Results: We found a high degree of spatial consistency within subjects within session. In fact, for each of the ICNs tested, spatial extents overlapped and peaks were similarly localized. Longitudinal analyses indicated that activity of spatially segregated regions across long ranges was more coherent at Time 2, reflecting tighter functional coupling between these distant nodes. We also found specific changes in network structures that correspond to increases in cognitive operations that occur during this developmental period, and we provide evidence for different maturational time-courses across the ICNs that are consistent with the cognitive functions that exhibit the most protracted developmental effects.

Conclusions: We observed reliable coherent fluctuations in resting state across spatially distal, functionally relevant regions, including those involved in executive functioning, salience processing, motor function, visual processing, and the default mode. This finding is consistent with what has been established in studies of adults, and is the first indication that ICN maps are relatively stable in children and adolescents. We also provide the first evidence for the developmental trajectories of these networks longitudinally within participants. We demonstrated that the ICNs change in a manner that reflects local pruning and strengthening of distal connections, a pattern that reflects previously observed anatomical progress. This work provides a methodological basis for future work with samples of children and adolescents, elaborates our understanding of the development of ICNs, and provides evidence that changes in large-scale network FC measured in resting state mirror maturation patterns.