Time-based Behavioral Interventions at Early Ages to Reduce Impulsive Choice

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Introduction

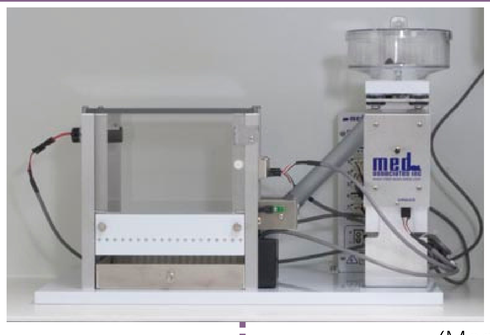
Impulsive choice behavior is choosing a smaller reward available sooner rather than a larger reward available later when the larger reward is objectively optimal in terms of reward-earning potential (Madden & Bickel, 2010; Renee Renda et al., 2018). There is evidence that training with time based schedules such as Variable Interval (VI) or Differential Reinforcement of Low Rates (DRL) reduces impulsive choice (Smith et al., 2015). This study is a replication of such effects with two time-based behavioral interventions in rats but when the rats were between PND 25 and 40. The impulsive choice was measured at PND 90 in a delay discounting procedure with delays increasing in the LL alternative in successive blocks.

Method

Subjects:

24 male and 24 female Wistar rats were divided into four groups.

TIME-BASED BEHAVIORAL INTERVENTIONS: VI OR DRL



DELAY DISCOUNTING TASK

(Med Associates, 2023).

21-24 PND

Lever press training

25-40 PND

In early ages, half of the subjects (n=24) were exposed to a DRL-10 s and the rest to a VI-10 s. formula milk was used as reinforcement.

90 PND

Three blocks of increasing LL delay, 0, 15 and 30 s.
6 forced choice trials and 14 free choice trials
SS 1 pellet, LL 3 pellets.

Results

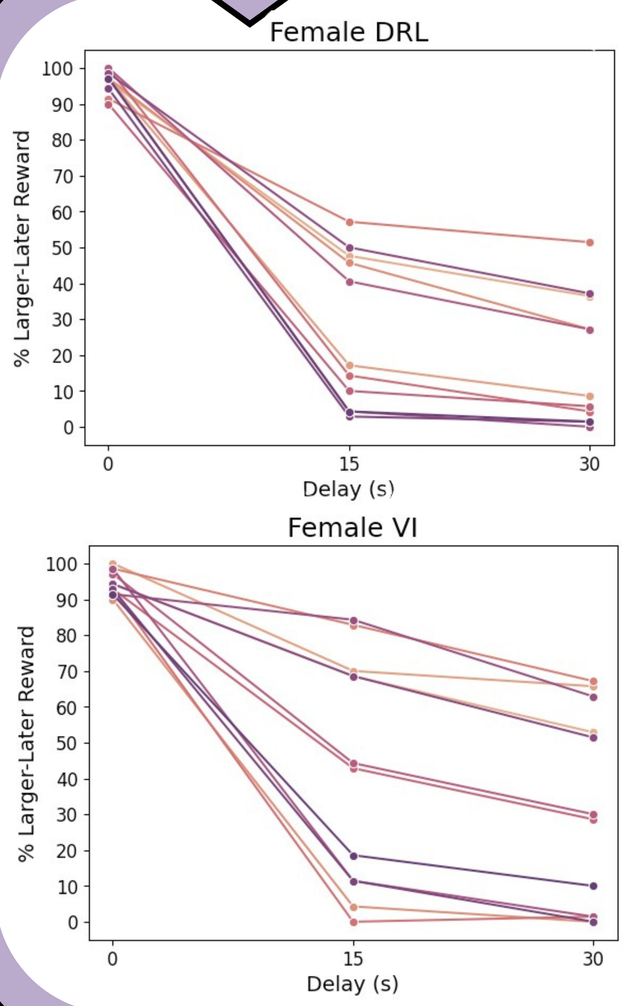


Fig 1. Average choice of lever LL in each block over the last five sessions per group.

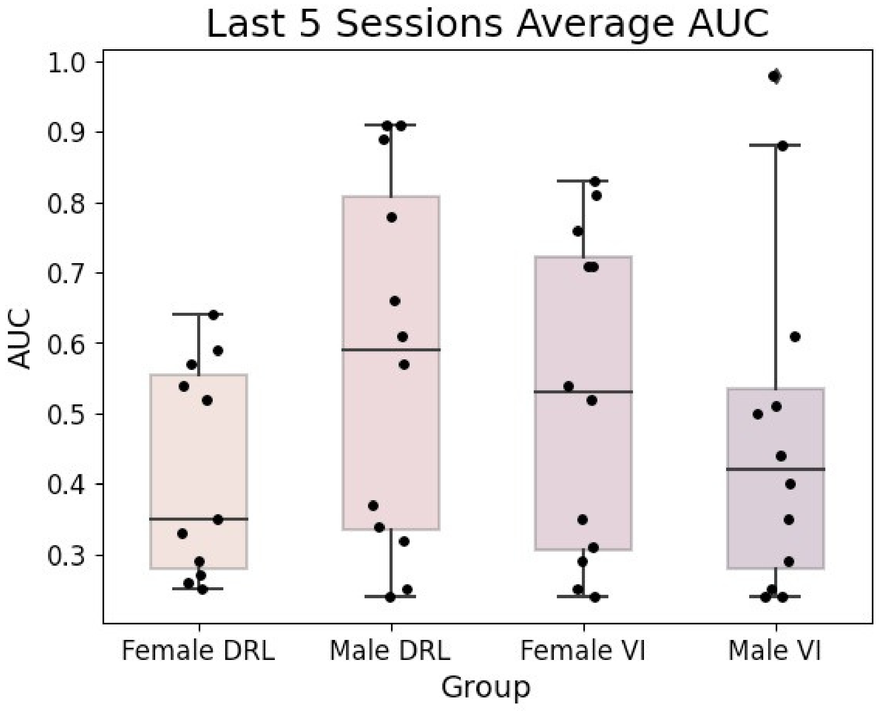


Fig 2. Boxplot of the average Area under the Curve (AUC) for the last five sessions of each group.

Conclusions

Both groups showed less impulsive choices compared with the expected level of impulsivity in rats without any treatment, a result that replicated other studies. However, the DRL in females seems to be less effective reducing the preference for the smaller-sooner alternative; there is no subject in such a group choosing above 80 % the LL alternative when the delays were 15 or 30 s. However, the treatment of 15 days during the PND 25-40 generate reductions of impulsivity comparable to those achieved by treatments with extended training. An estimation of the effect size of the treatment could increase the comparability of these results with the previous reports.

References

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