Salience network coupling is linked to both tobacco smoking and symptoms of attention deficit hyperactivity disorder (ADHD)


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Abstract

Introduction
Attention deficit hyperactivity disorder (ADHD) symptoms, even those below diagnostic threshold, enhance the likelihood of nicotine dependence, suggesting a neurobiological link between disorders. Of particular interest is the salience network (SN), which mediates attention to salient internal/external stimuli to guide behavior and is anchored by the dorsal anterior cingulate cortex (dACC) and bilateral anterior insula (AI). Disrupted interactions between the SN and the default mode (DMN) and central executive networks (CEN) have been noted in both ADHD and nicotine dependence. Further, enhanced intra-SN coupling between the dACC-AI influences aspects of nicotine dependence such as reactivity to smoking cues.

Methods
To identify links between SN functional connectivity and ADHD symptoms in nicotine dependence, we compared 21 nicotine dependent individuals with 17 non-smokers on ADHD symptoms as measured by the ADHD self-report scale (ASRS) and resting state intra and inter-SN functional connectivity.

Results
Relative to healthy controls, nicotine dependent individuals had significantly higher ASRS scores and greater dACC-AI coupling. No group differences were noted on inter-SN network coupling. A significant association was found between ASRS and dACC-AI coupling both in the entire cohort and specifically when evaluating nicotine dependent individuals alone.

Conclusions
The greater ASRS scores in nicotine dependent individuals is in line with existent literature and the stronger dACC-AI coupling in smokers further supports the role of this network in nicotine dependence. The significant association between dACC-AI coupling and ASRS suggests that intra-SN coupling strength may impact neurocognitive functioning associated with both ADHD symptoms and nicotine dependence.