FEMALE VIGILANCE IN HOWLER MONKEYS (*ALOUATTA PALLIATA*)

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Abstract: Group vigilance is one beneficial aspect of group living in howler monkeys (*Alouatta palliata*), where the responsibility of scanning for danger may be partitioned among individuals depending on their social roles. We hypothesized that vigilance among female howler monkeys should vary with the risk faced to their young. We observed scanning behavior of females in two howler monkey troops in Palo Verde, Costa Rica. We found no significant difference in the percentage of time spent scanning among females with juveniles vs. infants vs. no associated young. Furthermore, the amount of time a female spent scanning did not vary with the distance to her associated young, nor with the presence or absence of a nearby male. Our finding that the presence of young had little effect on female vigilance is consistent with one but not both previous studies of this population. Sometimes male vigilance in troops may be sufficient for the detection of danger.

Key words: group living, juveniles, predator detection, primate behavior, scanning behavior

INTRODUCTION

The daily activities of howler monkey (*Alouatta palliata*) troops involve foraging, resting, traveling and scanning for danger. A reduced need for individual vigilance is one of the potential benefits of group living. Nowak et al. (2002) supported this idea and found a negative correlation between troop size and individual time spent scanning. Other studies have examined characteristics of troop vigilance in relation to the sexes and ages of the members within it. For instance, Iwamoto et al. (2003) found that the distance to and sex of the nearest neighbor had no effect on the vigilance of an individual. The effects of the presence of young on vigilance have been less clearly defined. Two contradictory studies have observed females with and without young: Cover et al. (1997) found increased vigilance in females with associated young compared to those without, while Bird et al. (1996) found no significant differences.

To resolve these contradictory findings, we studied how the presence and nearness of young affected the vigilance of female howler monkeys. We hypothesized that maternal vigilance in howler monkeys should vary with the risk faced to their young. We tested three predictions: (1) focal females with associated young (of any age) will be more vigilant than females without young; (2) focal females with infants will be more vigilant than females with free-ranging young; (3) focal females will be more vigilant when their young (of any age) are far away and therefore more exposed to danger; and (4) focal females with young will be more vigilant when there are no males nearby.

METHODS

On the mornings of 11 - 12 January 2004, we located and observed two troops of *A. palliata* at Palo Verde National Park, about 1 km northwest of the OTS field station. We conducted two-minute focal samples of individual females, and recorded the amount of time each spent scanning the surroundings, feeding, moving, or engaging in other activities. For this study, we calculated the percentage of total time spent scanning. We recorded whether each female was associated with an infant or juvenile (within 5 m) and the distance to other conspecifics. Young in direct contact with a female at all times were considered infants, while free-

roaming young were considered juveniles. All females in each troop were observed once, and then, because of the scarcity of troops in the area, observations on the same females were made again after approximately 45 min.

The percent of time spent scanning was log-transformed to correct for non-normality and heteroscedasticity. We used ANOVA and t-tests to test for differences in the percent of time a female spent scanning depending on (1) whether or not she was associated with any dependent young, (2) whether she was associated with an infant, (3) the distance to her associated juvenile, and (4) whether she was within 5 m of a male.

RESULTS

We obtained a total of 33 scan samples, from approximately 12 females over two days. Most observations came from one large troop which had no infants, approximately nine females, five males and six juveniles. A second smaller troop had approximately three females, two males and two infants.

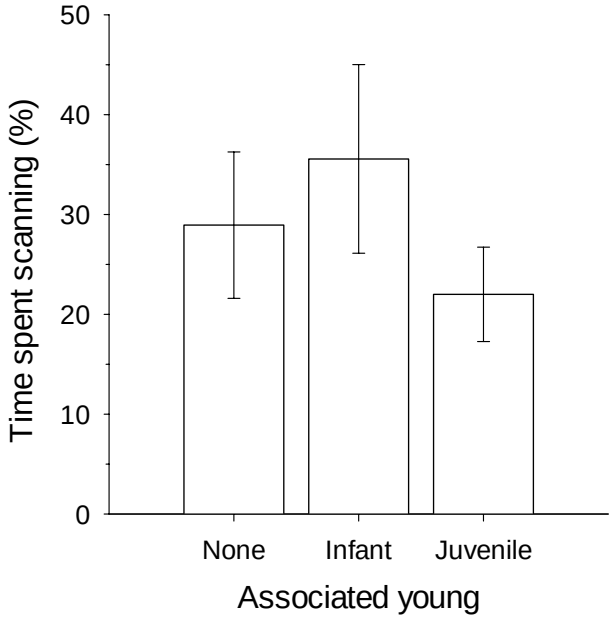

Figure 1. Mean percentage of time spent scanning (± SE) of howler monkey females with no young, an infant, or a juvenile. Young were considered to be associated when they were within 5 m of the female. Sample sizes are indicated above bars.

The vigilance of females was not significantly affected by the presence or nearness of any dependent young, or by the presence of a nearby male. There was no significant difference in the percentage of time spent scanning among females with juveniles vs. infants vs. no young ($F_{2,32}$ = 0.77, P = 0.47; Fig. 1). Females with young at distances that were near (≤ 2 m) vs. medium (2 - 5 m) vs. far (5 - 10 m) did not differ in percentage of time spent scanning ($F_{2,21}$ = 0.02, P = 0.98; Fig. 2). Among females with young at any distance, those near a male (≤ 5 m) scanned less often than those that were not near a male (Fig. 3), but the difference was not significant (t = 0.25, df = 19, P = 0.81; Fig. 3).

DISCUSSION

Female howler vigilance was not significantly affected by the presence, age class or distance of associated young. These findings are consistent with those of Bird et al. (1996), who found no difference in vigilance among females with and without young, but contrast with those of Cover et al. (1997).

We defined the nearness of each female to her conspecifics using distances that may not be biologically relevant on the scale of a howler monkey troop. We assumed that juveniles within 5 m of a female belonged to that female, but this association may not be valid for juveniles old enough to be free-roaming. Additionally, for more mobile young, the social structure of the troop may be such that communal vigilance is more important than individual maternal vigilance. It is still possible that females with dependent infants are more vigilant than females with juveniles, but too few females with infants were included in our sample to provide

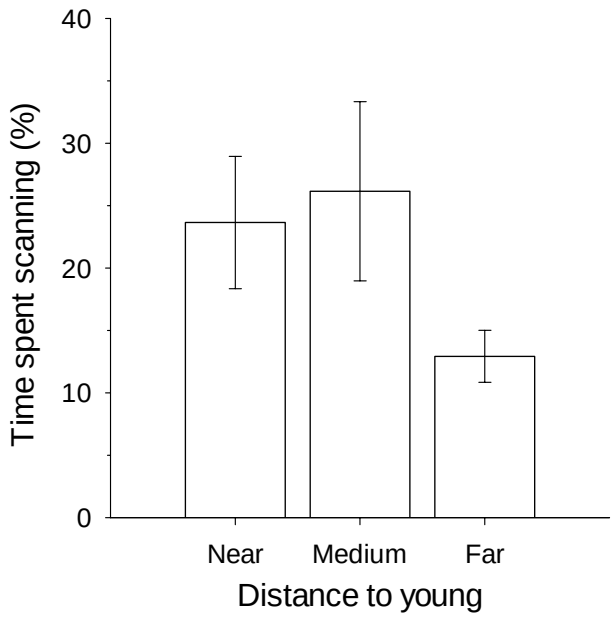

Figure 2. Mean percentage of time spent scanning (± SE) of females with young that were at a near (< 2 m), medium (2 - 5 m), and far distance (5 - 10 m). Sample sizes are indicated above bars.

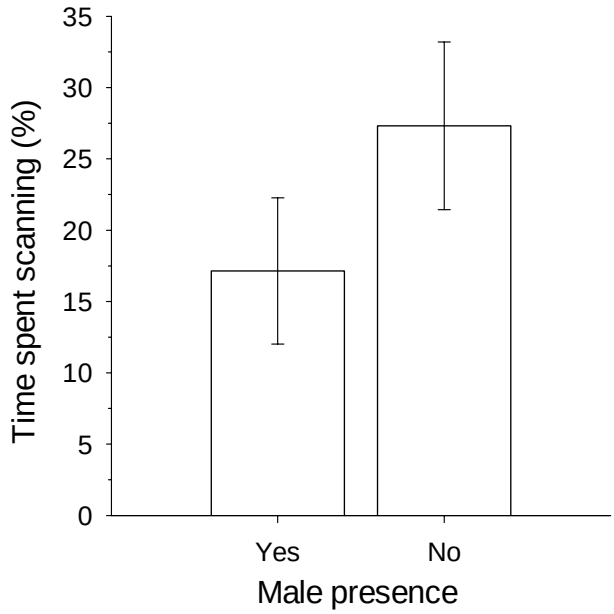

Figure 3. Mean percentage of time spent scanning (±) SE of females with young when males were and were not present within 5 m. Sample sizes are indicated above bars.

a robust test. Future studies of howler monkeys could further explore maternal vigilance by observing more females with infants. Although nearby males did not affect female howler vigilance in our study, the presence of males anywhere in a troop may ensure maternal and juvenile safety, and thus affect female vigilance. Females may relax their vigilance once a threshold number of males per female in the troop has been reached. In our study, we assessed the effect of males only within 5 m of a female. This distance may not be biologically relevant to howler monkeys, whose troop members often roam for dozens of meters in any direction. Further studies could explore this characteristic of troop vigilance. Finally, some sampling difficulties, especially low sample size, may be responsible in part for our findings. The variability in time spent scanning was so large that a greater number of samples might be necessary to detect a difference in vigilance rates. The number of individuals and troops scanned was low, and the majority of our scans came from one large troop with no infants.

Given that Nowak et al. (2002) showed that troop size has a negative effect on individual vigilance, using data primarily from a single large troop may not be representative of female vigilance in all situations. Ideally, several troops of varying sizes and compositions should be studied to address the question of female vigilance.

Earlier studies indicate that the responsibility of scanning for danger is divided among troop members (Nowak et al. 2002). Our study suggests that females may not be solely responsible for the protection of their young and that vigilance by the troop as a whole, and perhaps by adult males in particular, may have a greater role. Future studies should explore more precisely how vigilance responsibilities are divided among howler monkey troop members.

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