

Characterizing impulsivity traits as a part of the personality of the domestic cat – Abstract

An increasing number of companion animals, including cats, are obese, resulting in increased risk of health disorders. Many risk factors have been considered for contributing to the development of obesity in cats already, but the influence of personality has not. In humans, the trait impulsivity is known to play a role in overweight and here it was investigated if the same is true for cats. Impulsivity is the inability to think about a decision before acting upon it, possibly including three independent components, namely motor impulsivity (i.e. the ability to inhibit a prepotent response), non-planning impulsivity (the ability to delay gratification) and attentional impulsivity (the ability to focus on present events). Motor impulsivity and non-planning impulsivity can be measured using respectively the differential reinforcement of low rate (DRL) test and the delayed discounting test (DDT). The present study aimed to develop a DRL test for measuring motor impulsivity in cats. An operant conditioning model was used in which the cats could obtain food by pressing on a lever, but not during the time when a tone sounded. The tone that signalled the no-reward condition started after each press for a food reward and after nine seconds of inactivity, and increasing tone length with subsequent rewards obtained was used to increase difficulty of the test. Motor impulsivity in the DRL test was expressed as response efficiency, calculated as the proportion of successful presses relative to the total number of presses. Aspects of the cats' impulsivity levels was further tested using a food enrichment item. Cats were presented a puzzle box that contained food which could be accessed by manipulating the lid of the box. Cats learned one of two possible actions to open the box and were observed for their reactions when this worked no longer. Scores for locomotion and other behaviours, as shown by the cats while in a one by one meter square around the puzzle box, were analysed using principal component analysis (PCA) to identify different coping strategies. Results of the DRL and puzzle box test were related to other measures of impulsivity and (over)eating, as determined in preceding experiments with the studied cats, analysing the maximal delay cats were willing to wait for a big reward during the DDT, the number of switches during the three bowl test and grams of food eaten during the ad libitum test. Cats obtained DRL response efficiency scores varying from 10 to 65% with a mean of $29.8 \pm 16.5\%$ (SD). Compared to females, males had higher response efficiencies with a three second tone duration but lower response efficiencies with a five second tone duration and when increasing tone length was used ($p < 0.001$ for two-way interaction effect calculated by Linear Mixed Model analyses). For the puzzle box test, touching the puzzle box, walking and standing and reversely the time spent inside the square, staring at the experimenter and sitting were associated by the PCA, assumingly identifying the more pro-active cats. However, such coping styles were not related to motor or non-planning impulsivity. Response efficiency of the DRL test and maximal delay of the DDT test were found to be independent concepts, confirming the existence of separate impulsivity components. A measure of the DRL test, i.e. the maximal tone length accepted, associated with the maximal delay during the DDT, which raises questions on what type of impulsivity is measured precisely with the DRL test. Cats with a lower response efficiency ate more food during the ad libitum test and thus motor impulsivity in cats may well be related to the risk for obesity.

Keywords

Domestic cat; Differential reinforcement of low rate of response; Obesity; Personality; Impulsivity