3Rs Prize Winner

Joanna Makowska

The importance of burrowing, climbing and standing upright for laboratory rats

Summary

 The winning paper, by Joanna Makowska and Daniel Weary from the University of British Columbia, describes research comparing the behaviours of laboratory rats in two different caging types, standard "This year's prize winning paper provides compelling scientific evidence that burrowing, upright standing, stretching and climbing are important behaviours for rats and that the opportunity to express these behaviours is limited in standard laboratory caging. It suggests that the welfare of laboratory rats could be improved and the challenge now for the research community and those who develop guidelines is to consider how these findings can be incorporated into every day practice."

caging and semi-naturalistic caging. The latter provides greater space and complexity, and opportunities to perform a wider range of natural behaviours.

- The study showed the laboratory rat has a high motivation to perform natural behaviours such as burrowing, climbing and standing upright. Rats are limited from performing these activities in standard caging.
- One particular difference between standard and semi-naturalistic caging was the frequency of lateral stretching. Rats housed in standard caging have high rates of lateral stretching which suggests that they are compensating for the inability to stretch in the upright position. One function of stretching is to relieve stiffness and positional stress.
- Despite having been bred in captivity for more than 150 years, the rat has innate natural behaviours. Failure to satisfy these behavioural needs could negatively affect animal welfare.

The Panel's view

3Rs impact

 This work provides a scientific basis for a change in guidelines on laboratory rat housing, including increasing cage height from the current minima of 18 cm or 20 cm (depending on geographical location) and providing substrate for burrowing.

 A number of laboratories across Europe and North America, informed by this research, have already modified their rat housing to allow the animals to express these natural behaviours and to be more active.

Figure 1: Photographs of the two housing environments.

Figure 1a: The semi-naturalistic cage measured 91×64×125 cm (L×W×H) and was made of horizontal wire bars that allowed climbing. It also contained climbing structures and soil for burrowing.

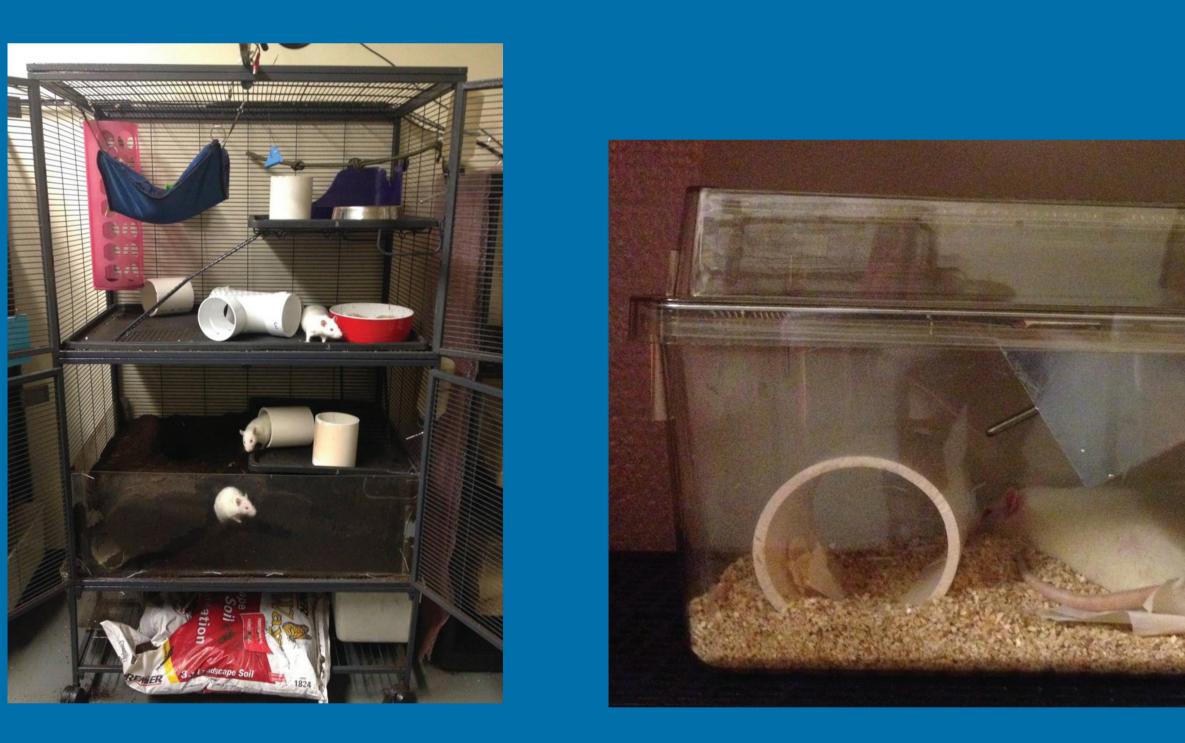
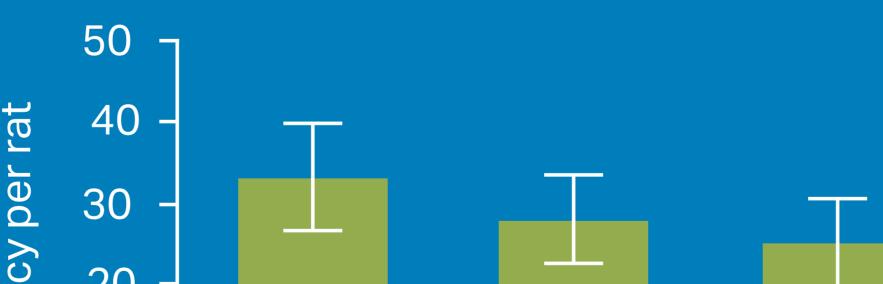


Figure 1b: The standard cage measured 45×24×20 cm (L×W×H); this height does not allow rats to stand and stretch upright.

Figure 2: Rats' propensity to burrow as they got older remained constant at approximately 30 bouts/day totalling 20-30 mins. Since rats and other mammals become less active with age, a constant rate of burrowing suggests that this activity may be particularly important to rats.



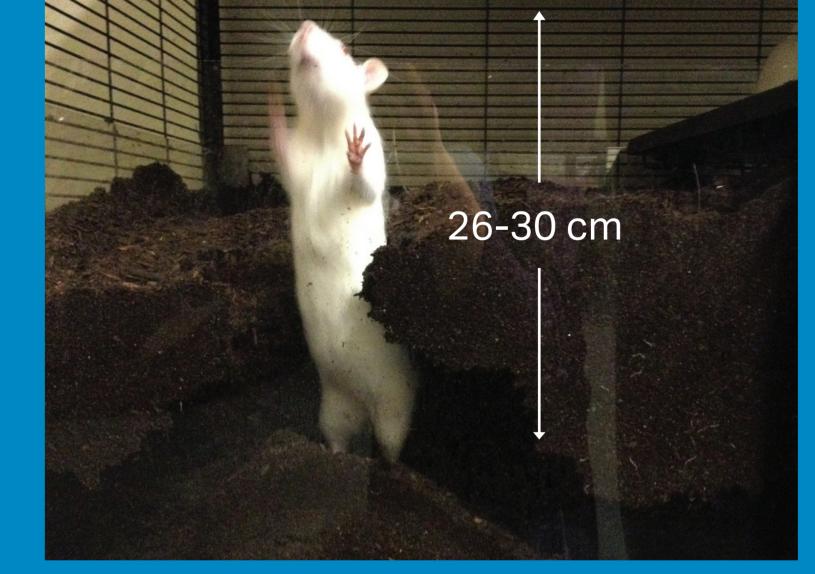




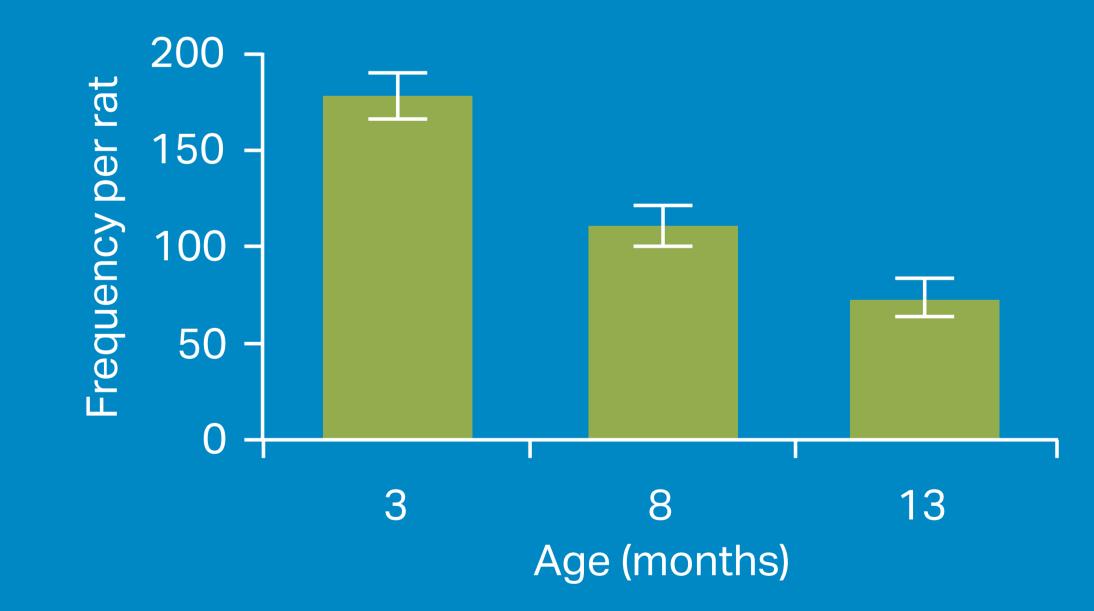
 The prize grant will be used to help deliver more practical ways of allowing rats to express natural behaviours in the laboratory setting.

Figure 3: Young rats stood upright approximately 180 times per day, or every 4 mins. Older rats still stood upright about 75 times per day. Rats appeared to stand upright to explore or to stretch.









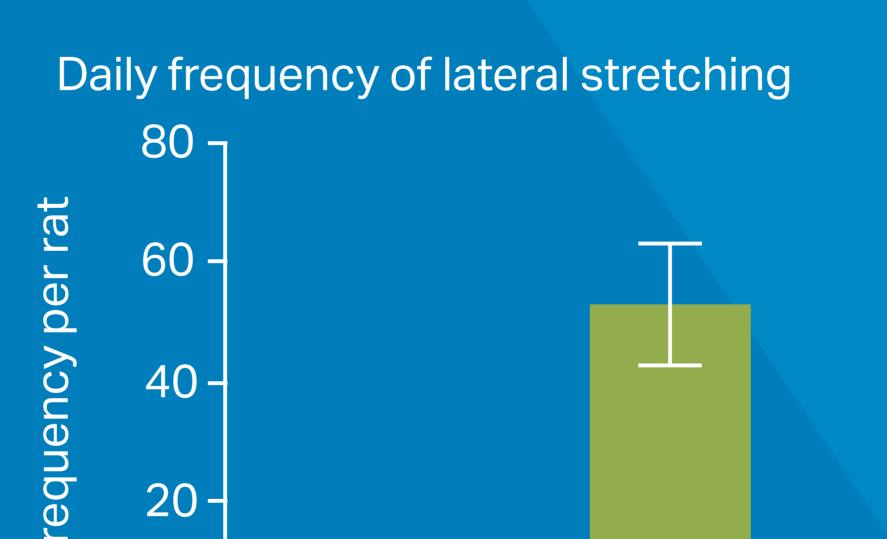
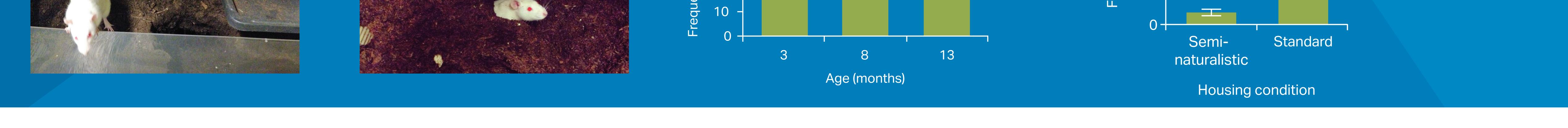


Figure 4: Standard housed rats performed nine times more lateral stretches than rats in the semi-naturalistic condition.



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