



Adjusting to city life: oxidative stress in adult and juvenile urban House Finches

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Background: urbanization and oxidative stress

House Finches are native to the southwest and occur in both natural desert and urbanized habitats.

Oxidative stress is the state in which the amount of reactive oxygen species (ROS) exceeds the antioxidant capacity of the body, leading to cellular damage [1].

Urban environments might increase oxidative stress through a several sources [1] including:

- Air pollution, especially NO_x compounds
- Food sources with poor nutrition (lack of antioxidants)
- Increased prevalence of diseases

Age could affect ability to cope with the above stressors.

We hypothesized that measures of oxidative stress would differ as a function of:

- Age
- Health status (higher in birds infected with avian pox)



Native desert environment



Urban environment (ASU campus)

Recently independent juveniles experience more oxidative stress

- Juveniles had higher reactive oxygen metabolites (ROMs) in plasma, which result from oxidative damage (Fig. 2).
- Juveniles had higher uric acid levels in plasma (an antioxidant), though this was not significant after Bonferroni correction (Fig. 3).



Figure 2. Reactive oxygen metabolites across age groups.

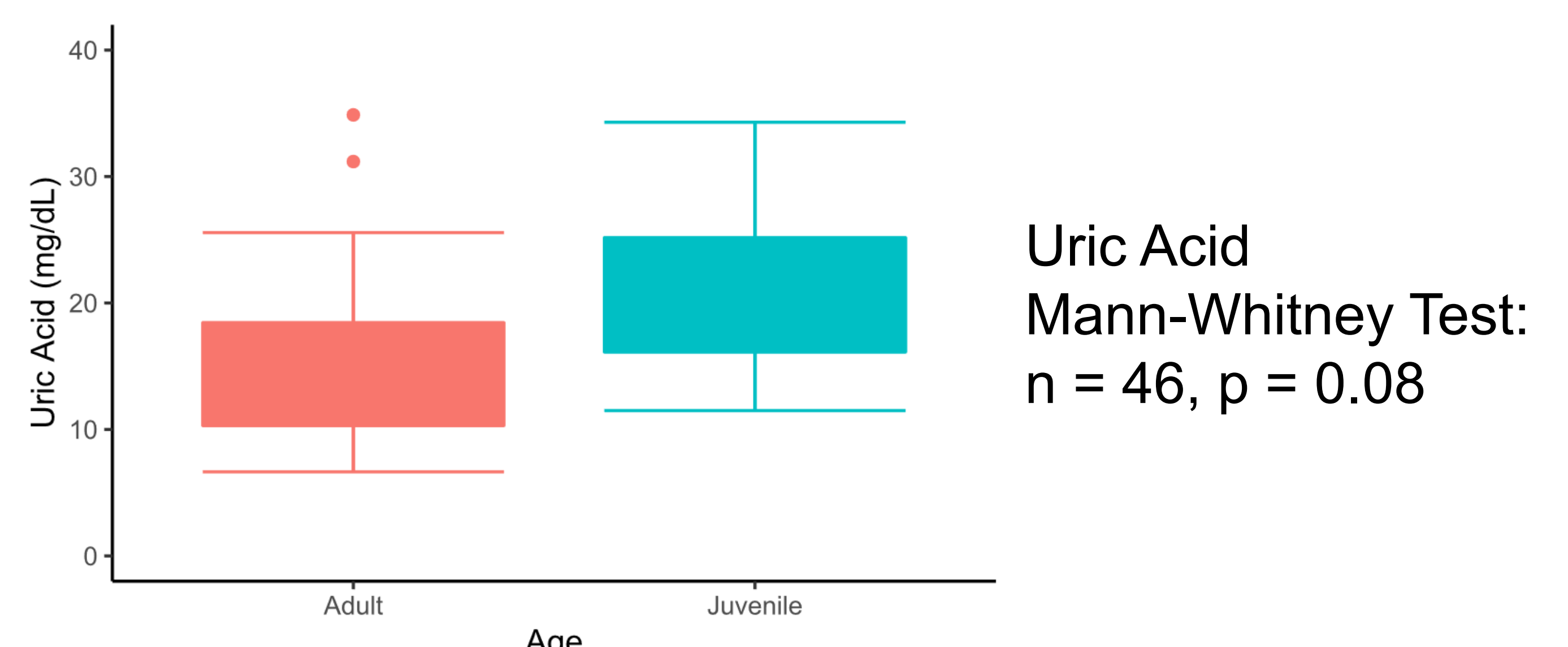


Figure 3. Plasma uric acid levels across age groups.

Uric acid and reactive oxygen metabolites (ROMs) are positively correlated

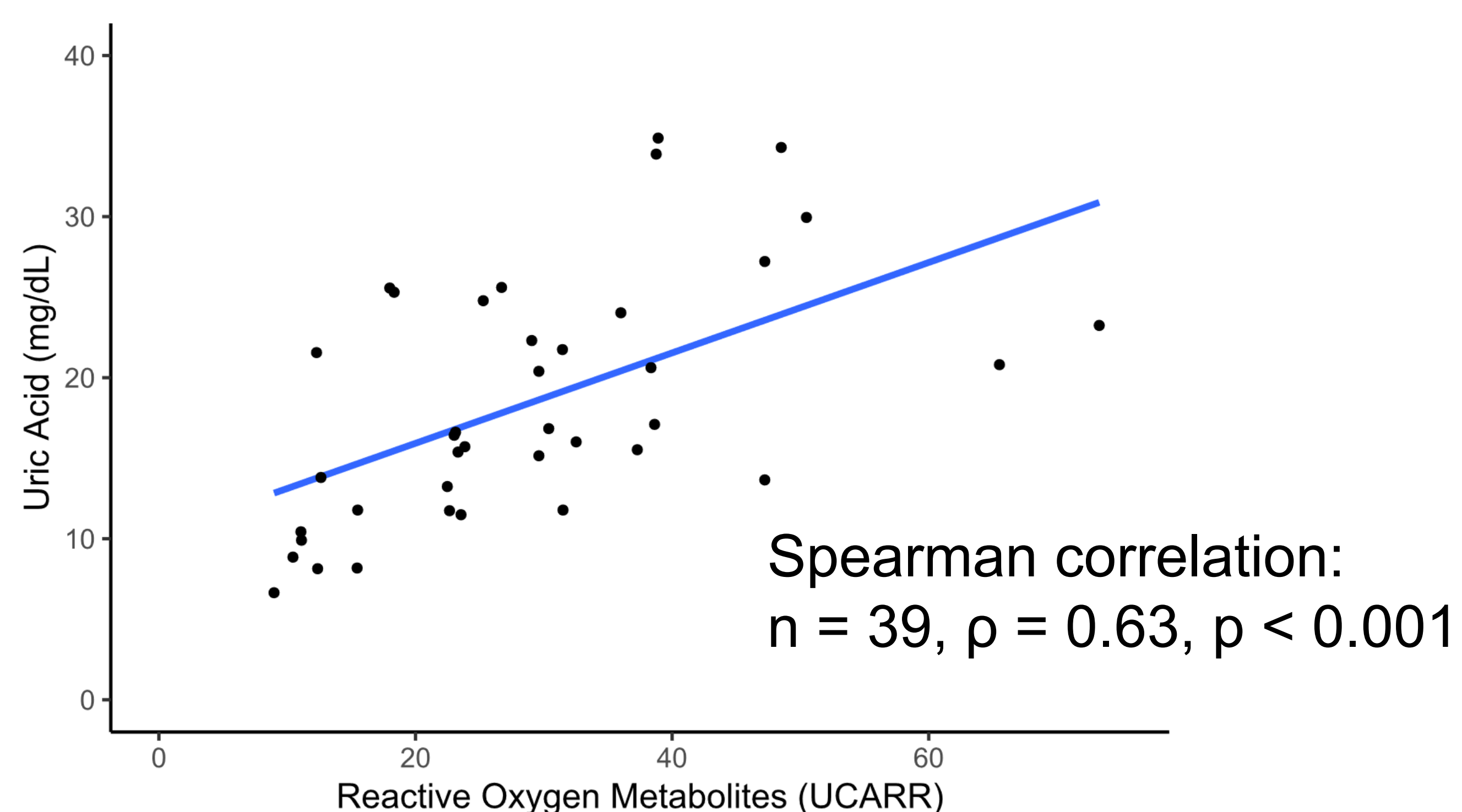


Figure 1. Correlation between plasma levels of uric acid and reactive oxygen metabolite. Each point represents an individual house finch.

Conclusions

- Juveniles experience oxidative stress differently than adults, possibly due to increased metabolism.
- Age groups might respond differently to the same external stressors.
- Antioxidant levels correlated with oxidative damage.

Future Directions

This study is the start of a multi-year monitoring project to determine the effects of urbanization on house finch physiology, fitness, and behavior.

We will begin sampling non-urban finches this winter for comparison to urban populations.

We will introduce additional measures including:

- Catalase activity (an antioxidant enzyme)
- Corticosterone levels (a "stress" hormone)
- Total antioxidant capacity
- Exploratory behavior



Exploratory chamber (WIP)

Acknowledgments

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References

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