

How does condition dependence for sexually dimorphic traits evolve during rapid adaptation?

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Introduction

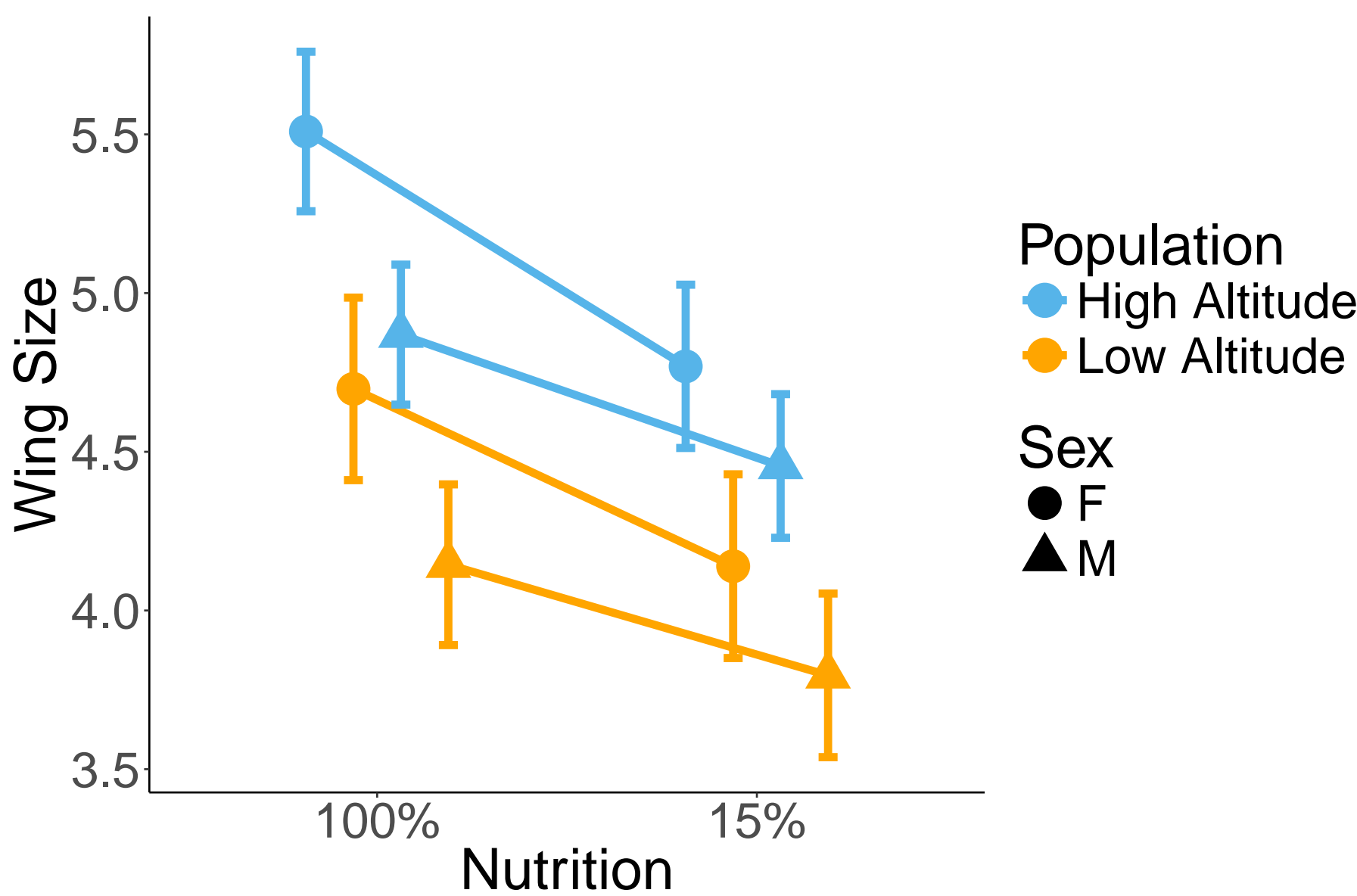
Sexual dimorphism is thought to arise as a resolution of sexual conflict due to sexually antagonistic selection (1). Condition dependence, the relationship between access to resources and the organism's resource utilization efficiency that leads to the ultimate size of the organism, is essentially universal (2). A close relationship between sexual dimorphism and condition dependence exists, with the most sexually dimorphic traits often exhibiting greatest condition dependence, especially for male-biased sexual dimorphism (3). It remains unclear how condition dependence for sexual dimorphism evolves under different evolutionary scenarios. Here we examine how condition dependence of sexual dimorphism changes after recent rapid evolutionary change to a new environment. We used natural populations of *Drosophila melanogaster* from Sub-Saharan Africa that vary substantially with respect to altitude (4). The high-altitude population has undergone recent, rapid evolution during its adaptation to the high-altitude environment including a substantial increase in overall size and greater wing-body size ratio (4). We raised flies from isogenic lines collected from the high and low altitude populations in different nutrition and temperature treatments and quantified wing size, wing shape, sexual size dimorphism (SSD) and sexual shape dimorphism (SShD).



Questions

- Does condition dependence of sexual dimorphism differ in the high and low altitude populations?
- Do we observe similar condition dependent responses for strength and direction of sexual dimorphism for size and shape?

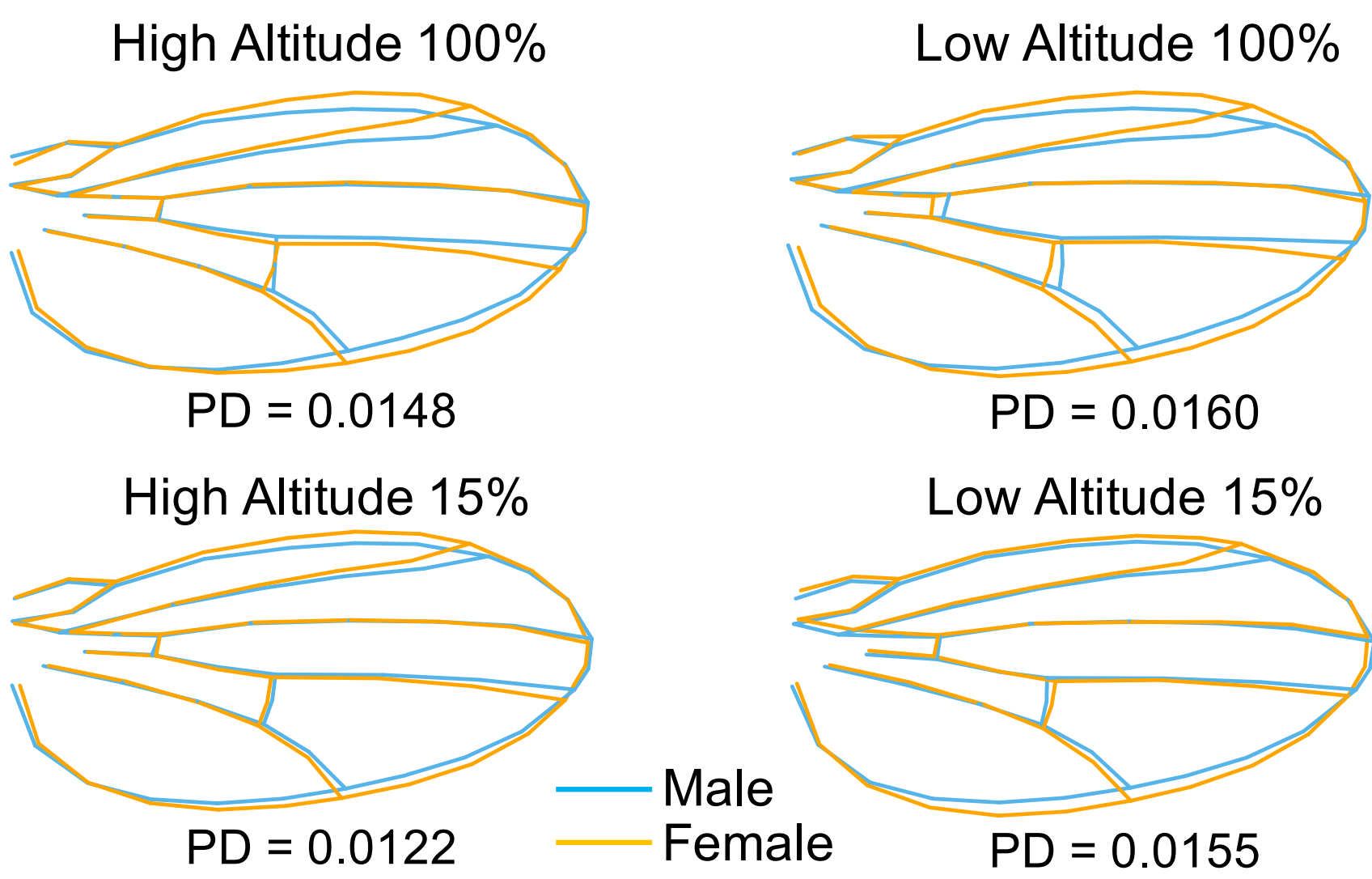
Condition dependence of sexual size dimorphism is similar across populations



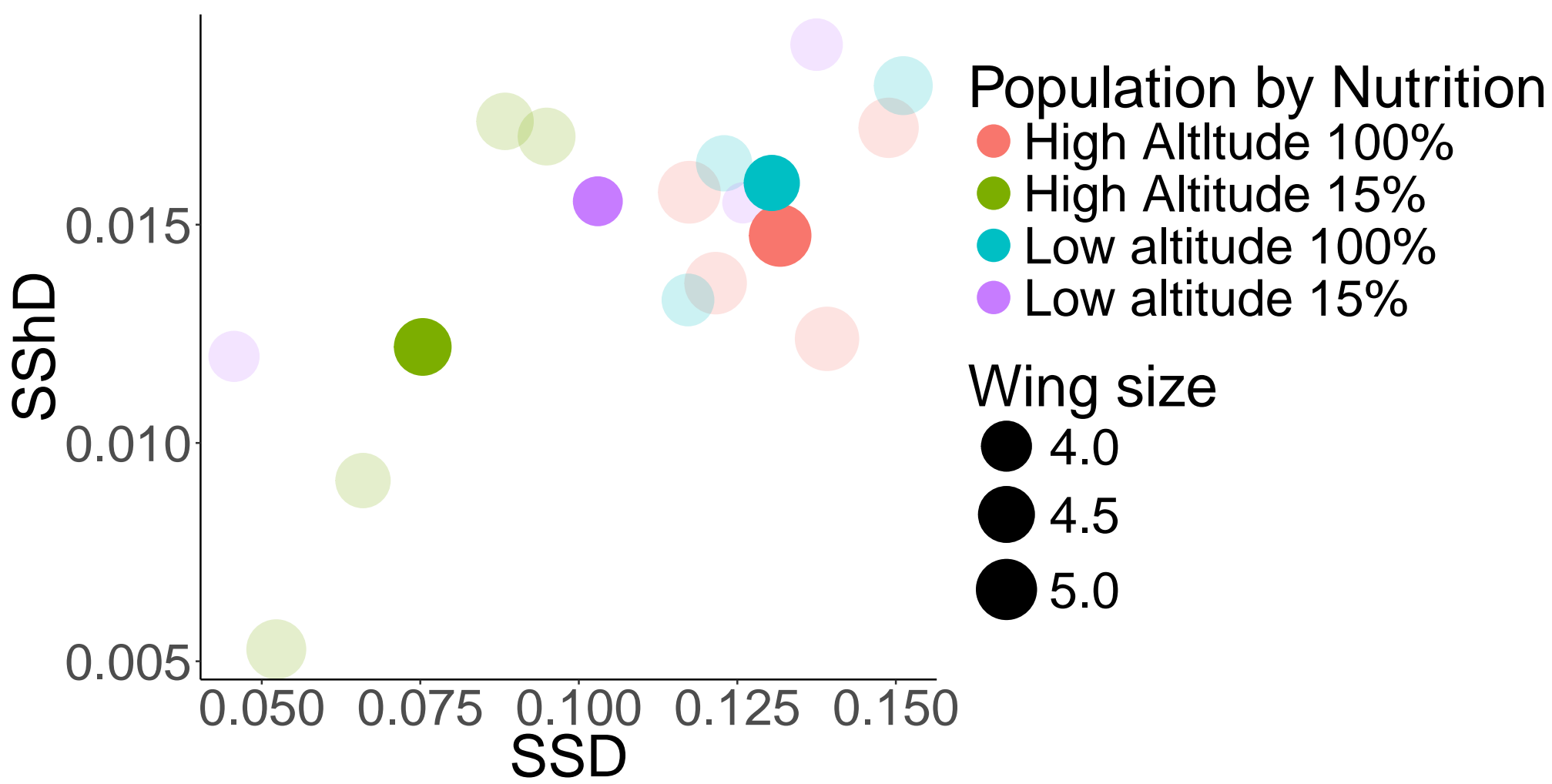
Acknowledgements

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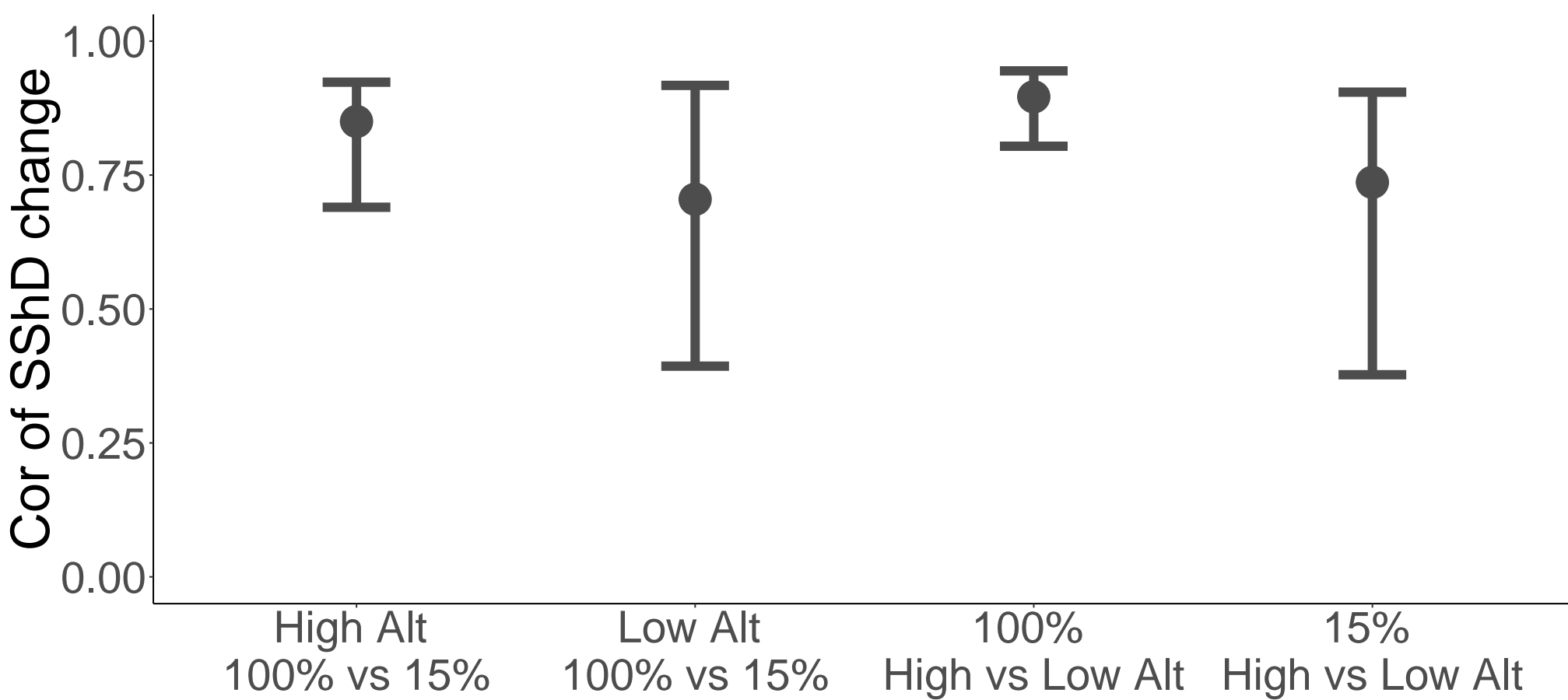
Condition dependence for sexual shape dimorphism differs across populations



Differences in sexual shape dimorphism are driven by changes in magnitude ...



... but directions of sexual shape dimorphism are similar across populations and condition



Conclusions

- Females are more strongly affected by poor condition.
- Condition dependence of sexual shape dimorphism is greater in the high-altitude population.
- Condition dependence of SShD is primarily due to magnitude rather than the direction of SShD change.

References

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3. R. Bonduriansky, *American Naturalist* **169**, 9–19 (2007).
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