Binge-like eating elicited by cyclic food restriction and frustrative nonreward varies during the ovarian cycle in intact rats, is suppressed by estradiol in ovariectomized rats, and is preceded by increased pERK expression in the PVN, CeA, and BNST

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Because bulimia nervosa and binge-eating disorder are more prevalent in girls and women than in boys and men, we investigated the role of reproductive-axis function in binge-like eating in a female rat model. Binge-like eating was elicited by three cycles of 4 d of food restriction and 4 d of free feeding followed by a single frustrative-nonreward episode (15 min visual and olfactory exposure to a familiar palatable food) immediately before presentation of the palatable food. Intact rats showed binge-like eating during the diestrous and proestrous phases of the ovarian cycle, but not during the estrous (peri-ovulatory) phase, and estradiol (E2) treatment eliminated binge-like eating in ovariectomized (OVX) rats. Locomotor activity both in the central zone and throughout an open field was increased by frustrative nonreward in diestrous/proestrous rats independent of food-restriction history, suggesting that frustrative nonreward increases arousal in a cycle-dependent manner. OVX rats subjected to food restriction and frustrative nonreward that were not treated with E2 and were sacrificed immediately after frustrative nonreward had increased numbers of cells expressing phosphorylated ERK in the central nucleus of the amygdala (CeA), paraventricular nucleus of hypothalamus (PVN), and dorsal and ventral bed nucleus of the stria terminalis (BNST); there were no changes in E2-treated rats. These data increase the translational validity of our female rat model of binge eating in girls and women and identify the PVN, CeA and BNST as CNS areas that appear to contribute information processing that is critical for binge-like eating in this model.