



# Impact of Heart Rate Intensity on Shooting Accuracy during Games in NCAA Division I Women Basketball Players



James Hutson, Courtney Elliott, Casey Pederson, and Dustin P. Joubert

Human Performance Lab; Department of Kinesiology and Health Science; Stephen F. Austin State University; Nacogdoches, TX

## Abstract

Shooting accuracy in basketball is key to winning games. While there are various factors as to why a team either makes or misses their shots, the intensity of play is likely a contributing factor. A player who has played the majority of the game would likely have a higher, more intense heart rate (HR). Depending on the athlete, this could impact shooting accuracy. Examining the relationship between HR intensity and shooting accuracy has not been looked at in a real game setting before. Therefore, we set out to determine the impact heart rate intensity has on shooting accuracy in a game setting. **Purpose:** The purpose of this study was to determine the impact of heart rate intensity on shooting accuracy in a game setting in NCAA Division I female basketball players. **Methods:** We examined the team stats for shooting accuracy from overall attempts, three point attempts, and free throws during five games. During games players wore HR monitors that transmitted to a mobile app that displayed their HR in real time. Every time a shot was attempted, we recorded what kind of shot, where on the floor it came from, whether it was made or missed, and the HR zone that the athlete was at when it took place. The HR zones that were compared were 1) 70-80% HR max, 2) 80-90% HR max, and 3) 90-100% HR max. These data were input into a spreadsheet to calculate the average team shooting percentage across these three HR zones for overall shooting, free throws, and 3-pointers. **Results:** As indicated in the table, the team shooting percentage was highest for all types of shooting when players were at the lowest HR intensity. Shooting accuracy declined at higher HR intensities.

	70-80% Max HR	80-90% Max HR	90-100% Max HR	All HR Zones
Overall Shooting %	66.7% (26/39)	50.3% (93/185)	49.7% (81/163)	51.7% (208/402)
Free Throw %	84.6% (11/13)	81.3% (39/48)	61.9% (26/42)	74.3% (78/105)
3 Point %	72.7% (8/11)	28.3% (17/60)	40% (24/60)	38.4% (53/138)

**Conclusion:** There are several potential takeaways from these data that could be used to improve performance. If shooting accuracy declines at higher HR zones, the players could potentially improve shooting accuracy by improving fitness so their HR decreased during competition. However, assuming HR stayed elevated during competition regardless, changes in practice would be key. Altering practice to run game simulations where the athletes HR is high when practicing shooting drills could be a potential strategy. This could help improve their shooting accuracy at the higher HR zones experienced in games. Lastly, since free throw shooting accuracy was lowest when HR was over 90% max, players might improve free throw shooting accuracy by taking their time at the free throw line to allow HR to recover some. This research can be used to alter how teams practice and play to improve performance than from the traditional methods that we see in today's sports.



KTRE.com



Polar Bluetooth Heart Rate Monitor



Polar Team App

## Introduction

- Shooting accuracy in basketball is key to winning.
- Heart rate (HR) intensity has been shown to be a factor contributing to shooting accuracy in a practice or drill setting.
- However, the relationship between HR intensity and shooting accuracy have never been looked at in a game setting.
- Our purpose was to determine the impact of HR intensity on shooting accuracy in a game setting in NCAA Division I female basketball players.

## Methods

- Shooting accuracy was determined as the percentage of makes/attempts over the course of 5 games.
- Shooting accuracy was determined for the team as a whole for all shots, 3-point shots, and free-throws.
- During the games, each athlete wore a HR monitor that transmitted the athlete's current HR to a mobile app that displayed HR in real time.
- We recorded every time a shot was attempted, type of shot, who took it, and the HR intensity for that particular player when the shot was taken.
- This data was hand recorded on a spreadsheet in real time and later entered into an excel to determine the shooting percentages for each type of shot in each particular HR zone.

Qtr	#	Non Shooting			Shooting				Made		HR Zone					
		TO	DF	OF	FT	2LU	2IP	2OP	3	Y	N	Gray	Blue	Green	Orange	Red
		TO	DF	OF	FT	2LU	2IP	2OP	3	Y	N	Gray	Blue	Green	Orange	Red
		TO	DF	OF	FT	2LU	2IP	2OP	3	Y	N	Gray	Blue	Green	Orange	Red
		TO	DF	OF	FT	2LU	2IP	2OP	3	Y	N	Gray	Blue	Green	Orange	Red

Sample Data Collection/Score Sheet

Gray Zone	Blue Zone	Green Zone	Orange Zone	Red Zone
50-60% HRmax	60-70% HRmax	70-80% HRmax	80-90% HRmax	90-100% HRmax

Heart Rate Intensity Zones

## Results

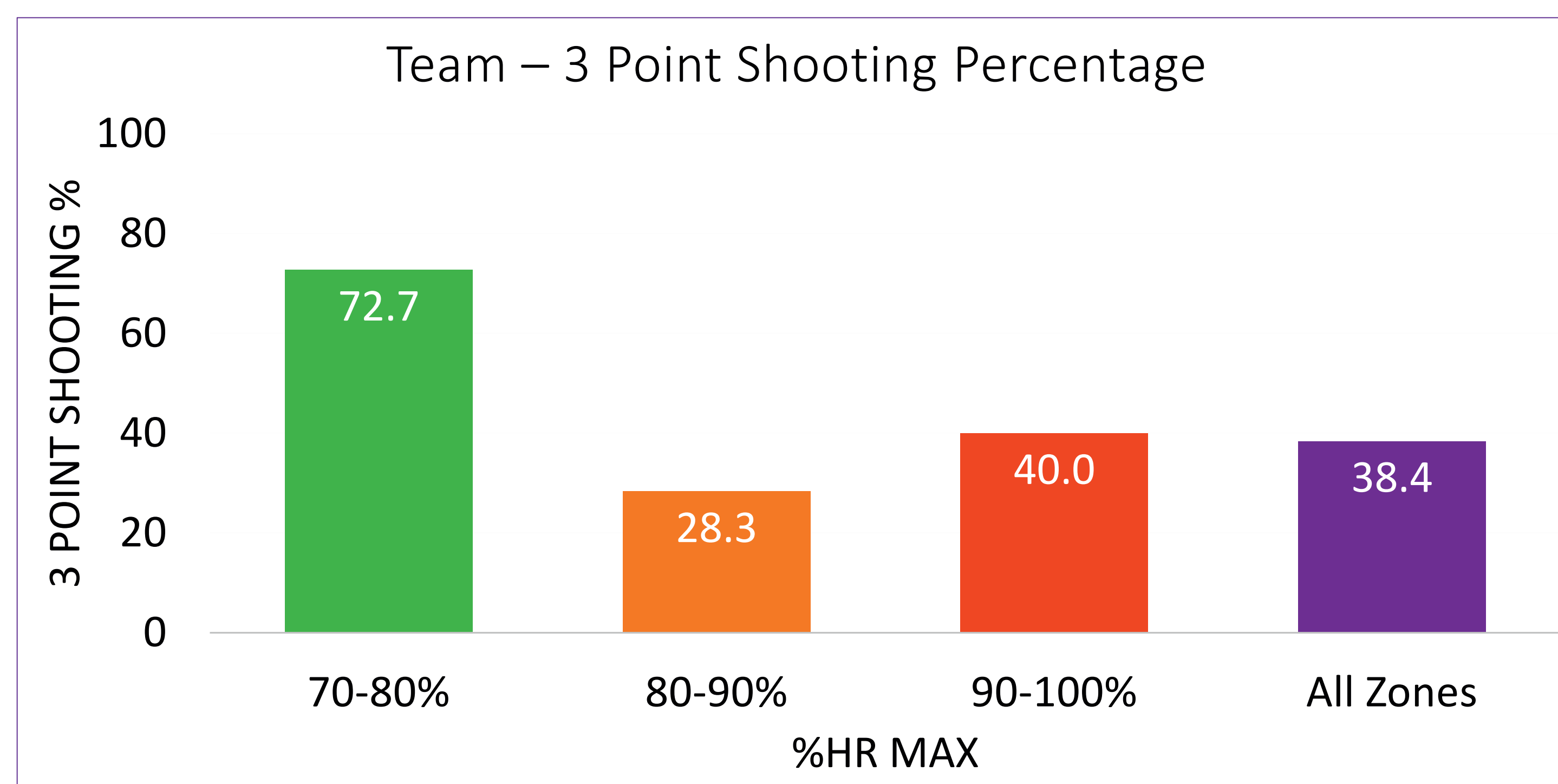
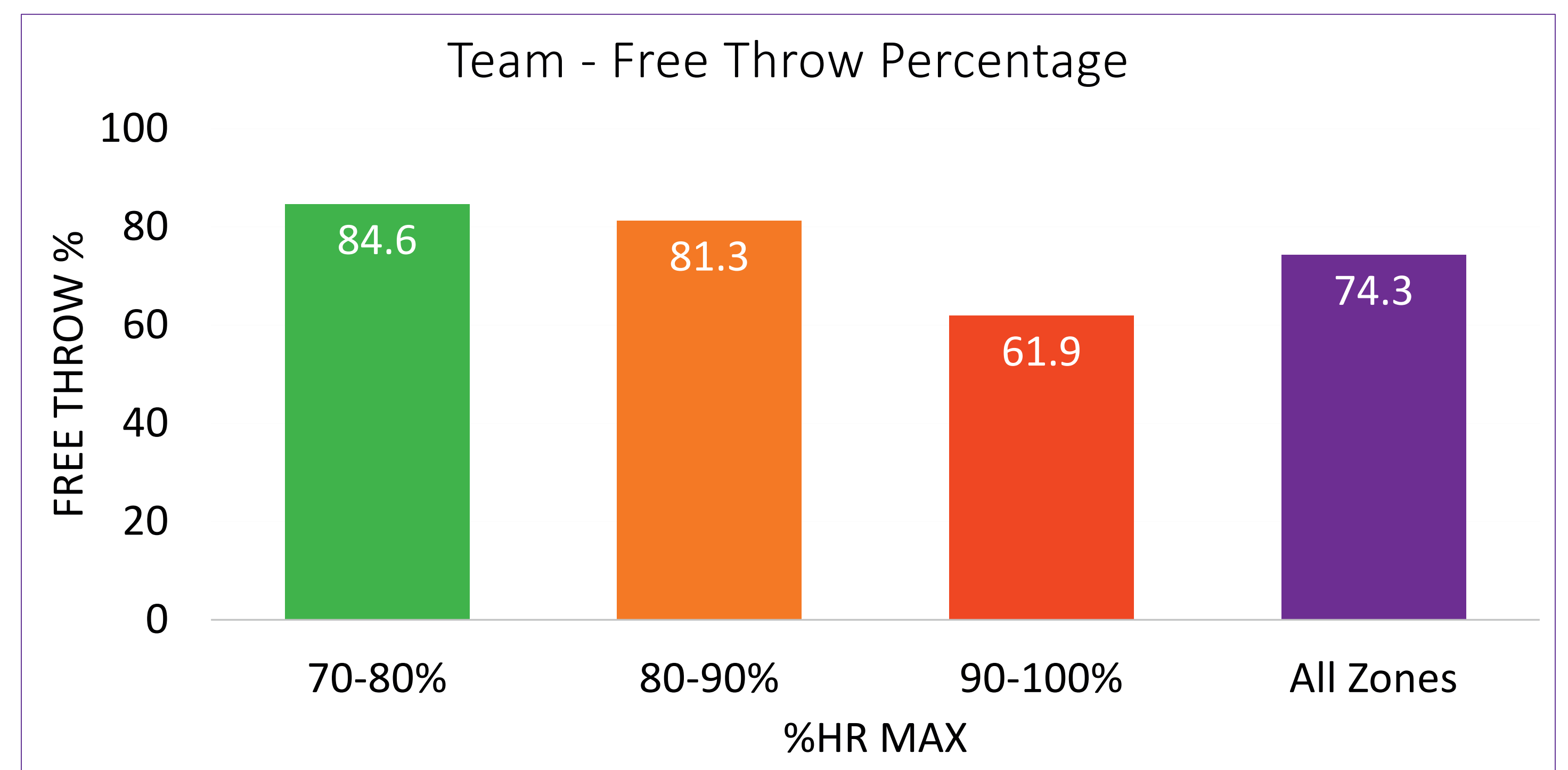
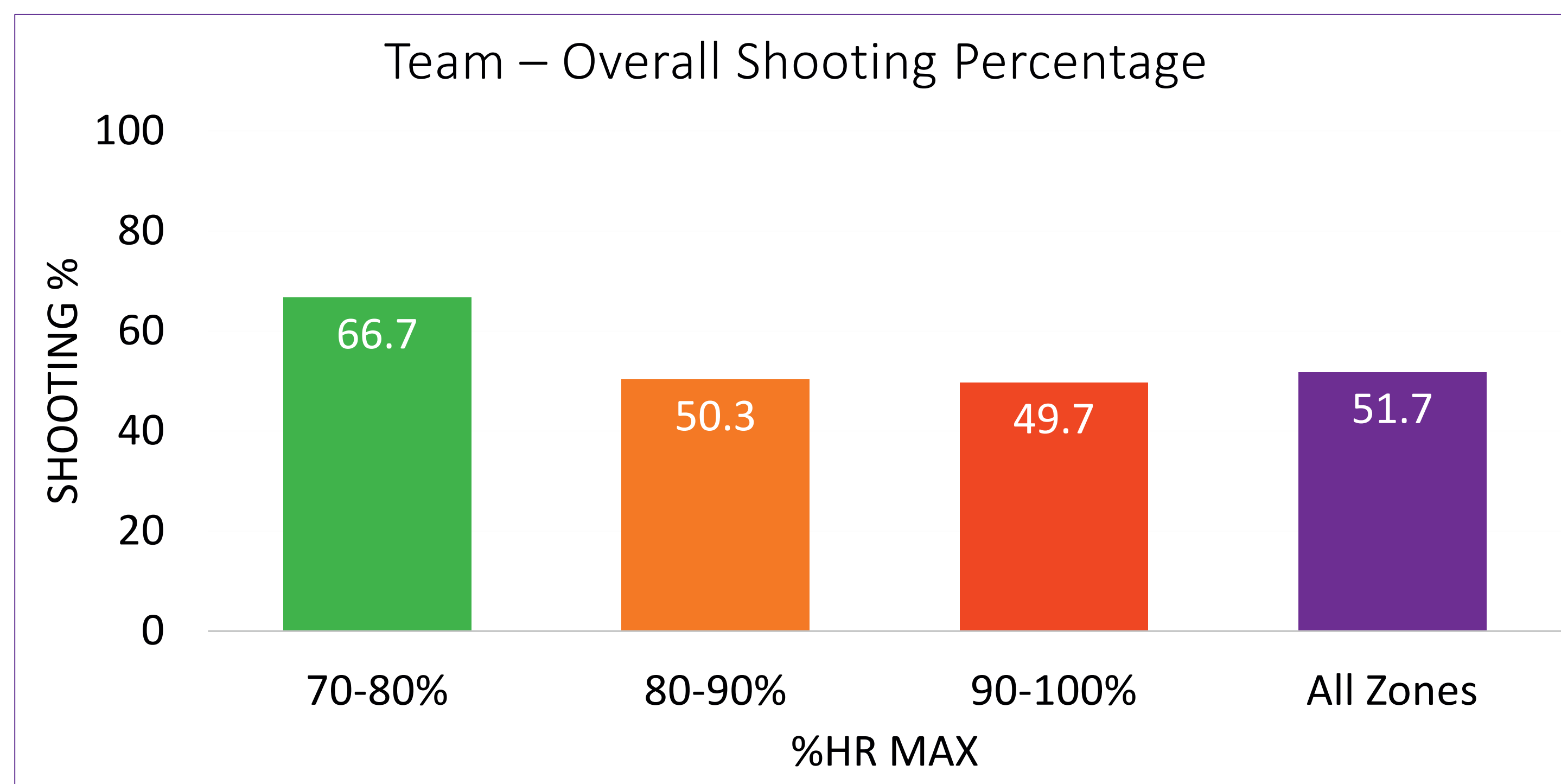


Table 1. Shooting percentages (made/attempts) relative to heart rate zones.

	70-80% Max HR	80-90% Max HR	90-100% Max HR	All HR Zones
Overall Shooting %	66.7% (26/39)	50.3% (93/185)	49.7% (81/163)	51.7% (208/402)
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## Conclusions

- This is the first study to look at the relationship between HR intensity and shooting accuracy in a real game setting.
- These data show that team shooting accuracy declines at higher HR intensities.
- Players could potentially improve shooting accuracy by improving fitness so their HR is lower during competition.
- Practicing shooting drills at these higher HR zones in practice could help improve performance in games as well.
- For free throws, players might benefit from taking the maximum allowable time at the line in order to take their shots at a lower HR.
- This research provides coaches data to improve their player's performance and make more informed decisions during practices and games.