

Bigger is not always better: selection on body mass varies across life stages in a hibernating mammal

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Abstract

Body mass is often viewed as a proxy of past access to resources and of future survival and reproductive success. Links between body mass and survival or reproduction are, however, likely to differ between age classes and sexes. Remarkably, this is rarely taken into account in selection analyses. Selection on body mass is likely to be the primary target accounting for juvenile survival until reproduction but may weaken after recruitment. Males and females also often differ in how they use resources for reproduction and survival. Using a long-term study on yellow-bellied marmots (*Marmota flaviventer*), we show that body mass was under stabilizing selection in the first years of life, before recruitment, which changed to positive directional selection as age increased and animals matured. We found no evidence that selection across age-classes on body mass differed between sexes. By investigating the link between running speed and body mass, we show that the capacity to escape predators was not consistent across age classes and followed a quadratic relationship at young ages only. Overall, our results indicate that mature age classes exhibit traditional patterns of positive selection on body mass, as expected in a hibernating mammal, but that mass in the first years of life is subject to stabilizing selection which may come from additional predation pressures that negate the benefits of the largest body masses. Our study highlights the importance to disentangle selection pressures on traits across critical age (or life) classes.

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