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Background: Current diffusion MRI studies of schizophrenia are limited by methodology and sample size. With normative models and the largest single-site cohort, we aimed to delineate a comprehensive profile of tract alteration in unaffected siblings, first-episode schizophrenia (FES), and chronic schizophrenia.
Methods: A total of 277 patients with schizophrenia, 81 unaffected siblings, and 1023 healthy people underwent diffusion-weighted imaging on the same 3T scanner. Generalized fractional anisotropy (GFA), mean diffusivity (MD), radial diffusivity (RD), and axial diffusivity (AD), were sampled along 45 major neural tracts. A normative model was built from the images of 1023 healthy people; Z scores represented the normalized deviation of the index value from that of the age- and sex-matched healthy population.
Results: Widespread involvement of neural tracts was found in patients with FES, and the tracts connecting the prefrontal lobe were the most severely affected. In patients with chronic schizophrenia, virtually all neural tracts were altered, with the tracts connecting the sensorimotor cortex the least affected. A significant negative correlation was observed between GFA alterations and the duration of illness. In unaffected siblings, scattered tracts were involved in GFA, but not in MD or RD.
Discussion: The study revealed widespread white matter involvement in the early stages of schizophrenia. The alteration continues to progress from the neural tracts connecting the prefrontal lobe to the entire brain. Compared to a large sample of normal controls, the attenuated peak and rapid decline of white matter GFA across the lifespan suggest that schizophrenia is associated with neurodevelopmental and neurodegenerative abnormalities of white matter.

S140. CHARACTERISTICS OF COGNITIVE CONTROL SPECIALIZATION IN HEALTHY AND PATIENT POPULATIONS

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Background: Cognitive control mechanisms enable an individual to regulate, coordinate, and sequence thoughts and actions to obtain desired outcomes. A theory of control specialization posits that proactive control is necessary for anticipatory planning and goal maintenance and recruits sustained lateral prefrontal activity, whereas reactive control, essential for adapting to transient changes, marshals a more extensive brain network (Braver, 2012). Increased task errors and reduced frontoparietal activity in proactive contexts is observed in severe psychopathology, including schizophrenia (Poppe et al., 2016), leading to the prediction that patients rely on reactive control more when performing such tasks. However, evidence of primate prefrontal 'switch' neurons, active during both proactive and reactive contexts, challenges the notion that cognitive control relies on discrete processing networks (Blackman et al., 2016). To examine this contradiction, we sought to characterize the distinctiveness between proactive and reactive control in healthy and patient populations using the Dot Pattern Expectancy Task (DPX). We also examined if a bias toward proactive or reactive control predicted behavioral metrics.
Methods: 44 individuals with schizophrenia (SZ) and 50 matched healthy controls (HC) completed 4 blocks of the DPX during a 3-Tesla fMRI scan (Poppe et al., 2016). Participants followed the 'A-then-X' rule, in which they pressed one button whenever an A cue followed an X probe, and pressed a different button for any other non-target stimulus sequence. We examined bilateral frontoparietal ROIs from the literature for evidence of cognitive control specialization as well as whole-brain analyses. Subsequent nonparametric tests and measures of neural response variation strengthened our interpretations. Participant d'-context (dependent on task accuracy) measured their tendency to engage in proactive control.
Results: Behavioral data revealed that HC participants showed a greater proclivity for proactive control than did their SZ counterparts. HC reaction time outpaced SZ reaction time in trials requiring successful marshalling of proactive control. Preliminary neuroimaging analyses suggest marginal between-group differences in control specialization. HC specialization appeared to be most apparent in diffuse frontal lateral regions, and bilateral posterior parietal cortex. Within the SZ group, specialization was most evident in bilateral posterior parietal cortex. Between-group control specialization differences were most apparent in right hemisphere frontal regions. Superior frontal gyrus and medial temporal lobe activity during proactive processes accounted for modest variance in d'-context.
Discussion: There were significant between-group differences in goal maintenance behavioral metrics such as reaction time and a tendency to engage in proactive control. Control specialization occurred more diffusely in controls compared to patient counterparts. However, activity in these regions had minimal ability to predict behavioral metrics. Overall, the relatively small size of control-specific areas compared to regions involved in dual processing offers support for the malleable nature of regions implicated in human cognitive control.

S141. REWARD PROCESSING IN CHILDREN WITH PSYCHOTIC-LIKE EXPERIENCES

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Background: Individuals with psychosis display an attenuated response to reward. However, it has not yet been established whether individuals with psychotic-like experiences (PLEs) also exhibit alterations in reward anticipation.
Methods: The present study examined whether non-distressing and distressing PLEs were associated with functional activity in the nucleus accumbens during reward anticipation. The sample consisted of 10313 children from the ABCD study aged 9–10 who had participated in the Monetary Incentive Delay task. PLEs were measured using the Prodromal Questionnaire Brief Child version and functional activity was measured using regional fMRI summary statistics for reward anticipation activation (data release 2.0, contrast of expected large reward versus neutral expectation). Linear mixed-effects models were used to investigate the relationship between reward anticipation and PLEs (distressing and non-distressing), whilst controlling for gender, household income, ethnicity, BMI and affective symptoms. The analyses were weighted by the average standard error of the mean activation in the accumbens. Separate linear mixed-effects models were conducted for the right and left hemisphere.
Results: 6169 (59.8%) of the children did not report any PLEs, compared to 2270 (22.0%) with non-distressing PLEs and 1874 (18.2%) with distressing PLEs. We ran a regression to examine the association between reward anticipation and PLEs (distressing or non-distressing) and found that non-distressing PLEs were related to reduced reward anticipation in the right nucleus accumbens ($P = 0.009$). However, there was no significant association between reward anticipation and PLEs when adjusting for potential confounders.
Discussion: In the present study of 9–10 year olds, reward anticipation was not associated with PLEs. As previous research has found reductions in reward anticipation in individuals with schizophrenia, further follow-up studies of the ABCD cohort are needed to explore whether these associations emerge during adolescence.