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# Acceptability and feasibility of a Fitbit physical activity monitor for endometrial cancer survivors☆

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## HIGHLIGHTS

- Fitbit physical activity monitors were well accepted in a socioculturally diverse sample of endometrial cancer survivors.
- There was no convergent validity between the Fitbit and the Godin Leisure Time Exercise Questionnaire.
- Both physical activity measures indicated insufficient physical activity to maintain health.

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## ABSTRACT

*Objective.* Endometrial cancer survivors are the least physically active of all cancer survivor groups and exhibit up to 70% obesity. While studies suggest lifestyle interventions result in improved health outcomes, recruitment and availability of these programs are limited. The purpose was to evaluate the acceptability and validity of the Fitbit Alta™ physical activity monitor (Fitbit) for socioculturally diverse endometrial cancer survivors.

*Methods.* Thirty endometrial cancer survivors were given wrist-worn Fitbits to wear for 30 days. Participants then returned the Fitbits, completed the Godin Leisure-Time Exercise Questionnaire (GLTEQ), Technology Acceptance Questionnaire, and answered qualitative prompts. Correlations between daily Fitbit step counts, demographic factors, body mass index (BMI), and GLTEQ Index, were analyzed using Stata 13.0. Concordance Correlation Coefficient using U statistics was used to examine convergent validity.

*Results.* Twenty-five participants completed the study. Mean age was 62 ± 9 years. Mean BMI was 32 ± 9 $kg \cdot m^{-2}$. Self-identified race/ethnicity was 36% Hispanic, 36% non-Hispanic white, 16% non-Hispanic black and 12% Asian. Participants wore the Fitbits a median of 93% of possible days. Median daily Fitbit step count was 5325 (IQR: 3761–8753). Mean Technology Acceptance score was 2.8 ± 0.5 out of 4.0. Younger (<65 years) and employed participants were more likely to achieve at least 6000 daily steps ($p < 0.05$). There was no correlation (CCC = 0.00, $p = 0.99$) between step count and GLTEQ Index. Most free responses reflected positive experiences.

*Conclusions.* The Fitbits were well accepted in this sample. Self-reported physical activity was not associated with steps recorded. The physical activity data indicate an insufficiently active population.



## 1. Introduction

Approximately 63,000 women will be diagnosed with endometrial cancer in the United States in 2018 [1], and the incidence is projected to increase by 50% by 2030 [2]. Although the 5-year survival rate is over 80% [1], endometrial cancer has a negative impact on physical function and quality of life, especially in obese survivors [3]. Endometrial cancer survivors have been reported to be the least physically

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active of all cancer survivors [4]. Targeted physical activity interventions in endometrial cancer survivors have demonstrated an improved health-related quality of life, physical function, self-efficacy, and body composition [5–7]. Previous studies of socioculturally diverse endometrial cancer survivors have demonstrated that physical activity interventions with centralized classes have acceptable adherence rates once the barriers to access are overcome [5].

Belt-worn Fitbit physical activity monitors have been commercially available since 2009 and their use has been reported for women during treatment for breast [8] ovarian [9], and mixed site cancer survivors [10]. These studies, conducted in predominately non-Hispanic white samples, found Fitbits to be an acceptable and feasible method for assessing physical activity in female cancer survivors. However, physical activity tracking with belt-worn pedometers has been reported to have difficulty of use and lack of acceptance in a socioculturally diverse population [5].

Wrist-worn physical activity monitors may be a valuable tool for tracking and/or increasing physical activity among endometrial cancer survivors. Because of differences in technology acceptance associated with age, race, and education [11], there may be differences in the acceptability and validity of Fitbits among socioculturally diverse endometrial cancer survivors. The purpose of this study was to evaluate the acceptability and convergent validity of Fitbit Alta™ activity monitors for socioculturally diverse endometrial cancer survivors.

## 2. Methods

### 2.1. Participants

Eligibility criteria included being an adult (ages 18–90 years) endometrial cancer survivor with no diagnosed signs of disease within the previous six months, an English speaker, and a patient of gynecologic oncologists at the Montefiore Einstein Cancer Center in the Bronx, NY. Participants were excluded if their Eastern Cooperative Oncology Group performance status was over two, so as to include only independent ambulatory participants.

### 2.2. Recruitment

After Institutional Review Board approval, eligible participants were identified by their attending gynecologic oncology physician. Eligible patients were approached by trained study personnel in the Montefiore Einstein Center for Cancer Care while waiting for their routine follow-up gynecologic oncologic appointments, or after visits were completed.

### 2.3. Data collection

After enrollment, participants completed a demographic questionnaire. They were then given a Fitbit Alta™ physical activity monitor (Fitbit), instructed on its use, and asked to wear it at all times for 30 days, excluding while bathing and sleeping. Participants were instructed that the device had been programmed to vibrate when they reached the daily goal of 6000 steps in any given day. They were also give an instructional pamphlet with images in case they needed a reminder on proper use. After one week, participants were called by a trained study coordinator to address any questions regarding use of the device.

At the end of 30 days, participants were called and asked to complete a scripted telephone interview. During that recorded phone call, participants answered several qualitative questions regarding their experience with the device. Participants were then instructed to ship their Fitbit back in a prepaid envelope along with two completed questionnaires: 1) Godin Leisure-Time Exercise Questionnaire [12], which asks three questions regarding the number of times per week they engage in mild, moderate and strenuous physical activity lasting >15 min, and 2) Technology Acceptance Questionnaire [13] which asks 13 questions regarding the participants perceived ability to use the Fitbit. Medical demographics such as height, weight, cancer stage and diagnosis date were accessed from medical records at Montefiore Medical Center.

### 2.4. Data analysis

*A priori* sample size determination was conducted based on the assumption from the previous literature, which reported an intraclass correlation (ICC) of 0.85 between the physical activity monitors [14]. Based on this assumption of ICC = 0.85, a random sample of 21 subjects when measured twice (Godin Leisure-Time Exercise Questionnaire Index and Fitbit) would produce a two-sided 95% confidence interval with a width of 0.269 using a two-way mixed effects model. Assuming a 30% dropout, the goal was to recruit 30 participants.

The qualitative data were coded and analyzed using thematic analysis according to the grounded theory framework described by Chapman et al. [15]. First, the audio recordings were transcribed verbatim and all identifying data were removed. The transcripts were then read independently by two of the study authors (AR and DM) to become familiar with the data. The authors then independently generated codes related to the data by briefly summarizing each line and paragraph of data. Based on the initial codes, the authors independently developed a list of preliminary emergent themes. The authors then discussed and refined the themes based on the independent coding processes. Each theme was exemplified by representative quotes. Lastly, the authors reread the transcripts to verify that the themes that had emerged accurately described the collected data.

Data from the technology acceptance questionnaire were reported as means and standard deviations (SD), and were triangulated with the qualitative data to evaluate the acceptability of the Fitbit. Correlation between step count data from the Fitbit, demographic indicators, BMI and were examined using Spearman's rank correlation coefficient. Association between categorical demographic variables and categorized step count variables were examined using chi-square test or Fisher's exact test. Continuous variables were tested using Student *t*-test. Convergent validity, which assesses the agreement of two different measure of the same constructs, was analyzed using concordance correlation coefficient (CCC) using U statistics [16], in order to determine whether the two physical activity measures, Godin Leisure-Time Exercise Questionnaire Index (subjective; seven-day recall) and the corresponding seven days of the Fitbit step count (objective), agreed. CCC is a specific intraclass correlation and when the data are skewed and small, CCC estimated using U statistic is recommended. It was assumed that the measures (Godin Leisure-Time Index and Fitbit step count) are fixed and individuals were random.

## 3. Results

Out of 37 eligible participants approached, 30 agreed to participate and completed the informed consent process. Of the seven participants who declined, four were not interested, two were too busy, and one did not want her doctor to know that she did not exercise. Five of the 30 participants did not complete the study; two were unable to be contacted, two did not like the elastic band of the Fitbit, and one was excluded *post hoc* because she used a walker at home. Twenty-five (83%) of the thirty enrolled participants completed the study and had evaluable data. The mean (±SD) age of the participants was 62 ± 9 years. The mean (±SD) BMI of participants was 32 ± 9 $kg \cdot m^{-2}$. Self-identified race/ethnicity was 36% Hispanic, 36% non-Hispanic white, 16% non-Hispanic black and 12% Asian (Table 1). Participants who were younger, and those that had an ECOG Performance Status of 0, were more likely to achieve 6000 steps per day.

Data from the 25 returned Fitbits reflected that participants wore them a median of 93% of the 30 days (Range 33%–100%). Mean number of daily steps over the 30 days was 6425 (3724). The Fitbits had been set to a goal of 6000 steps per day; eight participants achieved that goal >75% of the days, seven achieved the goal 25–74% of the time and ten