

Human disturbance has no effect on the foraging behavior of *Cardinalis cardinalis*

Background

Growing urbanization in major cities has led to increasing anthropomorphic changes to the natural environment, including how humans and wildlife may interact with one another. As human density grows, natural areas may experience a rise in human disturbances (visitation, bicycles, loud noises) which can directly impact resident species. In particular, bird populations have experienced changes in breeding, nesting, and foraging behavior as a response to these human disturbances. In some instances, bird populations become habituated, or **increase their tolerance towards human exposure**, and may **modify their behavior in the presence of humans to reduce potential costly responses**.

Hypothesis

Foraging behavior **differs** between areas of high human disturbance and areas of low human disturbance

Predictions

1. Cardinals in **highly disturbed** areas will **forage closer to the trails**
2. Cardinals in **highly disturbed** areas will spend **more time foraging**



Methods

- We walked trails in Brackenridge divided into low and high disturbance
- Once a cardinal was spotted, location and behavior were recorded until it flew out of sight (n=54 birds)
- Recorded measures:
 - Time in or out of foraging zone
 - Distance from trail
 - No. people who walk past for 10 minute interval after bird was spotted (disturbance unit)



Disturbed trails are characterized by **high human traffic**



Undisturbed trails are characterized by **low human traffic**



A total of 49 GPS coordinates were recorded for birds encountered on the trails at Brackenridge Park, San Antonio Texas. Image taken from Google Maps

Results

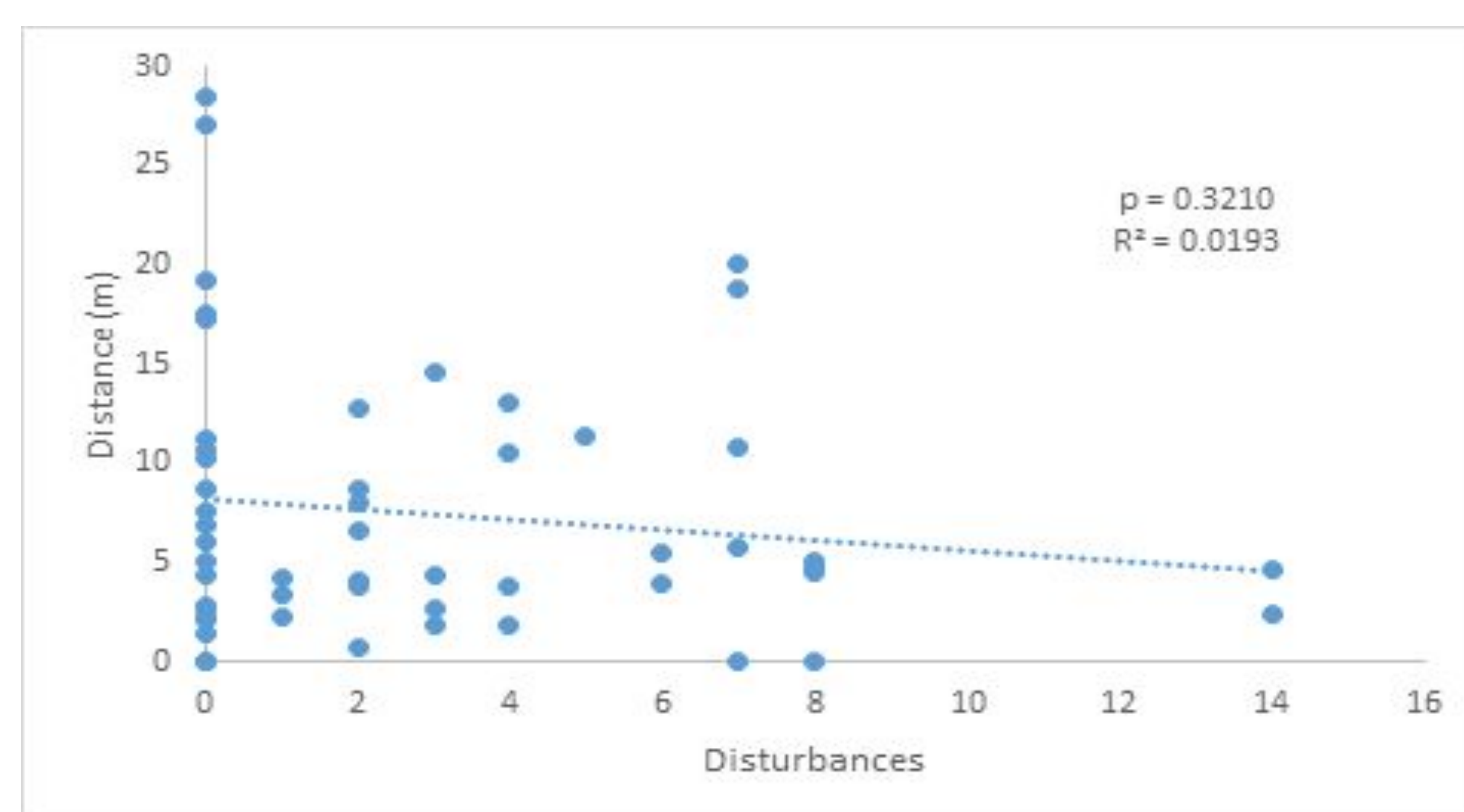


Figure 1. Distance from the trail versus number of human disturbances. The p-value is 0.3210 (n = 53; R² = 0.0193).

The distance at which cardinals forage *does not correlate* with the amount of human disturbance in the area

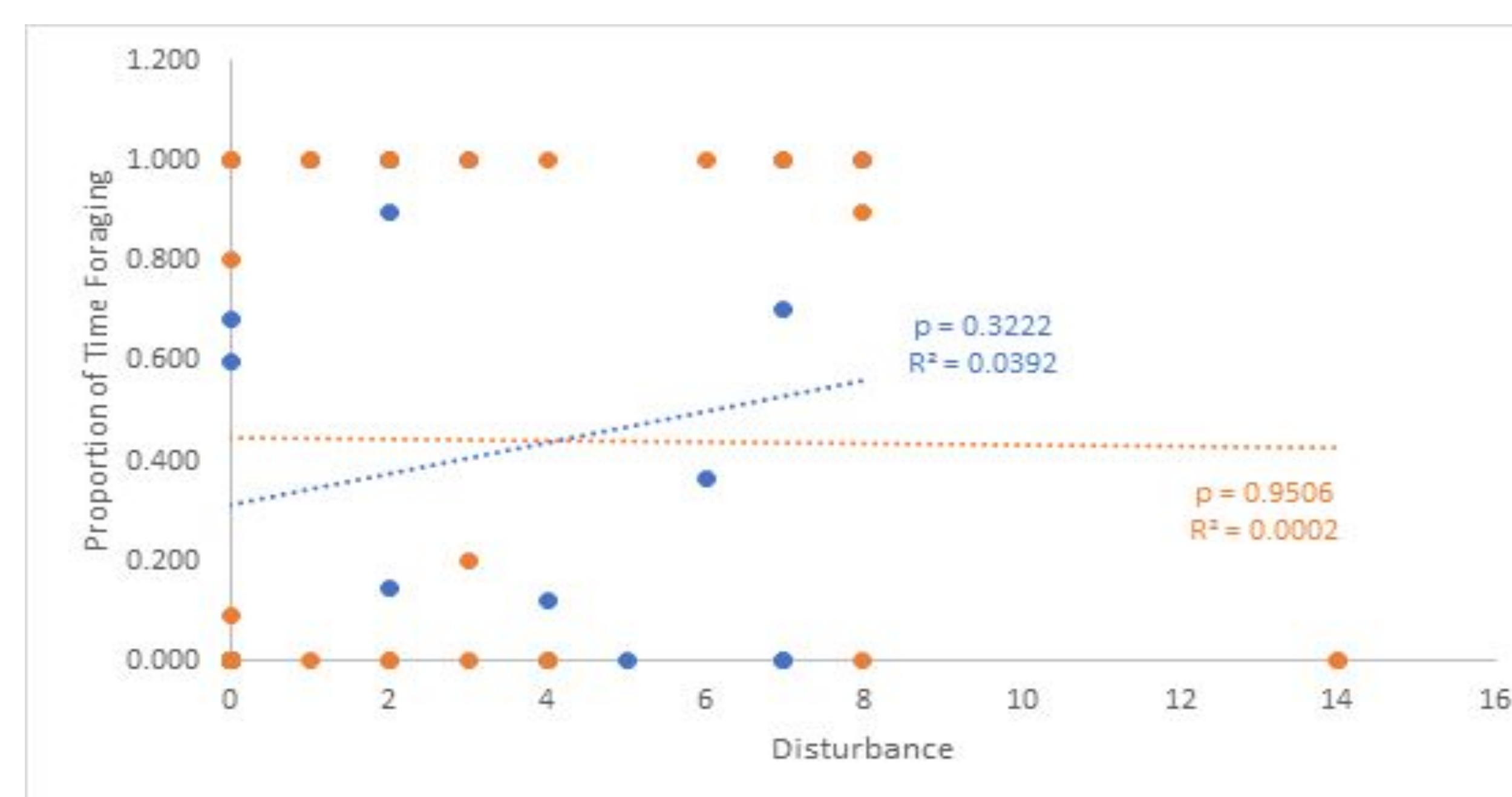


Figure 2. Proportion of time spent foraging per observation versus number of human disturbances. The p-value is 0.5851 (n = 54). The 50th percentile of cardinals with closest distances from the trail (n = 27; R² = 0.0002; orange) show a p-value of 0.9506, while those in the 50th percentile of farthest distances from the trail (n = 27; R² = 0.0392; blue) have a p-value of 0.3222.

Cardinals who forage closer to the trail *do not differ in behavior* from those who forage farther away from the trail

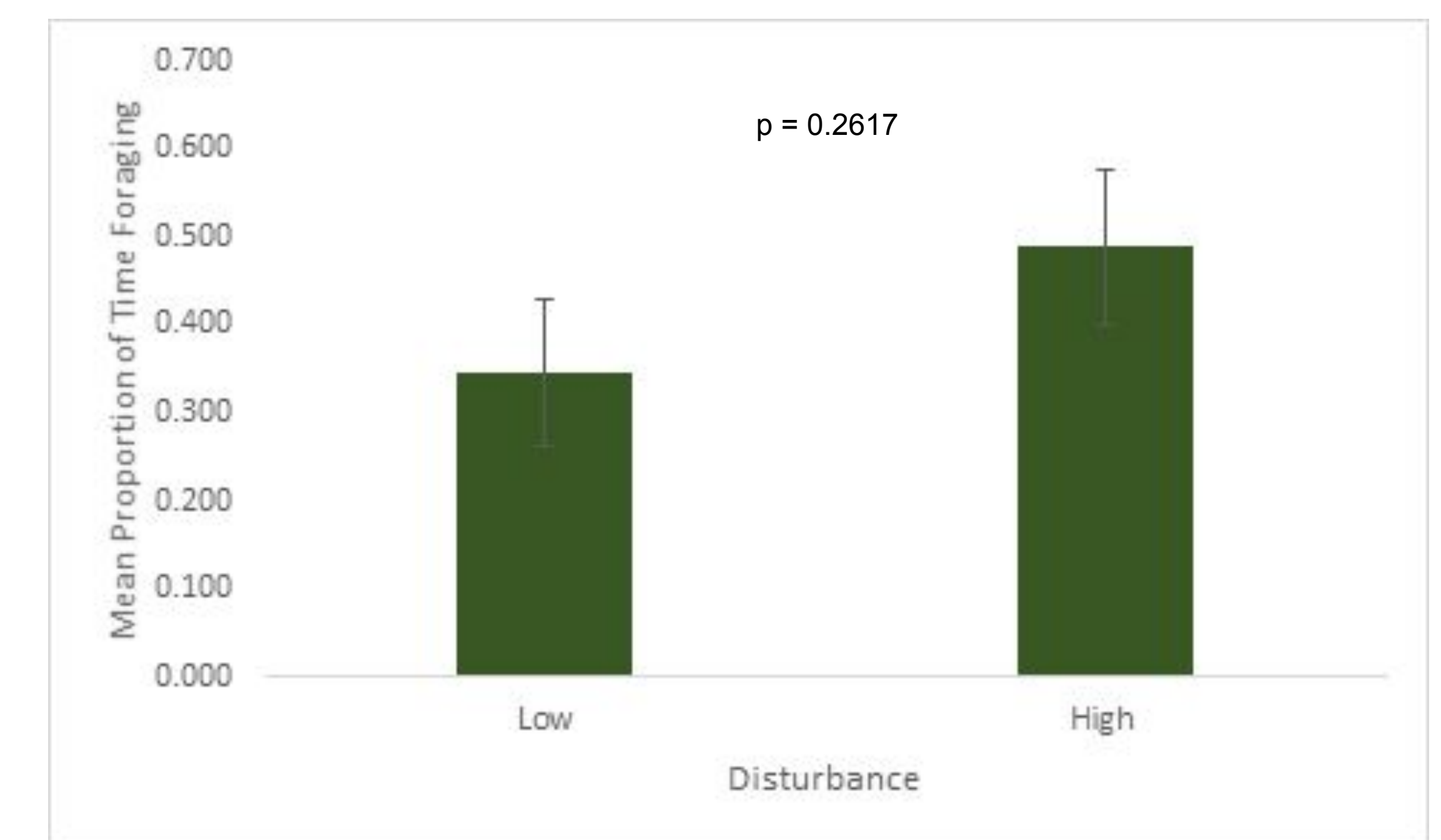


Figure 3. Mean proportion of foraging time for cardinals in high versus low disturbance areas. A t-test comparing the top 50th percentile of human disturbance (n = 27; mean = 0.4884; SE = 0.0885) and the bottom 50th percentile (n = 27; mean = 0.3454; SE = 0.0829) shows a p-value of 0.2617.

There is *no difference* between average time spent foraging for cardinals near low or high disturbed areas

Discussion

We found no significant evidence that foraging behavior of the northern cardinal population at Brackenridge Park is modified by the number of human visitors on the recreational trails.

Northern cardinals at Brackenridge either fail to perceive differences in human density or do perceive this difference but do not alter the distance at which they forage or the time spent foraging near areas of human activity. Future studies should investigate whether cardinals have the ability to comprehend discrepancies of human activity levels to determine which of these scenarios is more likely.

References

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