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Postweaning social isolation induces abnormal aggression associated to increased arousal states: hormonal and neurobiological changes.

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We submitted rats to postweaning social isolation and investigated their behavior, autonomic- and corticosterone stress response and the neuronal activity in the resident intruder paradigm. Socially deprived (SD) animals showed abnormal aggression as they frequently attacked the vulnerable body parts of the opponent and initiated attacks without social signals (e.g. offensive threats). Despite the enhanced aggression, SD rats showed increased level of defensive behavior compared to socially housed controls. Social deprivation did not influence basal corticosterone levels along the lifespan. In contrast, corticosterone responses to the aggressive encounters were doubled in SD rats. Heart rate activity showed a similar picture as diurnal oscillations were not affected by social isolation, but the response to aggressive encounters was markedly increased. We also noticed a significant increase of the frequency of behaviors performed per unit, so thus, SD rats were hyperaroused and hypervigilant. This type of hyperarousal-driven aggression was associated to hyperactivation of the medial amygdala and prefrontal cortex. Taken together, our findings show that post-weaning social isolation induces abnormal forms of aggression associated to an increased behavioral, endocrine and autonomic arousal. We suggest that this paradigm may be used to model hyperarousal-driven psychopathologies, particularly those that are triggered by adverse rearing conditions.