is needed to investigate how to overcome the identified barriers (e.g. staffing, resources) in order to implement and maintain an effective PA program long term. In health care settings, interventions and programming must be designed to integrate within the existing organizational processes as well as the abilities of the practitioners and the reach of the clinic (Lee, R. E. et al., 2017).

**Implications for Clinical Practice**

While no significant differences were found between groups, it is vitally important to continue to find ways to make PA a priority to improve the overall health and well-being of rural adults. This provides critical implications for health care providers. The availability of a standardized, practical, PA program as part of routine clinical care in rural primary care clinics is critical in addressing the obesity epidemic as PA is a necessary component of weight loss, weight maintenance and chronic disease reduction. This study found that both the study participants and nurses saw value in improving PA. However, barriers exist that need to be examined further and addressed in order to implement an effective PA program.

In addition, nurses and providers can play an important role in teaching patients about the role physical activity plays in obesity and chronic disease prevention. One of the challenges related to maintaining appropriate PA levels lies in assisting rural individuals with setting appropriate and realistic goals, planning for challenges and staying motivated. It will be important for rural adults to identify barriers of PA (e.g., lack of time, lack of access to gyms, transportation barriers), in order to implement a plan to overcome barriers to increasing PA levels as this too was an important concern voiced by participants. Physical activity in rural adults should be encouraged because previous studies found that physical activity was a key factor in weight loss (Jakicic, Wing, & Winters-Hart, 2002; Kruger, Blanck, & Gillespie, 2006; Unick, Jakicic, & Marcus, 2010). Results from this study will inform larger clinical trials that incorporate greater numbers of health care providers, patients, and clinics to test the effects of combined patient-provider communication and community-based exercise programs on PA and patient outcomes in rural populations.

## Conclusion

This study demonstrated the feasibility and acceptability of developing and implementing PA programs in rural primary care clinics. While rural adults did modestly increase their PA levels, the PA levels were still not meeting current guidelines

recommended by multiple public health agencies. Although both the study participants and nurses saw value in improving PA, barriers exist that need to be examined further and addressed in order to implement a PA program. More research is needed to determine how best to implement and maintain PA programs long term to reach rural adults and assist them in achieving recommended levels of PA to ultimately decrease morbidity and mortality that results from physical inactivity.

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Appendix A - Letter of Support from Phelps Medical Group

March 23, 2017

Jill R. Reed, PhD, APRN –NP
UNMC College of Nursing – Kearney Division
Health Science Education Complex - Room 233
2402 University Drive
Kearney, NE 68849 -4510

Dear Jill,

It is with excitement that I provide this letter of support for your grant proposal "Increasing Physical Activity to Improve Health through Primary Care Clinics in Rural Nebraska." I understand the purpose of your feasibility study is to examine the effectiveness of using the 5A's model (Assess, Advise, Agree, Assist, and Arrange) for physical activity behavioral counseling to increase rural subjects' physical activity. I support your research team working with Phelps Medical Group, a primary care clinic in Holdrege, to recruit adults who currently are not meeting the recommended 150 minutes/week of physical activity.

We know there are significant health disparities for much of rural America. Increasing physical activity in rural adults is an important area to focus on to improve the health of rural Nebraskans. I believe this research is incredibly important and would provide great health benefits to those subjects who elect to participate.

I wish you great success with this project. If you need any further assistance, please do not hesitate to contact me.

Sincerely,

Bethanne Kunz

Bethanne Kunz
Chief Operating Officer
ruralMED Management Resources

**Dependable. Efficient. Dedicated to You.**

*Charlotte A. Wirges, MD // Nicole Buettner, PA-C // Brendie Ellison, APRN // Michelle Hunter, APRN*
1315 Tibbals Street // Holdrege, NE 68949 // P: 308.995.6111 // Fax: 308.995.4868 // www.PhelpsMedicalGroup.net

Appendix B - Physical Activity Readiness Questionnaire (PAR-Q)

**Data Collection Sheet**

NAME:_____ DATE:_____

HEIGHT:_____in. WEIGHT:_____lbs. AGE:_____

PHYSICIANS NAME:_____ PHONE:_____

**PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)**

| | Questions | Yes | No |
|---|---|---|---|
| 1 | Has your doctor ever said that you have a heart condition and that you should only perform physical activity recommended by a doctor? | | |
| 2 | Do you feel pain in your chest when you perform physical activity? | | |
| 3 | In the past month, have you had chest pain when you were not performing any physical activity? | | |
| 4 | Do you lose your balance because of dizziness or do you ever lose consciousness? | | |
| 5 | Do you have a bone or joint problem that could be made worse by a change in your physical activity? | | |
| 6 | Is your doctor currently prescribing any medication for your blood pressure or for a heart condition? | | |
| 7 | Do you know of any other reason why you should not engage in physical activity? | | |

*If you have answered "Yes" to one or more of the above questions, consult your physician before engaging in physical activity. Tell your physician which questions you answered "Yes" to. After a medical evaluation, seek advice from your physician on what type of activity is suitable for your current condition.*

Appendix C – Demographic Questionnaire

**Demographic Information:** Please answer the following questions as they describe you.

1. **Sex:** ___ Male ___ Female

2. **Age:** _____ years old

3. **Ethnicity:** Do you consider yourself to be of Hispanic origin such as Mexican, Puerto Rican, Cuban or other Spanish background?

   ____ Yes

   ____ No

4. **Race:** ___ White ___ American Indian or Alaska Native

   ___ Asian ___ Native Hawaiian or Other Pacific Islander

   ___ Hispanic ___ Multiracial

   ___ African American ___ Other _____

5. **Marital Status:** ___ Married ___ Partnered, but not married

   ___ Widowed ___ Never married

   ___ Divorced/separated

6. What is the highest level of education completed.

| | |
|---|---|
| Grade School | Associate's Degree |
| High School | Bachelor's Degree |
| Some College | Master's Degree |
| | Doctorate Degree |

7. Which category below best describes your yearly family income? Circle one
   Below $50,000
   $50,000 to $75,000
   $75,000 to $100,000
   Over $100,000

8. **Work Status: Currently Working:** ___ Yes ___ No ___ Retired

9. If currently working, how many hours per week do you work? _____

10. **What is your main job/type of work?** Main means the work you spend the most time on, or you consider as your main job/work. Place an X in the **one** box that best describes your job/work. If you are retired, please answer this question for your most recent type of work.

_____ **Managerial/professional work**, like executive, administrator, analyst, purchasing manager, loan officer, engineer, registered nurse, physical therapist, counselor, teacher, lawyer, writer, artist

_____ **Technical/sales work**, like laboratory technician, dental hygienist, license practical nurse, computer programmer, legal assistant, buyer, salesperson, real estate agent, cashier, travel agent, advertising agent

_____ **Administrative support work**, like clerical supervisor, computer operator, administrative assistant, secretary, accounts clerk, bookkeeper, mail carrier, dispatcher, customer service representative, insurance adjuster, bank teller, or teachers' aide

_____ **Service work**, like child care worker, housecleaner, police or firefighter including supervisors, guard, bartender, cook, food server, dental assistant, nursing aide, pharmacy aide, phlebotomist, janitor, hairdresser, personal care attendant

_____ **Precision production/craft/repair work**, like mechanic, electric equipment repairer, telephone installer, construction trade worker, earth driller, painter, plumber, supervisor of this work

_____ **Operator/fabricator/laborer work**, like machine operator, assembler, inspector, bus driver, warehouse worker, packer, fabricator, tester, laborer, farm worker, supervisor of this work

_____ **Other work (write-in)** _____

11. **How many children do you have?** _____

12. **What medication are you currently taking?**

_____

_____

13. **Charlson Comorbidity Index (CCI)** Please mark Yes or No if you have any been diagnosed with any of the following medical conditions.

| | Conditions |
|---|---|
| Myocardial infarction (Heart Attack) | □ Yes □ No |
| Congestive heart failure | □ Yes □ No |
| Peripheral vascular disease | □ Yes □ No |
| Cerebrovascular disease (Stroke) | □ Yes □ No |
| Chronic pulmonary disease | □ Yes □ No |
| Connective tissue disease | □ Yes □ No |
| Ulcer disease | □ Yes □ No |
| Mild liver disease | □ Yes □ No |
| Diabetes | □ Yes □ No |
| Hemiplegia | □ Yes □ No |
| Moderate or severe renal disease | □ Yes □ No |
| Diabetes with end organ damage | □ Yes □ No |
| Any tumor | □ Yes □ No |
| Leukemia | □ Yes □ No |
| Lymphoma | □ Yes □ No |
| Moderate or severe liver disease | □ Yes □ No |
| Metastatic solid tumor | □ Yes □ No |
| AIDS | □ Yes □ No |

Appendix D – Godin Leisure Time Exercise Questionnaire

**MODIFIED GODIN MEASURE: PHYSICAL ACTIVITY AND EXERCISE**

**How many times per week on average did you do the following kinds of exercise OVER THE PAST MONTH?**

When answering these questions please:

- consider your weekly average over the past month.
- only count exercise sessions that lasted 15 minutes or longer in duration.
- only count exercise that was done during free time (i.e., not occupation or housework).
- note that the main difference between the three categories is the intensity of the exercise.

1. Thinking about MILD EXERCISE (MINIMAL EFFORT, NO PERSPIRATION)
(e.g., easy walking, yoga, archery, fishing, bowling, lawn bowling, shuffleboard, horseshoes, golf, snowmobiling)

    a. How many times per week do you do MILD EXERCISE? _____
    b. How many minutes each time? _____

2. Thinking about MODERATE EXERCISE (NOT EXHAUSTING, LIGHT PERSPIRATION)
(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

    a. How many times per week do you do MODERATE EXERCISE? _____
    b. How many minutes each time? _____

3. Thinking about STRENUOUS EXERCISE (when your HEART BEATS RAPIDLY, SWEATING)
(e.g., running, jogging, hockey, soccer, squash, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, vigorous aerobic dance classes, heavy weight training)

    a. How many times per week do you do STRENUOUS EXERCISE? _____
    b. How many minutes each time? _____

4. Thinking about exercises to increase muscle strength, such as lifting weights or calisthenics.

    a. How many times per week do you do exercises to increase muscle strength? _____
    b. How many minutes each time? _____

5. ***Thinking about the time you spend sitting at work, at home, while doing course work and during your leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television. Answer to the closest quarter of an hour (e.g., 10.25 hours).***

    a. How many hours do you spend sitting on a typical weekday? _____
    b. How many hours do you spend sitting on a typical weekend day? _____

6. Compared to a year ago, how much regular physical activity do you get?

| Much less | Somewhat less | About the same | Somewhat more | Much more |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

Appendix E – Health Beliefs Survey for Self-Regulatory Skill Use

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Never | Seldom | Occasionally | Often | Repeatedly |

| *In the past month how often did you:* | *How often (1-5)* |
|---|---|
| 1. Set aside time each day to walk or do other exercise? | |
| 2. Make a plan to walk or do other exercise? | |
| 3. Keep or make a new plan based on how well you were doing with your walking or other exercise? | |
| 4. Set a goal for the number of days you walked or exercised each week? | |
| 5. Keep track of how many steps you take each day? | |
| 6. Keep track of the number of days you walked or exercised each week? | |
| 7. Keep track of how long your walks or exercise sessions were? | |
| 8. Plan to walk or exercise 5 days a week? | |
| 9. Plan to make your walking or exercise sessions a little longer? | |
| 10. Set goals for how long your walking or exercise sessions will be? | |
| 11. Plan your walking or other exercise sessions so they are enjoyable? | |
| 12. Get together with someone else to walk or do other exercise? | |
| 13. Keep track of how much you enjoy your walking or other exercise? | |
| 14. Keep track of how fast you walked or how hard you did other exercise? | |

Use this scale to tell us if you agree with the following statements:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neither Agree or Disagree | Agree | Strongly Agree |

| *My friends or members of my family …* | *Agree or Disagree (1-5)* |
|---|---|
| 1. Make time to walk or do other exercise. | |
| 2. Set goals to walk or exercise. | |
| 3. Plan to walk or do other exercise. | |
| 4. Exercise or walk most days of the week. | |
| 5. Make their walks or other exercise as enjoyable as possible. | |
| 6. Keep track of their walking or other exercise. | |
| 7. Keep or make new plans based on how well they are doing with their walking or other exercise. | |
| 8. Set goals to walk faster or exercise longer. | |

Appendix F - Perception of Health

PROMIS v.1.1 - Global

## Global Health

**Please respond to each item by marking one box per row.**

| | | Excellent | Very good | Good | Fair | Poor |
|---|---|---|---|---|---|---|
| | In general, would you say your health is: ..... | ☐ 5 | ☐ 4 | ☐ 3 | ☐ 2 | ☐ 1 |
| | In general, would you say your quality of life is: ..... | ☐ 5 | ☐ 4 | ☐ 3 | ☐ 2 | ☐ 1 |
| | In general, how would you rate your physical health? ..... | ☐ 5 | ☐ 4 | ☐ 3 | ☐ 2 | ☐ 1 |
| | In general, how would you rate your mental health, including your mood and your ability to think? ..... | ☐ 5 | ☐ 4 | ☐ 3 | ☐ 2 | ☐ 1 |
| | In general, how would you rate your satisfaction with your social activities and relationships? ..... | ☐ 5 | ☐ 4 | ☐ 3 | ☐ 2 | ☐ 1 |
| | In general, please rate how well you carry out your usual social activities and roles. (This includes activities at home, at work and in your community, and responsibilities as a parent, child, spouse, employee, friend, etc.) ..... | ☐ 5 | ☐ 4 | ☐ 3 | ☐ 2 | ☐ 1 |
| | | **Completely** | **Mostly** | **Moderately** | **A little** | **Not at all** |
| | To what extent are you able to carry out your everyday physical activities such as walking, climbing stairs, carrying groceries, or moving a chair? ..... | ☐ 5 | ☐ 4 | ☐ 3 | ☐ 2 | ☐ 1 |

PROMIS v.1.1 - Global

**In the past 7 days…**

| | | Never | Rarely | Sometimes | Often | Always |
|---|---|---|---|---|---|---|
| Global10 | How often have you been bothered by emotional problems such as feeling anxious, depressed or irritable? ..... | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 |
| | | **None** | **Mild** | **Moderate** | **Severe** | **Very severe** |
| Global08 | How would you rate your fatigue on average? .... | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Global07 | How would you rate your pain on average?..... | ☐ 0 **No pain** | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 **Worst imaginable pain** |

Appendix G - Theory of Planned Behavior Tool for Exercise

**Theory of Planned Behavior Tool for Exercise**

Please take your time to answer the following questions that ask about exercise activities performed **<u>at least</u>** at a ***moderate intensity*** (for bouts of at least 30 minutes each time). Please fill in the response that best describes you.

For example, if a question asks:
**Exercising _____ times per week over the next week would be good for my health. (e.g., 0-7)**

Directions: Fill in the number of exercise bouts (30 minutes) that best describes the weekly frequency of exercise that you feel would beneficial to your health. (e.g., 0-7)

1. Exercising _____ times per week over the next week would be enjoyable.
2. Exercising _____ times per week over the next week would be useful.
3. It would be pleasant to exercise_____ times per week over the next week.
4. It would be wise to exercise_____times per week over the next week.
5. It would be boring to exercise more than _____times per week over the next week.
6. It would be beneficial to exercise_____ times per week over the next week.
7. Most people who are important to me want me to exercise_____ times per week over the next week.
8. Most people who are important to me think I should exercise _____ times per week over the next week.
9. Most people who are important to me will exercise an average of _____ over the next week.
10. If I really wanted to exercise daily, exercising_____ times over the next week would be completely under my control.
11. Exercising more than _____ times over the next week is beyond my control, even if I were really motivated to exercise every day.
12. I plan to exercise _____ times for the next week.
13. I intend to exercise _____ times over the next week.

Appendix H – Institutional Review Board Approval Letter

University of Nebraska Medical Center

NEBRASKA'S HEALTH SCIENCE CENTER

Office of Regulatory Affairs (ORA)
Institutional Review Board (IRB)

July 20, 2017

Jill Reed, PhD, APRN-NP
CON-Kearney Division
UNMC - 68849

**IRB #** 362-17-EP

**TITLE OF PROPOSAL:** Increasing Physical Activity to Improve Health through Primary Care Clinics in Rural Nebraska

**DATE OF EXPEDITED REVIEW:** *06/05/2017*

**DATE OF FINAL APPROVAL AND RELEASE:** 07/20/2017 **VALID UNTIL:** 06/05/2018

**CLASSIFICATION OF RISK:** Minimal

**EXPEDITED CATEGORY OF REVIEW:** 45 CFR 46.110; 21 CFR 56.110, Category *4, 6, 7*

The IRB has completed its review of the above-titled protocol. The IRB has determined you are in compliance with HHS Regulations (45 CFR 46), applicable FDA Regulations (21 CFR 50, 56) and the Organization's HRPP policies. Furthermore, the IRB is satisfied you have provided adequate safeguards for protecting the rights and welfare of the subjects to be involved in this study. This letter constitutes official notification of final approval and release of your project by the IRB. You are authorized to implement this study as of the above date of final approval.

Please be advised that only the IRB approved and stamped consent form(s) can be used to make copies to enroll subjects. Also, at the time of consent all subjects must be given a copy of *The Rights of Research Subjects* and "What Do I Need to Know" forms.

The IRB wishes to remind you that the PI is ultimately responsible for ensuring that this research is conducted in full compliance with the protocol, applicable Federal Regulations, and Organizational policies.

Finally, under the provisions of this institution's Federal Wide Assurance (FWA00002939), the PI is directly responsible for submitting to the IRB any proposed change in the research or the consent form(s)/information sheet(s). In addition, any adverse events, unanticipated problems involving risk to the subject or others, noncompliance, and complaints must be promptly reported to the IRB in accordance with HRPP policies.

This project is subject to periodic review and surveillance by the IRB and, as part of the Board's surveillance, the IRB may request periodic progress reports. For projects which continue beyond one year, it is the responsibility of the PI to initiate a request to the IRB for continuing review and update of the research project.

On behalf of the IRB,

Signed on: 2017-07-20 09:31:00.000

Bryan Ludwig, BA
IRB Administrator II
Office of Regulatory Affairs

cc: Bruce G. Gordon M.D.
IRB Executive Chair