

Kids, candy, brain and behavior: Age differences in responses to candy gains and losses.

Katherine R Luking, Joan L Luby, and Deanna M Barch

The development of reward-related neural systems, from adolescence through adulthood, has received much recent attention in the developmental neuroimaging literature. However, few studies have investigated behavioral and neural responses to both gains and losses in pre-pubertal child populations. To address this gap in the literature, in the present study healthy children aged 7-11 years and young-adults completed an fMRI card-guessing game using candy pieces delivered post-scan as an incentive. Age differences in behavioral and neural responses to candy gains/losses were investigated. Adults and children displayed similar responses to gains, but robust age differences were observed following candy losses within the caudate, thalamus, insula, and hippocampus. Interestingly, when task behavior was included as a factor in post hoc mediation analyses, activation following loss within the caudate/thalamus related to task behavior and relationships with age were no longer significant. Conversely, relationships between response to loss and age within the hippocampus and insula remained significant even when controlling for behavior, with children showing heightened loss responses within the dorsal/posterior insula. These results suggest that both age and task behavior influence responses within the extended reward circuitry, and that children seem to be more sensitive than adults to loss feedback particularly within the dorsal/posterior insula.