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Feasibility and acceptability of using pedometers as an intervention tool for Latin

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Abstract

Background—Due to high rates of inactivity and related chronic illnesses among Latinas,[1] the current study examined the feasibility and acceptability of using pedometers as an intervention tool in this underserved population.

Methods—Data were taken from a larger randomized, controlled trial[2] and focused on the subsample of participants (N=43) who were randomly assigned to receive a physical activity intervention with pedometers and instructions to log pedometer use daily and mail completed logs back to the research center each month for six months.

Results—Retention (90.7% at six months) and adherence to the pedometer protocol (68.89% returned ≥ 5 of the 6 monthly pedometer logs) were high. Overall, participants reported increased physical activity at six months and credited pedometer use for helping them achieve these gains (75.7%). Participants who completed a high proportion (5/6) of pedometer logs reported significantly greater increases in physical activity and related process variables (stages of change, self-efficacy, behavioral processes of change, social support from friends) than those who were less adherent (completed > 5 pedometer logs).

Conclusions—Pedometers constitute a low-cost, useful tool for encouraging self-monitoring of physical activity behavior in this at-risk group.

Introduction

Latinas report significantly higher rates of physical inactivity (51.3% versus 31.7%) and related, preventable chronic conditions, including overweight and obesity (74.4% versus 57.4%), and diabetes (15.7% versus 8.8%), than Non-Hispanic White women.[1, 3] These health disparities call for effective physical activity interventions for Latinas. Self monitoring is a key component of most physical activity interventions and strongly supported by theory.[4]

Subsumed under the Social Cognitive Theory concept of self-regulation, self monitoring involves systematically observing one's physical activity behavior. This objective feedback on physical activity performance can then be reviewed to determine how activity levels might be improved, identify incremental and long-term physical activity goals, establish

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rewards for meeting activity goals, and enlist support from family and friends.[4] Self monitoring of physical activity is frequently accomplished using pedometers. These relatively small, low-cost devices record the individual's number of steps and have become widely adopted intervention tools.[5] In fact, findings from a systematic review of 26 studies using pedometers to improve physical activity and health (N=2767 participants; 8 randomized controlled trials and 18 observational studies) indicated that pedometer users increased their physical activity by 26.9% from baseline levels.[5]

Unfortunately, underserved populations have not been well-represented in the research conducted thus far in this area, with the exception of a few small pilot studies using pedometers to promote physical activity among African American women[6–8] and low income mothers.[9] Results from these studies indicated high adherence (85% of weekly pedometer logs completed over a six month program)[6], retention (92% after eight-week intervention)[7], and acceptability of pedometer use.[8] For example, pedometers were endorsed as a key motivating factor in a sample of 43 postmenopausal African American women.[8] Furthermore, an eight-week pedometer program produced significantly greater increases in physical activity participation among low-income overweight/obese mothers of young children (n=93), relative to a comparison group (n=31).[9]

The current study extends this research to another underserved group of women, Latinas, and fills an important gap in the research literature. Pedometer-based studies in this community are lacking despite well-known physical activity-related health disparities.

Therefore, specific aims of this research included assessing the feasibility and acceptability of using pedometers as a physical activity intervention tool for Latinas. Data were taken from a larger randomized controlled trial[2] examining the efficacy of a six-month, theory-based (Social Cognitive Theory,[10] Transtheoretical Model)[11] physical activity intervention for Latinas. The current study focuses on previously unexplored data from the subsample of women who were randomly assigned to receive the physical activity intervention with pedometers, with hypotheses that that these Latina participants would report wearing the pedometers frequently over the six month period, rate the pedometer experience favorably on consumer satisfaction questionnaires, and demonstrate good adherence (by completing pedometer logs). Furthermore, we anticipated that participants who demonstrated high levels of adherence to the self-monitoring protocol would report greater increases in physical activity and related process variables (stages and processes of change, self-efficacy, social support; Social Cognitive Theory and Transtheoretical Model constructs which often serve as early indicators of behavior change) from baseline to six months, compared to those who were less adherent.

Method

Design

Data were taken from a larger randomized controlled trial (Seamos Activas, NCT00724165, N=93) testing the efficacy of a six-month culturally and linguistically adapted, individually-tailored, print-based physical activity intervention for Latinas.[2] The current study focused on assessing the feasibility and acceptability of using pedometers in this underserved population with the subsample of participants who were randomly assigned to the intervention arm and received pedometers as part of their participation in the program (n=43). The protocol was approved by the institutional review board of Brown University and written informed consent was obtained from participants.

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Participants

Participants were Spanish-speaking women between 18–65 years old who self-identified as Latina/Hispanic and underactive (i.e., engaging in less than two days of moderate or vigorous physical activity for 30 minutes or less each day). Participants were recruited through community-based organizations and Spanish-language newspapers and radio stations.

Exclusion criteria included any serious medical condition that would make physical activity unsafe (history of heart disease, diabetes, stroke, orthopedic problems), hospitalization due to a psychiatric disorder in the past three years, taking medication that may impair physical activity tolerance or performance (e.g., beta blockers), a body mass index (BMI) above 40 kg/m2, or current pregnancy or intent to become pregnant

Procedure

Participants completed a telephone screening interview to establish initial eligibility and an orientation session to learn more about the study. Next, baseline assessments were conducted, including psychosocial measures, and 7-Day Physical Activity Recall interviews.[12, 13] Height and weight were measured by research staff using a digital Health-o-Meter medical scale that measured body weight to the quarter pound and a stadiometer to measure height to the quarter inch. All participants in the current study were randomly assigned to the intervention group and received Accusplit AE120XL-xBX pedometers. This model has previously demonstrated high average interclass correlation (.97)[14] with the Yamax SW-200, which has been shown to be valid and accurate in several studies[15–17] with other objective measures of physical activity (i.e., accelerometry).[18, 19] Participants were encouraged to wear the pedometers on their waist during waking hours for six months, except when showering, bathing, or swimming. The women were also given six monthly pedometer logs with instructions to log their pedometer use daily (e.g., “Did you wear your pedometer today? Circle yes or no”) and mail the completed logs back to the research center each month for six months. Postage-paid envelopes were provided, along with an incentive ($10 gift card) for each completed log mailed back to the center.

During this six month period, the participants received a packet of psychosocial questionnaires in the mail each month, then mailed the completed questionnaires back to the research center in postage paid envelopes, and in return received six monthly mailings of physical activity self-help print materials that were individually tailored to their intervention needs based upon these questionnaire responses. Please see Pekmezi et al. 2009 for further detail on the home-based individually tailored physical activity print intervention.[2] At six months, participants returned to complete the 7-Day Physical Activity Recall Interview and psychosocial measures again, along with a consumer satisfaction questionnaire. Study sessions, questionnaires, and interviews were provided in Spanish.

Measures

At baseline, demographic information and measurements (height, weight) were taken. Physical activity was assessed pre- and post-intervention with the 7-Day Physical Activity Recall (PAR), an interviewer-administered instrument that provides an estimate of weekly minutes of physical activity.[12, 13] This measure has consistently demonstrated acceptable reliability, internal consistency, and congruent validity with other more objective measures of activity levels[20–23] (in past studies with Latinos)[24] as well as sensitivity to changes in moderate intensity physical activity over time.[25, 26] Depression and social support were also measured at baseline and six months, using the Center for Epidemiological Studies Depression Scale[27] (alpha=0.76 in the current study) and a social support for physical

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activity questionnaire[28] with 14 items and 3 subscales for family, friends, and rewards and punishments (alphas in the current study= 0.95, 0.89, 0.86, respectively).

Psychosocial factors, such as self-efficacy and stages and processes of change, were measured pre- and post-intervention at the research center and on a monthly basis via mail to inform the tailoring of the intervention. Self-efficacy, or confidence in one's ability to persist with exercising despite barriers was measured with a 5-item instrument.[29] Internal consistency (alpha = .67 in the current study) and test–retest reliability over a two-week period (0.90) were high. Motivational readiness for physical activity behavior change was assessed with a four item measure that has shown reliability (Kappa = 0.78; intra-class correlation r = 0.84) and concurrent validity with measures of self-efficacy and physical activity.[29] Processes of change describe cognitive and behavioral strategies used to increase motivational readiness for behavior change and were assessed by a 40-item measure[30] with ten sub-scales (average alpha was .795 in the current study).

At 6 months, the feasibility and acceptability of using pedometers as an intervention tool to promote physical activity in this underserved target population was evaluated with an adapted, 19-item version of the consumer satisfaction questionnaire that Marcus and colleagues have used in previous trials.[31]

Analyses

Data were collected in 2007–2008 and analyzed in 2010–2011 using SPSS version 14.0 for Windows and SAS 9.2. Analysis included a subsample of 43 participants from a larger trial who were randomly assigned to receive a physical activity intervention with pedometers and instructions to log pedometer use daily. Two women did not return any pedometer logs back to the research center and thus were included in the adherence rate but excluded from further analyses. Retention for the current study was calculated by dividing the number of participants who completed the post-intervention (six month) physical activity assessment by the number of participants enrolled.

Sample characteristics including baseline demographics, height, weight, and physical activity were summarized, using means (standard deviations) for continuous variables and percentages for categorical variables. Similarly, we summarized feasibility and acceptability data from pedometer logs and consumer satisfaction questionnaires. As the intervention advocated self-directed goal setting and did not require a defined amount of daily steps, adherence was measured by the number of pedometer logs submitted. Perfect adherence at the individual level was defined as 6 monthly logs completed and returned, however we considered participants adherent if they returned at least 5 of the monthly pedometer logs as this criteria served as a good indicator of the feasibility and acceptability of this protocol without being overly stringent. Two-sample t-tests were conducted to assess whether there were differences in changes in physical activity and psychosocial characteristics from baseline to 6 months between those who were adherent (returned at least 5 pedometer logs) and those who were not (returned fewer than 5 logs). In addition, using chi-square analyses, we assessed whether the proportion of participants who reported increases in motivational readiness for physical activity from baseline to 6 months was different for those classified as adherent vs. non-adherent.

Results

Demographics

Baseline characteristics of participants are summarized in Table 1. Overall, the sample was comprised of predominantly overweight (M BMI=28.98 kg/m2, SD=4.71), underactive (M= 17.33 minutes/week of moderate intensity physical activity, SD=26.10) Latina women with

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low income and acculturation. Most participants reported an annual household income of $30,000 or less (80.95%), were born outside the U.S. (93%), and spoke Spanish/more Spanish than English at home (90.70%). Commonly reported countries of origin were Colombia (37.21%), Dominican Republic (25.58%), Guatemala (9.30%), and Puerto Rico (9.30%). The mean age of the sample was 41.60 (SD=11.53).

Feasibility and acceptability of pedometers as an intervention tool for Latinas

The majority of participants (68.89%, or 31 out of 45) were considered to be adherent, returning at least 5 of the 6 monthly pedometer logs required by the protocol. Only two participants returned no logs. According to returned logs, participants wore their pedometers an average of 14 days per month. Figure 1 shows days/month of pedometer use over the six-month study period.

90.7% retention (n=39) was achieved at the post-intervention assessment session. Amongst participants (N=37) who completed post-intervention consumer satisfaction questionnaires, 89.2% (n=33) reported wearing a pedometer and most of these women endorsed wearing the pedometer “often” (59.5%, n=22). The pedometer logs were also rated favorably and described as “easy to use” by 91.9% of participants (n=34). When asked about problems encountered during pedometer use, only two participants reported any problems. One woman lost her device and another found wearing the pedometer with loose clothing a challenge.

Changes in physical activity and related psychosocial characteristics

Overall, the women reported increasing their physical activity from 17.33 minutes/week (SD=26.10) on average at baseline to 154.12 minutes/week (SD=245.04) at six months (p=0.001; primarily through brisk walking, based on qualitative data from the 7-Day Physical Activity Recall interviews) and described pedometer use as “helpful” (75.7%, n=28) in this process. Results indicated significant differences in changes in physical activity between those who completed a high proportion of pedometer logs vs. those who completed a low proportion of logs. Specifically, participants who returned at least 5 of the 6 pedometer logs over the study period reported greater increases in physical activity from baseline to six months (M=165.30 minutes/week, SD=281.50), relative to those who returned less than 5 logs (M=54.21 minutes/week, SD=83.66, t=-2.01, p=0.05).

Similar trends were seen in the psychosocial constructs related to physical activity. For example, there were significantly greater changes in self-efficacy for physical activity (M=0.51, SD=1.10 vs. M=0.09, SD=0.59, t=2.36, p=0.02), social support for physical activity from friends (M=5.77, SD=15.95 vs. M=-3.07, SD=11.50; t=2.11, p=0.04), and behavioral processes of change (M= 0.91, SD=0.85 vs. M=0.39, SD=0.65, t=2.23, p=0.03) for those who were adherent vs. not-adherent. Furthermore, significantly more participants who returned at least 5 logs reported increases in motivational readiness for physical activity from baseline to 6 months compared to those who returned less than 5 logs (87.10% vs. 28.57%, respectively; chi-squared=15.41, p<.001). There were no significant differences between adherers and non-adherers with respect to changes in cognitive processes of change, depression, or the social support measure subscales related to family and rewards and punishments (p’s>0.05).

Discussion

Findings from the current study support the feasibility and acceptability of using pedometers as an intervention tool for promoting physical activity in Latinas. Overall, the Latina participants rated the wearability and ease of use of the pedometers favorably. Retention

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(90.7% at six months) and adherence to maintaining the pedometer logs were high (68.89% returned at least 5 of the 6 monthly pedometer logs). In fact, several participants (n=3) were so diligent and conscientious about returning the completed monthly pedometer logs that they even returned logs when only zeros were recorded, indicating no activity or pedometer use. While high retention and adherence in the current study may have been due to incentives, such rates are consistent with findings from past studies in other populations. For example, a review of 26 pedometer-based studies[5] found perfect (100%) retention reported in nine studies, with an average attrition rate of 20% for the rest of the studies. The mean rate of adherence to keeping pedometer logs was 83% (SD=20%) among the five studies in this review which reported such data.

Moreover, in the current study, most of the sample went from sedentary at baseline to meeting national physical activity guidelines by six months and credited pedometer use for helping them achieve these gains. Data indicating significantly greater increases in physical activity and related process variables (motivational readiness for physical activity, behavioral processes of change, self-efficacy, social support from friends) for participants who completed a high proportion of the pedometer logs vs. those who were less adherent support such claims. These results corroborate findings from pedometer-based studies previously conducted with low income and/or minority women and extend this research to a new underserved population (Latinas).[6–9] However, as these data are taken from a small subsample of participants, more research with larger samples will need to occur before definitive conclusions can be drawn.

Limitations of the current study include the inability to tease out whether benefits were derived from simply wearing the pedometer or from maintaining a log (or a combination of the two). Past research appears to support the latter. In the previously discussed review of pedometer-based interventions,[5] participants in the studies that required a pedometer log significantly increased their activity from baseline, unlike those who were not required to maintain a pedometer log. This review [5] also found that having a specific goal was a predictor of increased physical activity. Pedometer users who were given a goal (10000 steps/day or other) significantly increased their physical activity over baseline, unlike those not given a goal. The current study did not include a step goal or require participants to log their daily step counts as the intervention goal was focused on meeting national physical activity guidelines of at least 30 minutes of moderate intensity physical activity on most days of the week. However, results from a recently published Australian study indicate that underactive, overweight women undertook significantly more physical activity when given a 10,000 steps/day goal (using a pedometer) vs. a 30 minutes of walking per day goal.[32] While increases in physical activity were achieved in the current study, future pedometer studies in this underserved target population should examine whether specific step-related goals would result in even better outcomes.

Also, researchers in this area should consider performing checks to ensure that pedometers are working properly (e.g., 20 step test), given the high rates of obesity in the Latino community and data suggesting that spring-levered pedometers (similar to the Accusplit model used in the current study) may be less accurate for obese participants.[33–35] While participants in the current study did not report concerns regarding pedometer accuracy when queried about such issues in open-ended consumer satisfaction questionnaire items and frequent contacts with research staff, a pedometer that is not functioning properly could affect participant compliance and motivation.

In sum, these findings have implications for physical activity interventions targeting Latina participants; specifically, pedometers can be a useful tool for encouraging self-monitoring of physical activity behavior in this at-risk group. Latinos are the largest, fastest growing

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minority group[36] in the U.S. and suffer disproportionately from inactivity-related chronic diseases.[1] Such low-cost strategies for promoting physical activity in this population have great potential for impacting public health and eliminating health disparities.

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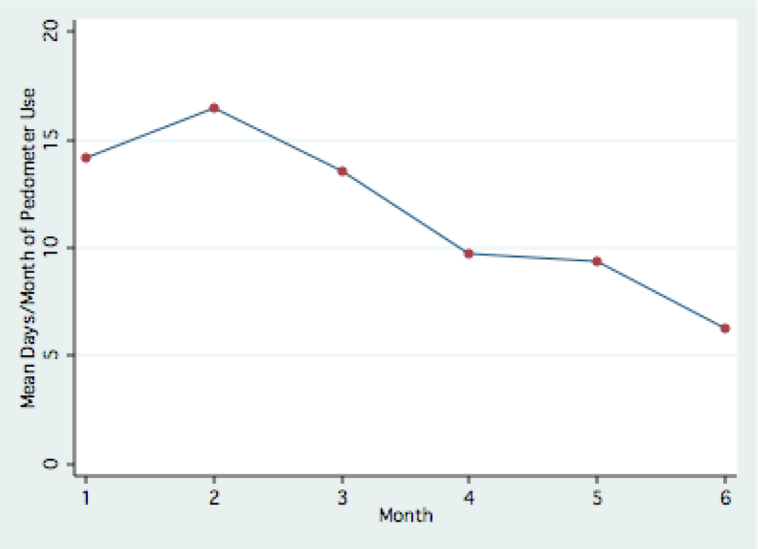

Figure 1.
Pedometer use over time

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Table 1

Participant Characteristics (N = 43)

	No. (%) or *M* (*SD*)
Age, years	41.60(11.53)
Education	
Less than 12 yrs school	34.90%
High School Graduate	9.30%
Vocational/Technical School	9.30%
At Least Some College	46.51%
Marital Status	
Married	39.50%
Separated or Divorced	19.60%
Living With Partner	11.6%
Never Married or Living with Partner	30.2%
Household income (% ≤ $30000/year)	80.95%
% with ≥1 young child (<5 years of age) in the household	34.9%
% with ≥1 older child (5–18 years of age) in the household	37.2%
Born outside the US	93.0%
Speak Spanish/more Spanish than English at home	90.70%
BMI (kg/m2)	28.98(4.71)
Baseline CES-D Score (>15 indicates depressed)	21.63(4.65)
Baseline Physical Activity (min/week)	17.33(26.10)