



Officials during a game: Time of Exercise, Calories, Kilometers Skated, & Steps

To a person, refereeing is good exercise. Officials may treat officiating as the only exercise they do, while others have numerous strategies to stay in shape to be a good official. How can we quantify officiating's effect on the body? One approach has to include a biometric device (something that measures how your body is performing) such as Fitbit or Apple Watch or Garmin SmartWatch.

Between Fall 2018 and Spring 2020 a Fitbit was worn by one official (born: 1986, gender: male, Body Mass Index: 24) in 58 games: 28 games as referee, 21 as linesman, and 9 in the two-official system. Games took place in a variety of levels from U10 to U22. The official committed to officiating every game with full effort expected of higher level officials including creating presence every stoppage, proper endzone positioning, correctly working the line, skating as though "pulling a rope" with strong strides and hustling to be in position with proper pursuit of play. Basically, the official never "dogged it".



The data for calories burned, Kilometers (KM) skated, steps, and exercise time was downloaded from the Fitbit to an iPhone then typed into Excel. The length of games varied from 39 to 60 minutes, therefore, all games were statistically adjusted to reflect a game length of 60 minutes.

Results

Here are the average statistics for each of 4 categories per 60-minute game.

	Overall regardless of position	3-Official System, Referee	3-Official System, Linesman	Official in the Two-Official System
Calories (c)	803.15c	797.08c	817.09c	789.49c
KMs skated (km)	3.69 km	4.56 km	2.79 km	3.09 km
Steps	4392.75 steps	5403.03 steps	3274.45 steps	3858.98 steps
Exercise ¹ (minutes)	79.74 min.	76.40 min.	81.99 min.	84.84 min.

The first column represents the average regardless of referee, linesman or two-official. So, an official burns enough calories to consume 80% of a Big Mac Meal (1080 calories) or 2 Venti Frappuccinos (340 calories). Officiating is also similar to cycling, where cyclists burn 450-750 calories per hour while officials burn about 800 per two hours of hockey.

On average, an official skates 3.69 KMs per 60 minute game. The CN tower is 553 meters, so the official skates up the CN tower 7 times or skates the length of a CFL

¹ Fitbit gives credit for "exercise" when you are burning 3x the calories that you do at rest for at least 10 minutes.

football field (137 meters) about 27 times. The number of steps taken during two hours of ice time is less than two hours of walking; according to Google, a person walks about 100 steps per minute but the above data suggests that officials take about 37 steps per minute.

Finally, consider exercise time. A 60-minute game takes about 2 hours. Therefore, an official is completing about 80 out of 120 minutes of true exercise when officiating, which represents 66% of the time. The remaining 34% is likely spent sitting in the dressing room between periods (20 to 30 minutes per 2 hours) or watching the play (10 to 20 minutes). In comparison, brisk cycling, running or walking would be closer to 100% exercise as constant effort in those activities is required to maintain a brisk pace.

Comparing Referees, Linesmen, and the Two-Official system

Another interesting question: does a referee work harder than a linesman? How much exercise does an official do in the two-official system? To explore these questions, a statistical analysis (a t-test) was used to compare referees to linesmen to the two-official system and determine if the data represents a significant difference.

Does a referee work harder than a linesman or an official in the two-official system? The answer, when considering calories and exercise is “no, time of exercise and calories are not significantly different and can be treated as the same.” When considering steps or kilometers, “yes, the referee does skate significantly more than linesman and officials in the two-official system.”

Regarding linesmen and officials in the two-official system, an official in the two-official system takes significantly more steps than a linesman but skates a similar distance to a linesman. Officials in the two-official system use the same amount of energy as linesmen or referees.

Conclusions

Conclusion 1: A referee takes more steps and skates further than linesman or officials in the two-official system, but does not work harder than linesmen or officials in the two-official system.

Explanation 1: This conclusion makes sense, referees need to skate the full length of the ice and be very efficient. Linesman skate between the blue lines then come into the players every whistle, requiring fewer steps but many short burst of energy resulting in similar amounts of energy used.

Conclusion 2: Officials in the two-official system take more steps than linesman but skate the same distance as linesman. Officials in the two official system skate less than referees. They use the same energy as a linesman or a referee.

Explanation 2: The two-official system official skates from blue line to endzone as well as coming into the players at whistles. The demands placed on the two-official system requires short bursts of energy (like linesman) and long distance skating (like referees),

which explains why two-official system officials use more steps than linesmen but less than referees. The data also suggests that two-official system officials skate the same distance as linesman. This is difficult to explain and may be due to a statistical anomaly that would be explored by correcting limitation #2 noted below.

Conclusion 3: Officials need to be in shape regardless of working as a linesman, referee, or official in the two-official system.

Explanation 3: You may hear officials say, "I am too out-of-shape to be a referee." This current suggests that referees, linesman and officials in the two-official system use the same calories and achieve the same exercise time when applying full effort. Out-of-shape officials cannot hide as a linesman or in the two-official system. Given this, officials need multiple strategies, aside from officiating, to stay in shape: stretching, walking, running, or biking are excellent options.

Limitations to this Research

All research is limited by certain decisions made by the researcher or by the research design. This does not make a research study void, but it does give options for future research. Here are two limitations for this study.

1. This study was a single-participant design. The official used in this study had specific characteristics (born in 1986, male, Body Mass Index of 24) that does not match other people. Would females have different results? 45 year olds? Someone with a BMI of 30? What are the results of an official who does not hustle to be in position? Future studies would need to include many different officials to answer these questions.
2. This study had 28 referee games, 21 linesmen games, and 9 two-official games. Future research could collect more data in general. However, given the small sample of two-official games, it is imperative to increase the sample of two-official games.