Public Posting as a Strategy to Increase Walking: A Worksite Intervention

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Abstract

Because most American adults do not meet recommended physical activity guidelines, the need for new and innovative strategies is apparent. The current study employed public posting in an attempt to increase walking behavior in a worksite setting. Pedometer generated data was publicly posted in a prominent location in the worksite. In our study that utilized a pre-experimental design, we found that walking steps were statistically higher during the intervention and in a post intervention period as compared to the baseline data. We conclude that the public posting of physical activity data has the potential to increase walking behavior.

Keywords: public posting, walking, worksite, Nevada health

Introduction

The importance of physical activity as a health behavior is evidenced by the United States government sanctioning the publication of the Surgeon General's Report on Physical Activity and Health (SGRPAH) in 1996 (US Department of Health and Human Services, 1996). Despite the dissemination of the SGRPAH and other publicized reports on the physical and psychological benefits associated with participation in regular physical activity (LaCroix, Leville, Hecht, Grothaus & Wagner, 1996; Powell, Casperson, Koplan & Ford, 1989), little progress has been made in the effort to increase the physical activity levels of Americans (USDHHS, 1999). Another benefit of physical activity that is of great importance is its potential to reduce or prevent obesity, which has recently been identified as an epidemic (Centers for Disease Control and Prevention, 2004).

Although many Americans are aware of the health-related benefits associated with physical activity (Morrow, Krzewenski, Jackson, Bungum & FitzGerald, 2004), most do not exercise sufficiently to meet suggested guidelines of 30 minutes of brisk walking on all or most days of the week. The recommendation for 30 minutes of physical activity on most, and preferably all days of the week, is based on epidemiological evidence that demonstrates that modest amounts of physical activity produce health benefits (Pate et al., 1995). During 1997 only 15 percent of adults performed the recommended amount of physical activity, and 40 percent of adults engaged in no leisure-time physical activity according to the Healthy People 2010 document. Specific benefits of regular physical activity include reductions in the risk of developing or dying from some of the leading causes of illness and death in the United States such as obesity, heart disease, diabetes, high blood pressure, colon cancer, depression, and anxiety (Powell et al., 1996). Accordingly, physical activity is one of the leading health indicators highlighted in the Healthy People 2010 document. While many people intend to increase their physical activity most do not succeed in sustaining a long term exercise regimen (Dishman, 2001). Because physical activity an important component of a healthy lifestyle, it is clear that innovative strategies to increase physical activity are needed. One strategy that has been used to enhance athletic performance and to improve performance of health behaviors is the public posting of performance or behavioral data. Performance data is typically posted in readily viewable

places such as on bulletin boards or gymnasium walls. This tactic is low-cost and an easily implemented intervention strategy. For example Ward, Smith and Sharpe (1997) assessed the effectiveness of posting on task accomplishment during football practices and games. Their purpose was to determine the effects of public posting on the performance of two critical wide receiver skills, blocking and running a predetermined pass route. They used a daily performance chart that was placed on a locker room wall where all team members could see their, and other's performance ratings. Over the course of the study correctly performed blocks increased from 73% to approximately 90% (Ward et al., 1997).

Similarly, Galvan and Ward (1998) used public posting in an effort to reduce inappropriate on-court behaviors among tennis players. In that study the number of inappropriate behaviors were again publicly posted on bulletin boards in locker rooms that team members regularly checked for information about upcoming tournaments and practice schedules. Again, posting was found to be an effective method of reducing this unwanted behavior.

In a third study, public posting was used to enhance peer-mediated accountability among physical education students who practiced basketball skills. In this investigation students were asked to perform lay-ups as instructed by the teacher. Classmates judged the lay-ups by assessing critical elements such as taking off with the inside foot, shooting with the outside hand and extending the arm toward the basket. According to Ward and colleagues (1998), the proportion of correct performances were either maintained or improved during the period when basketball skills were evaluated.

A potential setting for using the posting strategy is the worksite. The worksite has been an alluring target for health promotion interventions as work-site exercise and health programs are seen as a strategy to maintain employee health and thereby increasing productivity while potentially holding down health insurance costs (Shephard, 1999). Therefore, the purpose of this study is to assess the effectiveness of increasing physical activity in the form of walking among employees of a large health district by publicly posting walking data.

Methods

Participants

Participants were employees of a large county health department located in the Southwestern United States. Potential participants were recruited via flyers, posters, an internal health district email message and word of mouth. Additionally flyers were posted in hallways throughout health district facilities inviting employees interested in a walking program to attend an informational meeting where they would receive a free lunch. All employees of the health district were eligible to participate. The criteria for participation was that one must have been 18 years of age or older, were willing to attend an organizational meeting, wear a pedometer, and to record their pedometer data for a period of seven weeks. All potential participants attended one of two orientation sessions held on the same day. A door prize drawing was used as an additional incentive to attract participants.

The orientations consisted of a 20-minute PowerPoint presentation that described physiological and psychological benefits of walking and the design of the program. Participants were told exactly what dates and where the posting of pedometer results would take place. Other program specifics such as beginning and ending dates, log sheets, pedometer education, walking safety, and walking tips such as avoiding the hottest parts of the day were provided. Each participant was given a folder with instructions that included a copy of the PowerPoint presentation, an informed consent form, handouts about heat safety and proper walking techniques and seven log sheets that spanned one week each. The principal investigator (R. E.) informed participants that they would receive a baseball cap at the conclusion of week three if they still participating in the program. Participants were also taught how to read, wear and reset the pedometer. Those who participated were informed that they could keep the pedometer at the conclusion of the study.

Additionally participants completed a registration sheet that included demographic characteristics such as age, race, and gender. Participants were also asked to complete a 10-item questionnaire that assessed physical activity related knowledge. Five multiple choice questions addressed appropriate modes of activity, number of times per week a person should exercise to produce health benefits, a definition of physical fitness, and a body fluid replacement question. Other items addressed the appropriateness of checking with physicians prior to exercising, frequency of exercise-related health emergencies, the importance of drinking fluids, stretching muscles, and sleeping as part of a well planned fitness program. These items were in true/false format. Participants also signed the letter of informed consent and provided a code name that would be used on the posted chart. The project was approved by the University of Nevada Las Vegas' Institutional Review Board.

This study design utilized a two-week baseline period during which participants wore the pedometers and reported their step counts to the principal investigator, this data was not posted. A subsequent three-week intervention period ensued where step counts were posted by the code names in a heavy traffic hallway, and finally a two-week period where data was again not posted. The program began during July and ended in September of 2002. Walking was the selected mode of exercise because it was simple and not overly intense. This selection is supported by research that shows that people of all ages and activity levels may improve their health and well being by becoming moderately active on a regular basis (Pate et al., 1995). Walking is also a mode of exercise that is most frequently cited by Americans in large epidemiological studies (Stephens, Jacobs & White, 1985).

As stated earlier accumulated steps for intervention weeks three, four and five were reported on the chart. Stickers served as placeholders to show each participant's accumulated steps. Inexpensive 10K brand pedometers were used to measure physical activity in this investigation. As cited by Wilde, Sidman and Corbin (2001), the pedometer can be a useful tool for monitoring the accumulation of physical activity. Tudor-Locke (2001) has demonstrated that under laboratory conditions, pedometers are accurate, but they may be less precise in free-living conditions because walking speeds vary and movements such as bending and weight shifting may be interpreted as steps. According to Tudor-Locke, testing the pedometers is recommended and involves walking a short distance wearing the pedometer and simultaneously counting the actual steps taken (Tudor-Locke, 2001). Although 10,000 steps is considered by some to be a reasonable goals for most people (Tudor-Locke & Bassett, 2004) participants were not told or encouraged to strive for any specific goal. To date, the only empirical study providing evidence of the usefulness of a 10,000-step count as an appropriate behavioral target is by Welk et al. (2000). In that study, no attempt was made to assess baseline activity levels of participants. According to Wilde et al. (2001), 10,000 steps per day has been a target reinforced in the literature, however, there is little compelling research to support it. During weeks one and two, an average for baseline steps was attained for all participants.

The principal investigator conducted tests prior to the study to measure pedometer accuracy. Results indicated an eight percent error rate for our analog pedometer when used in moderate activity. Specifically, 1,000 steps were counted while the pedometer showed 1,080 pedometer counts. Tests were repeated three times with different pedometers and it was these devices consistently over-counted by 8-10%. Based on this information, steps reported here are 9% less than those reported by participants.

A posttest containing the same 10 questions as the pretest was distributed to participants one week after completion of the program. Participants were not aware of the correct answers to the pretest, however, the principal investigator sent out weekly emails during the intervention that provided information that may have been useful in answering those same 10 questions at the posttest. Providing information

to the participants was not expected to increase physical activity because it is posited that knowledge is necessary but not sufficient to change behavior (Glanz, 1990).

Participant exercise bouts were unsupervised and pedometer measured steps self-reported on their log sheets. Most participants submitted their sheets to the principal investigator in person. Some sent results by email, others faxed results or sent them by inter-office mail. The principal investigator did not record the method of submittal. If log sheets were not received by Wednesday the principal investigator sent email reminders or dropped off copies of the sheets to those participants who did not have access to email.

Statistics

Descriptive statistics were used to describe the sample and walking data. Paired t-tests were utilized to assess differences in step counts from pre to intervention to post intervention. Alpha was set at .05/2 to test for significant differences.

Results

The sample numbered 46 and included 43 women (93.5%) and three men (6.5%). The small number of male participants is reflective of past program participation at the Clark County Health District, and the sex breakdown of employees at that workplace. According to the registration forms submitted by participants, the range for participants was between 19 and 65 years. The mean age was 43.3 (SD=11.2) years. Most of the participants (36/45 or 80%) were white, 6.5% were African American, 6.5% were Asian or Pacific Islander, 4% were Hispanic American, and 2% were American Indian.

The mean of the daily steps during the baseline period was 8879.7 (SD=3819.8) as shown in Table 1. During the intervention period that involved the public posting of pedometer steps for weeks 3, 4, and 5, the mean daily steps was 9837.1 (SD=3880.9). For the two-week post intervention phase, the mean number of daily steps was 10251.8 (SD=4353.6). The difference between the baseline steps and those taken during the intervention period was significant (t=2.57, p=.014). Weekly steps were also significantly different between the baseline and post intervention steps (t=2.33, p=.025). The intervention steps and post intervention steps did not differ (t=.356, p=.723). A graphic description of weekly steps is presented in Figure 1.

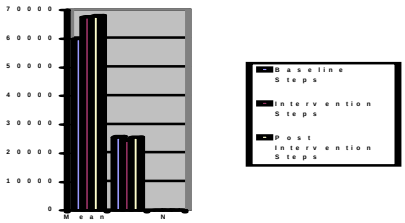

Figure 1
Average weekly steps taken during the pre-intervention, intervention and post-intervention periods

There were 41 participants who took the pre and post tests, involving the same ten questions. For the pretest, 41 participants had a mean of 83.17% items correct. The mean for the posttest was 85.37% of items correct. This difference was not significantly (t=1.244, p=.221) and not unexpected because there was very little room for scores to improve. This ceiling effect made it very unlikely that significant differences would be encountered.

Discussion

The most interesting finding of the study is that a simple intervention such as the public posting pedometer resulted an increase the number of steps taken by a sample of employees. Thus, the present study provides preliminary evidence that publicly posting exercise data may increase physical activity. This is important because the current guidelines are such that people do not need to do especially vigorous exercise to meet them (Pate et al., 1995). By simply posting pedometer data, employees were able to increase their physical activity significantly, as measured by steps. As stated earlier, no definitive criteria are available to determine how much activity is needed. A goal of 10,000 steps is a reasonable amount to walk, and there is emerging documentation of the health benefits at this level (Tudor-Locke & Bassett, 2003). Our results show that 15/44 or 34.1% of participants met this guideline at baseline, 17/41 (41.4%) in the intervention period and 22/42 (52.4%) in the post period. This data suggests that we had a typical group as 8800 steps per day is thought to be "somewhat active" for American adults (Tudor–Locke & Bassett, 2004).While evidence is emerging that a goal of 10,000 steps per day is a reasonable amount to walk and there is emerging data to suggest that health benefits accrue at this level (Tudor-Locke & Bassett, 2004). We must also entertain the possibility that the pedometer itself produced an effect as it has been shown to be a motivating factor in addition to an effective measurement tool of physical activity (Tudor-Locke & Myers, 2001). Thus potential Hawthorne effect cannot be ruled out because our study design did not include a control group. However, because the number of steps did increase when data was posted we have some reason to believe that the posting may have been an effect. This is important because most Americans are not sufficiently physically active to produce health benefits (US DHHS, 1999).

As with every study there are limitations. This was a fairly active group before the intervention as the weekly mean of steps was 59909.8 during the baseline step phase, indicating an average of 8879 daily steps per participant. At the time of the pre intervention steps 15 of 43 or 35% were already averaging more than 10,000 steps per day a rate that has been described as appropriate for producing health (Tudor-Locke & Bassett, 2004). Thus, some participants were already meeting exercise guidelines as defined by the Surgeon General.

The pre-experimental design exposed the findings to numerous threats to internal validity. At a minimum, history, regression towards the mean and attrition are not accounted for in the current study. This intervention needs to be tested on larger populations using a true experimental design and in other settings and with a random sample, if possible. Limitations existed in this study because the principal investigator used a small, fairly physically active convenience sample. Also, the timing of this project was during the summer months when it is more difficult to exercise in a hot arid climate.

Because eight participants had missing data (missing one or more weeks during the study), step count data were analyzed using only 33 participants. These participants were tracked for baseline steps for weeks one and two, then for intervention steps involving public posting for weeks three, four, and five, and finally for post intervention steps for weeks six and seven.

The lack of differences in changes in knowledge was not unexpected because there was little room to improve scores. This ceiling effect made it unlikely that we would observe a significant improvement. This finding that people were reasonably knowledgeable in regards to physical activity was also to be expected as studies have shown that knowledge

of benefits of exercise is common (Dergance et al., 2003) as well as how to exercise (Morrow et al., 2004).

This study demonstrated that a simple and inexpensive device may be used to increase physical activity in the form of walking. Studies that employ more rigorous research designs, such as experiments, will need to be completed before the effectiveness of public posting on walking behavior can be definitively assessed.

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