

Research into impact of food deprivation on starlings shines new light on depression

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Just ten days of restricted access to food in early life has led to enduring effects on feeding motivation and sensitivity to reward in starlings – behavioural characteristics consistent with depression in humans.

In humans, early-life [adversity](#) including physical and emotional neglect, abuse and trauma, are associated with increased vulnerability to [mood disorders](#) in later life. Recent evidence seems to indicate that the type and timing of childhood exposure to adversity could play a key role in determining the subsequent consequences for the development of mood disorders.

However, due to the diverse nature of the adversities to which people can be exposed, it is challenging to identify specific effects using epidemiological human data. Animal studies permit the manipulation of the sources of adversity, enabling causal hypothesis to be conclusively tested. Which is just what the COMSTAR project has done, with support from the European Union, and its findings have just been reported in a paper published in the journal *Scientific Reports*.

The team explains that much work has been done to analyse the impact of early-life adversity on

laboratory rodents, usually involving the temporary separation of pups from their mothers, for various periods, within the first fortnight of birth. But as with the constraints on studies into humans, most of the experiments typically confound different sources of adversity (e.g. malnutrition, hypothermia, lack of grooming, physical contact and protection). Only one experiment they cite tested the impact of one specific adversity, food deprivation, by placing pups with a non-lactating female.

Food, say the researchers, "(...) is arguably the most important developmental input. In addition to the fundamental role of food in fuelling normal growth and development, food is also a primary reinforcer, capable of shaping behaviour via learning." Feeding schedules influence how the subjects experience reward, and also punishment by removal when food is withheld. So the team set out to analyse to what extent early-life feeding could play a role in calibrating the way individuals seek, evaluate and respond to reward and punishment.

As they explain, since depression is characterised by hypo-sensitivity to reward and hyper-sensitivity to negative stimuli, they were interested to see if early-life feeding schedules could be important in the development of depression-like phenotypes. Cautious not to muddy the waters, they were careful to ensure the subjects of their experiments, European starlings, had more [food](#) delivered than the effort required to obtain it, so dissociating effects from those arising from simple, nutritional needs.

They manipulated the amount (Amount treatment) and the begging effort (Effort treatment) to create different combinations and found that the feeding schedule experienced for just 10 days in early life can cause enduring effects on adult feeding motivation and sensitivity to reward loss and gain. These results highlight the importance of early-life feeding schedules in the development of depression-like phenotypes.

Anxiety and depression often occur at the same time. So far this has frequently been taken to mean they arise from the same cause. But COMSTAR's results suggest the possibility that they could have different causes relating to the experience of punishment and of reward. As they put it, '(...) our results contribute to recent arguments that the role played by feeding schedules in shaping adult human behaviour may have been underestimated and needs serious consideration."

COMSTAR (The effects of early-life adversity on cognition: A comparative approach) is investigating the consequences of [early-life](#) adversity for adult health and behaviour. Unusually the team is also researching the same topic comparatively in humans and in European starlings in a bid to establish if early stress and adversity speed up ageing. Ageing is measured chiefly through changes in the length of telomeres, the protective DNA 'caps' at the ends of chromosomes. Their research is trying to understand how individuals adjust their behavioural decisions according to their bodily state and their biological age.

More information: Vikki Neville et al. Dissociating the effects of alternative early-life feeding schedules on the development of adult depression-like phenotypes, *Scientific Reports* (2017). [DOI: 10.1038/s41598-017-13776-4](#)

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