Risk, Cognitive Control, and Adolescence: Challenging the Dual Systems Model

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Introduction

According to the dual systems model (Steinberg, 2008), adolescence can be characterized by an imbalance between the hyperactive motivational system, responsible for sensitivity to rewards, and the cognitive control system, responsible for reaction inhibition. Despite the fact that the model does not specify whether tendency towards risk is adaptive (Strang, Chein, & Steinberg, 2013), it is criticized mainly for the fact that it adopts a deficit perspective. A new development for the model might be offered by research demonstrating that adolescent sensitivity to rewards can lead not only to risk-taking, but can also be channeled towards safe or prosocial behavior.

The conceptualization of adolescent risk-taking within the model remains, the most intriguing issue. Are adolescents impulsive risk-takers, who cannot override risky tendencies in the presence of incentives? Or is risk-taking rather a strategy adopted whenever it seems profitable? When we view risk-taking as a strategy, we can also see adolescents as having more control over their behavior than is assumed in the model.

We expected that adolescents would be more sensitive to rewards than adults. Also, as the model does not provide a link between the presence of rewards and cognitive control, we hypothesized that the effect may be mediated by emotional arousal.

Method

The 186 participants (81 men) consisted of two groups: adolescents (mean age 13.82) and adults (25.04).

The risk was measured with two tasks: "Spaceride", had form of a game in which the participant controls a spaceship. The task was to fly as quickly as possible to the end of the route. In each of "danger zones" the decision was to be made: either to to fly fast and risk collision or fly slowly and safely. The "Stock market" task required a series of economic decision. In each turn participant could choose stocks which were safe or risky.

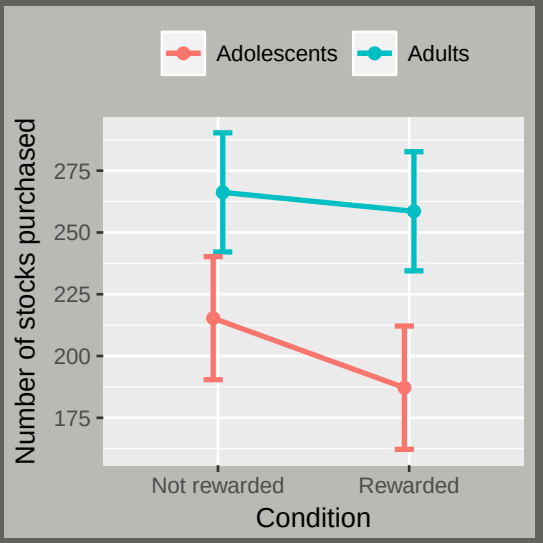
Participants performed all task two times. In rewarded condition they were paid for performance, in control condition - they were not.

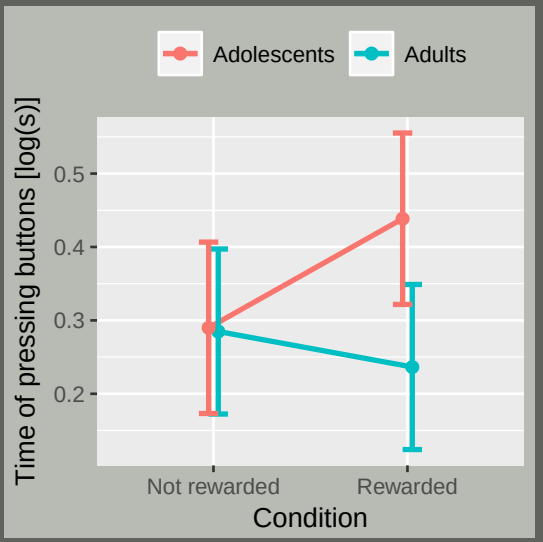
Results

There was neither an effect of condition nor an interaction between condition and age group in the Antisaccade task and the Stroop task, however, there was a difference between adolescents and adults in reaction latencies in the Antisaccade task (p = .001).

There was a significant effect of condition (p = .0031) and age group (p < .001) in the Stock Market task (upper panel), as well as an effect of interaction between condition and age group in the Spaceride task (p = .031). The effect of condition or age group in the latter task was not significant (lower panel).

The arousal differed significantly depending on condition (p < .001), but it was not a mediator between condition and DV in the Stock Market task (p = .63).





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Strang, N. M., Chein, J. M., Steinberg, L. (2013). The value of the dual systems model on adolescent risk-taking. *Frontiers in Human Neuroscience*, *7:223*, 1-4.

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