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# *PEDOMETERS AND BRIEF E-COUNSELING: INCREASING PHYSICAL ACTIVITY FOR OVERWEIGHT ADULTS*

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Physical inactivity has emerged as a public health epidemic and is associated with the rising obesity rate. A multiple-treatments reversal design was utilized to test whether pedometer-aided self-monitoring and brief e-counseling could help 3 overweight adults increase their physical activity. Dependent measures were taken for pedometer steps and weight. Two participants approximately doubled their daily step totals and lost a modest amount of weight by study end.

DESCRIPTORS: counseling, health, pedometer, physical activity, weight loss

Excess body weight is a risk factor for numerous chronic health conditions, and the prevalence of obesity has risen dramatically over the past 30 years (U.S. Department of Health and Human Services [USDHHS], 2001). Although multiple factors are linked to excess body weight, physical inactivity stands out as one of the most pressing contributors. A 1996 report from the USDHHS recommends that adults accumulate at least 30 min of moderate physical activity on most days of the week. The same report, however, also indicated that over 60% of adults do not get the recommended amount of activity and at least 25% are completely inactive.

Behavioral interventions have often proven helpful in promoting physical activity and increasing physical performance (Brobst & Ward, 2002; USDHHS, 1996; Ward & Carnes, 2002). Most studies to date, however, have focused on structured exercise. Although structured exercise is beneficial, adherence to such programs is notoriously poor, averaging around 50%. Many researchers now recommend a "lifestyle" approach whereby sedentary individuals are encouraged to build more physical activity into their daily routine and leisure time. Walking ranks among the most prevalent and beneficial forms of activity (USDHHS). Pedometers are waist-worn step counters that offer a practical means to promote walking by raising awareness and serving as an environmental prompt (Tudor-Locke, 2002; USDHHS). Several investigations have linked wearing a pedometer to increased activity as well as to other health improvements, including weight loss (Tudor-Locke).

With over 50% of U.S. households now in possession of at least one computer, interactive web technology may also enhance exercise interventions (Marcus, Nigg, Riebe, & Forsyth, 2000). The purpose of this experiment was to test whether pedometer-aided self-monitoring and brief e-counseling could help overweight adults increase their physical activity. Effects on weight loss were also examined.

Portions of this study were presented at the 2003 annual meeting of the Association for Behavior Analysis, San Francisco.

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## METHOD

Three overweight adults self-referred by phone to the experimenter for information

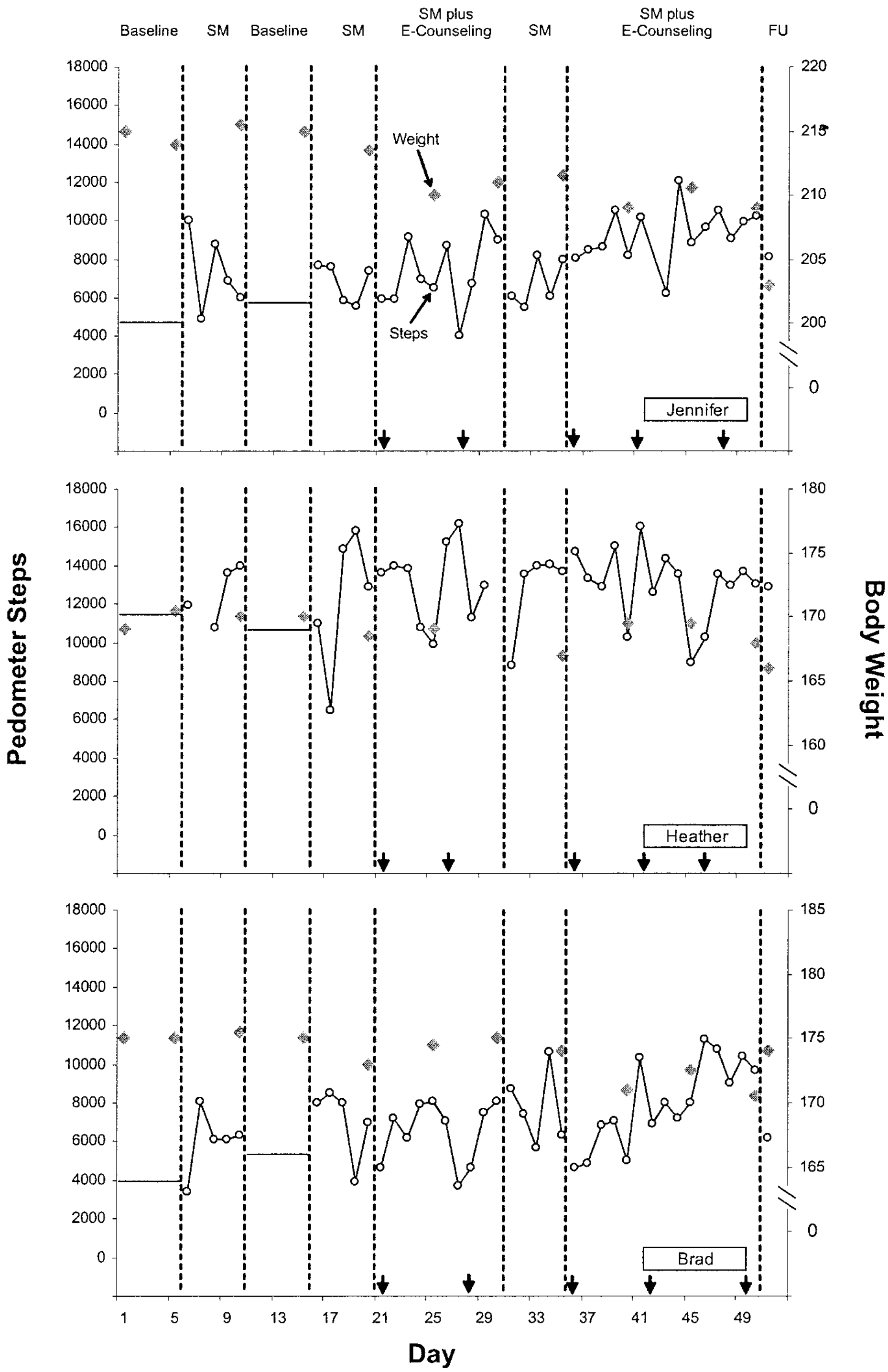


Figure 1. Pedometer steps (circles) and body weights (diamonds) for Jennifer, Heather, and Brad. The straight line representing step data during baseline phases indicates the calculated daily average. The arrows on the *x* axis of each graph indicate days on which a counseling session occurred.

on physical activity were recruited to participate in the study. Jennifer was a 32-year-old woman who weighed 215 lb. Heather was a 52-year-old woman who weighed 169 lb. Brad was a 48-year-old man who weighed 175 lb. To screen for medical contraindications, all participants completed the Physical Activity Readiness Questionnaire (Thomas, Reading, & Shephard, 1992). Data were collected under "free-living" conditions (e.g., work, home, leisure) on weekdays over a 10-week period.

Physical activity was operationally defined as any activity that resulted in a step recorded by the pedometer. Participants were given a Yamax Digi-Walker® Model SW-200 pedometer to wear. The Digi-Walker is considered the most valid and reliable unit available (Tudor-Locke, 2002). Participants were instructed to reset the pedometer each morning, wear it all day, and record their daily step total each night before bed. Weight was measured on the 1st day of baseline and every Friday thereafter using participants' home scales. Participants recorded their weight in the morning before breakfast. Step data were submitted to the experimenter periodically throughout the study (see below), and weight data were submitted at the study's end.

Participants were initially e-mailed a series of instructions regarding pedometer usage, setting up a basic Microsoft Excel® spreadsheet and graph, and a contact number to call with questions. Study phases included baseline, self-monitoring, self-monitoring plus e-counseling, and follow-up. During baseline, participants wore their pedometers blinded (i.e., sealed with a sticker) to prevent activity feedback. Participants removed the sticker at the end of the week and divided their step total by five to record a daily average for that week. During self-monitoring, participants wore their pedometers unsealed and recorded daily step totals each night on the spreadsheet. The self-monitoring plus e-counseling phase added a basic counseling component (step review, weekly goal setting, and praise; details available from author) that included one scheduled e-mail conversation (about 10 min) per week with the experimenter. Participants attached their updated pedometer graph to the initial e-mail contact of each counseling session. Follow-up was conducted on 1 day 6 months after the study's end. Participants wore their pedometers sealed to gauge physical activity maintenance without reactivity from pedometer feedback.

Interobserver agreement for pedometer steps (23% of days) and body weight (83% of days) was performed every Friday by an independent observer. Independent observers were members of the participants' households (e.g., husband, mother). The independent observer concurrently recorded each participant's step total and weight. A tolerance level of ±1 lb was used as the agreement criterion for weight data because of the difficulty in reading home scales without digital displays. Agreement for both pedometer steps and body weight was 100% across all checks. Independent observers also verified whether participants adhered to the blinding protocol by checking the sticker for evidence of tampering (e.g., cutting, adhesive mismatch, limited wear).

## RESULTS AND DISCUSSION

Results for physical activity and weight loss are shown in Figure 1. Jennifer and Brad had the lowest activity at baseline, averaging only 4,607 and 3,983 steps per day, respectively. Heather was the most active at baseline, averaging 11,444 steps per day. All participants increased their steps during treatment phases, with Jennifer and Brad roughly doubling their step counts by study end. Jennifer and Heather were able to maintain high levels of activity at follow-up, whereas Brad regressed toward baseline. Baseline phases (including reversal) clearly yielded the fewest steps for all participants, indicating a functional relation between self-monitoring and physical activity. During e-counseling phases, only Jennifer clearly improved at a rate greater than self-monitoring alone.

Jennifer and Brad also saw the most improvement in regard to weight loss. Jennifer lost 6 lb (−2.8%) between baseline and the study's end and continued to lose weight (12 lb total) at follow-up. Brad lost about 5 lb (−2.9%) over the course of the study, but failed to maintain weight loss at follow-up. Heather's weight was relatively stable with a slight weight loss (3 lb) observed at follow-up. Consistent with other studies (USDHHS, 1996), the amount of weight loss was associated with the magnitude of physical activity improvement. Jennifer and Brad saw the sharpest increases in physical activity (+121% and +144%, respectively) and achieved the greatest weight loss. In contrast, Heather saw a comparatively small step increase (+14%) and negligible weight loss.

It is difficult to speculate on the health implications of increased steps given the brief nature of this study. Considering the affordability of pedometers (about $25) and the high prevalence of computers in U.S. households, such interventions could feasibly be conducted across large segments of the sedentary population and be sustained over longer periods of time. The use of e-mail was a convenient medium for professional contact, and adherence (i.e., recording steps, being available for appointments, attaching graphs) was high for all participants. Also, the intervention worked best for those who were the least active. Tudor-Locke (2002) suggested that roughly 4,000 steps per day correlated with the USDHHS guidelines for physical activity. All participants far exceeded this amount by the end of the study.

Limitations included the use of noncalibrated home scales and minimal control over potential confounding effects known to influence weight (e.g., diet, illness) and physical activity (e.g., weather, injuries). In addition, the involvement of family members in the collection of interobserver agreement data may have provided added opportunities for social reinforcement. Most notably, the blinding procedure limited conclusions regarding baseline stability because step totals had to be averaged. Future research should attempt to use direct observation whenever possible.

In the broader context, assessment remains a major weakness in physical activity research (Tudor-Locke, 2002). Investigators are often forced to choose between self-report surveys with questionable reliability and biological assays with enormous costs. Despite their limitations, pedometers may help bridge the gap between real-world practice and the rigors of behavior-analytic designs, especially in situations in which direct observation is problematic.

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