

Acute social isolation evokes midbrain craving responses similar to hunger

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In this report Tomova et al, have demonstrated how acute forced social isolation affects the brain activity in humans. Specifically, the authors have investigated whether social craving evoked by deprivation of social needs is analogous to fasting induced food craving mediated by dopaminergic (DA) midbrain regions in humans. The study was conducted on 40 healthy, right-handed adults, ranging in age from 18 years to 40 years (mean age 26 years; n = 27 females). First, individuals underwent screening for their social connectedness measured by social network size and self-reported loneliness. Each participant then underwent 10 h of social isolation and functional magnetic resonance imaging (fMRI) with a cue-induced craving (CIC) paradigm. Each participant also underwent 10 h of food fasting and subsequent MRI. CIC task is designed to simultaneously measure craving for both food and social interaction, relative to a control. In this task, participants viewed colored images depicting: (1) groups of individuals as they meet, talk, laugh, smile, etc.; (2) different kinds of highly palatable foods such as cake, pizza, chocolate, etc.; and (3) attractive flowers as the control condition. The authors have also used self-report questionnaires to assess people's resulting subjective experience of loneliness and social craving. After 10 h of social isolation, participants reported substantially increased social craving, loneliness, dislike of isolation and decreased happiness compared with when they started isolation. Of the 40 individual participants, 36 reported feeling more lonely after isolation. As anticipated, following 10 h of food fasting, participants reported increased food craving, hunger, discomfort (and dislike of fasting), and decreased happiness compared with when they started fasting. It was noted that, social craving after isolation was more variable across participants than food craving after fasting. Furthermore, imaging studies revealed that, responses in the substantia nigra pars compacta and ventral tegmental area (SN/VTA) were higher for food after fasting compared with isolation. Responses in the midbrain functional region of interest (ROI) were higher for food after fasting (compared with isolation) and for social cues after isolation (compared with fasting). Interestingly, the pattern of SN/VTA activity in response to social cues on the isolation day was more similar to the pattern of food cues on the fasting day than to food cues on the baseline day. In summary, the above results suggest that, across all participants, the SN/VTA shows an increased response to social cues after objective social isolation compared with after fasting, with a spatial pattern that is similar to the response to food cues when hungry. The magnitude of this response was variable across participants, and larger in those who reported more social craving after the acute isolation period. Although the authors concluded that acute social isolation provokes brain activity similar to that seen during hunger cravings, they warrant further studies to answer one of the vital questions; how much, and what kinds of, positive social interaction is necessary to fulfil our social needs in order to eliminate the neural craving response. This will help us to better understand human social needs and the neural mechanisms underlying social motivation.

Reference article:

Tomova L, Wang KL, Thompson T, Matthews GA, Takahashi A, Tye KM, Saxe R. Acute social isolation evokes midbrain craving responses similar to hunger. *Nature Neuroscience*. 2020 Dec;23(12):1597-1605. doi: 10.1038/s41593-020-00742-z. Epub 2020 Nov 23. PMID: 33230328.