

How Social Complexity and Conflict Shapes Stress Coping Styles and Cognition—lessons from fishes

Abstract:

Have you ever thought that your social environment might be shaping your personality, cognitive abilities, and your stress response? These types of hypotheses are difficult to test (definitively) with humans; however, we can rigorously examine them with fish. We took advantage of the diversity of reproductive phenotypes in the swordtail fish (*Xiphophorus nigrensis*) to conduct rearing experiments that manipulated the social environment along gradients that differ in social complexity, conflict, and variability. Following a lifetime of exposure to different social conditions, we examined female swordtail personality traits, cognition, stress coping styles, and neurogenomic responses. We found that (i) certain personality traits (boldness, aggression) were driven by the complexity of the social environment; (ii) female stress reactivity and coping styles varied by the amount of conflict (sexual coercion) they experienced; and that (iii) the type of cognitive domains females excelled in differed by social experience. We found that the harshest social environment (e.g. the one with the greatest level of sexual coercion) produced females exhibiting the highest levels of social cognition; however, these females did poorly on a problem-solving (inhibitory control) task. In general, females from more complex social environments performed better at inhibitory control than those from simple environments. And lastly, females from simple environments performed better at spatial cognition than females from complex social environments. Overall, our research points to a large contribution of the social environment to the development of behavior, stress response, and cognition. Furthermore, it highlights that the social environment can have a targeted effect on specific cognitive domains and produce cognitive trade-offs.