# Relationship between weight restriction and delay discounting in rats

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## Abstract

Delay discounting is a form of impulsive choice in which the perceived value of a reward decreases as delay to reward increases. Increased rates of delay discounting have been associated with a multitude of psychopathologies, including substance use disorders. Translational studies using rodent models have broadened our understanding of this behavior and been used identify potential therapeutic interventions. It is common practice to restrict weight when using animal models to increase both motivation and engagement with the discounting task. However, the proportion of weight reduced can vary. This study explores the relationship between differing degrees of weight restriction and delay discounting rates in 346 heterogeneous stock rats (177 female, 169 male). Discounting rates were determined using adjusting-amount delay discounting procedure assessing choice between a varying immediate sucrose reward and a fixed 150 µl delayed reward (0, 2, 4, 8, 16 or 24 second delays). Rate of discounting was reported in terms of ln (k) and calculated using the hyperbolic equation. Analyses showed rats weighing less than 85% of their ad lib weight discounted the value of a sucrose reward at higher rates ($M$ = -1.86, $SD$=0.71) than rats whose weight was kept between 85% and 100% ($M$ = -2.07, $SD$ =0.59). Rats whose weight was kept between 85% and 100% discounted at similar rates to animals whose weight exceeded 100% during discounting ($M$= -2.11, $SD$= 0.58). These results emphasize the importance of developing a more standardized weight restriction procedure in studies using food restriction as a way to increase animal motivation in discounting tasks. Future research may look to determine the role of feeding times and metabolism on delay discounting rates.