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Case Report

Does the Absence of Zoo Visitors during the COVID-19 Pandemic Impact Gorilla Behavior?

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Abstract: Whether or not primates are behaviorally affected by the presence of visitors in a zoo setting is a question of great relevance to zoo animal well-being. The situation imposed by the COVID-19 pandemic provided an unusual opportunity to examine how the absence of visitors impacts behavior. We took advantage of this opportunity to study the behavior of a gorilla troop during periods of no-visitors compared to our long-term database on gorilla behavior during normal zoo operations. While there were notable individual differences in response to visitors, we found no significant relationship between presence of visitors and behavior. These results suggest that the presence of visitors does not have a significant impact on behavior and well-being of zoo-housed gorillas.

Keywords: COVID-19; pandemic; research; gorilla; visitors; zoos; behavior

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1. Introduction

More than 700 million people visit zoos and aquariums each year, making visitors a significant feature of the zoo environment [1]. Because visitors are ubiquitous in zoos, it is nearly impossible to systematically evaluate how or whether visitors impact the behavior and well-being of zoo animals. The study of human-animal relationships in zoos has highlighted that humans may be positive, negative, or neutral stimuli. Differences based on the humans (for example, familiar keepers versus unknown visitors) and the animal species (for example, predator or prey species) influence the nature of this relationship [2–5]. The COVID-19 pandemic resulted in the temporary closure of the majority of zoos world-wide. As a result, animals have had to go about their daily routines without visitors present. This has led to a unique opportunity to study the impact of visitors' presence or absence on animals in zoos.

A number of studies have attempted to explore the relationship between visitors and animal behavior. Wells [6] studied visitor effects on gorillas (*Gorilla gorilla gorilla)* and found that a low density of crowds caused the gorillas to rest more often than at times of high visitor density. High crowd densities caused the gorillas to exhibit higher degrees of auto-grooming, conspecific aggression, and abnormal behavior, therefore showing that visitors have a significant impact on gorilla behavior. Another study provides evidence that visitors have an effect on the HPA axis of spider monkeys (*Ateles geoffroyii rufiventris*) [7]. Increased visitor numbers led to increased levels of urinary cortisol (accounting for diurnal fluctuations) within the spider monkeys, ultimately demonstrating that visitors have a significant impact on some zoo-housed primates. A study on the impact of crowd density on lowland gorilla behavior found that high levels of visitors affected the behavior in a gorilla troop, causing changes in the troop's enclosure use, activity, and anxiety-related behaviors [8]. Similarly, a study on chimpanzees (*Pan troglodytes*) in Nigeria showed a significant change in behavioral patterns related to relaxation behaviors in response to tourists' presence, absence, and interactions [9].