Do European Starlings 'Exercise' in Anticipation of Fledging?

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It is well known that increased activity levels in humans can enhance morphological or physiological traits (Hoppeler et al 1985; Pollok et al 1987; Malina 1996)

What about animals?

Most work is anecdotal in birds +

Very little evidence of 'exercise' is observed in small, cavity-nesting birds

We predicted:

a) active behaviours would increase in frequency and duration approaching fledging,

b) "voluntary activity" will be independent of brood size (cf. simple social crowding effects),

c) if activity functions as "exercise" then increased nestling activity will positively correlate with somatic and physiological developmental traits at fledging.

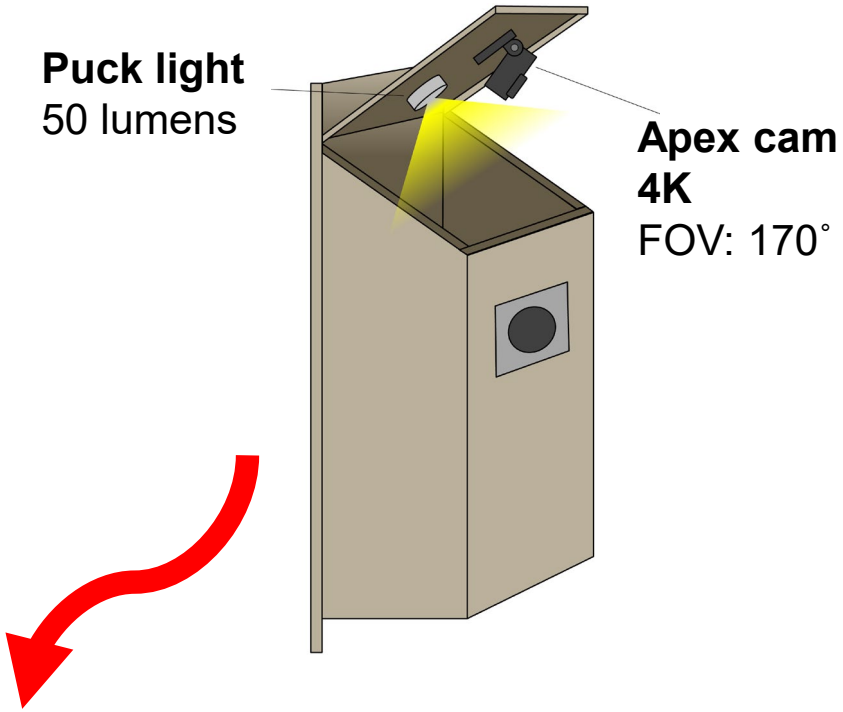
Methods

- Filmed 14 nest boxes, 1 hour per day throughout days 16-20 post hatch

- n = 53 chicks, brood size 2-6 chicks

- Blood sampled each chick on day 20 to assess physiological development (1 day before fledging)

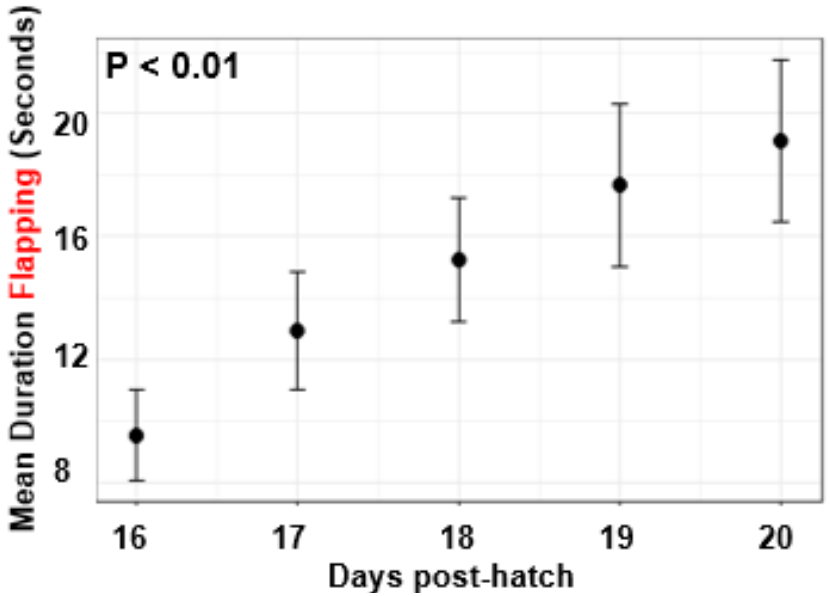
- Created an ethogram to define activity state and event behaviours for video analysis

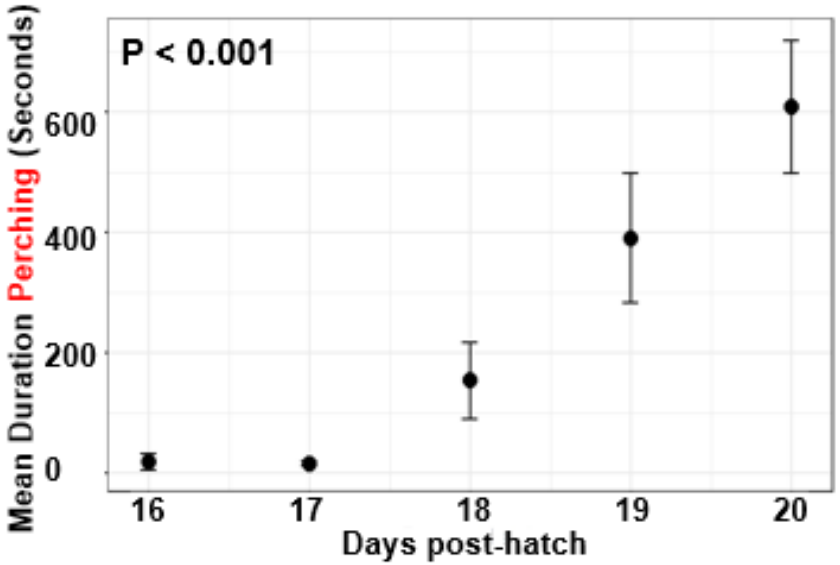


Behavior		Code	Description
State	Wing flap	FL	Wings are fully extended and moving up and down
	Walk	WA	Movement consisting of small hops or steps within the nest
	Stand	ST	In an upright position with legs extended; breast not in contact with nest floor
	Sit	SI	Legs tucked into body; breast in partial or full contact with nest floor
	Perch	P	Using feet to maintain upright, balanced position at nest box entrance; not in contact with nest floor
	Maintenance	M	Self- or allopreening with beak, scratching body with feet, or wiping beak

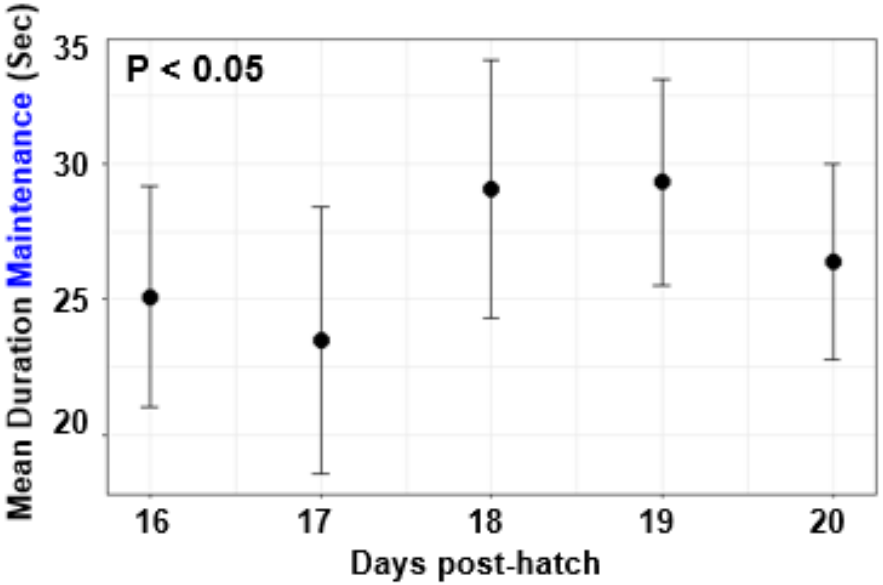
Results

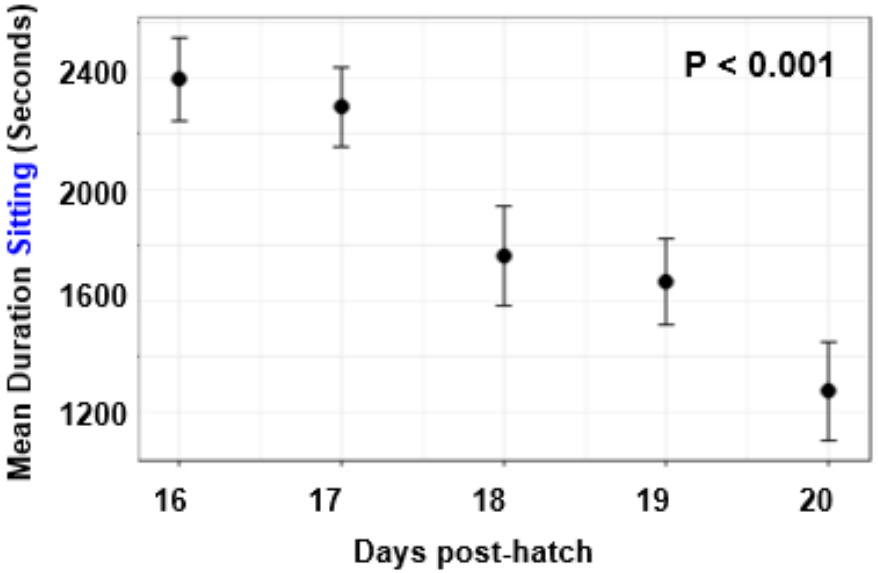
Some putative "exercise" behaviours did increase in days leading up to fledging





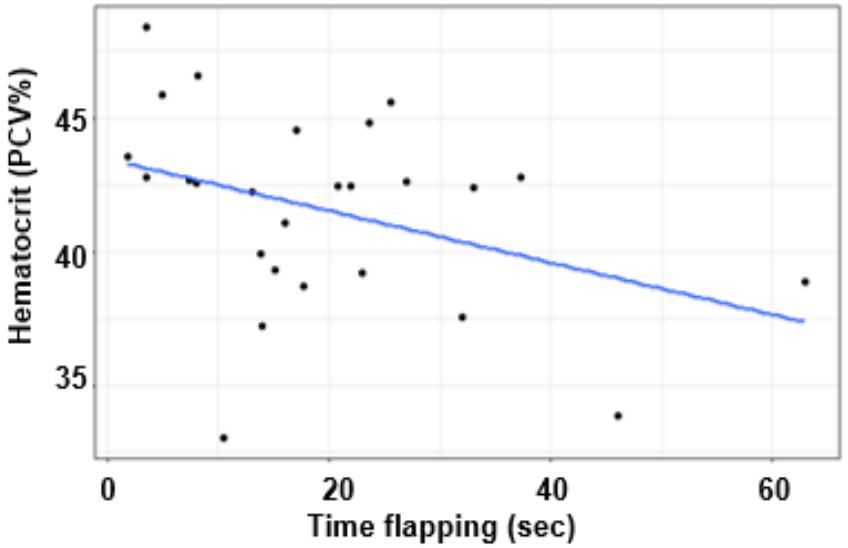
Other behaviours either do not change or decrease in days leading up to fledging

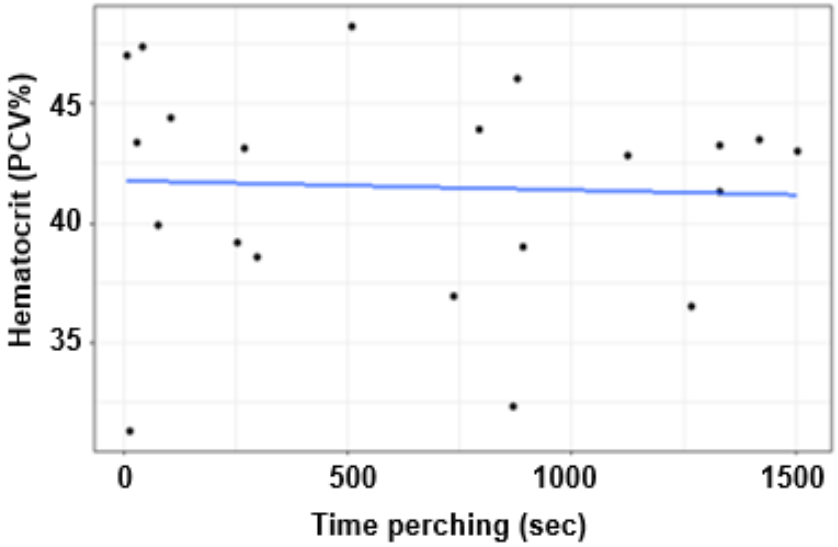




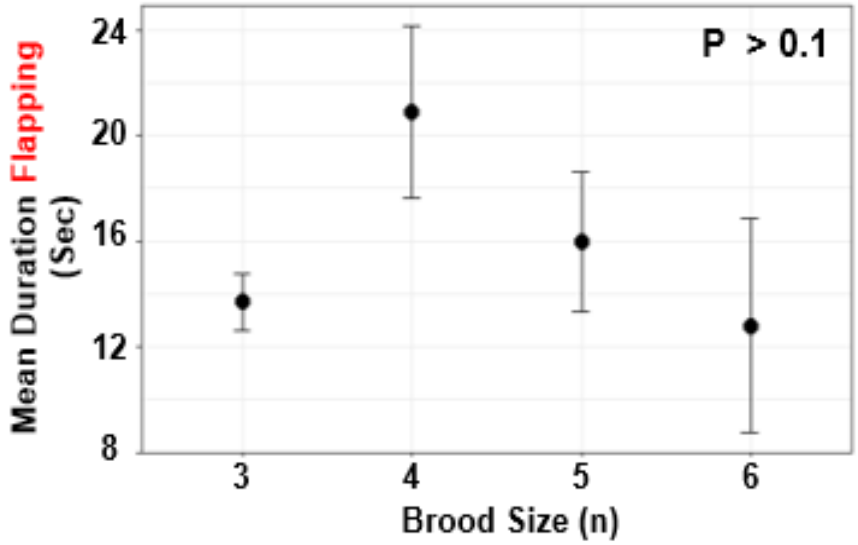
Results

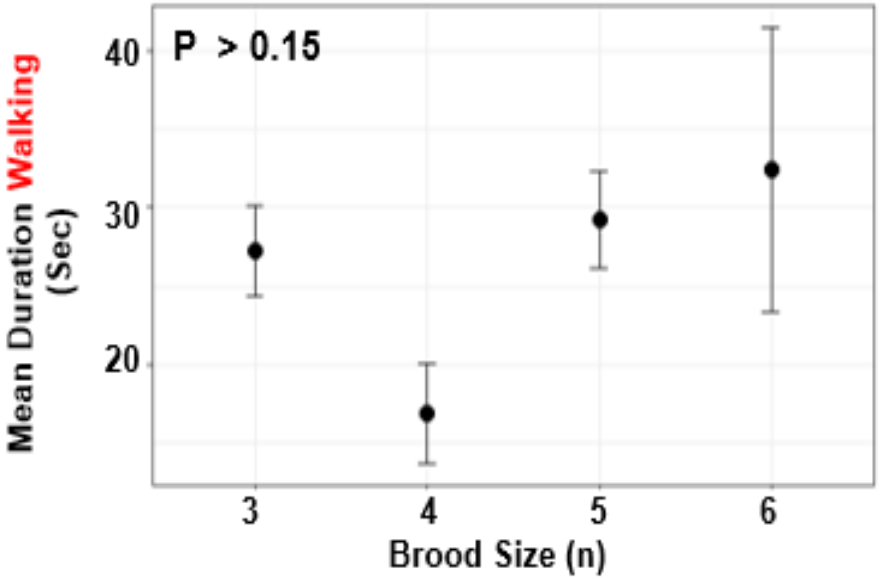
No evidence that individual variation in putative "exercise" behaviours related to physiological state at fledging





'Activity' is not simply a side-effect of social crowding (i.e. brood size)





Conclusion: Do European starling chicks really ‘exercise’ in anticipation of fledging? Maybe...

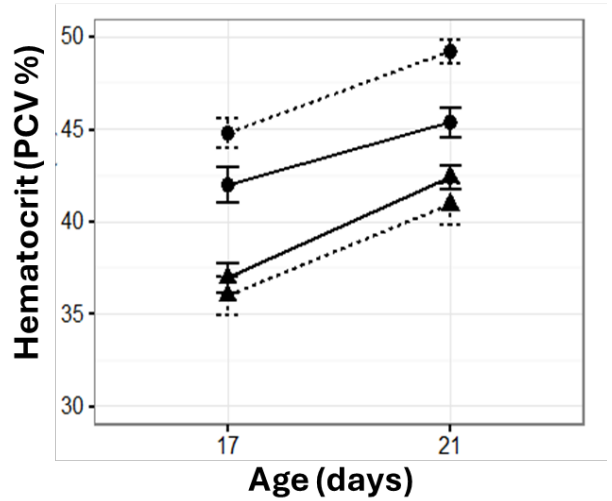
If wing flapping is interpreted as “exercise”,wing flapping (and other ‘exercise’ behaviours) increased in the days leading up to fledging

If Starling chicks do ‘exercise’ (e.g. wing flapping), they likely do not ‘exercise’ enough to show physiological effects

However, most activities (e.g. perching, flapping, walking) DO *increase* leading to fledging

These presumably have an energetic cost at a time that coincides with a critical period for pre-fledging physiological development (Cornell et al. 2017)

– does this constraint explain why chicks fledge with sub-adult physiology (Hct, Hb)?



Credits

Tony Williams

Brett Hodinka

Joshua Allen

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