

INTRODUCTION

There have been a lot of different studies on the accuracy of Garmin devices during structured exercises such as walking or running (Claes et. al. 2017; Wahl et. al. 2017). Similar to my case study, Wahl et. al. compared a Garmin device against a Polar chest heart rate strap to see the accuracy of calories burned and time spent in each heart rate zone. They found that Garmin devices did not vary significantly from the chest HR strap. However, they did not investigate the accuracy of the Garmin during unstructured exercise. Due to the lack of information surrounding Garmin devices and unstructured exercise, I chose to further investigate that.

PURPOSE

The purpose of this study was to investigate the accuracy of Garmin devices when measuring heart rate, step count and calories burned for unstructured exercise. I hypothesized that the Garmin device would be inaccurate by underestimating all of these categories during unstructured exercise.

METHODS

Participants: My study was a simple case study on myself. My Garmin watch had already been programmed to my statistics, so it would be inaccurate with anyone else who tried to use it.



Picture 1: The Polar M400 next to the Garmin Forerunner 645 Music.

METHODS

Procedure: To start, I gathered two gold standard devices to compare against the Garmin Forerunner 645. Those two devices were the Actigraph GT9X Link and the Polar H7 chest strap paired with the M400 watch. Each device was worn on the same wrist as pictured in picture 1. For unstructured exercise, I chose to workout at Fit Body Boot Camp three days out of the week. All three devices were started at the same time to ensure the most accurate results. Exercise days were separated by at least 48 hours.

Data Collected: Both the Garmin Forerunner 645 and the Polar M400 with the chest strap collected time spent in each heart rate zone, calories burned and steps taken. For the Polar device, I had to record the number of steps at the beginning and end of each session. This way, I could accurately calculate the number of steps taken during each session. The Actigraph recorded steps taken and time spent in each heart rate zone; however, I was only able to collect data from two sessions as opposed to the 7 total sessions as collected by the Garmin and Polar devices.

RESULTS

My results are displayed in Figure 1 below and figure 2 to the right. Figure 1 shows the average time spent in each HR zone. HR zones were based off of %HR max. Zone 1 was 50-60% HR max, zone 2 was 60-70% HR max, zone 3 was 70-80% HR max, zone 4 was 80-90% HR max, and zone 5 was 90-100% HR max. I used a max HR of 206 as recorded by the polar chest strap.

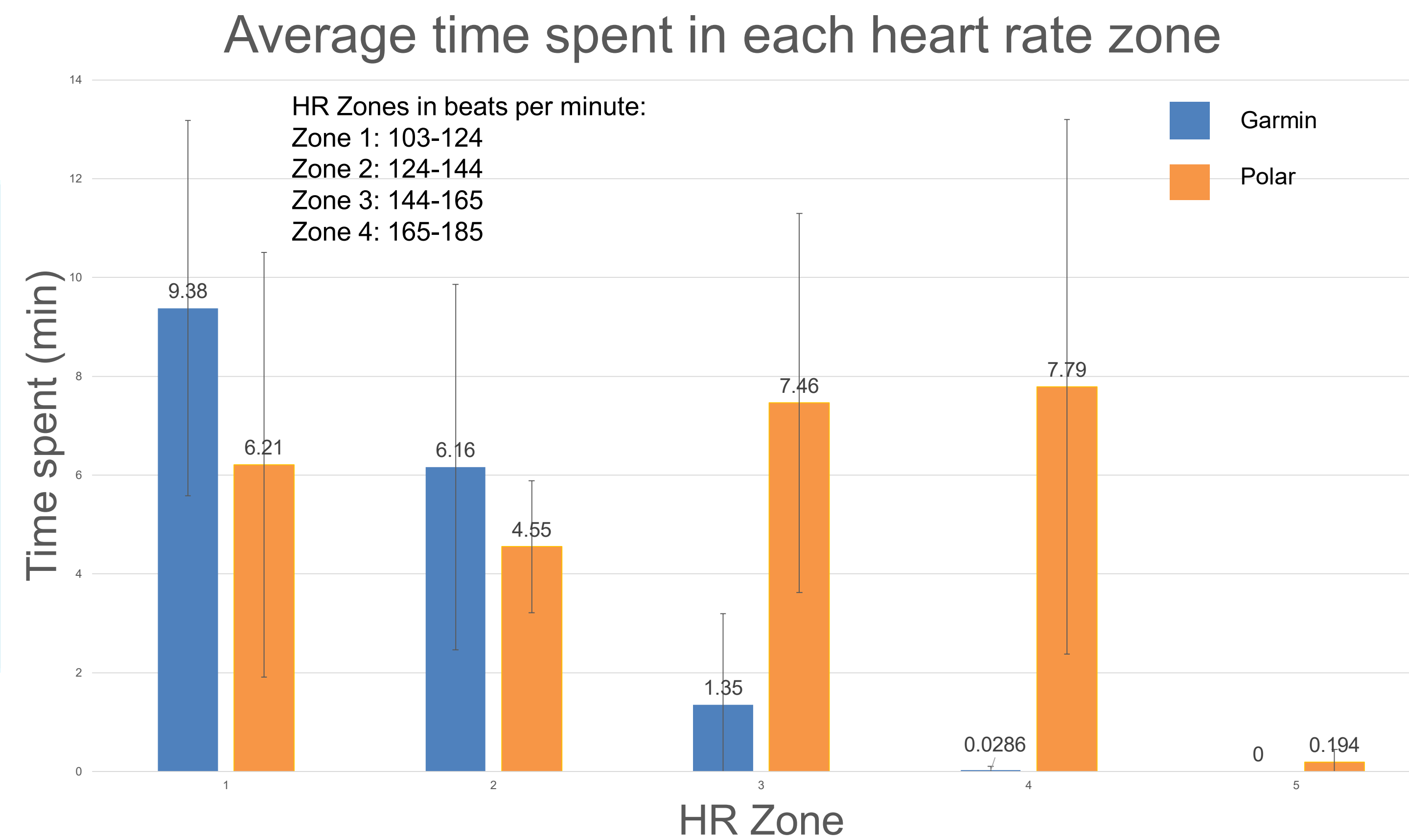


Figure 1: time spent in each heart rate zone as calculated by Garmin Forerunner 645 and Polar HR Chest strap

RESULTS

The Garmin Forerunner 645 underestimated my heart rate. As a result, I spent the most time in HR zone 1 as shown in figure 1. Time spent in each HR zone decreased as the zone increased. The Garmin Forerunner recorded no time spent in HR zones 4 or 5. The Polar data was much more spread out. I spent the most time in HR zones 3 and 4 even had a few minutes in zone 5. The average steps taken and calories burned during a single 30 minute exercise session are shown in figure 2 below. The Polar recorded the highest average amount of steps taken when compared to the Garmin and Actigraph devices. For number of calories burned, the Polar estimated a higher average when compared to the Garmin—216 calories and 155 calories, respectively.

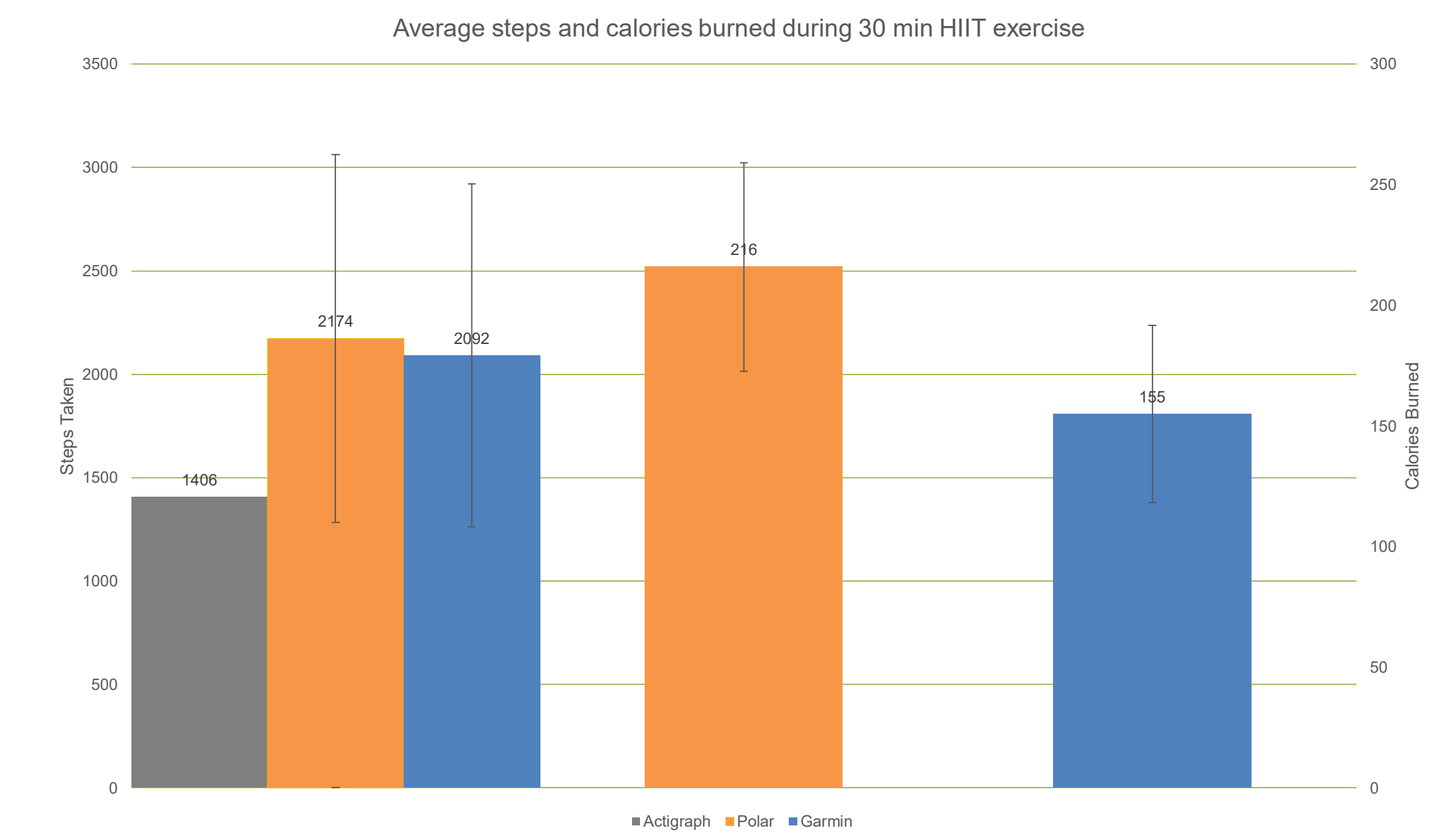


Figure 2: Left: steps recorded by the Actigraph, Polar and Garmin devices. Right: calories burned as calculated by Polar and Garmin devices.

CONCLUSION

I found that the Garmin Forerunner 645 underestimated calories burned, heart rate zones, average HR and max HR for unstructured exercise. My results were similar to the study done by Dooley et. al. (2017) who also found that Garmin devices were not reliable in determining heart rate zones and thus calories burned for unstructured exercises. Our results can be applied into everyday life by informed the public about the reliability of Garmin devices for exercise classes such as those at Fit Body Boot Camp. If clients want the most accurate information, they need to use a chest HR strap. Further research should be conducted to investigate the accuracy of Garmin devices during structured exercise.

REFERENCES

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