

## Understanding Brain Behavior During Social Isolation Stress Exposure and Possible Neuropsychological Alterations

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Interspecific and intraspecific interactions are the prime requirement for sustainability of all species and races. Mammals being endowed with highest grade of evolved senses are able to propagate a better way of interaction and communication with their conspecifics. Therefore social interaction is an important part of life in mammals including human beings to maintain normal mood function, behavior, cognitive function, etc. Human beings are very sensitive to emotional and psychological stress and thus social interaction is very important for good mental and emotional health [1]. Human beings are social by nature, as they characteristically have an elementary need and aspiration to sustain positive social relationships [2]. Social associations can foster nurturance, enhance feelings of social enclosure, and lead to success in social life [1].

However, negative social interactions, such as disruptions of social bonds, confrontation, isolation, or moving away from peers, can result in psychosocial stress, posing a risk to mental and physical health [3-5]. Thus, anything that disrupts or threatens to disrupt the social relationships can result in "social stress". Stressful life events such as social defeats, predator exposure, etc. are usually exhibit with precipitating effects on the development of psychopathologies such as anxiety and depression like traits in animal models [6]. Therefore, social relationships are crucial for the development and maintenance of normal behavior in all animals including human.

It has been reported that hippocampus can modulate reward circuitry and emotional behavior through projections to nucleus accumbens, prefrontal cortex and amygdala, and stress responses by regulating the hypothalamic-pituitary-adrenal axis [7]. However, animals that are raised in isolation build up an uncharacteristic pattern of behavior that persists even when they are reunited later. In rodents, social isolation is a stressful event and is associated with a decrease in hippocampal neurogenesis leading to altered mood behavior thus developing anxiety and depression like symptom [8-11]. Anxiety and depression symptoms involve nervousness, hyperactivity, despair response, confined movement, etc. Further it is also reported in rat model that rearing in isolation can leads to long term effect on morphology of brain, behavior and function of neurotransmitters. Most of these effects of social isolation stress are showing symptomatic similarities with that of schizophrenia and depression. Alteration in synaptic plasticity of the hippocampus is directly linked to stress [12,13]. It is also been reported that chronic social isolation stress in rats leads to insensitivity to rewards [14]. Insensitivity to rewards that is an anhedonic symptom is considered to be a major symptom of human depression [15].

Social stress can have adverse long lasting impact on behavior, physiology, biochemistry and neuroendocrinology and brain structure-function even after the end of the stress exposure [16]. Therefore, social associations and interactions plays an important role in enhancing feelings of social enclosure and maintaining normal brain functions leading to a success in social life.

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