Accelerometers are a type of noninvasive activity monitor that track changes in acceleration.\(^1\) Their use is extremely popular in humans and comprises a 53.9-billion-dollar market industry in the US alone.\(^2\) In contrast, these devices have historically served their greatest utility in research in veterinary medicine.\(^1\) Much of this research is centered on the Actical, a validated omnidirectional canine accelerometer that uses a cantilevered rectangular piezoelectric bimorph plate and seismic mass to measure activity as a step count.\(^3\) Validation research has shown that the Actical provides a good approximation of movement compared to computer-assisted videography during different types of movement as well as periods of inactivity.\(^3\)\(^-\)\(^7\) Based on these findings, the Actical device has been used as an objective outcome assessment tool in clinical studies, including evaluating activity level post laparoscopic-assisted gastropexy and laparoscopic ovariectomy in dogs and evaluating the outcome of osteoarthritis treatment.\(^3\)\(^-\)\(^7\) However, despite this evidence, the Actical has still not been widely used due to its cost and requirement to physically download data from the device as well as the required software and equipment for data interpretation.

In contrast, new commercially available accelerometers are affordable, easily accessible, user

### OBJECTIVE

To compare a commercially available accelerometer, FitBark 2 (FitBark 2nd Generation; FitBark) with a previously validated accelerometer, Actical (Actical; Respironics Inc) during periods of activity and rest. We hypothesized that the FitBark 2 would correlate strongly with the Actical during periods of activity and rest.

### METHODS

20 dogs between the ages of 1 and 9 years of variable sex, breed, and body weight were enrolled from April through August 2022 in a 1-week pilot trial. Dogs were fitted with a neck collar with both devices mounted on it and wore it continuously for 1 week. Six time points were established to evaluate varying degrees of activity and periods of rest, which included the week, a 1-mile walk, the day of the walk, the hour the walk occurred in, 6 AM to 7 AM on the morning of the walk, and 11 PM to 12 AM on the evening of the walk. Actical and FitBark 2 were compared using linear regression and correlation analysis.

### RESULTS

Correlation analysis revealed a very strong correlation between the Actical and FitBark 2 during the entire week of the study, with a moderate correlation at other time points. Linear regression revealed the strength of the relationship by the \(r^2 = 0.85, F_{1,13} = 76.08\).

### CONCLUSIONS

FitBark 2 can be used to evaluate the activity and rest of dogs with varying degrees of correlation when compared to the Actical.

### CLINICAL RELEVANCE

The time period assessed impacts the correlation of the FitBark 2 and Actical. This should be considered when using the FitBark 2 for data collection.

### Keywords:

accelerometry, activity monitor, FitBark 2, Actical, fitness tracker

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friendly, and can be acquired directly by pet owners. The FitBark 2, a 3-axis accelerometer, is 1 of these devices marketed directly to consumers as a fitness tracker for dogs with the ability to provide dog owners health information, including activity assessment while at rest, when active, and during play time, nocturnal sleep score, overall health index, activity index, calorie burn, and activity counts. To assess activity, the FitBark 2 uses a proprietary system termed “BarkPoints” to measure physical activity based on input information. However, independent research regarding the FitBark 2’s ability to accurately assess activity/movement is limited. The single study addressing this question used video analysis to evaluate the FitBark 2’s activity data, BarkPoints, to correlate with dog step count under different conditions. It concluded that the FitBark 2 was valid in tracking activity in off-leash dogs; however, further work was needed to track on-leash activity. The investigators postulated that the FitBark 2 may undersense activity while on a leash. Given the FitBark 2’s ease of use and commercial availability, veterinarians are increasingly exposed to the data and information provided by these devices. Therefore, the objective of this pilot study was to evaluate the relationship of the FitBark 2 BarkPoints compared to the previously validated step count from the gold standard Actical accelerometer during periods of general activity, on leash activity, and rest. We hypothesized that the FitBark 2 would correlate strongly with a validated device (Actical) during periods of activity and rest. Therefore, this pilot study is the first to evaluate the FitBark 2 and the Actical for the purpose of assessing the FitBark 2’s accuracy of measuring activity in dogs.

Methods

This prospective pilot study was approved by The Ohio State University’s IACUC (IACUC #2020A00000060). It was performed from April through August 2022 at The Ohio State University. Written informed owner consent was required prior to enrollment. Dogs of any sex or breed were eligible for inclusion if their body weight was between 10 and 45 kg and they were at least 1 year of age without concurrent clinically significant orthopedic or neurologic disease at the time of enrollment in this pilot study.

During the screening visit at the Ohio State University’s Veterinary Medical Center, health status was evaluated by owner-provided history of current medical status, general physical examination, and complete orthopedic and neurologic examinations. Clinically significant orthopedic disease was defined as lameness of grade 1 to 5 of 5 on subjective gait evaluation. Clinically significant neurologic disease was defined as ataxia or paresis characterized by moderate to severe delay in conscious proprioception. Dogs were excluded from the pilot study if they were found to have orthopedic or neurologic disease on physical examination (performed by a single investigator, ECH) that precluded them from participating in a defined 1-mile-long walk during the duration of the study. Specifically, the orthopedic examination included evaluation of the pelvic limbs, thoracic limbs, and spine, including assessment of long bone pain and joint pain/instability. The neurologic examination included an assessment of conscious proprioception, hopping, and reflexes. If all inclusion criteria were not met, the dog was not eligible for enrollment into the pilot study.

As a medical record was required for the study, some patients had been previously seen at The Ohio State University, whereas others had new records started to participate in the pilot study. The medical record was accessed with the acquisition of each dog’s age, weight, breed, sex, and spay/neuter status for pilot study purposes. Body weight measurement was acquired using a nonslip digital platform scale that was calibrated and verified for accuracy at the beginning of the study.

A flat collar was provided to each owner with the Actical premounted by the University of Minnesota Clinical Trials Office, and a FitBark 2 was applied by the owner or study team at the screening visit. The FitBark 2s used in this pilot study were owned by The Ohio State University College of Veterinary Medicine and had been in a previous research study. Prior to use in the current pilot study, the devices were fully charged and reset to allow entry of the new dogs participating in the study. Both devices were mounted on the collar as recommended by the manufacturer for appropriate placement and verified for correct fitting by the study team. Verbal instructions were given to each owner on how to download the manufacturer’s web-based application for the FitBark 2. This was confirmed via in-person or remote conversation via telephone with the owner and primary investigator after the application had been downloaded. The FitBark 2 was then activated using the web-based application via Bluetooth. The owner entered the following information into the FitBark 2 application: name, sex, spay/neuter status, birth date, weight, primary breed, and any known medical conditions. The owner selected the activity level based upon their interpretation of their dog’s normal activity levels based on classifications recommended by FitBark (average, active, Olympian, or custom). This classification influences the BarkPoint baseline for dogs of similar age, weight, and breeds across the world. Upon activation, the owner was instructed to invite the primary investigator to be a user on the account. This allowed the primary investigator to track the dog’s activity throughout the pilot study period via a website application. The Actical required no monitoring or owner involvement during pilot study collection. In addition to the pilot study collar, the owners were instructed to keep the dog’s personal collar in place for the entire duration of the study.

The devices collected data continuously for the duration of the study. Six time points were established to evaluate the pilot study participants at both varying degrees of activity and during periods of rest. These defined time periods were the total week of the study, the duration of a standardized 1-mile walk,
the day of this 1-mile walk, the hour of the 1-mile walk, 6 am to 7 am on the morning of the 1-mile walk, and finally 11 pm to 12 am on the evening of the 1-mile walk. These time points were selected to observe a longer duration of time (the entire 1-week pilot study period), a shorter duration of time (the day of the standardized 1-mile walk), a defined period of activity (the standardized 1-mile walk itself), and a defined period of rest (11 am to 12 am).

The week-long pilot study timeframe was defined as the time between the initial evaluation by the primary investigator and placement of the collar with the 2 devices to the removal of the devices from the dog 7 days later. Enrollment was continuous until 20 dogs enrolled, which meant that the day of the week that dogs began to participate varied throughout the study. The day of the standardized 1-mile walk was defined as 12 am to 11:59 pm on the day of the scheduled 1-mile walk. The hour of the standardized 1-mile walk was defined as the hour the walk occurred in; for example, if the walk occurred from 8:21 am to 8:48 am, the hour included was 8:00 am to 9:00 am. The standardized 1-mile walk itself was defined as the activity phase of the study. On the morning of the planned 1-mile walk, the primary author (ECH) evaluated the FitBark 2 profile for the dog to ensure that it was retrieving data. The primary investigator walked all dogs. The time (hour, minute, and second) each pilot study participant made it to the starting point of the outdoor course (Fred Beekman Park, Columbus, OH) and the time the pilot study participant completed the outdoor course were recorded. Therefore, walking to the starting point to begin the walk and walking away from the finish of the course were not included in the time of the walk. Dogs were encouraged to not sniff or wander from the outdoor course to obtain an accurate repeatable walk for each dog. The fifth time point was defined as 6 am to 7 am on the morning of the walk. Many participants in this pilot study were owned by veterinary residents whose mornings at this time were spent caring for their dogs, therefore resulting in an increase in activity. Finally, the last time point, 11 pm to 12 am on the evening of the walk, was evaluated as the rest phase of the study.

At the completion of the study, raw data were downloaded from the FitBark website for the FitBark 2 device, and the Actical reader device was used to obtain data using the proprietary software for the Actical device. The FitBark 2 output value for measuring movement/activity is reported in BarkPoints. The calculation of BarkPoints is based on a proprietary calculation by the manufacturer. The epoch interval for the FitBark 2 was 1 minute.

The Actical output value for measuring movement/activity is in steps. Actical measurement begins as a digital value that is adjusted to filter out constant sources of acceleration, such as gravity. The difference from baseline is added to a 1-second accumulated activity value, divided by 4, and then added to accumulated activity value to create a raw activity value for the measurement period of an epoch. The epoch length is the period Actical will accumulate activity counts prior to saving the sample, recording it, and resetting the counter to zero. The epoch is set by the investigator and can be set at 15-second intervals, up to a maximum of 1 minute. Using a 1-minute epoch length, 1,440 epochs can be evaluated per day for 45 consecutive days. In this study, the epoch for the Actical was set to 1 minute. After obtaining the data, it was then imported into an Excel (Microsoft Corp) workbook for further analysis.

**Statistical analysis**

Data were tested for normality using the Shapiro-Wilk test. Descriptive data are reported as mean ± SD, and nonparametric data are reported as median (range). Correlations between FitBark 2 BarkPoints and the Actical steps at each of the

<table>
<thead>
<tr>
<th>Week</th>
<th>Week total: Actical</th>
<th>Week total: FitBark</th>
<th>Day of walk: Actical</th>
<th>Day of walk: FitBark</th>
<th>1-mile walk: Actical</th>
<th>1-mile walk: FitBark</th>
<th>Hour walk occurred in: Actical</th>
<th>Hour walk occurred in: FitBark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>11,745</td>
<td>9,261</td>
<td>4,684</td>
<td>1,362</td>
<td>1,049</td>
<td>1,090</td>
<td>1,829</td>
<td>1,457</td>
</tr>
<tr>
<td>25th percentile</td>
<td>34,305</td>
<td>30,879</td>
<td>5,863</td>
<td>4,637</td>
<td>1,450</td>
<td>1,269</td>
<td>2,015</td>
<td>1,693</td>
</tr>
<tr>
<td>Median</td>
<td>50,515</td>
<td>41,191</td>
<td>8,203</td>
<td>7,387</td>
<td>1,867</td>
<td>1,584</td>
<td>2,762</td>
<td>1,977</td>
</tr>
<tr>
<td>75th percentile</td>
<td>67,233</td>
<td>81,450</td>
<td>11,065</td>
<td>9,924</td>
<td>2,162</td>
<td>1,710</td>
<td>3,098</td>
<td>2,491</td>
</tr>
<tr>
<td>Maximum</td>
<td>93,085</td>
<td>100,834</td>
<td>18,019</td>
<td>18,842</td>
<td>2,982</td>
<td>2,131</td>
<td>4,275</td>
<td>3,689</td>
</tr>
<tr>
<td>Mean</td>
<td>50,642</td>
<td>41,191</td>
<td>8,203</td>
<td>7,387</td>
<td>1,867</td>
<td>1,584</td>
<td>2,762</td>
<td>1,977</td>
</tr>
<tr>
<td>SD</td>
<td>21,975</td>
<td>28,995</td>
<td>4,109</td>
<td>4,754</td>
<td>491</td>
<td>236.2</td>
<td>698.2</td>
<td>598.5</td>
</tr>
<tr>
<td>SE of mean</td>
<td>5,674</td>
<td>7,487</td>
<td>1,061</td>
<td>1,228</td>
<td>126.8</td>
<td>84.22</td>
<td>180.3</td>
<td>154.5</td>
</tr>
<tr>
<td>Lower 95% CI of mean</td>
<td>38,472</td>
<td>30,271</td>
<td>6,735</td>
<td>5,113</td>
<td>1,604</td>
<td>1,337</td>
<td>2,306</td>
<td>1,908</td>
</tr>
<tr>
<td>Upper 95% CI of mean</td>
<td>62,681</td>
<td>68,385</td>
<td>11,486</td>
<td>10,379</td>
<td>2,148</td>
<td>1,740</td>
<td>3,079</td>
<td>2,471</td>
</tr>
<tr>
<td>95% CI of median</td>
<td>Actical Actual confidence level</td>
<td>96.4%</td>
<td>98.4%</td>
<td>98.4%</td>
<td>98.4%</td>
<td>98.4%</td>
<td>98.4%</td>
<td>98.4%</td>
</tr>
<tr>
<td>Lower limit</td>
<td>34,305</td>
<td>30,879</td>
<td>5,863</td>
<td>4,637</td>
<td>1,450</td>
<td>1,269</td>
<td>2,015</td>
<td>1,693</td>
</tr>
<tr>
<td>Upper limit</td>
<td>67,233</td>
<td>81,450</td>
<td>11,065</td>
<td>9,924</td>
<td>2,162</td>
<td>1,710</td>
<td>3,098</td>
<td>2,491</td>
</tr>
<tr>
<td>Coefficient of variation</td>
<td>0.4339</td>
<td>0.55</td>
<td>0.4461</td>
<td>0.6137</td>
<td>0.2618</td>
<td>0.2092</td>
<td>0.2593</td>
<td>0.277</td>
</tr>
<tr>
<td>Lower 95% CI of geometric mean</td>
<td>33,953</td>
<td>30,155</td>
<td>6,641</td>
<td>4,191</td>
<td>1,567</td>
<td>1,357</td>
<td>2,270</td>
<td>1,791</td>
</tr>
<tr>
<td>Upper 95% CI of geometric mean</td>
<td>60,721</td>
<td>53,498</td>
<td>10,711</td>
<td>9,433</td>
<td>2,104</td>
<td>1,718</td>
<td>3,005</td>
<td>2,392</td>
</tr>
<tr>
<td>Sum</td>
<td>759,624</td>
<td>784,919</td>
<td>138,163</td>
<td>116,194</td>
<td>28,135</td>
<td>23,390</td>
<td>40,384</td>
<td>32,095</td>
</tr>
</tbody>
</table>
6 time points described were measured with the use of different correlation indices (the Pearson coefficient and Spearman ρ coefficient) based on individual test assumptions and normality testing. For correlation analyses, a correlation coefficient of 0.9 to 1.0 was considered very strong, 0.7 to 0.89 was considered strong, 0.4 to 0.69 was considered moderate, 0.4 to 0.69 was considered weak, and 0.1 to 0.39 was considered weak, and 0.00 to 0.10 was considered negligible. The relationship between the FitBark 2 BarkPoints and the Actical steps at the 6 time points described prior was further explored using univariable linear regression after testing assumptions were met. For all analyses, values of \( P < .05 \) were considered significant. Standard statistical software was used (GraphPad Prism, version 9).

Table 2—Correlation analysis reported as \( r \) values with associated 95% CIs for each of the 6 time points evaluated in this pilot study.\(^\text{15} \)

<table>
<thead>
<tr>
<th>Time point</th>
<th>( r ) value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week total</td>
<td>0.9</td>
<td>0.71–0.97</td>
</tr>
<tr>
<td>Day of mile walk</td>
<td>0.59</td>
<td>0.20–0.84</td>
</tr>
<tr>
<td>Hour the walk occurred</td>
<td>0.71</td>
<td>0.29–0.90</td>
</tr>
<tr>
<td>Mile walk itself</td>
<td>0.75</td>
<td>0.38–0.91</td>
</tr>
<tr>
<td>6 am–7 am morning of walk</td>
<td>0.65</td>
<td>0.20–0.87</td>
</tr>
<tr>
<td>11 pm–12 am evening of walk</td>
<td>0.78</td>
<td>0.43–0.93</td>
</tr>
</tbody>
</table>

A moderate correlation was defined as 0.40 to 0.69; 0.70 to 0.89 defined a strong correlation, and 0.90 to 1.00 defined a very strong correlation.

Table 3—\( r^2 \) and linear regression equations for each of the 6 time points for all 15 dogs in this pilot study comparing the Actical steps and FitBark 2 BarkPoints.

<table>
<thead>
<tr>
<th>Time point</th>
<th>( r^2 )</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week total</td>
<td>0.8541</td>
<td>( Y = 1.219^*X - 9,424)</td>
</tr>
<tr>
<td>Day of walk</td>
<td>0.3467</td>
<td>( Y = 0.6813^*X + 1,471)</td>
</tr>
<tr>
<td>1-mile walk</td>
<td>0.5543</td>
<td>( Y = 0.4947^*X + 631.6)</td>
</tr>
<tr>
<td>Hour walk occurred in 6 am–7 am morning of walk</td>
<td>0.4172</td>
<td>( Y = 0.4024^*X + 345.4)</td>
</tr>
<tr>
<td>11 pm–12 am evening of walk</td>
<td>0.8859</td>
<td>( Y = 0.87^*X + 11.58)</td>
</tr>
</tbody>
</table>

Supplementary Table S1 provides complete data for the linear regression of each of the 6 time points.

Figure 1—Linear regression results demonstrated graphically for each of the 6 time points for the 15 dogs within this pilot study between the FitBark 2 BarkPoints and the Actical steps. In all graphs, the FitBark 2 BarkPoints are represented on the y-axis as the number of BarkPoints, and the Actical steps are represented on the x-axis as the number of steps. The solid represents the line of best, while the dashed lines represent the 95% CIs. Each black circle indicates the results for 1 dog.
Results

Twenty pet dogs of varying breeds were enrolled in the pilot study with written owner consent. Medical history, general physical, neurologic, and orthopedic examinations revealed no clinically significant abnormalities in all dogs. The mean age of dogs was 3.95 ± 1.24 years. The mean weight was 22.04 ± 3.344 kg. Spayed females represented 7 of 20 (35%), neutered males 12 of 20 (60%), and an intact female 1 of 20 (5%) of the pilot study population. Breeds in the pilot study included Beagles (3), Labrador Retrievers (3), mixed-breed dogs (3), Pembroke Welsh Corgis (2), and 1 each of the following breeds: American Pit Bull Terrier, Australian Cattle dog, Border Collie, Catahoula Leopard Dog, Golden Retriever, Gordon Setter, Irish Setter, Miniature Australian Shepherd, and Siberian Husky. All dogs tolerated wearing the collar and accelerometers continuously for the duration of the study.

Five dogs failed to successfully complete the pilot study due to incomplete or absent data collection (5/20 [25%]). Specifically, 1 dog was excluded due to Actical not collecting data during the entire pilot study period (1/20 [5%]). Another dog was excluded due to Actical not collecting data during the period of the standardized 1-mile walk (1/20 [5%]). Finally, 3 dogs were excluded due to the FitBark 2 not collecting data during the standardized 1-mile walk (3/20 [15%]). Therefore, data from 15 dogs were evaluated. Owners reported all dogs were at rest during the defined rest period.

The FitBark 2 was programmed at Olympian level for 1 of 15 (6.7%) dogs. A unique custom activity level was defined for the remainder of the dogs: below average for 1 of 15 (6.7%) dogs, between average and active for 9 of 15 (60%) dogs, and above active for 4 of 15 (26.7%) dogs. Descriptive data are demonstrated for each of the 6 time points for the Actical and FitBark 2 in Table 1. The strength of correlation analysis between the FitBark 2 BarkPoints and Actical steps varied between each of the 6 time points and is reported in Table 2. A very strong correlation was identified between the Actical and the FitBark 2 for the week total. A strong correlation was identified between the Actical and the FitBark 2 for the hour the walk occurred, 1-mile walk itself, and evening of the walk. Finally, a moderate correlation was identified between the Actical and the FitBark 2 for the morning of the walk and the day of the walk.

Linear regression results are represented numerically in Table 3 and graphically in Figure 1. Complete data are available for review in Supplementary Table S1.

Discussion

In this study, we hypothesized that the FitBark 2 would correlate strongly with the Actical during periods of activity and rest. We identified that the FitBark 2 does correlate strongly during longer durations of time but not as well during shorter durations of time. Therefore, we partially accept our hypothesis. The utility of the FitBark 2 to predict Actical results appears dependent upon both the intensity of activity and duration of the time period assessed. The variability in this relationship remains an important consideration when interpreting activity data from the FitBark 2 device. As this is a pilot study, further studies should continue to evaluate the FitBark 2 against gold standard methodologies to allow for complete validation for use in dogs, including a larger cohort, more varied activity levels, varied durations of activity, and different health statuses. A complete understanding and validation of the relationship between the FitBark 2 and Actical results has important implications for the potential to utilize this product in both veterinary research and clinical cases.

The strongest correlation identified in this study was between the Actical steps and the FitBark 2 BarkPoints for the week total. The remaining phases of the study still exhibited moderate and strong levels of correlation. Yashari et al. identified a very strong correlation (r = 0.925) between the Actical and another commercially available accelerometer, the Whistle device. The strongest relationship between the 2 methodologies was over a 24-hour period, which was the longest period of assessment in the study. Similarly, Dow et al. reported that the least variable estimate of sampling interval for the Actical in dogs was demonstrated in 7-day intervals when compared across 2 separate 7-day intervals. Taken together, the duration of this study was designed with a 7-day interval as identified by Dow et al. This time period in our pilot study demonstrated a very strong correlation. It was suggested by Dow et al. that the evaluation of activity level should be performed over at least a 7-day period to partially eliminate owner schedule variability because of potential increased owner interaction on weekends resulting in an increase in activity level and duration of dog. However, fully eliminating daily variability would likely require a substantially longer duration than this given people’s variable weekend schedules, which was not feasible for this pilot study. Our pilot study showed similar findings, with the total duration of the study having the highest correlation between the results of activity monitors. Further studies examining the impact of duration of assessment under different circumstances, such as healthy dogs compared to those with orthopedic or neurologic disease that might affect gait directly or dogs with systemic disease, are needed to fully assess the relationship between Actical steps and the FitBark 2 BarkPoints.

The lowest correlation (r = 0.59) identified within this pilot study was on the day of the walk. On this day, all dogs were walked on a leash numerous times throughout the day (owners bringing them to the hospital, leaving the hospital to travel to the walk destination, back to the hospital from the walk, to go outside to relieve themselves throughout the day, and finally to go home with their owners). The cause of this decreased correlation is unknown at this time but may be associated with the FitBark 2 undersensing activity while on a leash as a result of modifications of the dog’s gait and stride length. Colpos and DeCock saw a similar decrease in the correlation...
coefficient when dogs were observed walking on a leash compared to observation of dogs interacting freely in an enclosed room with and without human interaction. A potential explanation for this modification in gait when on a leash may be associated with an approximately 12% variation in total pressure index of the left and right forelimb at the walk and shifting weight toward the forelimb opposite the leash without obvious tension on the leash. In the current pilot study, all dogs were leash trained.

Based on data regarding the impact of leash walking on gait in dogs and the effects it has on accelerometer data, the leash was never attached to the collar with the devices but rather a second collar or a harness based on what the dog normally used, so movement by the leash was unlikely to have had a significant effect on data collection. All activity monitors were maintained on the ventral aspect of the collar due to previously being identified as the highest level of correlation. In addition to leash attachment and activity monitor placement, dog weight and conformation had previously been reported to not influence activity when being walked and trotted on a leash by Brown et al20; therefore, it is unlikely that this played a role in the decreased correlation indices between the walk and day of the walk compared to the total week.

In addition to the factors contributing to the FitBark 2’s ability to sense activity when the dog is moving, it should also be noted that the FitBark 2 must distinguish activities that involve motion but do not require traveling. Such activities include eating, scratching, tail wagging, sniffing, or shaking that may strongly influence a collar-mounted accelerometer but do not include true movement or acceleration. These activities may falsely increase the dog’s BarkPoints without true movement. This was previously defined with the Actical device with computer-assisted videography.3 The FitBark 2 device pairs with a highly interactive cellular phone application that allows owners to create and customize a profile for their dog, with the ability to track their dog’s ability to meet their “goals” by simply refreshing the application throughout the day, providing instantaneous feedback and “goals” by simply refreshing the application throughout the day, providing instantaneous feedback and results. This contrasts with the Actical, where data are not easily accessible and the device must be removed from the dog and evaluated by the Actical reader to obtain data. In this pilot study, 2 dogs had incomplete or complete lack of data collection by the Actical, which could not be identified until the pilot study was completed, thereby excluding these 2 dogs from the study. Although the FitBark 2 has a highly interactive application, we still had 3 dogs where date was not recorded for the time of the walk. It is unknown why this occurred; however, battery life may be a contributing factor.

The multivariable linear regression analyses revealed that the overall accuracy was highest for the week total and the evening of the walk, whereas the lowest accuracy was identified on the day of the walk. The prediction of Actical steps from the FitBark 2s proved to be a good model, with the $P$ value being less than the $\alpha$ in all scenarios. Based upon this data, additional, longer assessments are required to improve the reliability.

Although the Actical serves as the current gold standard for the evaluation of activity monitoring in veterinary medicine, there were 2 cases where the device did not obtain any data or obtained incomplete data, impacting the results of this study. The Actical, like the FitBark 2, also uses proprietary Activity and Energy Expenditure software that must be used to interpret the data and is not available to the public. In human medicine, the use of ECG and visual step counts is considered the gold standard for the assessment of activity. This methodology is impractical in dogs.

The limitations of the pilot study included the small sample size. This was performed as a pilot study as prior data were not available to establish a prehoc power analysis. Additionally, there was only 1 defined activity period, the 1-mile walk. If this activity point had been repeated during the study, we could have established within-dog variation. Only 1 of each device was used on each dog; therefore, inter-device variability could not be evaluated. Technical difficulty involving the FitBark 2’s inability to sync the device with the web-based application for owners and poor battery life led to a loss of data points. The FitBark 2s used in this pilot study had been used for prior studies, so it is unknown if this affected their battery life or efficacy in monitoring. However, they were not used for lengthy periods before this study, so the data collected is what would be expected for a normal owner to obtain within a year of purchasing such a device. To access Actical data, the device had to be physically removed from the dog and evaluated at an off-site facility; therefore, it is unknown during the pilot study period if data are being obtained as was the case for 2 of the dogs in this study. Further research needs to be performed as to why correlation during a specific activity was decreased from the overall length of the study.

In conclusion, the FitBark 2 can be used to evaluate the activity and rest of dogs with varying degrees of correlation at different activity levels and time periods when compared to the current gold standard method assessment by the Actical. Further research is necessary before widespread implementation and confidence in the data under different circumstances are available.

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Supplementary Materials

Supplementary materials are posted online at the journal website: avmajournals.avma.org.