Top-down dysregulation - from ADHD to emotional instability

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doi: 10.3389/fnbeh.2016.00070

Deficient cognitive top-down executive control has long been hypothesized to underlie inattention and impulsivity in attention-deficit/hyperactivity disorder (ADHD). However, top-down cognitive dysfunction explains a modest proportion of the ADHD phenotype whereas the salience of emotional dysregulation is being noted increasingly. Together, these two types of dysfunction have the potential to account for more of the phenotypic variance in patients diagnosed with ADHD. We develop this idea and suggest that top-down dysregulation constitutes a gradient extending from mostly non-emotional top-down control processes (i.e., “cool” executive functions) to mainly emotional regulatory processes (including “hot” executive functions). While ADHD has been classically linked primarily to the former, conditions involving emotional instability such as borderline and antisocial personality disorder are closer to the other extreme. In this model, emotional subtypes of ADHD are located at intermediate levels of this gradient. Neuroanatomically, gradations in “cool” processing appear to be related to prefrontal dysfunction involving dorsolateral prefrontal cortex and caudal anterior cingulate cortex, while “hot” processing entails orbitofrontal cortex and rostral anterior cingulate cortex. A similar distinction between systems related to non-emotional and emotional processing appears to hold for the basal ganglia and the neuromodulatory effects of the dopamine system. Overall we suggest that these two systems could be divided according to whether they process non-emotional information related to the exteroceptive environment (associated with “cool” regulatory circuits) or emotional information related to the interoceptive environment (associated with “hot” regulatory circuits). We propose that this framework can integrate ADHD, emotional traits in ADHD, borderline and antisocial personality disorders into a related cluster of mental conditions.