USC.NEA Study of Sages & Seekers 8-Week Program - 2018

Neural and psychosocial development underlying adolescents' abstract life goals

Forming life goals is an important part of adolescents' development. Abstract life goals, in particular, orient individuals toward broadly framed relationships and societal contributions, rather than toward acquiring goods and status. As such, abstract goals help adolescents connect with the world beyond themselves and build purpose. Based on core values and beliefs, abstract goals help adolescents make important decisions that will affect their future. Studying adolescents' ability to formulate and articulate abstract goals offers a window to examine the interaction between planning, social rewards and core values within adolescents' own frame of reasoning, both at the neural and at the psychological levels.

Several neural systems likely contribute to adolescents' processing of abstract life goals. Neuroimaging studies have shown that the Basal Ganglia Network (BG) processes value-driven behavior. In addition, the Default Mode Network (DMN) supports abstract understandings of one's own and others' perspectives and stories, and reasoning about values and beliefs. At least one study with adolescents has shown that connectivity between the DMN and BG increases with development. In the first study presented, we test whether the degree of coordination between these networks during resting-state MRI may correlate with individual differences in adolescents' formulation of abstract goals assessed in a laboratory interview.

Given the importance of reflecting on personal stories in the context of supportive relationships with older, wiser adults, in a second study we paired with an arts organization that teaches intergenerational storytelling to senior citizens and adolescents, *Sages and Seekers* (www.sagesandseekers.org). At the psychological level, adolescents' growing abilities to formulate abstract goals are thought to be supported by high quality social relationships with more experienced and trusted adults who listen and reflect with the adolescent. We tested whether the 8-week program impacted adolescent participants' self-understanding and abstract goals, relative to a control movie-watching condition that involved enjoying stories in intergenerational pairs, but offered no specific support for personal storytelling.

Study 1. 25 adolescents underwent a resting state scan, and completed an open-ended interview about their future goals. Participants' videotaped interviews were transcribed and verified, and descriptions of goals were coded. Intentions comprising value-driven and social goals were coded as abstract. We found that participants who reported more abstract goals showed higher intrinsic connectivity between the inferior/posterior precuneus (a central DMN hub) and the BGN. This study suggests that the cross-talk between brain areas important for goal processing and for reflecting about values and narratives may support building abstract goals among adolescents.

Study 2. The second study, conducted in the field, examined the effects of an intergenerational storytelling intervention in a sample of 47 adolescents, compared with a

18-person control group who completed a movie-watching activity of equivalent length. The intergenerational storytelling intervention consisted of an eight-week program focused on meaningful conversations about life stories, along with systematic opportunities for reflection. Participants completed open-ended questions regarding their future goals and surveys about their psychosocial development. After the intervention, participants increased the frequency of abstract goals, as well as they exhibited higher wellbeing, purpose in life, and growth mindset, compared to the control group.

By integrating findings from social-affective neuroscience research on goal processing with the results from an established educational storytelling program, this research offers insights into the neurobiology of fostering abstract goals and the value of offering adolescents with opportunities for reflecting on their communities in relation to their future goals, in order to promote thoughtful citizenship.

In addition, by demonstrating the effectiveness of an established arts-based educational program in promoting healthy development of adolescents, we can inform practitioners and school administrators about the benefits of intergenerational storytelling, an engaging platform for adolescents. Storytelling could expand the repertoire of educational practices that promote social-emotional learning, contributing to transforming classroom climates. Finally, it also illustrates for policy-makers the benefits the promoting equal access to the arts and of systematically providing adolescents with spaces for personal reflection in schools.