

# What's the meta-analytic evidence for life-history trade-offs at the genetic level?

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## Abstract

Understanding the evolutionary mechanisms underlying the maintenance of individual differences in behavior and physiology is a fundamental goal in ecology and evolution. The Pace-of-life syndrome hypothesis is often invoked to explain the maintenance of such within-population variation. This hypothesis predicts that behavioral traits are part of a suite of correlated traits that collectively determine an individual's propensity to prioritize reproduction or survival. A key assumption of this hypothesis is that these traits are underpinned by genetic trade-offs among life-history traits: genetic variants that increase fertility, reproduction and growth might also reduce lifespan. We performed a systematic literature review and meta-analysis to summarize the evidence for the existence of genetic trade-offs between five key life-history traits: survival, growth rate, body size, maturation rate, and fertility. Counter to our predictions, we found an overall positive genetic correlation between survival and other life-history traits and no evidence for any genetic correlations between the non-survival life-history traits. This finding was generally consistent across pairs of life-history traits, sexes, life stages, lab vs field studies, and narrow- vs broad-sense correlation estimates. Our study highlights that genetic trade-offs may not be as common, or at least not as easily quantifiable, in animals as often assumed.

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