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A Social Media–Based Physical Activity Intervention:

A Randomized Controlled Trial

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Abstract

Background—Online social networks, such as Facebook™, have extensive reach, and they use technology that could enhance social support, an established determinant of physical activity. This combination of reach and functionality makes online social networks a promising intervention platform for increasing physical activity.

Purpose—To test the efficacy of a physical activity intervention that combined education, physical activity monitoring, and online social networking to increase social support for physical activity compared to an education-only control.

Design—RCT. Students ($n=134$) were randomized to two groups; education-only controls receiving access to a physical activity–focused website ($n=67$) and intervention participants receiving access to the same website with physical activity self-monitoring and enrollment in a Facebook group ($n=67$). Recruitment and data collection occurred in 2010 and 2011; data analyses were performed in 2011.

Setting/participants—Female undergraduate students at a large Southeastern public university.

Intervention—Intervention participants were encouraged through e-mails, website instructions, and moderator communications to solicit and provide social support related to increasing physical activity through a physical activity–themed Facebook group. Participants received access to a dedicated website with educational materials and a physical activity self-monitoring tool.

Main outcome measures—The primary outcome was perceived social support for physical activity; secondary outcomes included self-reported physical activity.

Results—Participants experienced increases in social support and physical activity over time but there were no differences in perceived social support or physical activity between groups over time. Facebook participants posted 259 times to the group. Two thirds (66%) of intervention participants completing a post-study survey indicated that they would recommend the program to friends.

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Conclusions—Use of an online social networking group plus self-monitoring did not produce greater perceptions of social support or physical activity as compared to education-only controls. Given their promising features and potential reach, efforts to further understand how online social networks can be used in health promotion should be pursued.

Trial Registration—This study is registered at clinicaltrials.gov NCT01421758.

Introduction

Social support is a well-established correlate of greater physical activity and a growing number of web-based health interventions have employed social support strategies including online bulletin board services, group chats, and facilitating e-mail communication to increase physical activity.^{1–17} However, the efficacy of these strategies to increase social support and physical activity is difficult to determine from these studies, because social support has rarely been included as a measure or emphasized as a primary intervention component.^{6, 8, 10–12, 14–16}

Online social networks, such as Facebook™, possess a number of useful features that could enhance social support interventions including the ability for users to share personal information that is aggregated and displayed to other users in real time.^{18,19} In addition, more than one third of adults have online social network accounts.²⁰ This combination of reach and functionality makes online social networks a potentially effective means of delivering social support interventions.

The purpose of this study was to test the efficacy and feasibility of a 12-week physical activity social support intervention partly administered through Facebook. The primary hypothesis was that individuals randomized to the intervention would exhibit greater increases in perceived social support for physical activity than individuals in an education-only control group.

Methods

Participants

Female undergraduate students ($n=134$) at a large Southeastern public university were directed to an online screener through print and electronic communications including e-mail, Facebook, and Twitter™. Currently enrolled female undergraduates were deemed eligible if they were aged <25 years, reported <30 minutes of daily physical activity, and >30 minutes of daily use of Facebook. Participants were excluded if they answered *yes* to three or more questions on the SCOFF disordered eating questionnaire and were required to submit physician approval if they answered *yes* to one or more questions on the Physical Activity Readiness Questionnaire.^{21,22} Women were chosen as participants based on research that social support's influence on physical activity is greater for women than it is for men.^{23–25} A full description of participant recruitment is included in Figure 1. All study participants provided informed consent.

Design

Participants were randomized into two groups, online social network plus self-monitoring ($n=67$) and education-only control ($n=67$). Perceived social support for physical activity was assessed at baseline and 10 weeks. Physical activity was assessed at baseline and 12 weeks to establish an appropriate temporal sequence among variables for a separate mediation analysis. Participants received \$30 for completing all study measures. Recruitment and data collection for this study occurred in 2010 and 2011 and data analysis was performed in 2011. The IRB at the University of North Carolina at Chapel Hill approved this study.

Study Procedures

Intervention participants had access to the Internet Support for Healthy Associations Promoting Exercise (INSHAPE) website, which provided educational information related to physical activity and a self-monitoring tool that allowed participants to set goals, track their daily physical activity, and view a chart depicting their progress relative to their goal and to national recommendations for physical activity.²⁶ Participants in the intervention group only were invited to join a Facebook group using their existing Facebook account, where they could exchange social support. To encourage participation, group members were entered into a biweekly gift-card drawing based on group contributions.

The moderator's role was to encourage participation and answer technical or physical activity-related questions from participants, but it did not include direct social support to individual group members. Intervention participant and moderator activities are described in more detail in Table 1. Control group participants received access to a limited version of the INSHAPE website, which excluded self-monitoring, and received e-mails throughout the study with links to the same news stories related to physical activity that were provided to the Facebook group.

Study Measures

Participants completed self-report study measures by online survey. Perceived social support for physical activity was measured using an adapted version of the positive subscales (informational, esteem, and companionship) from Chogahara's Social Influence on Physical Activity questionnaire modified to explicitly include support experienced through online forms of communication.^{27,28} Physical activity was measured using a version of the Paffenbarger activity questionnaire adapted for online use.²⁹

The Facebook Intensity Scale was used to measure participants' overall engagement in Facebook.³⁰ The study administrator recorded Facebook interactions manually during the intervention, including all comments and web links, discussion board posts, and instances where participants hit the "like" button in response to content. A post-intervention questionnaire was used to measure unobservable behavior in the Facebook group, such as visiting but not posting to the group, and intervention participants' attitudes toward the Facebook component of the intervention. INSHAPE website use for both groups was tracked using participants' unique login credentials.

Statistical Analysis

The study sample size was determined based on the primary outcome of perceived social support using an effect size ($d=0.70$) smaller than those observed in some previous studies with minimal intervention controls.^{31,32} It was estimated that 110 participants were necessary to give 80% power to detect a significant difference between groups assuming 20% attrition and $\alpha=0.05$. Using intention-to-treat analysis, differences in perceived social support and physical activity were assessed with linear mixed models including group, time, and group X time interaction as factors and a random intercept to account for missing data. Differences on baseline characteristics were examined using Fisher's Exact Test and independent *t*-tests. All data analysis was performed using SPSS 19.

Results

No differences were found at baseline between groups with the exception of the Facebook Intensity Scale, $t(132) = -2.03$, $p=0.04$, where those in the control group showed higher scores than those in the intervention group. Participants were predominately white (73%), non-Hispanic (92%), and had parents who had attained college or higher-level education

(79%). Attrition was different between the intervention group (16%, $n=11$) and the control group (4%, $n=3$) at 12 weeks ($p=0.02$). The only difference between the baseline characteristics of participants who completed all study measures versus those who did not was Facebook Intensity, with completers having a higher score than noncompleters, $t(132)=-2.43$, $p=0.02$.

Sixty-four intervention group participants (96%) accepted the Facebook group invitation. Intervention participants logged into the INSHAPE website on average approximately every 2 weeks during the intervention versus twice over the course of the intervention among controls (584 total logins). Intervention participants who posted more than once ($n=37$) had on average 8.0 Facebook interactions during the intervention and there were 60 moderator posts. Of participant interactions, 81 (32%) were to the discussion board and 130 (50%) were posts or responses to the group wall. Both website logins and Facebook activity declined during the intervention. More than half (63%) of intervention participants who completed the post-study survey ($n=56$) reported visiting the Facebook group at least 2–3 times per month. Overall, two thirds (66%) of these survey respondents indicated that they would recommend the program to their friends.

Means and tests of significance for main effects and interactions related to changes in perceived social support and physical activity are included in Table 2. Two cases exhibited extreme total physical activity values exceeding 12,000 kcals per week and were excluded from the analysis for all physical activity outcomes. Comparison of analyses of physical activity outcomes with and without these cases did not reveal any differences. There were no group X time interactions for perceived social support or physical activity. There were main effects of time for physical activity and esteem and companionship social support, as these variables increased over the course of the intervention. Conversely, there was no main effect for informational support.

Additional linear mixed models did not identify any modifying effects of baseline social support values on social support changes or baseline Facebook intensity values on social support or physical activity changes between groups. A within-intervention group analysis also did not reveal an effect on these variables based on contributing more than once to the Facebook group.

Discussion

Although this study did not find increases in perceived social support or physical activity over time between groups, participant satisfaction with and use of the Facebook group suggest that online social networks are a feasible platform for intervention delivery among young adults. Participation rates in the Facebook-based online social support component of this intervention were higher than those documented in some previous studies with other online support mechanisms, which have averaged close to one post per participant.^{10–12} This finding suggests that studies including participants with high baseline Facebook use that actively promote online social network interaction may be more successful in encouraging the exchange of online social support.³³

Other randomized trials using online peer-to-peer mechanisms have reported increases in various types of social support.^{4,13,34} The failure of this study to detect increases in social support related to participation in the Facebook group may be explained by relatively low amounts of social support from Facebook interaction versus that which occurred offline naturally in both groups as a result of being enrolled in a physical activity intervention. The current findings related to physical activity are similar to several other studies comparing

social support conditions that have found changes over time but not between groups over time.^{6,12,16}

The main effects in the current study could be the result of baseline measures taken during a less-favorable time period for participating in outdoor activities than post-intervention measures, demand characteristics, measurement reactivity, or the inherent motivation of study participants to increase their physical activity. The greater attrition in the intervention group may be the result of some participants being discouraged by the act of self-monitoring. Future iterations of this research might effectively employ application technology that would enroll individuals and provide them automated prompts and tools to include a subset of their existing friends as study participants, which was found in some previous studies to increase effectiveness.³⁵ It might also be beneficial to match participants on physical activity–related criteria such as physical activity preferences to encourage group participation.

Limitations of this study include the use of a self-report physical activity measure. The current study design did not allow for the assessment of the effects of Facebook use separate from self-monitoring. Including men and broadening the demographic characteristics of participants would improve the generalizability of the current findings. Some measures of participation, such as viewing but not contributing to the group, could be assessed only by self-report. To more accurately assess participation in future studies using commercial online social networks, additional objective data-collection measures should be pursued. Although this study was adequately powered based on studies observing minimal social support changes among controls, future studies could benefit from larger sample sizes capable of detecting smaller relative changes for both social support and physical activity outcomes.

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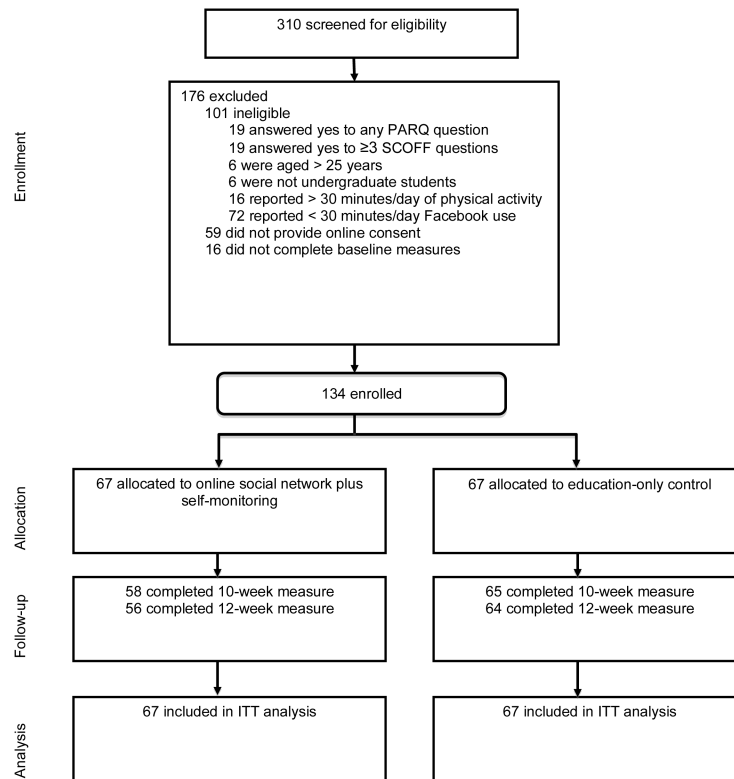


Figure 1. CONSORT diagram showing flow of participants through trial
^a Some participants were ineligible for multiple reasons, so total does not sum to 101.

Table 1

Participant and moderator activities for the online social networking plus self-monitoring group

Intervention component	Participant/moderator activities
INSHAPE website	Participant activities: <ul style="list-style-type: none"> • Self-monitoring (daily) • Review study expectations and procedures (at the beginning and as needed) • Review physical activity–related content (at the beginning and as needed) <ul style="list-style-type: none"> Exercise safety Exercise recommendations Exercise benefits Aerobic, strengthening, and flexibility exercises Exercise barriers
E-mail (Facebook messaging and traditional e-mail)	Moderator activities: <ul style="list-style-type: none"> • Communicate Facebook group policies (beginning and midpoint of intervention) • Notify participants of new discussion question posts (weekly) • Notify participants of aggregate exercise posts (weekly) • Announce drawing winner (biweekly) • Send Facebook group activities reminder (biweekly) • Respond to participant questions (as needed)
Facebook group	Participant activities: <ul style="list-style-type: none"> • Post answers to icebreaker questions on the Facebook discussion board (beginning of the intervention) • Connect with other participants to exercise on the Facebook wall and in Facebook discussion boards dedicated to specific exercises (ongoing) • Share their goals, progress, and setbacks related to exercise (ongoing) • Provide messages of support to other participants (ongoing) • Share relevant information about exercise • Post pictures and videos related to exercise Moderator activities: <ul style="list-style-type: none"> • Post exercise totals (weekly, Weeks 2–12) • Post drawing winner (bi-weekly, Weeks 5–12) • Post discussion question (Weeks 3,4,5,7,8,10) • Post exercise-related articles (weekly) • Respond to participant questions and technical issues (as needed)
Individual Facebook wall	Participant activities: <ul style="list-style-type: none"> • Share their goals, progress, and setbacks related to exercise (ongoing)

INSHAPE, Internet Support for Healthy Associations Promoting Exercise

Table 2

Means and intervention effects on perceived social support and physical activity

Dependent variable	Treatment group	Baseline M (SD)	Post-study survey M (SD)	Group time interaction effect	Time effect
Informational support	Control	1.79 (0.77)	1.85 (0.73)		
	Intervention	1.74 (0.90)	1.92 (0.86)	F(1,123.23) = 0.48, p=0.49	F(1,123.23) = 2.27, p=0.13
Esteem support	Control	1.84 (0.70)	2.27 (0.89)		
	Intervention	1.85 (0.87)	2.19 (0.94)	F(1,127.62) = 0.34, p=0.56	F(1,127.62) = 19.87, p<0.000
Companionship support	Control	2.10 (0.90)	2.55 (1.12)		
	Intervention	2.25 (0.99)	2.49 (0.99)	F(1,127.28) = 1.57, p=0.21	F(1,127.28) = 12.13, p<0.00
Physical activity (total kcal)	Control	1706.23 (1315.44)	2248.98 (1541.19)		
	Intervention	1646.39 (973.68)	2394.75 (1448.00)	F(1,127.75) = 0.42, p=0.52	F(1,127.75) = 23.59, p<0.000
Physical activity (heavy kcal)	Control	155.97 (347.70)	378.23 (731.36)		
	Intervention	151.79 (333.57)	298.21 (575.32)	F(1,129.58) = 0.35, p=0.55	F(1,129.58) = 9.19, p=0.003
Physical activity (moderate kcal)	Control	166.69 (343.15)	272.78 (604.52)		
	Intervention	81.03 (215.81)	253.79 (646.08)	F(1,128.75) = 0.26, p=0.61	F(1,128.75) = 6.80, p=0.01
Physical activity (light kcal)	Control	25.89 (72.60)	61.69 (134.95)		
	Intervention	76.79 (177.79)	81.25 (182.55)	F(1,128.84) = 0.69, p=0.41	F(1,128.84) = 2.54, p=0.11