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Neural correlates of real-life affective resilience measures in healthy community-based individuals

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Disturbed affective well-being contributes to the development of major psychiatric disorders. Thus, scientists and clinicians have been investigating how to help psychiatric patients and at-risk populations become resilient against distressed affective states. In the present dissertation, I studied two real-life affective resilience measures, namely social affective benefit and affective reactivity to positive events that capture the respective effects of social contact and positive events on real-life affective well-being. To this end, I used a neuro-epidemiological approach combining state-of-the-art smartphone-based ambulatory assessment, neuroimaging, and self-report inventories of psychiatric risk and resilience. I examined the neurobiological correlates of social affective benefit using structural MRI in study 1, and the neural basis of affective reactivity to positive events using functional MRI measured with the monetary incentive delay task in study 2. Additionally, in both studies, I also probed the potential relevance of these two real-life affective resilience measures for psychiatric risk and resilience.

In study 1, I corroborated in two independent community-based adult samples that real-life social contact was associated with increased affective valence using multilevel models, an effect I named social affective benefit. Our findings also showed that higher levels of social affective benefit were associated with greater anterior cingulate cortex gray matter volume, suggesting that structural integrity of the anterior cingulate cortex may be important for this fundamental affective resilience measure. Moreover, higher levels of social affective benefit were linked to increased social competence, indicated by utilizing social support in stressful life situations and socially desirable personality traits such as agreeableness and conscientiousness. Together these findings demonstrate that social affective benefit may be relevant for psychiatric resilience. In study 2, I showed a strong association between real-life positive events and momentary affect in a community-based developmental sample comprising adolescents and young adults. Further, affective reactivity to positive events was linked to laboratory-based reward-related ventral striatum reactivity at the between-subject level. Additionally, using an accelerated longitudinal design, I demonstrated that ventral striatum reactivity was linearly associated with real-life affective reactivity to positive events within subjects across three annually separated measurement time points. This within-subject association indicates that real-life and laboratory-based neural reward measures co-evolve over time, which was specifically pronounced in individuals with high social environmental risk indicated by higher urban upbringing scores and a smaller social network size. I speculated that for at-risk individuals, the ability to benefit from rewarding experiences may represent an important real-life resilience measure to compensate for compromised striatal reward processing. Moreover, I showed that the within-subject association between ventral striatum reactivity and affective reactivity to positive events was independent of the developmental effect of striatal reward processing in adolescence and early adulthood.

In summary, beneficial social influences and positive daily-life experiences are major sources of mental health resilience. This dissertation suggests that social contact and positive events are strongly associated with enhanced affective well-being in real life, thus forming two real-life affective resilience measures: social affective benefit and affective reactivity to positive events. The neurobiological substrates of social affective benefit and affective reactivity to positive events map to a region shown as a convergence site for psychiatric resilience and a core region in the brain reward system that is often perturbed in psychiatric patients. Given the technological advances in mobile research and intervention technologies, real-life social affective benefit and affective reactivity to positive events may thus represent important and feasible targets for smartphone-based preventative and therapeutic interventions aiming at identifying and utilizing daily life experiences to reduce the mental health risk in vulnerable populations and mitigating affective symptoms in psychiatric patients.