The effects of intraspecific variation in metabolic rate on tolerance to hypoxia and risk-taking behaviour in European sea bass

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The effects of environmental hypoxia on vulnerability to predation in fishes are not well understood, especially with regard to how these effects may differ among animals due to individual variation in physiological factors such as metabolic rate. We measured the swimming activity of juvenile European sea bass (n = 23) under conditions of normoxia and hypoxia (40% and 20% oxygen saturation). After being startled with a model predator, fish exposed to hypoxia re-emerged from cover sooner and were generally much more active compared to when the same fish were tested under normoxia. The magnitude of the increase in activity among individuals during hypoxia was correlated with metabolic rate. Instances of aquatic surface respiration were also observed under hypoxia, and were also directly related to individual metabolic rate. In nature, increased activity during hypoxia could increase the likelihood of finding an area with increased oxygen availability but could also increase exposure to predators. The rank order of each measure of risk was not consistent between the three oxygen levels, further suggesting that individuals differ in their sensitivity to hypoxia and the degree to which this environmental stressor affects risk-taking behaviour, and possibly, susceptibility to predation.