



# Impact of Humans on Captive Red Kangaroo Behavior

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## INTRODUCTION

- Do captive red kangaroos exhibit increased vigilance (awareness of potential threats) in the presence of large crowds of people? How does the presence of visitors in close proximity impact the interaction of red kangaroos?
- The average amount of time an individual kangaroo spends being vigilant is known to decrease as group sizes increase. (Carter *et al.* 2009).
- Vigilance is an integral component of antipredator behaviors in animals (Edwards *et al.* 2013). Many species exhibit fear responses, or vigilant behaviors, towards humans (Ciuti *et al.* 2012) However, some species do not as a result of the “Human Shields” hypothesis (Sarmiento, Wesley).
- Research has found that in areas of a free-range exhibit in a zoo where there were more humans, kangaroos were much more vigilant (Sherwen *et al.* 2015).
  - Sherwen *et al.* (2015) also identified that visitor effects on animals can be intensified in free-range zoo habits.
- Group size can influence the degree and amount of time red kangaroos exhibit vigilant behaviors in the wild (Favreau *et al.* 2010).
- The effects of visitor proximity and effects on red kangaroos behaviors are relatively understudied in captivity (Jones *et al.* 2021) so it is currently unknown how the stress of these animals relates to human presence, the levels of vigilance, or if humans are an enrichment to the captive kangaroo environment, among other notions.

## RED KANGAROO (MACROPUS RUFUS)

- We observed 6 males and 13 females of varying ages, from joey to adult, red kangaroos (*Macropus rufus*) in the Indianapolis Zoo.
- Red kangaroos are the largest living marsupials in the world, which makes them a novelty in numerous zoos in the world (Jones *et al.* 2021).
- Red kangaroos are endemic to Australia (Zdun *et al.* 2023) and found in arid zones of Australia that typically have lower areas of cover available (Blumstein *et al.* 2003).
- Red kangaroos are likely to display changes in behavior in the presence of visitors in a free-range zoo exhibit. They are more likely to show an increase in visitor-directed vigilance and locomotion, and a decreased amount of time resting (Sherwen *et al.* 2015).

## MATERIALS AND METHODS

- Two dozen red kangaroos (*Macropus rufus*) at the Indianapolis Zoo were monitored for ten, one-hour sessions consisting of twenty instantaneous scan samplings that lasted one minute with inspiration derived from Sherwen *et al.* (2015).

## MATERIALS AND METHODS CONTINUED

- Two ethograms of behavior were utilized. One depicted the red kangaroos behaviors by Sherwen *et al.* (2015), while Jones *et al.* (2021) depicted the red kangaroo's distance to the path.
- We performed scan samples from an area of the enclosure where most kangaroos were visible.
- After each scan, there was a two-minute break until the next scan.
- We analyzed the data utilizing Microsoft Excel software to form scatter plots and bar charts.

Path Proximity	
On Path	the animal is on the visitor path
Near Path	the animal is within one body length (not including the tail) of the path
Distant to Path	the animal is more than one body length (not including the tail) away from the path
Unclear/Not Visible	proximity to the path cannot be determined or the animal is not visible

Figure 1. Jones *et al.* (2021) path distance determinants.

Behaviour	Description
Visitor-Directed Vigilance	Erect posture with fixed gaze toward visitor pathway
General Vigilance	Scanning surrounding environment not including visitors
Foraging	Manipulation of objects or substrate in an effort to obtain food
Locomotion	Moving from one location to another either by walking or hopping
Resting	Lying on side or back, head down
Grooming Self	Running mouth or paws through own fur, including licking
Grooming Others	Running mouth or paws through another individual's fur, including licking
Aggression	Chase, box or paw slap/grab of another individual, often accompanied by grunting

Figure 2. Sherwen *et al.* (2015) ethogram.

## RESULTS

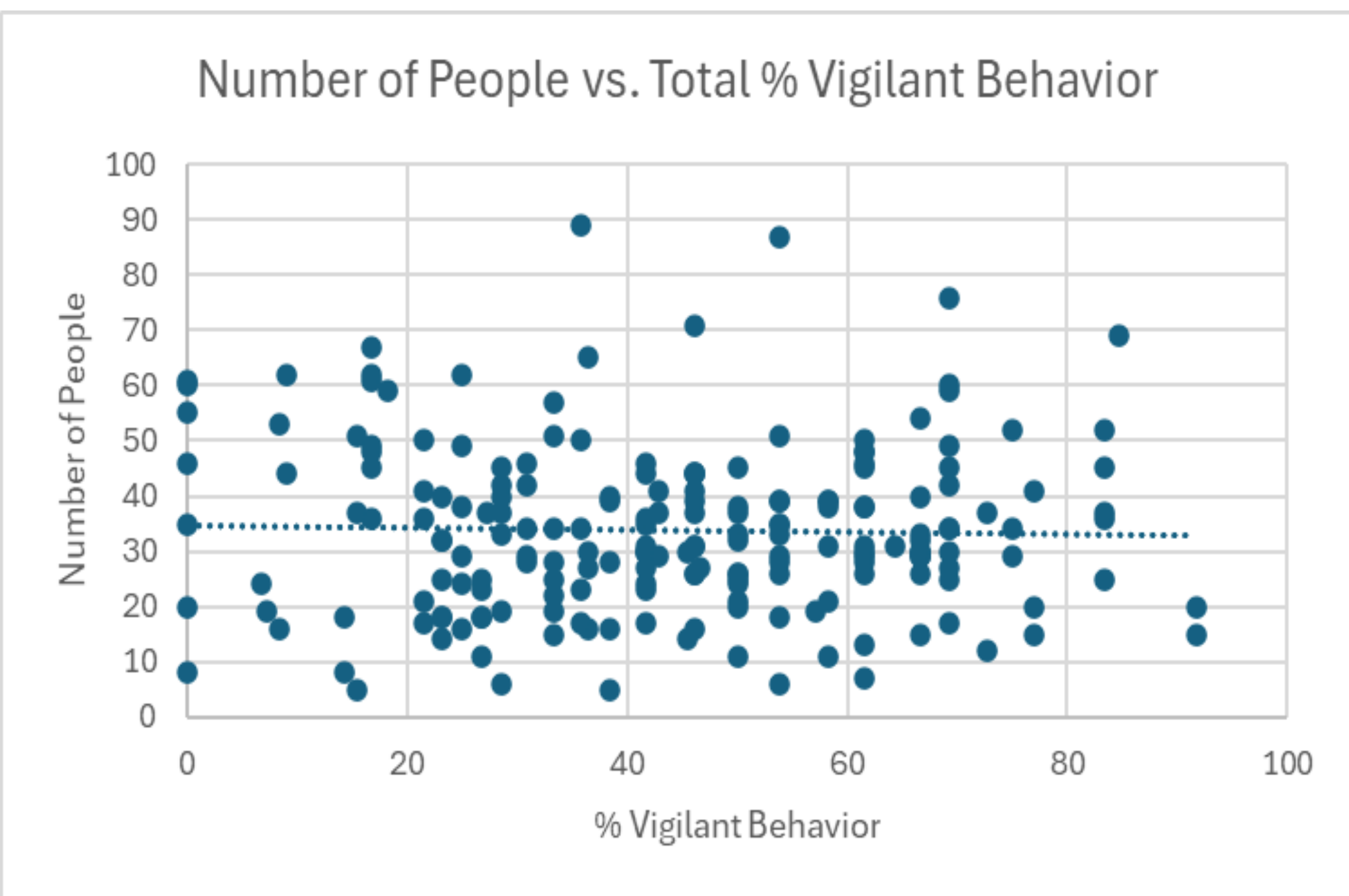


Figure 3. R<sup>2</sup> value is 0.001, which shows a low correlation between the number of people and the total percentage of time the red kangaroos displayed vigilant behavior.

## RESULTS CONTINUED

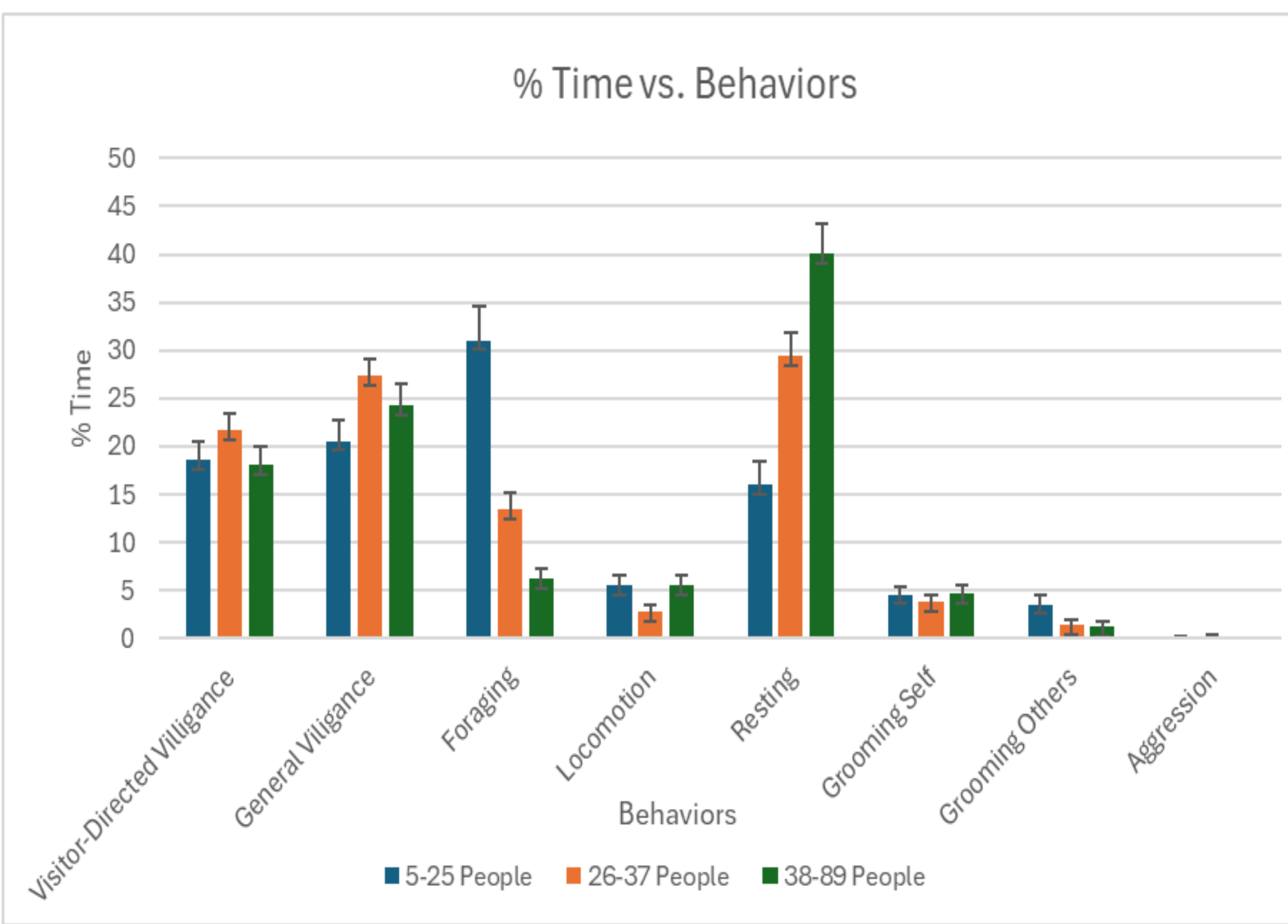


Figure 4. The percentage of time certain behaviors were observed compared to the amount of people in the enclosure is shown, as well as the standard deviations for each bar.

## DISCUSSION

- The scatterplot depicting ‘Number of People vs. Total % Vigilant Behavior’ showed that the number of people does not seem to play a large factor in the amount of time the kangaroos spend doing vigilant behaviors.
  - This disagrees with research by Sherwen *et al.* (2015) that found when more humans were present, captive kangaroos were more vigilant.
- The bar graph analyzing ‘% Time vs. Behaviors’ highlights that a medium amount of humans (26-37 people) appear to evoke the most vigilance in the red kangaroos. A small amount of humans (5-25 people) seems to lead to the most time spent foraging, while a large amount of humans (38-89 people) leads to the most time resting.
  - Carter *et al.* (2009) identified that the larger a kangaroo mob, the less time the kangaroos will spend doing vigilant behaviors. The number of kangaroos was consistent with only human amounts changing. When more kangaroos live at the Indianapolis Zoo, further research could bridge this gap in data.
  - Hume *et al.* (2019) found that kangaroos were much more vigilant in urban areas than in rural due to the higher human density, however our data disagrees with this finding as both visitor directed, and general vigilance were highest with a medium (26-37) amount of people rather than a large amount (38-89).

## LITERATURE CITED

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