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Gain and Loss Processing in Healthy Children: An Investigation of the Effects of Anhedonic Symptoms and Individual Differences on a Signal-Detection Task

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Anhedonia (reduced responsiveness to pleasure) is an important feature of depression, yet the behavioral and neural underpinnings of this symptom are not fully characterized. Several behavioral paradigms, including a probabilistic reward task developed by Pizzagalli et al., have been designed to characterize responses to reward feedback in adult populations. Healthy, hedonic adults display a shift in choice behavior toward a “rich” stimulus over the course of a task. However, depressed adults, as well as healthy adults with higher anhedonic symptoms, fail to develop a strong bias in their responses.

Pizzagalli’s task specifically demonstrated reward responsivity in adults. The motivations of this study were to demonstrate both reward and punishment responsivity across a developmental spectrum. The aim was to determine if children with anhedonia specifically struggle with reward processing, reward and punishment processing, or learning in general. To assess a developmental component of reward and punishment responsivity in relation to anhedonic symptoms, the task was modified to display stimuli for a longer period of time and have fewer trials in task blocks, and was then administered to children aged 7 to 10 to determine if the task would elicit reward and punishment responsivity in kids. Twenty-nine healthy children and their parents completed self-report measures to assess levels of depressive and anhedonic symptoms.

Children developed strong biases toward the rich stimulus across both reward and punishment blocks of the task. Moreover, anhedonic symptoms negatively correlated both with change in response bias across the punishment version of the task and with response bias at the end of the reward block of the task. Interestingly, this relationship was specific to anhedonia and was not found for depressive or other internalizing/externalizing symptoms. These findings help to characterize anhedonia as a distinctly different phenomenon than depression.