Examining the Impact of an Email Campaign to Promote Physical Activity and Walking in Adult Women Six-Weeks and One-Year Post-Intervention

by Julian A. Reed

Abstract

The purpose was to examine the impact of an email intervention campaign to increase physical activity among women. Participants' activity levels were assessed at baseline, immediately following the intervention and one year post intervention. (N=475) received weekly Walking Tips Intervention Emails (WTIE) for 6 weeks. Participants were primarily Caucasian, college-educated, middle-aged women with income greater than $60,000. Following the intervention a significant increase in weekly moderate intensity physical activity was found (37% [n=75]; t=-2.743, p=.007). Post-intevention the percentage of participants who walked 5 or more days significantly increased (N=103; t=-3.168, p=.002). Minutes of walking per day increased significantly (t=-2.114, p=.039) as well. The percentage of respondents reporting to exercise regularly for 6 months or more significantly increased.

Background

Regular participation in leisure-time physical activity (PA) can provide a variety of protective health benefits. Yet, the majority of Americans are either sedentary or do not engage in recommended amounts of PA; with women participating in the least amount of weekly activity (Macera & Pratt, 2000; Pratt, Macera, & Blanton, 1999; US DHHS, 1996; Hawkings et al., 2004; Trost et al., 2002). Surveillance data identified from the Behavioral Risk Factor Surveillance System (BRFSS) have documented that among those women who are active; walking is the most common form (Dunn et al., 1999).

A variety of interventions have been employed to intervene on the risky behavior of inactivity among women over the past decade (Hawkings et al., 2004; Trost et al., 2002), however the implementation of email delivered health behavior programs remain limited (Ferney & Marshall, 2006; Dinger et al., 2006). Published studies in this area frequently site utility of the delivery medium (Dinger et al., 2006). Ferney and Marshall (2006) successfully illustrated that information and communication technology has a significant potential to deliver behavior change programs to large populations. The increased numbers of research on web-based interventions has, unfortunately, not provided enough information on short and long-term efficacy of this intervention approach (Dinger et al., 2006). Since email has become a ubiquitous, widely used communication tool, it is perceived as a convenient and productive intervention method (Walji et al., 2005), that remains under-utilized. The purpose of this study was to examine an email intervention campaign to increase PA and intent to exercise among a convenience sample of adult women.

Methods

Participants

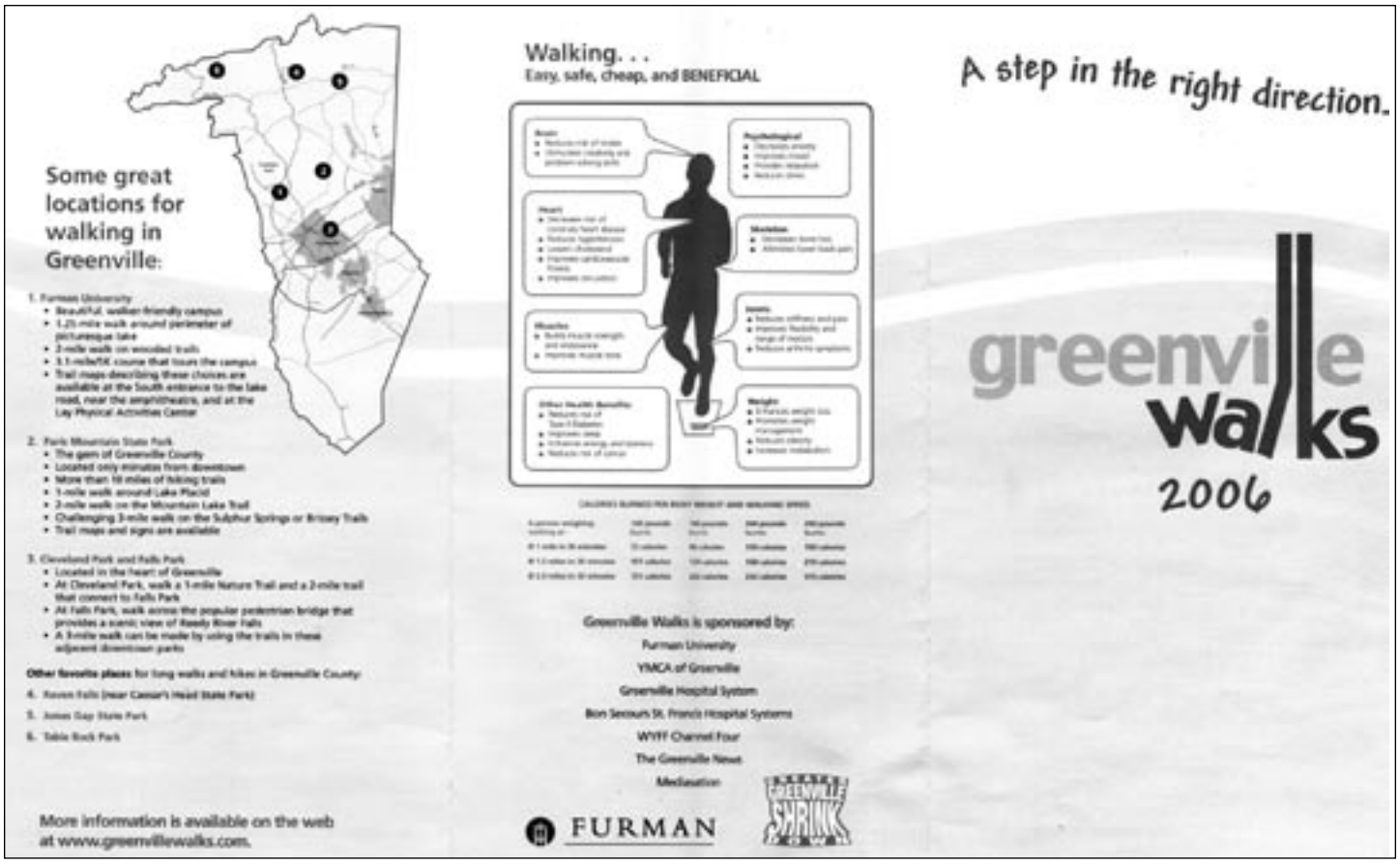
A convenience sample of adult women attending a mass media wellness campaign kick-off event supported by the YMCA of Greenville was the sub-population of participants solicited for this study. The sample of participants enrolled in a wellness living programmed entitled the: YMCA Greater Greenville Shrinkdown (GGS). The PA component of the GGS was called Greenville Walks. Approximately, 5,000 residents of Greenville County, South Carolina enrolled in this free healthy living awareness program that targeted adult obesity and related diseases at a kick-off event held in the second week of January, 2006. Each Shrinkdown participant had the opportunity to specifically enroll in Greenville Walks upon enrollment in the GGS. Eleven-hundred participants chose to participate in the Greenville Walks Program. This program was 6 weeks in length. Of the 1,100 participants who signed-up for Greenville Walks, over 95 percent were adult women. A sub-sample of 1,009 women from the GGS signed-up for the walking program at the kick-off. Approximately two-days later, following the first Walking Tips Intervention Email (WTIE), 470 women completed the baseline BRFSS PA module questionnaire. The response rate was 47 percent for the baseline assessment. Following the 6-week intervention, approximately 50 percent of respondents remained in the program (470 vs. 206). In addition, participants who completed the follow-up survey received an email notice to complete the survey again one-year later (February, 2007). The response rate for the final administration of the survey was 55 percent (n=114).

Measures

The main outcome measures were moderate intensity PA, and walking behaviors assessed with 2001 BRFSS PA Module Questionnaire (*www.cdc.gov*). This module has been used in several national studies and has been validated and deemed reliable (Ainsworth et al., 2002; Wilcox et al., 2002a; Wilcox et al., 2002b). Three questions to assess moderate intensity PA and the three walking questions from this module were used. One additional question was used to assess current exercise levels or intent to exercise within the next 30 days and/or 6 months (Norman et al., 1998; Marcus et al., 1992; Shirazi, 2006).

Procedures

The GGS mass media campaign began approximately 12 weeks prior to the kick-off event, and was rolled-out the second week of January, 2006. Advertisements (e.g., TV, print, radio) were standardized for consistency. Greenville residents were encouraged to attend the kick-off event to receive free weight loss educational material and to receive their initial weigh-in value. Following registration for GGS, each participant was asked if they were interested in participating in the Greenville Walks Program. Approximately 1,100 participants chose to participate by providing their name and email address. Each Greenville Walks participant was provided with an educational brochure (highlighting the Greenville Walks website address [see figure 1]) illustrating the benefits of PA and walking and popular sites in Greenville to be active. Each participant was informed that they would receive weekly



Some great locations for walking in Greenville:

1. Furman University
   - Beautiful, walker-friendly campus
   - 1.25-mile walk around perimeter of picturesque lake
   - 2-mile walk on wooded trails
   - 3.1-mile/5K course that tours the campus
   - Trail maps describing these choices are available at the South entrance to the lake road, near the amphitheatre, and at the Lay Physical Activities Center

2. Paris Mountain State Park
   - The gem of Greenville County
   - Located only minutes from downtown
   - More than 10 miles of hiking trails
   - 1-mile walk around Lake Placid
   - 2-mile walk on the Mountain Lake Trail
   - Challenging 3-mile walk on the Sulphur Springs or Brissy Trails
   - Trail maps and signs are available

3. Cleveland Park and Falls Park
   - Located in the heart of Greenville
   - At Cleveland Park, walk a 1-mile Nature Trail and a 2-mile trail that connect to Falls Park
   - At Falls Park, walk across the popular pedestrian bridge that provides a scenic view of Reedy River Falls
   - A 3-mile walk can be made by using the trails in these adjacent downtown parks

Other favorite places for long walks and hikes in Greenville County:

4. Raven Falls (near Caesar's Head State Park)
5. Jones Gap State Park
6. Table Rock Park

More information is available on the web at www.greenvillewalks.com.

Walking. . .

Easy, safe, cheap, and BENEFICIAL

Greenville Walks is sponsored by:

Furman University

YMCA of Greenville

Greenville Hospital System

Bon Secours St. Francis Hospital Systems

WYFF Channel Four

The Greenville News

Mediacation

FURMAN

A step in the right direction.

greenville walks 2006

KICKOFF YOUR OWN PERSONAL WALKING PROGRAM!

30 Minutes a Day, Five Days a Week

- Walking is very easy, fun, and inexpensive
- It can be done practically anywhere and anytime, alone or in a group
- A regular walking regimen can provide the kind of physical exercise that can help prevent heart disease, stroke, diabetes, obesity, and certain types of cancer
- You can walk with friends and family
- A commitment to yourself and to others increases the likelihood you'll exercise regularly
- Scheduling when you are going to walk will increase your daily participation
- It's simple: walking 30 minutes a day, 5 days a week can provide tremendous benefits towards weight control and fitness
- Furthermore, walking five days a week will make you feel better and younger

. . . not bad for putting one foot in front of the other!

WHAT'S IN IT FOR YOU?

- Controls appetite
- Lowers cholesterol
- Reduces stress
- Improves sleep
- Increases blood volume
- Increases ability to burn fat
- Increases attention span
- Stimulates immune system
- Improves strength and balance
- Increases energy
- Decreases back pain
- Improves mood

An Ideal Family Activity

- Walking is great for the whole family!
- A group walk can bring the family together for conversation and bonding.
- Try going for a walk together after dinner instead of sitting down and watching TV
- Parents who walk demonstrate healthy behavior for their children
- Active children are much less likely to be among the growing population of obese children

HOW TO OVERCOME

Common Barriers to Starting a Walking Program

- Problem: Lack of time
  Solution: Walk 10 minutes in the morning, 10 minutes at lunch, and 10 minutes in the evening for a total of 30 minutes a day
- Problem: Lack of motivation
  Solution: Find a walking partner to encourage you
- Problem: Family obligations
  Solution: Take your kids along for a walk. Or alternate babysitting responsibilities with friends or other family members.
- Problem: Unsafe neighborhood
  Solution: Listed in this brochure are some of our favorite places to walk in Greenville County

Most important: Keep a positive attitude and don't get discouraged, even if you don't see immediate results

More Tips for the Greenville Walker

- Warm up at an easier pace for 5 minutes. This helps your muscles call on their fat reserves
- Walk briskly for at least 30 minutes
- After the main portion of your walk, cool down at a slower pace for 5 minutes
- Finish with some light stretching
- Certain essentials will make your walk more comfortable and enjoyable: proper socks, shoes, and clothing; hat and sunscreen; water bottle
- To avoid injury, gradually increase your walking pace and length over the weeks
- Remember, exercise does not have to be strenuous to be beneficial
- A brisk, moderate intensity is sufficient for health benefits

www.greenvillewalks.com

Proper Walking Technique

- Walk tall: "suck in your gut, tuck in your butt!"
- Roll from heel to toe in a smooth motion
- Point toes forward
- Bend arms lightly and swing them while you walk
- Maintain a pace where you are breathing deeply but are still able to carry on a conversation
- **Common Walking Technique Mistakes:** Leaning, head down, foot slapping, over-striding, and no arm movement

KEEP TRACK!

- Chart your progress (see sample card below).
- Record minutes walked daily.
- Increase your time if you're able, but remember:
- It's more important to establish a healthy walking habit than to count the minutes.

SAMPLE TRACKING CARD

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Mon	30	-						
Tue	-	30						
Wed	45	30						
Thu	30	30						
Fri	-	30						
Sat	30	30						
Sun	30	30						
Total minutes	195	210						
Days walked 30 minutes	4	5						

Walking goal: 150+ minutes per week; 30+ minutes a day for 5 or more days.

emails by the Greenville Walks staff with helpful PA and walking tips. This was stated verbally and in writing to each participant prior to providing their email address to ensure each participant was fully aware of the program's intent.

Intervention

At the kick-off event of the GGS, participants who chose to sign-up for Greenville Walks were provided with the brochure (see figure 1) that illustrated in detail popular accessible areas in Greenville, a chart to track their PA and educational content outlining the benefits of regular PA. Two-days following the kick-off event, each Greenville Walks participant was emailed a link to complete a short survey to measure PA baseline and other demographic variables. Following the completion of the baseline survey, each participant was sent the first week's WTIE. Content for the WTIE's weekly themes were derived from the Center's for Disease Control and Prevention Strategies for Overcoming Barriers to Behavior Change, Overcoming PA Barriers (US DHHS, 1999) and America on the Move content (America on the Move, 2006). The themes for week 1-6 were as follows: 1) Awareness of Great Places for PA and to Walk; 2) Overcoming PA and Walking Barriers; 3) Overcoming Walking Barriers Continued; 4) Strategies to use Transportation Walks; 5) When to Walk from America on the Move's Active Living Mission of Move More and Eat Less by making 2 small daily changes; and week 6) America on the Move's Active Living Tools. All participants were informed on the procedures each week for unsubscribing from the WTIE weekly emails.

Analysis

Descriptive statistics using the Statistical Package for the Social Sciences (14.0) were used to analyze frequency and percentage changes between the baseline and the two additional PA assessments (6-weeks and 1 year post hoc). Paired t-tests were used to examine differences in moderate intensity PA, walking behaviors per week, by hours and minutes per day. Paired t-tests were also utilized to examine intent to exercise and exercise adherence differences. Both men and women who chose to participate in the Greenville Walks Program received the weekly emails and completed the baseline and follow-up surveys; however, few men participated in this program, therefore women were only included in the data analyses. Individuals who completed the baseline survey, and the survey immediately following the 6-week intervention were included in the initial analyses. Respondents completing the survey immediately following the 6-week intervention, as well as the survey 1 year post-intervention (in February, 2007) were included in the paired t-test statistical model to examine differences.

Results

The demographics of the sample at the baseline assessment were primarily Caucasian middle-aged women (45-64 years old) with a family household income greater than $60,000 dollars per year with a college degree. Participants who completed the survey after the 6-week intervention reported similar results and are listed in table 1. The three moderate intensity PA and three walking PA

Table 1. ***Frequency and Percentage Distributions by Demographic Variables at Baseline, Post-Intervention and 1 Year Later***

	Baseline (N)	Percentage	Post-Intervention 6 Weeks (N)	Percentage	Post-Intervention 1-Year (N)	Percentage
Ethnicity						
Caucasian	358	82.1	156	76.8	84	78.5
African American	67	15.4	40	19.7	20	18.7
Hispanic	2	0.5	3	1.5	2	1.9
Asian	5	1.1	2	1.0	1	0.9
Bi or Multi-Racial	3	0.7	1	0.5	0	0.0
Other	1	0.2	1	0.5	0	0.0
Skipped Question	15		10		4	
Age						
18-29	53	12.1	16	7.8	12	11.3
30-44	170	38.8	74	36.3	31	29.2
45-64	199	45.7	105	51.5	57	53.8
65-74	13	3.0	8	3.9	6	5.7
>74	1	0.2	1	0.5	0	0.0
Skipped Question	15		9		5	
Household Income						
<10K	8	2.3	4	2.3	1	1.1
10-20K	20	5.4	11	6.3	6	6.5
20-30K	43	11.4	19	10.9	9	9.8
30-40K	62	16.3	21	12.1	13	14.1
40-50K	50	13.2	36	20.7	10	10.9
50-60K	28	7.5	15	8.6	5	5.4
>60K	170	43.9	68	30.1	48	52.2
Skipped Question	71		41		19	
Education Level						
<high school graduate	3	0.7	1	0.5	0	7.5
High school graduate	61	14	25	12.3	8	32.7
Some college	135	31	65	32.0	35	59.8
College graduate	235	54.3	112	55.2	64	0.0
Skipped Question	17				4	

questions of the BRFSS PA Module were used for the baseline and 6-week post-intervention assessments. Approximately 25 percent (n=118) of female respondents at baseline reported participating in moderate intensity PA 4 or more days in the past week. Following the 6-week intervention a significant increase in weekly moderate intensity PA was found (37% [n=75]; t=-2.743, p=.007). No significant differences in the weekly hours and minutes of moderate intensity PA were found following the intervention (p>.05). At baseline, 47.2 percent (N=164) of participants reported walking at least 10 minutes at a time either at work, home, walking to travel from place to place and other walking done solely for recreation, sport, exercise or leisure. Following the 6-week WTIE's the percentage of participants who walked 5 or more days significantly increased to 61 percent (N=103; t=-3.168, p=.002). When respondents were asked how many hours they spent walking on those days, 82.2 percent (N=282) of respondents at baseline reported walking from 0 to 1 hour per day in comparison to 77 percent (N=133) following the email intervention. The percentage of respondents walking 2 to 3 hours per day significantly increased from 13.1 percent (N=45) at baseline to 19 percent (N=32) following the intervention, (t=3.684, p=.001).

Similarly, the number of minutes respondents reported walking at least 10 minutes per day increased significantly following the 6-week intervention (t=-2.114, p=.039) as well. The mean frequency of moderate intensity PA also significantly increased 1 year post-intervention (3.21 vs. 4.75; t=-2.604, p =.015). Hours walking per week increased 1 year post-intervention and neared significance (p=.056). The t-test values, percentage values and frequencies for days, hours and minutes of PA per week for the baseline and the two post-intervention assessments are listed in table 2.

Participants were also presented with a valid question defining exercise as planned PA question to identify their current exercise status or intentions to begin an exercise program. The question was as follows: *(Regular exercise is any planned physical activity [e.g., brisk walking aerobics, jogging, bicycling, swimming, etc.] Such activity should be performed 3 to 5 times per week for 20-60 minutes per session. Exercise does not have to be painful to be effective, but should be done at a level that increases your breathing and causes you to break a sweat. Do you exercise regularly according to this definition? Yes, I have been for MORE than 6 months; Yes, I have been for LESS than 6 months; No, but I intend to in the NEXT 30 days; No, but I intend to in the NEXT 6 months; No, and I do not intend to in the NEXT 6 months.)* (Norman et al., 1998; Marcus et al., 1992). A significant mean difference was found between respondents intent to exercise following the 6-week intervention (t=6.772, p=.000). The baseline assessment revealed that the greatest percentage of participants responded with the answer of: *No, but I intend to in the next 30* days (44 percent; N=153). Following the email intervention this number decreased to 24.3 percent (N=42). In addition, after the 6-week intervention the largest percentage of participants responded by saying: *Yes, I have been [exercising] for less than 6 months* (39.9 percent, N=69) in comparison to 22.5 percent of respondents at baseline (N=78). Furthermore, approximately 28 percent of respondents following the 6 week intervention reported that they have been exercising more than 6 months. One year later this percentage increased to 37 percent. The baseline and post-intervention results are listed in table 2.

Discussion

The demographic data collected at baseline, immediately following the 6-week intervention and 1 year post-intervention is consistent with current findings in the literature suggesting that education, age, household income and ethnicity are related to PA (Trost et al., 2002). In the present study, participants were primarily Caucasian, middle-aged women with a college degree with an above average household income in comparison to current census data for this geographic region. The current PA prescription recommends that adults engage in moderate-intensity PA (e.g., brisk walking, etc.) most days of the week. In the present study, following the intervention women participating in 4 or more days of moderate intensity PA significantly increased. Furthermore, following the 6-week intervention the percentage of women walking 4 or more days per week significantly increased along with number of hours and minutes of walking. In addition, the percentage of women exercising or planning to exercise in the next 30 days and/or 6 months increased as well. One year post-intervention, female respondents reported an increase in weekly moderate intensity PA as well as an increase in women reporting to exercise for 6 months or more. It appears that the weekly emails impacted PA behavior and the intent to exercise among this sample of women.

Lamaitre et al. (1995) revealed that women who walk regularly had decreased their all cause mortality rates by 60% in response to maintaining a walking program that included at least 45 minutes of PA three to four times per week. Adherence to activity has many obstacles and continues to be barrier to regular participation. However, Shirazi and colleagues (2006) recently examined a home-based intervention to promote strength training and walking and found that following the intervention the experimental group had significant improvements in PA and lower body strength. Similarly, Mathews and colleagues (2006) revealed that a 12-week home-based walking intervention for breast cancer survivors was effective and increased short-term PA levels. Although the current intervention in the present study was only 6 weeks in length, the descriptive findings support its impact on the PA, walking patterns and intent to exercise for up to one year.

Teixeira and colleagues (2004) analyzed the behavioral and psychosocial differences between successful and non-successful participants in a 16-week weight management program and found that non-completion of the program was related more with previous unsuccessful attempts and quality of life. Perhaps, women in the present study who did not successfully complete the intervention did so because they were unable to finish similar programs in the past. Recently, Jones et al. (2006) used the Theory of Planned Behavior (TPB) to examine social cognitive determinants of brain tumor patients and found that the TPB can be a useful framework to implement interventions to promote exercise. Maybe, respondents who participated in the 6-week intervention in the present study and completed the post-intervention questionnaire did so because they planned to change their PA behavior prior to entering this program.

Limitations

There were a variety of limitations associated with study that need to be discussed. Email is a readily available medium to target specific populations for interventions. However, the content of the email messages remains a vastly understudied area (Wilcox et al., 2002a) that requires further investigation. The present study uti-

lized content not specifically designed for persuasive email messages, but rather published content used as strategies for behavior change. Although one could posit that the content was appropriate for the specific population of women in this study, further examination of email content needs to be conducted. The convenience sample of women selected to participate in this study were prob-

Table 2. ***Frequency and Percentages of Women Respondents Walking Levels and Intent to Exercise at Baseline, Post-Intervention (6 week and 1 Year)***

BRFSS PA Module Questions		N	Baseline	N	(6-week) Post-Interv.	t-test (p)	N	1 year later	t-test (p)
Moderate Intensity PA in past 7 days	1	63	14.4%	22	10.7%	-2.743	7	6.5%	-2.604
	2	89	20.4%	34	16.6%	(p=*.007)	15	14.0%	(p=*.015)
	3	83	19.0%	39	19.0%		23	21.5%	
	4	45	10.3%	24	11.7%		19	17.8%	
	5	41	9.4%	35	17.1%		11	10.3%	
	6	11	2.5%	8	3.9%		2	1.9%	
	7	16	3.7%	8	3.9%		5	4.7%	
	Non	89	20.4%	35	17.1%		25	23.4%	
	Skipped Question	3		2			1		
Hours of Moderate Intensity PA	0.1 hour	353	81.9%	154	75.1%	.973	81	76.45	01.140
	2-3 hours	59	13.7%	36	17.6%	(p=.332)	22	20.8%	(p=.265)
	4-5 hours	19	4.4%	15	7.3%		2	1.9%	
	6-7 hours	2	0.5%	1	0.5%		1	0.9%	
	8-9 hours	1	0.2%	1	0.5%		0	0.0%	
	>9 hours	1	0.2%	1	0.5%		0	0.0%	
	Skipped Question	11					2		
Minutes of Moderate Intensity PA	0-10 minutes	96	22.4%	34	16.7%	.710	25	23.8%	.068
	11-20 minutes	65	15.2%	21	10.3%	(p=.479)	12	11.4%	(p=.947)
	21-30 minutes	104	24.3%	47	23.0%		20	19.0%	
	31-40 minutes	51	11.9%	36	17.6%		9	8.6%	
	41-50 minutes	41	9.6%	13	6.4%		5	4.8%	
	51-60 minutes	38	8.9%	33	16.2%		17	16.2%	
	>60 minutes	35	8.2%	25	12.3%		17	16.2%	
	Skipped Question	15		2			4		
Walking (days)	1	40	11.5%	15	8.8%	-3.168	11	12.1%	.979
	2	39	11.2%	14	8.2%	(p=*.002)	12	13.2%	(p=.338)
	3	51	14.7%	20	11.8%		16	17.6%	
	4	54	15.5%	18	10.6%		14	15.4%	
	5	74	21.3%	39	22.9%		12	13.2%	
	6	25	7.2%	12	7.1%		2	2.2%	
	7	65	18.7%	52	30.6%		24	26.4%	
	Skipped Question	92		36			28		
Walking (Hours)	0.2 hour	282	82.2%	133	76.9%	3.684	71	78.0%	-2.032
	2-3 hours	45	13.1%	32	18.5%	(p=*.000)	16	17.6%	(p=.056)
	4-5 hours	12	3.5%	6	3.5%		3	3.3%	
	6-7 hours	1	0.3%	2	1.2%		1	1.1%	
	8-9 hours	3	0.9%	0	0%		0	0.0%	
	>9 hours	1	0.3%	0	0%		0	0.0%	
	Skipped Question	96		33			22		
Walking Minutes	0-10 minutes	43	12.4%	17	9.8%	-2.114	17	19.3%	2.103
	11-20 minutes	56	16.2%	26	15.0%	(p=*.039)	13	14.8%	(p=.052)
	21-30 minutes	113	32.7%	39	22.5%		18	20.5%	
	31-40 minutes	60	17.3%	35	20.2%		13	14.8%	
	41-50 minutes	22	6.4%	15	8.7%		6	6.8%	
	51-60 minutes	29	8.4%	20	11,6%		8	9.1%	
	>60 minutes	26	7.5%	22	12,7%		13	14.8%	
	Skipped Question	91		32					
Exercise Definitions	Yes, I have been [exer.] for 6 months	78	22.5%	49	28.3%	6.772	34	37.0%	-3.994
	Yes, I have been for <than 6 months	78	22.5%	69	39.9%	(P=*.000)	15	16.3%	(P=*.002)
	No, but I intend to in the NEXT 30 days	153	44.1%	42	24.3%		25	27.2%	
	No, but I intend to in the NEXT 6 months	40	11.5%	12	6.9%		17	18.5%	
	No, and I do NOT intend to in the NEXT 6 months	1	0.3%	1	0.6%		1	1.1%	
	Skipped Question	113					26		

*p<0.05

ably already interested and planning on beginning a PA program and could have lead to a selection bias. It is reasonable to assume that individuals who attended the GGC's Kick-off event were interested in learning and receiving information on how to lead a healthy lifestyle. Thus those respondents who signed-up for Greenville Walks were, perhaps already interested in participating regularly in PA. However, many people begin wellness programs in the beginning of each calendar year, but fail to successfully adhere to these programs. Norcross and colleagues (1989) examined New Year's resolvers and nonresolvers interested in changing a problem later and found that resolvers reported higher rates of success than nonresolvers at 6 months. Forty-six percent of resolvers were continually successful in comparison to 4 percent of non-resolvers. Even if you are interested in changing a behavior, this intent does not automatically translate in adherence. Thus, although a selection bias could have been present during the initial solicitation of participants at the kick-off event, further compliance in participation in regular PA 6 weeks and 1 year post intervention was more likely due to behavior modification rather than selection bias. In addition, the New Year's Resolution time is a motivating teachable moment that could have skewed the results. The lack of a control group in the present study also limits these findings. Finally, lack of demographic diversity limits the external validity and versatility of these findings as well.

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