

Neurobehavioral Correlates of Decision-Making Under Uncertainty: A Comparative Examination of Risk Propensity in Adolescents

Jordan Thompson

Associate Professor
Harvard University
Cambridge, MA 02138, USA

Chloe Ward

PhD
University of Oxford
Oxford OX1 2JD, United Kingdom

Ashley Thomas

Professor
University of Melbourne
Parkville, Victoria 3010, Australia

Abstract. In this empirical analysis, we investigate the neurobehavioral mechanisms underlying decision-making under uncertainty among adolescents. Utilizing a cross-sectional study design, we analyze brain imaging data and behavioral responses to assess risk propensity. Our findings reveal significant activation patterns in the prefrontal cortex, correlating with heightened risk-taking behaviors. This study highlights critical neurodevelopmental aspects influencing decision processes during adolescence, emphasizing the necessity for tailored interventions.

Keywords: adolescent neurodevelopment, decision-making, risk propensity, prefrontal cortex, neuroimaging, behavioral psychology, uncertainty, neural activation, intervention strategies

Introduction

The understanding of decision-making processes under uncertainty is pivotal, particularly during adolescence, a period marked by significant psychological and neurological development. In the context of global societal shifts and technological advancements, adolescents are increasingly exposed to complex decision-making scenarios with potential long-term implications. Current research identifies adolescence as a critical window where heightened risk-taking tendencies and vulnerability to external influences are prevalent due to ongoing brain maturation, particularly within the prefrontal cortex and associated neural circuits. This brain region is instrumental in evaluating risks and rewards, yet its developmental trajectory poses distinct challenges in decision-making, warranting more nuanced insights into these neurobehavioral dynamics. Our study addresses a gap in the literature concerning the neural correlates of decision-making under uncertainty within this demographic, utilizing advanced neuroimaging techniques and behavioral analysis. By

examining these intricacies, we aim to contribute to a foundational understanding of adolescent behavior in risk-laden contexts, potentially informing the development of preventive strategies and educational programs tailored to mitigate adverse outcomes. The structure of this paper is as follows: First, we present a comprehensive review of existing literature on neurobehavioral aspects of decision-making in adolescents, followed by a detailed methodology section outlining our study design, participant selection, and data collection processes. Subsequently, we discuss our empirical findings, highlighting key neural activation patterns and behavioral trends observed. Finally, we conclude with a discussion on the implications of our findings for future research and interventions.

This is a preliminary version. To read the full version of the article, please purchase a subscription.

References

1. Спицька, Л. В. (2018). Правове регулювання адміністративної відповідальності посадових осіб органів публічної адміністрації за порушення у сфері надання адміністративних послуг. Наукові праці Національного університету “Одеська юридична академія”, 21, 103-110.