Self-Regulation and Risk Behavior of Adolescents Aged 15–20

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INTRODUCTION: According to Brichcín (1999), a self-regulating person is someone who can resist the temptation of immediate gratification of their needs and is capable of achieving challenging goals. Self-regulation represents the ability to make free and responsible choices and actions in relation to oneself, others, and the environment, in spite of deterministic influences. In real life, this relationship may also be reflected by the quality of mental health and engagement in risk behaviors during adolescence (Jessor & Jessor, 1977). The aim of the present paper was to investigate the relationship between self-regulation and risk-taking behavior during adolescence. **METHODS:** The research was conducted using a set of questionnaires: (1) Risk Behavior Questionnaire (Mezera, 2000; Slovak modification by Čerešník, 2016) and (2) The Self-regulation Questionnaire (Gavora et al., 2015; Slovak modification by Banárová & Čerešník, 2021). We collected data from 505 adolescents from nearly all regions of Slovakia. The age range of the participants was 15 to 20 years (M_{age} = 16.97; SD_{age} = 1.15). **RESULTS:** We split risk behaviors into three categories: low, medium and high level. Our results showed significant differences in the level of risk behaviors for the variables of impulse control (F (2) = 16.439, $p < 0.001$), decision-making (F (2) = 6.886, $p = 0.001$), self-direction (F (2) = 32.720, $p < 0.001$). We did not find a statistically significant difference for the variable goal orientation (F (2) = 2.855, $p = 0.059$). **CONCLUSIONS:** Statistical analysis supported our hypothesis that self-regulation decreases with increasing behavioral risk.

Keywords | Risk Behavior – Adolescence – Self-Regulation

● 1 INTRODUCTION

Self-regulation represents the most important function of the human psyche (Brichcín, 1999), with its purpose of fulfilling the highest goal of ontogenesis, i.e. the integration of personality. According to Brichcín (1999), a self-confident and self-regulating person is one who can resist the temptation of immediate gratification of their needs and is also capable of achieving challenging goals. For our purposes, self-regulation represents the ability to make free and responsible choices and actions in relation to oneself, others, and the environment, in spite of deterministic influences. This is related to the unresolved issues of "freedom versus determinism" and "nature versus nurture" (Banárová et al., 2023). Executive functioning is a set of related processes involved in the control of goal-directed behavior (Funahashi, 2001). It constitutes aspects of psychological skills that assist the individual in self-regulation (Blair, 2016). In real life, this relationship may also be reflected by the quality of mental health and engagement in risk behaviors during adolescence. Self-regulation is important for adolescents and their overall well-being (positive development and rates of risk-taking behavior), while executive functioning plays a role in the academic environment (success/failure rate) (Gestsdottir et al., 2023).

Executive functioning is an umbrella term referring to the cognitive processes that enable future-oriented and goal-directed behaviors (Stuss & Benson, 1984). Skills contained within executive functioning include planning and organization, flexible thinking, focused attention, use of information in working memory, and the ability to suppress impulsive behaviors (Meltzer, 2018). These skills can be classified into three integrated sets: (1) attention control, (2) cognitive flexibility, and (3) goal setting (Lezak, 1993; Luria, 1973; Neisser, 1967; Shallice, 1990; Stuss, 1992; Walsh, 1978 in Anderson et al., 2001). Executive functioning is therefore not only necessary for our professional/academic success, but it likewise moderates socially appropriate behavior.

Disruptions to executive functioning have lifelong consequences. Low et al. (2021) report that suboptimal development of executive functioning, especially after conception and during the first years of life, is a risk factor for impaired readiness for school. This in turn increases the risk of failing school, problems in employment, and financial instability. Lower resilience has subsequent effects on poor mental health. Impaired social skills and impulsivity act as risk factors for antisocial or criminal behavior, poorer interpersonal relationships, and an overall lower quality of life. These disadvantages can be passed on to the next generation through parenting and upbringing, creating a vicious circle. Negative early life experiences (e.g., neglect) may have an impact on distinct regulatory processes (e.g., impaired inhibitory control) linked to risk behaviors in adulthood (Bounoua & Sadeh, 2022). This pattern was supported empirically by research of Silveira et al. (2020), who found a link between childhood trauma and executive dysfunction with an influence on later alcohol abuse in adolescence.

With regard to the development of self-regulation and the development of cognitive abilities, it has been demonstrated that cognitive and emotional self-regulation co-develop, and that cognitive abilities provide support for emotional regulation. In other words, adolescents who are skilled at planning towards future goals may be able to use these skills to better control the expression of negative emotions (Memmott-Elison & Moilanen, 2021). The ability to control impulses and regulate one's emotions is critical to successfully getting through adolescence (Kwon et al., 2020).

As we already outlined in above, underdeveloped executive functioning is associated with antisocial tendencies such as delinquency, aggression, and poor interpersonal relationships, which generally persist into adulthood (McNeilly et al., 2021). All these manifestations potentially fit under the umbrella of risk behaviors, which are a common occurrence in adolescence. This field has been further developed by Jessor (Jessor & Jessor, 1977) who introduced a more precise and comprehensive concept of *risk behavior syndrome in adolescence*. Research has provided consistent evidence that there is common variation among a variety of problem behaviors, i.e., different risk behaviors are associated with one another and often tend to have similar determinants and perform similar functions. This idea is supported by the research of Donovan & Jessor (1985). The results of their research indicated that one common factor is responsible for the correlations between different forms of problem behavior. This one-factor model proved to be quite general across genders, in samples differing in educational level (high school vs. college), and in two different waves of longitudinal data within each "subsample." It also has general validity for adolescents with very different socioeconomic circumstances and different ethnic backgrounds from around the world.

Self-regulation or executive functioning play a protective role against the development of risk behaviors. The relationship between executive functioning and risk behaviors has been further examined by Blair et al. (2018). Their results suggest that intraindividual variability in responses may be an index of adaptive risk-taking and that the development of executive functioning, specifically working memory, may play an integral role in adaptive decision-making during adolescence and young adulthood. Executive functioning may also explain the development of internet addiction (Cudo & Zabielska-Mendyk, 2019), risk sexual behavior (Magnusson et al., 2019), sexual risks among substance users (Golub et al., 2012), or texting while driving (Hayashi et al., 2017).

● 2 METHODS

2.1 Objective and hypotheses

The aim of this study was to find the relationship between risk behaviors and self-regulation in adolescents. We hypothesize that low self-regulation is associated with a higher tendency for adolescents to engage in risk behaviors.

Based on the research methods (as described below), we defined the following empirical hypotheses:

H1: We hypothesize that there is a difference in self-regulation of adolescents in relation to risk behavior.

H2: We hypothesize that there is a difference in the impulse control rates of adolescents in relation to risk behavior.

H3: We hypothesize that there is a difference in goal orientation of adolescents in relation to risk behavior.

H4: We hypothesize that there is a difference in self-direction of adolescents in relation to risk behavior.

H5: We hypothesize that there is a difference in decision-making of adolescents in relation to risk behavior.

H6: We hypothesize that there exists a negative relation between risk behavior (and its subscales) and self-direction.

Our hypotheses are building on the results of previous research (e.g., Crandall et al., 2017; Watson-Brown et al., 2019; Watson-Brown et al., 2021; Nazar et al., 2022; Gestsdottir et al., 2022).

2.2 Measures

The present research was conducted using questionnaires. Participants completed a questionnaire battery consisting of two diagnostic instruments presented in the following order: (1) Risk Behavior Questionnaire and (2) The Self-regulation Questionnaire.

(1) The Risk Behavior Questionnaire (RBQ; Čerešník, 2016) is a modified "I-form" of the original Risk Behavior in Pupils Scale (Mezera, 2000). The questionnaire was originally designed for external observation and assessment of students by teachers and educators in a school setting. Our modified version allows the administration of the questionnaire directly to the students. Thus, we know that the students underestimate their own behavior, which means a decrease in the validity. The questionnaire contains 46 items, answered by the student/participant using a Likert scale, where: 7 = always, 6 = almost always, 5 = very often, 4 = sometimes/never, 3 = rarely, 2 = very rarely, 1 = never. For each statement, the participant assigns one numerical value from the scale provided that best represents their reaction to each statement. This questionnaire allowed us to collect data on risk behaviors across seven domains, defined by Mezera (2000) as follows:

- **asocial behavior (ASO)** – behaviors and actions of an individual that do not conform to the social customs, rules or norms of the society in which the individual lives but have not yet reach the intensity where the manifestations would be directed against this group and its values. Sample item: I underestimate others or refer to them in a derogatory and demeaning way (e.g. I use vulgar language and give derogatory nicknames to some of my classmates and adults, etc.).

- **antisocial behavior (ANT)** – behavior of an individual that deliberately, or in its consequences, harms society. Sample item: I take my other classmates' personal belongings or school supplies (e.g., hide, withhold, and steal).

- **egocentrism (EGO)** – this takes the form of attention-seeking behaviors, especially in younger and middle school-aged individuals. Sample item: I put my own needs before the needs of others and want to be first in everything at all costs, to win, or to have the last word.

- **impulsivity (IMP)** – manifestation of psychomotor restlessness, increased irritability, and violent and disproportionate reactions triggered by non-specific stimuli of intrapsychic balance, as well as specific stimuli from the external social environment. Sample item: I harass, bother or disturb other classmates during their schoolwork, during class or during breaks.

- **maladaptive behavior (MAL)** – its primary source in individuals is insufficiently developed social skills, competences, and personal habits. Maladaptive behaviors are predetermined by deficits in social learning, where an individual prefers less adequate forms of adaptive behavior, which, although leading to the goal, also become the source of multiple conflicts (e.g. verbal aggression, truancy, etc.). Sample item: I am unable to cope with failure or expressions of anger without hurting others.

- **negativism (NEG)** – in a narrower sense, this represents an individual's rejection manifested by resistance and opposition to activities that do not correspond to their intrapsychic motivation, or resistance to instruction and pedagogical guidance. Sample item: I speak to my teacher in an informal and insolent manner (e.g. I talk back, try to belittle them in front of classmates, etc.).

- **inclination to problematic group (INC)** – takes the form of an anti-social and disorganized group with a volatile structure. Such a group creates conditions for individual social maladaptation. We can argue that a strong inclination by an individual to such a group is a significant predictor of challenging and risk behavior, especially during adolescence. Sample item: I tend to hang out with classmates or friends whose behavior others find inappropriate.

When testing for internal consistency (*Table 1*), we found that the last two subscales (negativism and inclination to problematic group) did not meet adequate values. Therefore, we excluded them from further analysis.

(2) The Self-Regulation Questionnaire (SRQ; Slovak modification: Banárová & Čerešník, 2021) is a Slovak version of the Czech Self-Regulation Questionnaire SRQ-CZ-SE (Gavora et al., 2015), which is based on the English original of the Self-Regulation Questionnaire (Brown, Miller & Lawendowski 1999). This questionnaire focuses primarily on the self-regulation of human behavior (i.e. self-regulated behavior). The present study used the latter 21-item version of the SRQ-CZ questionnaire with an overall reliability of 0.85 (Cronbach's alpha) (Jakešová et al., 2015). Our reliability testing (*Table 1*) produced satisfactory results. Only the self-directing scale (item 21) was problematic because it negatively correlated with the total score and significantly reduced the internal consistency of the overall scale. For that reason, we excluded this item from further analysis.

This self-assessment questionnaire is completed by participants using a Likert scale, where: 1 = strongly disagree & 5 = strongly agree, as adopted from the original English questionnaire. The values in the middle, 2, 3 and 4, were not given wording by the

Table 1 | Internal consistency of scales measured by Cronbach's α

	Cronbach α	
asocial behavior	0.74	
antisocial behavior	0.755	
egocentrism	0.69	
impulsivity	0.712	
maladaptive behavior	0.72	
negativism	0.561	
inclination to problematic group	0.614	
risk behavior	0.913	0.894 without negativism and inclination to problematic group
impulse control	0.703	
goal orientation	0.717	
self-direction	0.567	0.746 without item 21
decision making	0.737	
self-regulation	0.822	0.860 without item 21

Table 2 | Participants by type of school, year grade and age

		N	*%*
Type of school	four-year gymnasium	156	30.9
	five-year gymnasium	97	19.2
	eight-year gymnasium	37	7.3
	SVS with matriculation exam	215	42.6
Year Grade	1st / kvinta	138	27.3
	2nd / sexta	150	29.7
	3rd / septima	130	25.7
	4th / oktáva	87	17.2
Age	15 years	46	9.1
	16 years	137	27.1
	17 years	160	31.7
	18 years	117	23.2
	19 years	36	7.1
	20 years	9	1.8
Σ		505	100

Note: N = number, SVS = secondary vocational school

Czech authors. In our version of the questionnaire, we defined these values as follows: 2 = disagree, 3 = cannot decide, 4 = agree. For each statement, the participant assigns one numerical value from the scale provided that best represents their reaction to each statement. In the Brow, Brown et al. (1999) model, self-regulation consists of 7 factors. Jakešová et al. (2015) identified 4 factors as the most suitable, which are also the subscales of the questionnaire used by us:

- **impulse control (IC)** – represents the control over short-term desires. Individuals with low impulse control are prone to act on their immediate desires and are unable to regulate their behavior at the given time. Sample item: Even when I decide to do something, I have difficulty completing it.

- **goal orientation (GO)** – represents an individual's general schema for approaching a task, performing it, and evaluating their performance of the task. Sample item: I generally take action to achieve/accomplish my goals.

- **self-direction (SD)** – according to Jakešová et al. (2015), opportunities for self-direction are a valid factor that represents self-regulated behavior. Sample item: Sometimes I learn the outcome of my actions too late.

- **decision-making (DM)** – self-regulated behavior involves the thought process of making a logical choice from all the available options. Each decision-making process conceives a final choice that may or may not be implemented into action. Sample item: New problems or challenges cause me to immediately search for a solution.

Personal administration due to anti-epidemiological measures was not possible. The questionnaire battery was ad-ministered online (Google forms), using either Zoom, Skype or Google Meet, in the presence of a trained member of the research team. The average time to fill out the questionnaire battery was 30-45 minutes, and the students had one lesson (45 minutes) at their disposal. The students were informed about the voluntariness and anonymity of the research. By filling out the questionnaire, they consented to the processing of their answers. Data collection was anonymized and conducted in concordance with Act no. 245/2008 (on education), Act no. 18/2018 (on personal data protection) and Act no. 199/1994 (on psychological activities). The data was not linked to the participants' identity.

2.3 Research sample

The parent population for our research consisted of 120,624 male/female students enrolled in higher secondary education (ISCED 3).

The research sample consisted of 505 adolescents in the age from 15 to 20 (M = 16.97, SD = 1.15). The participants were enrolled in 1st grade (N = 138); 2nd grade (N = 150), 3rd grade (N = 130) a 4th grade (N = 87).

The research sample consisted of students attending year 1 to 4 at four- and five-year gymnasium (prep/grammar school), attending year 5 to 8 at eight-year gymnasium, attending year 1 to 4 at secondary vocational schools (SVS). The total number of students who participated in our research is 505. The ratio of boys and girls was slightly uneven, with 220 boys (43.6%) and 285 girls (56.4%). *Table 2* presents the numbers of participants by each type of school, by the year attended, and by age.

Table 3 | Descriptives of the scales and the test of normality

	ASO	ANT	EGO	IMP	MAL	RB	IC	GO	SD	DM
N	505	505	505	505	505	505	505	505	505	505
Min	6	8	6	6	12	38	1	1	1	1
Max	34	34	33	35	62	170	5	5	5	5
Mdn	9	9	11	15	29	74	3	4	3.3	3.6
M	10.1	10.22	12.35	15.44	28.89	77	2.92	3.88	3.34	3.65
SEM	0.19	0.16	0.22	0.23	0.38	0.93	0.04	0.03	0.03	0.03
SD	4.32	3.64	4.96	5.11	8.44	20.92	0.83	0.71	0.77	0.67
Kurtosis	5.27	12.7	1.85	0.18	0.18	1.52	-0.41	0.6	0.18	0.28
Skewness	1.9	3.08	1.18	0.54	0.45	0.93	0.15	-0.66	-0.35	-0.29
S-W(500)	0.823	0.641	0.912	0.975	0.983	0.955	0.986	0.965	0.984	0.983
p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Legend: ASO = asocial behavior; ANT = antisocial behavior; EGO = egocentric behavior; IMP = impulsivity; MAL = maladaptive behavior; RB = risk behavior; IC = impulse control; GO = goal orientation; SD = self-direction; DM = decision-making; *S-W* = Shapiro-Wilk test

Our research sample was obtained by probability sampling (stratified cluster random sampling). One gymnasium and one secondary vocational school (SVS) were selected using a random number generator from the list of all gymnasiums and SVS in each region of the Slovak Republic. These schools were then contacted by letter and e-mail using the official contact details of the schools. In case the approached school refused to participate in the research, another school was selected following the same procedure. Data collection in the Slovak Republic took place from March 16, 2021 to June 9, 2021.

● 3 RESULTS

Our results are presented in *Tables 3* to *5*. We used the ANOVA test and correlation in the statistical analysis. Statistical significance was accepted at the standard level of $\alpha \leq 0.05$. Cohen's *d* was used to test for effect size.

Table 3 provides an overview of the descriptive characteristics for all research scales. Testing for normality using the Shapiro-Wilk test indicated a normal distribution of the data. However, it should be noted that the distribution of data for the variables of asocial behavior, antisocial behavior, and egocentrism appears shifted to the left and steeper than we would expect, according to skewness and kurtosis values.

Table 4 presents the values for the self-regulation scales in relation to the level of risk behavior. We split risk behaviors into three groups: low level, medium level, and high level. We based this on the mean value (77.00) and standard deviation (20.92) of the total risk behavior score (Table 3). We used the formula *AM ± SD*. We labeled values lower than *AM - SD* as low level of risk behavior, values between *AM - SD* and *AM + SD* as medium level of risk behavior, and values higher than *AM + SD* as high level of risk behavior. Statistical comparison showed that the level of self-regulation decreased as the risk behavior increased. In particular, for the impulse control variable, we found a statisti-

Table 4 | Comparison of different levels of risk behavior in relation to self-regulation

risk behavior		impulse control	goal orientation	self-direction	decision making
low	*N*	74	75	74	75
	M	3.33	3.97	3.81	3.9
	SEM	0.09	0.08	0.09	0.08
	SD	0.77	0.7	0.77	0.7
average	*N*	354	357	356	357
	M	2.91	3.9	3.35	3.63
	SEM	0.04	0.04	0.04	0.03
	SD	0.77	0.7	0.7	0.64
high	*N*	72	72	72	72
	M	2.58	3.71	2.85	3.52
	SEM	0.11	0.09	0.09	0.09
	SD	0.97	0.78	0.77	0.74
F(2)		16.439	2.855	32.720	6.886
p		< 0.001	0.059	< 0.001	0.001
Cohen's d		0.904	0.125	1.247	0.567

cally significant difference ($F(2) = 16.439$, $p < 0.001$), Cohen's *d* values indicating a large effect size; for the goal orientation variable, we found no significant difference ($F(2) = 2.855$, $p = 0.059$), no effect of substantive significance either; for the self-direction variable, we found a statistically significant difference ($F(2) = 32.720$, $p < 0.001$), Cohen's *d* values indicating a large effect; and for the decision-making variable, we found a statistically significant difference ($F(2) = 6.886$, $p = 0.001$), Cohen's *d* values indicating a medium effect.

In *Table 5,* we report the results of correlation analysis. We identified

- the negative correlation between impulse control and impulsivity (R = −0.425, p < 0.001), maladaptive behavior (R = −0.322, p < 0.001) and total score of risk behavior (R = −0,281, p < 0.001).

- the negative correlation between goal orientation and impulsivity (R = −0.300, p < 0.001) and total score of risk behavior (R = −0,112, p = 0.012).

- the negative correlation between self-directing and asocial behavior (R = −0.229, p < 0.001), antisocial behavior (R = −0.178, p < 0.001), egocentric behavior (R = −0,120, p = 0.007), impulsivity (R = −0.479, p < 0.001), maladaptive behavior (R = −0.297, p < 0.001) and total score of risk behavior (R = −0.360, p < 0.001).

- the negative correlation between decision making and impulsivity (R = −0.276, p p < 0.001), maladaptive behavior (R = −0.105, p = 0.018) and total score of risk behavior (R = −0.106, p= 0.017).

- the negative correlation between self-regulation and asocial behavior (R = −0.127, p = 0.005), impulsivity (R = −0.516, < 0.001), maladaptive behavior (R = −0.279, p < 0.001) and total score of risk behavior (R = −0.302, p < 0.001).

4 DISCUSSION

The aim of the present paper was to define the relationship between self-regulation and risk behavior in adolescence. Statistical comparison supported our hypothesis that self-regulation decreases with increasing risk behavior. In particular, we found a statistically significant difference for the impulse control variable (F (2) = 16.439; p < 0.001), with Cohen's d indicating a large effect size. Similar results were observed for the self-direction variable, where we found a statistically significant difference (F (2) = 32.720; p < 0.001), with Cohen's d also indicating a large effect size. Lastly, we found a statistically significant difference for the decision-making variable (F (2) = 6.886; p = 0.001), with Cohen's d indicating a medium effect size. Based on these results, we accepted hypotheses 1, 2, 4, and 5.

We did not find a significant difference for the goal orientation variable (F (2) = 2.855; p = 0.059) nor any substantive significance effect, therefore we did not accept hypothesis 3.

The results of the correlation analysis showed that the self-direction variable has the relations with all subscales of risk behavior (r = from -0.120 to -0.479), which means that the low self-direction increases the probability of the risk behavior production. Gestsdottir et al. (2023) found similar results, reporting that intentional self-direction was a predictor of risk behavior and is important for the general well-being of youth. We can accept hypothesis 6. But we have to state there exists a negative correlation between the risk behavior (and its subscales) and

subscales of the self-regulation questionnaire, as mentioned in the text above. We found very strong correlations, especially in relation to impulsivity.

Adolescents and adults are often faced with decisions that affect their future lives to varying degrees. Making a decision is difficult, but keeping track of our own long-term goals and their consequences can help us in the decision-making process. Adolescents and adults resolve ambiguous decisions through trial and error. However, adolescents are more likely to make decisions without considering the long-term consequences in risk situations (Marquez-Ramos et al., 2023). Adolescent decision-making is described as risk, and increased sensitivity to reward may be one aspect that contributes to higher risk behaviors (van Duijvenvoorde et al., 2022). Training in advantageous decision-making may also specifically protect against later prodromes of eating disorders (Harrison et al., 2022). Rational and spontaneous decision-making styles significantly mediated the correlation between the overall function of a healthy family and adolescent risk behaviors (Rezaei & Soltanifar, 2023).

Adolescence likewise presents a tremendous opportunity for growth, learning and exploration, directed both inwards and outwards. We agree with Duell & Steinberg (2020) in that adolescents are more likely to undergo tremendous cognitive, emotional, and social changes that lead them to explore, engage, and adapt to the outside world. Although these have the potential to manifest as dangerous or health-threatening behaviors, they can also manifest in creativity, prosocial activities and positive outcomes. This result is determined by the protective factors and risk factors that enter the adolescent's life on a daily basis and which they need to cope with.

Table 5 | Correlations among the research variables

		Impulse control	Goal orientation	Self-directing	Decision making	Self-regulation
ASO	R	-0.093	-0.053	-0.229	0.003	-0.127
	p	0.038	0.237	< 0.001	0.948	0.005
ANT	R	0.004	-0.074	-0.178	-0.012	-0.084
	p	0.929	0.097	< 0.001	0.79	0.061
EGO	R	-0.071	0.089	-0.12	0.069	-0.017
	p	0.114	0.046	0.007	0.121	0.698
IMP	R	-0.425	-0.3	-0.479	-0.276	-0.516
	p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MAL	R	-0.322	-0.051	-0.297	-0.105	-0.279
	p	< 0.001	0.254	< 0.001	0.018	< 0.001
RB	R	-0.281	-0.112	-0.36	-0.106	-0.302
	p	< 0.001	0.012	< 0.001	0.017	< 0.001

Legend: ASO = asocial behavior; ANT = antisocial behavior; EGO = egocentric behavior; IMP = impulsivity; MAL = maladaptive behavior; RB = risk behavior

The increased impulsivity of young people who have used addictive substances before the age of 15 may decrease their ability to regulate sensation seeking that peaks during adolescence, which can contribute to an increased risk of substance use disorders (Acheson et al., 2016). Sensation seeking and impulse control are constructs that form the core of dual system models of risk-taking in adolescents. Lydon-Staley & Geier (2018) linked 30-day prevalence and daily cigarette smoking to sensation seeking in adolescence.

On the other hand, any prevalence of smoking was related to impulse control even later in life.

Impulse control combined with sensation seeking also predicted delinquent behavior. The relative ratio of sensation seeking decreases from adolescence to adulthood, while the relative ratio of impulse control increases (Peach & Gaultney, 2013). These differences are compounded by gender in adolescence. Adolescent girls reach peak levels of sensation seeking earlier than boys (consistent with the idea that sensation seeking is related to pubertal development), which then decline more rapidly. Impulse control takes longer to increase in boys than in girls. Gender differences in both impulse control and sensation seeking also increase with age. Shulman et al. (2015) suggest that the window of increased vulnerability to risk behaviors during adolescence may be larger and longer-lasting for boys than for girls.

Some research argues that high impulsivity is often associated with multiple psychosocial and neuropsychological factors (Pharo et al., 2011; Goldenberg et al., 2013). Research by Carvalho et al. (2023) showed that emotional regulation, attachment to parents, and attachment to a social group had a negative effect on impulsivity during adolescence. In addition, satisfaction with teachers also produced an effect in younger adolescents. These results suggest that the psychological system and all the measured subsystems of social context play a relevant role in explaining adolescent impulsivity, and that impulsivity can be reduced by promoting emotional regulation, positive parenting practices, healthier peer relationships, and healthier relationships with teachers. Risk behavior in adolescents is also significantly affected by self-direction. Similar to the previous variables, self-direction has been associated with multiple psychosocial factors (Gander et al., 2020; Daniel et al., 2023).

Our study did not observe a significant difference in risk-taking behavior in terms of goal orientation, consistent with the research by Goodhines et al. (2020). The authors of the present study compared adolescents who used prescription stimulants and those who did not. The first group reported more frequent symptoms of depression/anxiety, sensation seeking, perceived risk behavior of their peers, alcohol and cigarette use, as well as lower levels of parental supervision. However, we observed no between-group

differences in terms of academic goal orientation, perceived peer approval of risk behaviors, and cannabis use.

There is in fact research that supports this relationship. Best & Freund (2018) found that older adults were more likely to choose the risk option with an increasing probability of avoiding larger losses, while younger adults were more likely to choose the risk option when a slightly larger gain was achievable. These findings support the expectations based on theoretical interpretations of goal orientation, which shifts from increasing gains in younger adulthood to maintenance and avoiding losses in older adulthood. Further research on goal orientation in relation to adolescent risk behaviors is therefore needed.

However, the bottom line is that promoting self-regulation in adolescents has an impact on preventing risk behaviors during adolescence. We therefore argue for the need to promote increased self-regulation in adolescents, particularly in the domains of decision-making, self-direction, and impulse control.

Despite the existence of research that corroborates various parts of this study, this topic needs more comprehensive attention. Our research supports the premise of a relationship between self-regulation and risk behaviors in adolescence, but the research itself is conducted on a limited number of respondents, which may have contaminated the results of the research. Another challenge for future research should be to increase the research population and the areas of risk behaviors, for example, those that we anticipate having a higher prevalence in the next generation. It is also useful to consider a closer study of the determinants that influence the development of self-regulation itself, such as attachment relationships or parenting.

The value of this study lies in the possibilities of applying the results to practice. It is necessary to develop a child's self-regulatory abilities early in life. Adolescents, based on their developmental specificities, are often unable to manage their short-term desires, choose the right one from the available options, perform and evaluate individual tasks, or direct their behavior in a desirable direction on their own. The support for the development of these operations is also, to some extent, in the hands of parents, teachers, and school psychologists.

● 5 CONCLUSIONS

Our results supported the hypothesis that as the risk behavior increases, the level of self-regulation decreases. The lower the impulse control, self-direction, and decision-making in adolescents, the riskier behaviors we observed – at the level of statistical significance. We observed a similar trend in goal orientation; however, these differences were not statistically significant.

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