

Decision making in adolescents: a multifaceted construct

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Abstract

Judging to make a decision amidst several possibilities that rise to risks, losses, gains and uncertainties is not a simple matter. In this process, the subject needs to verify the situation considering the alternatives that are made up of several elements, among them, the analysis of how much this decision will cost and what benefit it will have in response, and what the consequences will be in the long, medium and short term. In this sense, decision-making is associated with the deliberative and affective process that relates to multiple variables that are interconnected with the flow of information assimilated by the agent who is responsible for the judgment and the decision. This process is interdependent on the subject's structure with external stimuli. Thus, the individual's forces and social pressure are important elements to be considered for decision making. For the adolescent, this issue becomes even more important, as it is a phase of human development in which the person exhibits behaviors of risk and during this stage of life there is a process of maturation of the central nervous system, which are related to decision-making and motivational processes. Therefore, decision making among adolescents is a complex issue that in addition to biological factors are directly related to social and psychological elements, depends on a maturity in development, but can be impaired if stressful situations are constant stimuli in the lives of adolescents.

Keywords: Nervous system, decision, adolescent.

Judging to make a decision amidst various possibilities of risks, reduction, gains and uncertainties is not configured simple matters. In this process, the individual needs to verify a situation considering the alternatives that make up several elements, among them, an analysis of how much this decision will cost, the benefit he will receive in response, and the consequences in the long, medium and short term. Associated, there is the weight of moral and social aspects. These decisions are applied as implications not only for the individual, but also for other people, this associated with the perception of consciousness, because each decision involves a responsibility¹.

All the time, we are asked to give assertive responses to the different stimuli present in our environment. Therefore, decisions have to be made, and this requires an organization

and assessment of the central nervous system². During this decision-making process many cognitive elements are involved, like working memory, cognitive flexibility, inhibitory control and planning.

Decision making, despite being part of the activity of daily life, is still little known. Although it has been approached by economic science, mathematics and more contemporaneously by psychology and neuroscience¹. In economics, the most raised aspect is decisions in a risk scenario, with the study strategies developed by neuroscience making it possible to consider some brain areas involved in this process, including the prefrontal cortex (PFC).

Of particular interest is the ventromedial region and the frontal orbital cortex (FOC) region and the ventral area of the medial portion of the frontal lobes. In addition to

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these, subcortical structures, such as the amygdala and the base nuclei, have been considered as an important part of the process, given their connection with the frontoestriatal part. Patients with injuries in these areas have difficulties in making decisions^{1,2}. The areas of cortical (regulation) and subcortical (motivation) modeling within the dorsal (deliberative-cold) and ventral (affective-hot) fronto-striatal circuits are very important in understanding decision-making.

The balance resulting from the tuning of the two systems^{1,3} a deliberative, strategic and flexible circuit located in the prefrontal area of the brain considered a cold system; another, considered an affective system, emotionally moved by fears, desires and reflexes, associated with the limbic system portion, the hot system.

According to the human mind, the way in which thinking is elaborated can be organized from two conceptions, be it fast or slow. The quickest way of thinking is related to the emerging emotional aspects and intuition, in contrast the slowest way is based on logic and deliberative aspects³. The first relates to the cognitive elements and the second to the aspects of attention and self-control.

Within this context, thinking has the power to influence behavior, since neural associations undergo a learning process that is directly linked to neural circuits. What is in the human mind is individual knowledge, that is, it belongs to the subject himself, in this way, only he, who thinks within its singular world, owns his decisions. Therefore, each choice that the individual makes possible is directly related to the weight of his responsibility^{4,5}. For conscious decision-making, it is necessary to have self-knowledge.

In these circumstances, making choices does not translate into easy tasks and the way it occurs needs better understanding, as a process of constant adaptation is necessary for decision making⁶. In this regard, the executive control system, associated with executive functions, would be the provider of deliberative control to plan, decide and select what would be implemented. Functions that provide the ability to have flexibility of choice options, control of checking various possibilities of choices, inhibitory control, ability to think well about each option and assist in maintaining the implementation of choices by inhibiting interference, are expected elements of executive functions. The working memory would be one that would retain all the information needed for decision-making.

Actions in relation to stimuli have a need to tune in between the different elements that make up cognitive functions, including thinking, memory, awareness, perception, intelligence, conduct, affectivity, guidance, attention, awareness and language. All the elements mentioned here contribute to the full functioning and integrality of the cognitive functions, which favor the subject a reading of the reality lived in a coherent way. However, choosing and making the best decisions objectively are not always related to reason and emotions, since one is always suffering the impact or influence of stimuli that can undermine the ability to decide correctly².

Among the different brain areas¹⁻² related to decision making, in addition to those previously mentioned, there have been presented the cingulate cortex and the prefrontal area. Thus, decision-making is related to biological, social and psychological aspects. In this sense, neuroscience provides an important contribution to explain how this process happens, how the brain changes, in the face of environmental stimuli and affects the process of knowledge and learning itself.

Considering a neurobiology perspective, decision-making results from steps that differ in representation or

identification of options that emerge in a scenario, in the assessment of possible risks and gains and losses, as well as in the estimated time between the action and its consequences. However, all stages are influenced by both the environment and the individual¹.

In addition to the brain areas mentioned above, the frontal orbit cortex is also responsible for regulating the abilities to perform inhibition, assessment and the way one acts in the face of emotional and social information. In the conception of how emotional meanings and immediate behavior to stimuli are processed, it is known that the amygdala is responsible for affecting the mood state that changes when faced with social stimulus.

The social experiences lived enable us to avoid certain behaviors for fear of being negatively affected. Thus, stress can be an environmental stimulus that affects these processes, leading to emotional responses and decision-making, the result of which may be different from expected⁶.

Therefore, decision-making is associated with the deliberative and affective process that relates to multiple variables that are interconnected with the flow of information assimilated by the agent who is responsible for the judgment and the decision. This process is interdependent on the subject's structure with external stimuli. Thus, the subject's forces and social forces^{7,8} are important elements to be considered for decision making.

For the adolescent, this issue becomes even more important, as it is a phase of human development in which the person presents risky behaviors, considering that during this stage of life a process of maturation of the central nervous system is present, which are related to decision-making and motivational processes. Recognized as a phase in which the pressure of the environment can be a central element to lead the subject to make risky choices without assessing the consequences^{9,10}.

The risk scenarios are configured in situations where all probabilities are known to the agent. Uncertainty scenarios are described as those in which the person has no knowledge about the probability of the occurrence of a certain outcome. Nevertheless, in the general context, social situations elicit uncertainties, since the possibility of something happening cannot be predicted, considering the complexity of the factors associated with its origin⁸.

The search for immediate pleasure, that is, having a reward without taking into account the different situations that can be present in the lives of adolescents that lead them to make decisions that place them in a situation of vulnerability, such as, for example, the use of psychoactive substances and risk behaviors¹¹.

The above ideas are corroborated with data that consider the use of licit and illicit substances, where users replied that the beginning of use was around 12 years of age for alcohol and that drug-dependent use is present in almost 1,2 million people aged 12 and over. The almost 1.3% of people who use drugs in the age group 12-65 years, were victims of violence where the aggressor also used drugs¹².

The use of psychoactive substances can lead to a poor adaptation of the central nervous system, especially areas related to decision-making, this can lead to an inability to judge the risks and losses related to the decision and thus have losses associated with the situation of vulnerability¹³. Among the situations of vulnerability, one can infer exposure to crime and violence.

When these adolescents are exposed to extreme stress situations such as those mentioned above, there might be a difficulty in assimilating information¹⁴ that

would be protective for life and that, if used, could avoid disadvantageous consequences due to inappropriate choices, since changes in the associated factors to decision-making are impaired.

When assessing risk and protection factors for the situation of vulnerability, 13,199,862 schoolchildren between 13 and 17 years of age are in a situation of social risk and that different situations of vulnerability include criminal practices¹⁵. Other data show that more than 1,2 million adolescents worldwide have died, with interpersonal violence being the second cause in males aged 10 to 19 years¹⁶.

Therefore, decision making among adolescents is a complex issue that in addition to biological factors are directly related to social and psychological elements, depends on a maturity in development, but can be impaired if stressful situations are constant stimuli in the lives of adolescents.

Thus, studies with this population are necessary to a better understanding of the vulnerabilities that may imply in the decision-making process that covers relationships, lifestyle and behavior. In this context, the discussion from scientific publications, such as those published at Journal of Human Growth and Development stands out. This always brings themes that involve child development, situations related to adolescents and other topics that bring current reflections.

Thus, in this issue 30.2, situations that require decision-making have also been discussed. It brings themes like decisions related to abortion in situations of sexual violence contextualized in the current legislation that ensures women that are influenced by the aggressor in the decision to give up legally requesting the termination of pregnancy¹⁷. In the same theme of women's health, it brings a study on the type of birth and its relation to child development, considering the increase in psychological risks in non-vaginal births¹⁸.

Within this aspect, which is related to a stage of childhood development, it presents a study on new screening instruments for child development in Brazil, considering those used in different studies¹⁹. At another point, an interesting study that discusses other forms of violence experienced by students in public schools, considering risky, leisure, violent

behaviors and other variables²⁰.

Other areas are addressed, including studies on nutritional aspects. It presents a review of the lipid profile of people with Down syndrome. This study shows evidence for changes in the lipid profile in this study population²¹. This edition, also presents a longitudinal study on the nutritional status of schoolchildren in a public school system²². In this same line, it presents the profile of food and metabolic and anthropometric measures in adolescents who were born prematurely²³. To finalize the contextualization on nutritional aspects, it brings a study on the prevalence of overweight and obesity in children and adolescents in the northern region of the country²⁴.

Topics such as the effect of interdisciplinary intervention on insulin resistance indicators in overweight adolescents²⁵ and the use of surface electromyography as a measure of physical therapy outcome in children with cerebral palsy²⁶ are presented in this volume. This publication also contains the comparison of click and ce-chirp stimuli in hearing screening in the neonatal life cycle stage²⁷ and the effects of inspiratory muscle training and breathing exercises in children with asthma²⁸, close the themes related to the life cycle of childhood and adolescence.

Among other topics, the journal addresses the characterization of congenital syphilis cases with an emphasis on the therapeutic scheme in a philanthropic maternity in Espirito Santo, Brazil²⁹. This edition also brings considerations about the effects of aerobic exercises on biochemical parameters in people undergoing hemodialysis³⁰.

It presents a study on the social representations of the internet for the elderly³¹, as well as the theme about morbidity in adults from a population survey during the period 2007 to 2008 in Rio Branco, Acre, Brazil³².

Emerging themes are also included in this edition, such as the work that considers measures of social distance that can reduce the estimated deaths related to COVID-19 in Brazil³³.

In this way, the journal contributes in a contextualized way with the dissemination of relevant and important topics for the current context, giving visibility to relevant themes that are linked to global public health problems.

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