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Prenatal exposure to social stress alters adult behavior in Syrian hamsters

Introduction: Stress can have long-lasting effects on behavior and physiology. In a laboratory setting, the most common stressors are non-social (e.g., foot/tail shock, restraint); however, social stress is the most common stressor experienced in humans. Syrian hamsters are ideal for studying social stress because both male and female residents will actively defend their home territory against an intruder. The purpose of this study was to test the hypothesis that exposure to social defeat during pregnancy causes subsequent changes in maternal behavior of the dam and susceptibility to defeat in her adult offspring. We predicted that mothers that were socially stressed during pregnancy would neglect offspring more than those not socially stressed and that offspring of defeated mothers would have heightened submissive/avoidance responses when exposed to defeat in adulthood.

Method: Four male Syrian hamsters were mated with 8 females. Each male impregnated two females, one of which was socially defeated (3 times for 15min on Days 2, 4, and 6 of pregnancy) and one that was handled, but not defeated. Following parturition, maternal behavior (eating, drinking, nesting, licking/grooming, time away from pups) was measured. On post-natal day 60, half of the pups were exposed to a single, 15min social defeat. One day later, we measured avoidance behavior in all pups.

Results: Maternal behavior of dams exposed to social defeat was not different from that of handled dams. Interestingly, defeat-induced social avoidance in adulthood was attenuated in the male pups of stressed dams compared with those of non-stressed dams. Defeated female pups, by contrast, showed similar increases in defeat-induced avoidance behavior in adulthood regardless of the defeat status of their dams.

Conclusions: These data suggest social stress during pregnancy can have a behavioral effect on offspring of stressed dams and that this effect may differ depending on the sex of the offspring. In addition, our data suggest that this effect is not due to differences in the behavior of the stressed dams because maternal behavior was not significantly different between the two groups. Future experiments will investigate possible mechanisms for this effect including possible epigenetic effects of social stress.

Keywords: Maternal behavior, Prenatal stress, Epigenetics, Social Stress, Neuroscience, Syrian Hamster, Avoidance, Submission, Sexually Dimorphic