

OUT OF CONTROL: TEENAGERS, SELF-CONTROL, AND RISKY BEHAVIORS

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Abstract

Objectives. This systematic review aimed to explore the relationship between low self-control and risky behaviors, in order to identify prophylactic and interventional measures to reduce the dangers to which some adolescents may be exposed.

Material and methods. Using the APA PsycNet and PubMed platforms, studies that investigated the link between self-control and risk were sought. Of the 2707 articles initially obtained, it was opted for studies in English, with the average age of the participants between 14-21 years old.

Results. The 61 selected articles revealed seven categories of risks associated with a low level of self-regulation: substance use – 28 studies, aggressive manifestation – 13 studies, delinquency – 10 studies, risky sexual behaviors – 8 studies, living the situation of a victim – 4 studies, *gambling* – 2 studies, other risky behaviors (consumption of unhealthy foods, compulsive manifestations, executive dysfunctions, etc.) – 9 studies. Some authors have shown that self-control can hold both a mediator and a moderator role between certain predictors and risky behaviors. Also, the relationship between self-control and risky behaviors can be influenced by intermediate variables: substance use, volume of the left orbitofrontal cortex (mediators); school climate (moderator). Five studies indicated that boys showed less self-control capacity than girls, and two other studies showed the opposite.

Conclusions. Designing and implementing some individual and group intervention programs, with a focus on acquiring behavioral control skills, can be useful in preventing risky behaviors in adolescents, especially substance use, aggressive manifestations, delinquency, etc. It is also important that the management of one's own emotions be learned from pre-adolescence, the involvement of parents being essential in this psycho-educational approach.

Keywords: self-control; adolescence; impulsivity; risky behaviors.

Introduction

From a macroscopic point of view, the human brain consists of three major component elements: the brainstem, the oldest part of the brain from an evolutionary perspective, which the neuroscientist McLean called the "reptilian brain", the paleocortex, also called the limbic system, with a role in the expression of emotions, and the neocortex, the most recently developed part of the brain responsible for logical reasoning and language, also known as gray matter (Eysenck & Eysenck, 1981/2001). The prefrontal cortex is a region of the neocortex whose development occurs later and whose ventromedial areas are involved in the control of emotional and instinctual behaviors (Fuster, 2002, p. 373).

The American Psychological Association defined self-control as "the ability to have command over one's own behavior (overt, hidden, emotional, or physical) and to restrain or inhibit one's impulses", this definition referring to the comparison between long-term and short-term gain, opting for the former illustrating self-control, and the choice of the second representing impulsivity (VandenBos, 2013/2020, pp. 70-71). Some neuroscientists have explained that people have a single brain that hosts two minds: self-control and the impulsive self (McGonigal, 2012). According to McGonigal (2012), the impulsive self is in search of immediate gratification, while self-control refers to that part of the person exercising control over impulses, postponing the immediate achievement of pleasure and thus protecting the person's long-term goals. In the literature, self-control can be found under different names, among which Duckworth (2011) recalled the delay of gratification, effort control, willpower, executive control, time preference, self-discipline, self-regulation, and the ego strength (p. 2639).

According to McCrae (1976, as cited in McCrae & Löckenhoff, 2010, p. 147), self-control cannot be described as a trait or as a process, but rather as a function that can be influenced by certain personality traits. With time, however, self-control began to be considered a trait, as it could be observed that people differed from each other in their ability to self-regulate (McCrae & Löckenhoff, 2010; Baumeister & Tierney, 2011).

Self-control began to be discussed in the context of crime as early as 1950 by Glueck and Glueck, according to whom a low level of self-control is responsible for impulsive behaviors, which sometimes acquire a criminal aspect (as cited in Marsh, Melville, Morgan, Norris, & Walkington, 2006, p. 60). In 1990, self-control was the subject of a theory of criminal behavior developed by Gottfredson and Hirschi, who explained that low self-control is a consequence of poor child-rearing, and this leads to committing crimes later in life, as the person is unable to anticipate the consequences of his actions (as cited in DeCamp, 2015; Rafter, Posick, & Rocque, 2016, p. 299). According to the initiators of this theory, self-control is consolidated until the age of eight, following that after this age threshold it will remain constant. However, studies using brain imaging have shown that in adolescence, the brain goes through a series of changes with an effect on emotions, reasoning, behavior organization, and self-control (Papalia, Olds, & Feldman, 1978/2010, p. 360).

Inhibitory incapacity represents the central feature for a group of disorders specific to childhood and the age of adolescence – disruptive, impulse-control, and conduct disorders (American Psychiatric Association [APA], 2013/2016, p. 461). In people diagnosed with conduct disorder, differences in structure and functioning were revealed in the cerebral areas with a role in self-regulation, especially in the ventral prefrontal cortex and amygdala (APA, 2013/2016, p. 474). Some people with conduct disorder that started before 15 years may develop later in life antisocial personality disorder, which may be manifested by inability to comply with social norms, deception, impulsivity, irritability and aggressiveness, indifference to one's own safety and that of

others, irresponsibility or the absence of remorse (APA, 2013/2016, p. 659). Sometimes, because of their behavior, these people end up being sentenced to prison. In forensic situations, "even when one of the features of the disorder is the reduction of control over the behavior, the presence of the diagnosis itself does not demonstrate that the individual in question is (or was) unable to control his behavior at any given time" (APA, 2013/2016, p. 25).

According to the existing statistics at European level, in 2018, out of the total number of detainees, about 10689 were juveniles, Romania being at that time on the 18th place in the ranking of the states with the highest incarceration rate for juveniles (Eurostat, 2020). At the end of 2020, in the custodial system in Romania were 249 minors and 839 young people aged between 18 and 21 years (Administrația Națională a Penitenciarelor [National Administration of Penitentiaries (NAP)], 2020). Most of them were male, and the most frequently committed crime was robbery, followed by theft, murder, rape, trafficking and illicit drug use, etc. (NAP, 2020).

In the United States of America (USA), the arrest rate of persons aged between 10 and 17 years has registered a downward trajectory since 1996, reaching in 2019 the lowest number of arrests for this age group from 1980-2019 (Office of Juvenile Justice and Delinquency Prevention, 2020). A similar trend was registered in Europe, the rate of juvenile inmates decreasing between 2009 and 2018, except for 2017, when a slight increase in the number of cases of juvenile arrested was reported, compared to previous years (Eurostat, 2020).

The fact that the number of arrests among young people has decreased in recent years does not eliminate the problem of conduct which is the reason for the arrest and the associated factors. Moreover, these data raise the issue of the level of self-control available to adolescents involved in risky behaviors, sometimes at the limit or even outside the law. However, to state that adolescents are incapable of self-control as a result of incomplete brain development indicates a limiting belief. Assumptions such as those about the fact that adolescents are not able to make optimal decisions, that they do not have a prefrontal cortex, or that all adolescents go through similar periods of storm and stress were dismantled by Casey and Caudle (2013), who showed that some adolescents may have more self-control compared to some adults.

In view of all this, the present paper aims to highlight the dangerous consequences of a low level of self-control during adolescence, in the idea of promoting the importance of ensuring the access of adolescents to the resources necessary to stimulate the development of this trait.

Purpose and objectives of the study

This paper aimed to explore the literature on the relationship between low self-control and the risks associated with such a trait in adolescents and youth. The results of such an investigation could prove useful in formulating directions of prevention and intervention in order to reduce the crime rate among this category of persons.

The questions that guided the research were the following:

1. What risk behaviors are adolescents with low levels of self-control involved in?
2. What is the specific risk behavior of adolescents with a low level of self-control?
3. Are there gender differences between teenagers in terms of self-control?

From these research questions, the following objectives were derived:

- O1: Selecting the most relevant studies in which the relationship between the low level of self-control and risks during adolescence was investigated.
- O2: Extracting the main results related to the risky consequences of a low level of self-control in adolescence.

O3: Formulating recommendations to facilitate the development of self-control in adolescents, depending on the risk behavioral specificity.

Methodology

Source of data

The search platforms used to identify the literature needed to carry out this systematic review were APA PsycNet and PubMed. The search strategy consisted of combining the terms *low self-control* and *risk*, the link between the two terms being made by „AND”. The filters available on the two platforms were used, and the search results were selected according to age group (teenagers and youth) and the language in which the articles were written (English). It is important to note that the interval for each age group was different from one platform to the other, in the case of APA PsycNet taking into account the interval 13-17 years for adolescence and 18-29 years for young adulthood, and in the case of PubMed, adolescence was defined as the period between 13-18 years, while the young adulthood was set to fall between 19-24 years.

Following this search method, a number of 2707 articles were obtained. They were published between 1973 and 2021 and were extracted from the two platforms in January 2021.

Inclusion and exclusion criteria

The filters provided by the platforms for access to the scientific literature have proven to be useful, but not sufficient. In addition, filters differ from one platform to another (some platforms offer a limited variety of them), making it difficult to replicate the same article selection strategy. As a result, inclusion and exclusion criteria were defined for sorting the items obtained. These criteria are presented in Table 1.

Table 1

Inclusion and exclusion criteria used in the sorting process of items

Inclusion criteria	Exclusion criteria
The title, summary, or labels of the article contained at least one of the terms <i>self-control</i> , respectively <i>self-regulation</i> ;	The title, summary, or labels of the article did not contain any of the terms <i>self-control/self-regulation</i> ;
Average age of participants between 14-21 years;	Participants in developmental periods other than adolescence (e.g. children, adults, the elderly);
Studies based on field data processing;	Studies such as systematic review or meta-analysis;
Results oriented towards the relationship between self-control and risky behaviors.	Clinical peculiarities of the sample (e.g. pregnant women);
	Results of therapeutic interventions or prevention programs.

Data analysis and extraction

The articles obtained on PubMed such as those based on the selection, analysis, and interpretation of the results of other published works on the subject of low self-control and the risks associated with it were identified through the filters available on this platform and were subsequently saved in the Zotero program (Corporation for Digital Scholarship, n.d.), in a separate collection. Then, after all the articles generated by PubMed were saved in Zotero, the duplicate records represented by those described above were deleted. Thus, 157 search results such as meta-analyses, reviews, and systematic reviews were eliminated.

For the remaining items, the selection procedure of the most relevant ones was continued in the Zotero program. This program allowed sequential registration of items downloaded from the two search platforms, announcing that one of the items identified on the PubMed platform was withdrawn in 2016.

The first sorting was based on searching for the terms *self-control* and *self-regulation* in all the files and labels of the folder in which the remaining 2550 unique items were archived. Articles whose title, summary, or labels contained at least one of these terms were extracted (188). Of these articles, three other items were removed, as they constituted a duplicate (some articles were found on both PubMed and APA PsycNet).

For the 185 articles, a detailed analysis of the titles and abstracts was used, excluding 102 articles for reasons such as those presented in Table 2.

Table 2*Phase 1 and 2 of exclusion*

Phase 1	
<i>Characteristics of the sample</i>	<i>Examples</i>
Exceeding the established age range	Participants were in different developmental periods or the average age of the sample was not between 14-21 years.
Clinical peculiarities	Attention deficit hyperactivity disorder (ADHD), risk for bipolar disorder, risk for obesity, pregnancy, diabetes, etc.
Phase 2	
<i>Investigation characteristics</i>	<i>Examples</i>
Emphasizing variables other than the risky consequences of a low level of self-control	Adherence to cultural values, the relationship between parental styles and self-control, etc.
Self-control as a dependent variable	The low level of self-control was representing a consequence of the action of other variables on participants.
Topics of articles different from those followed	Mass vaccination campaign, self-control training to treat obesity, effects of exposure to antibiotics, quality of life after surgery, etc.

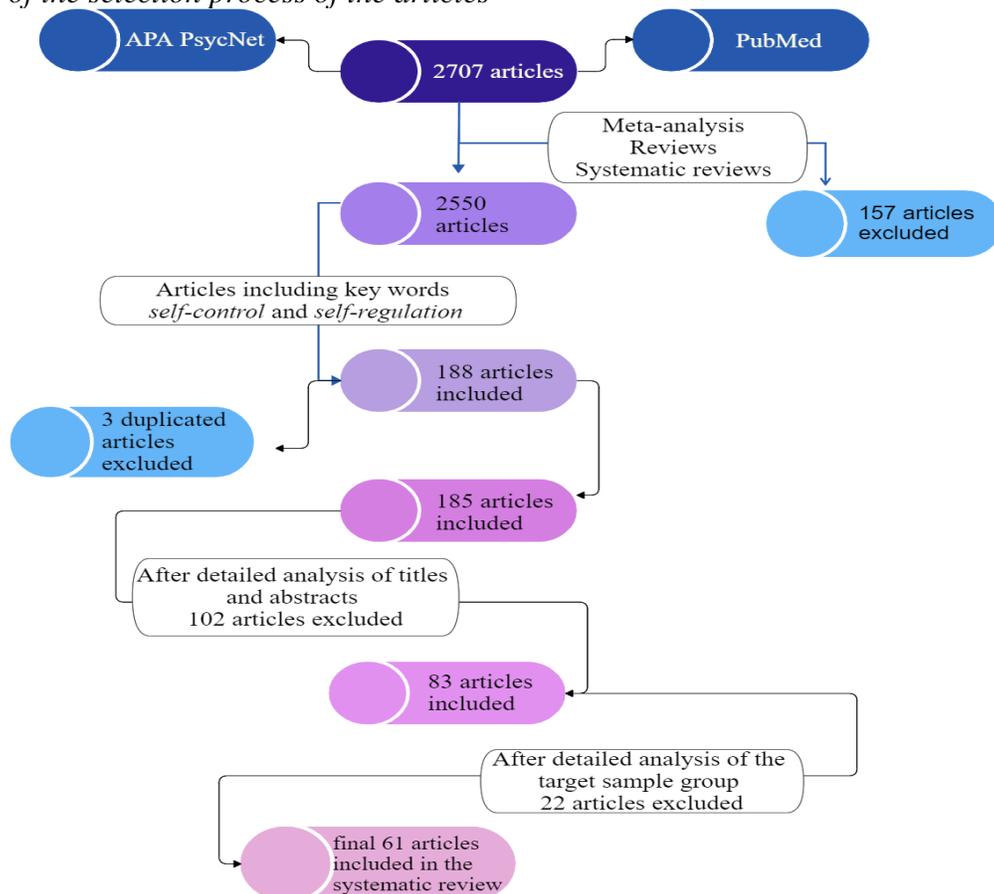
During the analysis of the abstracts, additional notes were introduced to the included items, in order to facilitate the reading of the entire text of the articles. The 83 articles whose abstracts were selected were subsequently subjected to an in-depth analysis of the text, following mainly those indicators noted during the analysis of the abstracts. Additional information of interest to the study that resulted from the full analysis of the text of each article was further noted in the Zotero program.

Another 22 studies were removed after checking the inclusion criteria in the whole article. In most cases, the reasons for exclusion were the exceeding of the range set for the average age and the lack of information required for this analysis (about the sample size, the average age and level of self-control of the participants, the proportion of participants by gender and the place of the research).

Those papers that did not provide data about the age of the participants, but which provided information about the level of education at which they were enrolled (e.g. high school) were also selected. However, studies that did not provide information on the age of the participants, but mentioned that they were students in a university, were excluded, as the age of people pursuing university studies can vary considerably, from adolescence to the third age. In the end, there are 61 articles left on whose data the results of this work are based. The entire systematic review process of the articles is summarized in Figure 1.

Figure 1

Diagram of the selection process of the articles



Results

In Table 3, placed after the conclusions, the information of interest extracted from each article was summarised. Data such as the number, average age, and gender of the participants, the place of the research, the design of the study, the particular features of the sample, and the main results related to the risk behaviors associated with a low level of self-control were followed.

Most studies (35) were conducted in the USA, but it is important to note that some research has covered several countries. Data obtained from participants from China, Italy, South Korea, and Canada were analyzed in three articles each, while samples from India, Switzerland, Germany, Australia, and the Netherlands were investigated in two scientific papers each. People from Colombia, Cyprus, Jordan, Kenya, Philippines, Sweden, Thailand, New Zealand, Taiwan, Israel, Malaysia, Texas, Georgia, Finland, and the United Kingdom (UK) were included in one study each.

Of the total articles included in the systematic review, 21 were based on data from extensive projects such as *Gang Resistance Education and Training* (G.R.E.A.T., n.d.), *Zurich Project on the Social Development from Childhood to Adulthood* (zproso) (Jacobs Center for Productive Youth Development, n.d.), *the Minnesota Twin Family Study (MTFS)* (Minnesota Center for Twin and Family Research, 2017), etc. Most of the studies (35) had a longitudinal design, and the remaining 26 were cross-sectional.

Sample sizes ranged from 25186 to 27 participants. Regarding the gender of the participants, although the majority percentage was represented by girls, in most studies a balanced ratio between the number of girls and that of boys was maintained. In five of the studies, only male individuals were evaluated.

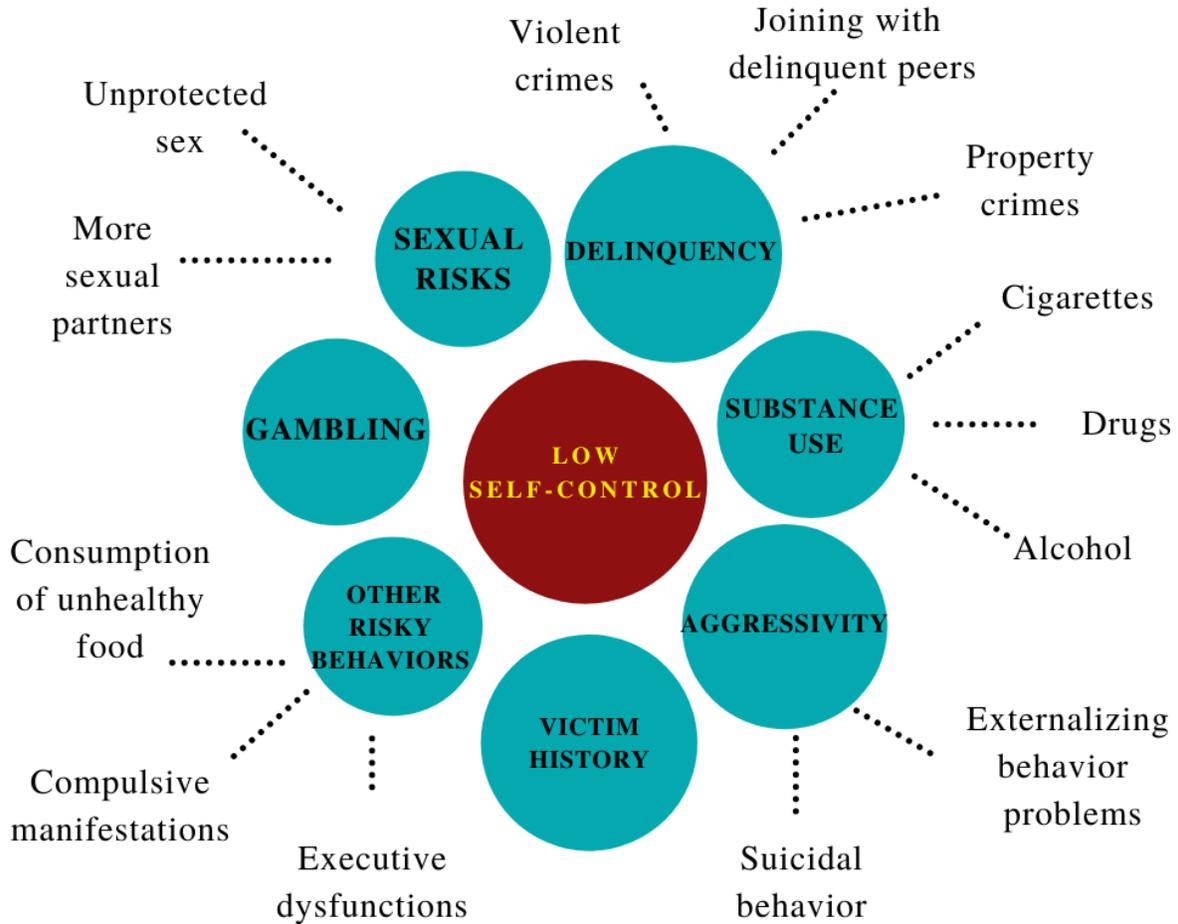
The selected cross-sectional studies included adolescents with a minimum age of 13 years, the maximum average age being 21.39 years. In the case of longitudinal research, the youngest participants at the time of the first measurement were newborns, and the oldest participants at the last moment of data collection had an average age of 36.6 years.

The results related to the risk behaviors with which the low level of self-control was associated can be grouped into the following main categories: substance use (alcohol, drugs, cigarettes) – 28 studies, aggressive manifestation (including externalizing behavior problems and self-aggression – e.g. suicidal behaviors) – 13 studies, delinquency – 10 studies, engaging in risky sexual behaviors (unprotected sex, more sexual partners) – 8 studies, living the victim situation – 4 studies, *gambling* – 2 studies, other risky behaviors (consumption of unhealthy foods, compulsive manifestations, executive dysfunctions, etc.) – 9 studies.

The main risky behaviors identified are illustrated in Figure 2.

Figure 2

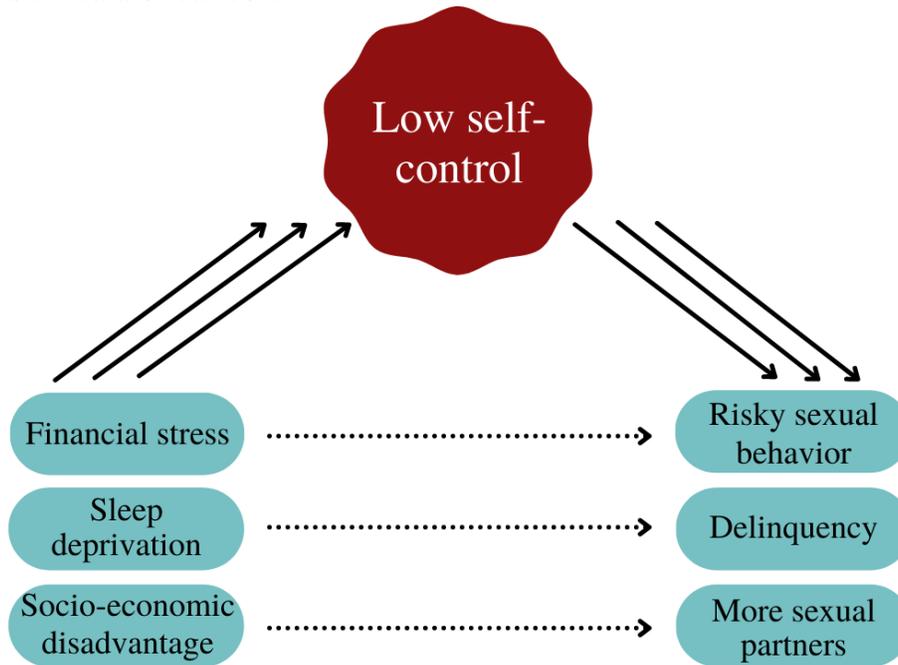
Risky behaviors associated with a low level of self-control



In some cases, it was found that self-control had a mediating role between a certain variable and some risky behaviors. For example, self-control mediated the relationship between the financial stress faced by adolescents' families and their risky sexual behavior (Crandall, Magnusson, Novilla, Novilla, & Dyer, 2017). In other studies, self-control mediated the link between sleep deprivation and delinquency (Meldrum, Barnes, & Hay, 2015) and between socioeconomic disadvantage in early adolescence and conventional trajectories of sexual partners in late adolescence (Kogan, Yu, Brody, & Allen, 2013). In this context, financial stress, sleep deprivation, and socio-economic disadvantage did not automatically determine risk behaviors, but had as impact a low level of self-control. Low self-control was the variable that subsequently led to risky sexual behavior, delinquency, and more sexual partners, creating a bridge between these behaviors and the other risk factors. An illustration of the identified mediation relationships is shown in Figure 3.

Figure 3

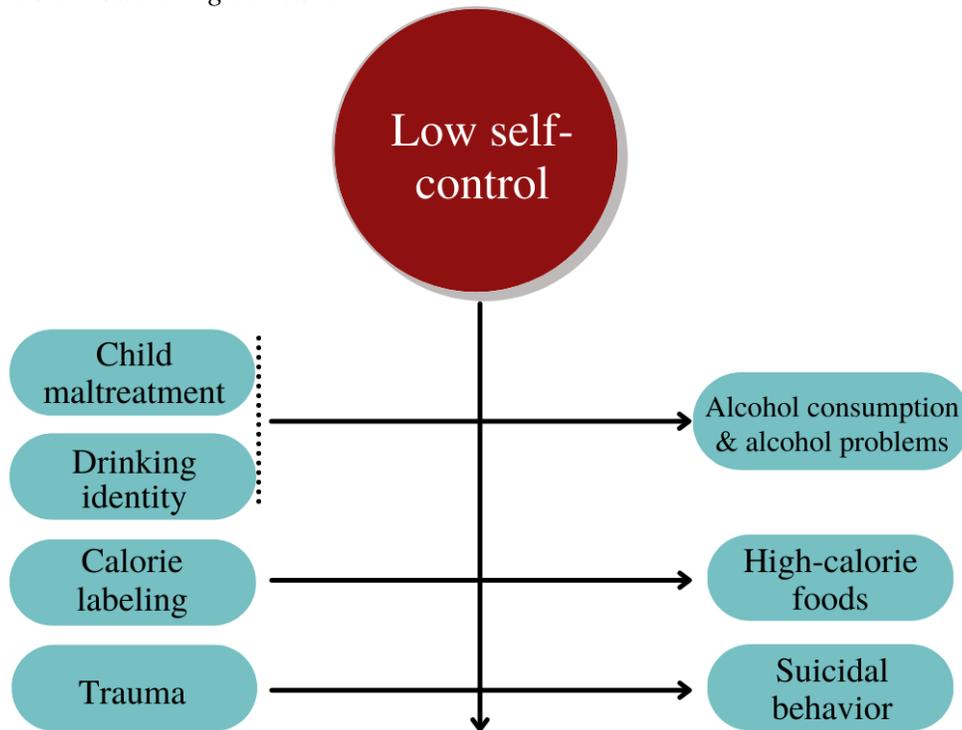
Self-control as a mediator variable



Some researchers have identified a moderating effect of low self-control on the risky behaviors of adolescents. For example, Chang et al. (2018) showed that self-control moderates the relationship between trauma and suicidal behaviors, and Rising and Bol (2017) presented the moderating influence of self-control in the relationship between labels that specify the number of calories and food choice. Liu, Oshri, and Duprey (2020) identified self-control as the moderator of the relationship between childhood maltreatment and alcohol-related problems, while Lindgren, Neighbors, Westgate, and Saleminck (2014) have observed that self-control moderates the link between drinking identity and alcohol consumption, respectively alcohol issues. The moderator character of self-control translates into the intensity of the relationship between predictor variables and risk behaviors. Thus, the link between childhood mistreatment and problematic alcohol-related behaviors, between drinking identity and alcohol consumption, between labels stating the number of calories and the choice of high-calorie foods, respectively between trauma and suicidal behavior, was stronger in adolescents with a low level of self-control as opposed to their counterparts with a high level of self-control. The role of moderator of self-control is schematized in Figure 4.

Figure 4

Self-control as a moderating variable



However, there have also been authors who have found that the relationship between self-control and risk behaviors is moderated or mediated by a third variable. In this regard, Novak and Clayton (2001) found that schools with low levels of discipline and involvement moderated the link between the low level of self-regulation of adolescents who participated in the study and their increased likelihood of experiencing smoking. Moilanen and Manuel (2018) observed that low self-control indirectly determines the early sexual onset and low level of condom use through substance use (mediation relationship). At the same time, Cheetham et al. (2017) showed that the smaller volume of the left orbitofrontal cortex mediated the relationship between effort control and substance use disorder. Figures 5 and 6 show the effect of mediating and moderating variables on the relationship between self-control and various risky behaviors.

Figure 5

Mediating the relationship between self-control and risky behaviors

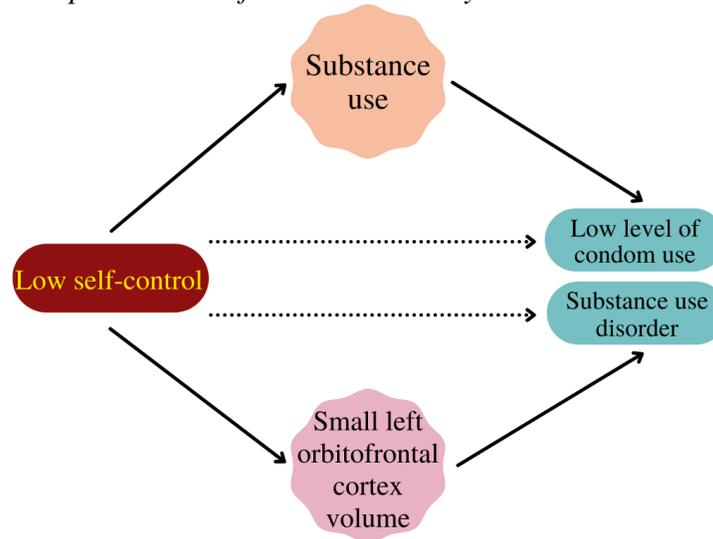
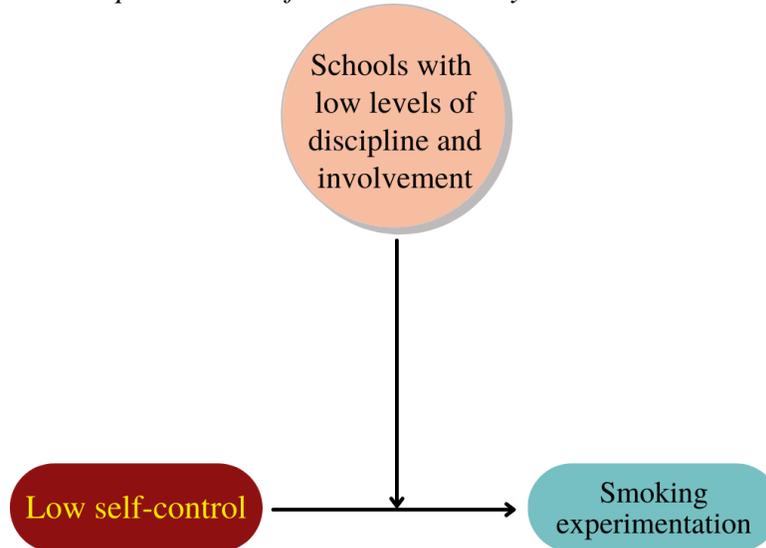


Figure 6

Moderating the relationship between self-control and risky behaviors



Gender differences in the level of self-control were identified in seven studies. Compared to girls, in five of them boys showed a lower self-control capacity (Piquero, Gibson, & Tibbetts, 2002; Clark, Dannellan, Robins, & Conger, 2015; Esposito, Bacchini, Eisenberg, & Affuso, 2017; Innamorati & Maniglio, 2015; Quinn & Fromme, 2010), and in two studies they reported a higher self-control capacity (Winstok, 2009; Ellis et al., 2015). In some papers, the comparison between males and females were outlined at the level of risk behaviors, some risky behaviors being identified only in a certain gender group. In others, it was highlighted in the relationship between self-control and such problematic behaviors, these being more pronounced for a certain gender. For example, compared to girls, boys were found to be more likely to engage in binge drinking

(Piquero et al., 2002), and in other studies, reduced self-control was associated with suicide attempt and condom non-use only in their case (Huang et al., 2017; MacKellar et al., 2000).

Discussions

Based strictly on the psychological variables analyzed in the studies included in the present systematic literature review, the risk behavioral specificity of adolescents with low levels of self-control was found to be related to substance use. This category included substances such as tobacco, cannabis (marijuana), opioids, and alcohol. Then, in descending order of the incidence of risky behaviors, aggressive manifestation, delinquency, risky sexual behaviors, victim history, and gambling were recorded. Another category was built from different behaviors, such as: excessive use of mobile phones, consumption of fast food, which were considered by the authors of this paper not to represent a direct danger to society or the person who practices them. However, a study conducted in Bucharest on a group of 459 subjects (83 male and 376 female) with an average age of 23.5 years showed that about 75% of the participants opened the mobile phone more than 10 times in an hour and that almost half of the study participants recognized that they could not last more than six hours without opening a device, self-control and low self-esteem, severe parents or family dysfunctions representing risk factors for the problematic use of smartphones (Baciu, 2020).

One of the advantages of this systematic analysis is the diversity of samples included in the 61 studies. Due to this, it was found, for example, that delinquency was not specific only to juvenile offenders (Fine, Steinberg, Frick, & Cauffman, 2016; Davis et al., 2018), and it also was identified in samples representative of the general population (Cho, 2019; Yun, Kim, & Park, 2016). Samples of frequent cannabis users (e.g. Lopez-Vergara, Jackson, Meshesha, & Metrik, 2019) also can be mentioned, who obtained results comparable to those obtained by participants randomly selected from among high school students (e.g. Pahl, Brook, & Lee, 2014).

Another advantage is represented by the multitude of longitudinal research, which allowed the long-term follow-up of behaviors determined by a low level of self-regulation, thus avoiding the main limitation assumed by a single assessment at a certain point in time: the impossibility of establishing a causal relationship between the variables involved (Kramer, 1988). Then, sample sizes and cultural variability can give the results a character of generality. However, a certain degree of caution is required in terms of extending the conclusions of these studies to the entire adolescent population, as some individual and cultural peculiarities can moderate the relationship between self-control and behavior.

Substance use and gambling - low self-control

In the case of adolescents, substance use is a consequence of being guided by the reward system, while their capacity to reason and make decisions is still limited, as a result of the incomplete development of the prefrontal cortex (National Institute on Drug Abuse, 2014, p. 6). Thus, regardless of whether smoking or alcohol and drug use are motivated by the desire to be accepted by the group of friends, to feel good, or to experience new things, the adolescent seeks to amplify his pleasure (fulfilling the need to belong, inducing euphoria, satisfying curiosity, etc.) and to avoid punishment (rejection from friends, monotony, feelings of sadness, guilt, etc.) (National Institute on Drug Abuse, 2014, pp. 16, 6). It also was observed that most of the time, drug users undervalue themselves or become powerless, present the inferiority complex, due to negative experiences, such as: convictions, problems in childhood and adolescence, socio-economic problems, to which is added the desire to imitate friends (Baciu, 2019).

Pathological gambling (ludomania) is discussed in connection with substance use, as this behavioral pattern was found to activate reward systems similar to those that are involved in drug abuse (APA, 2013/2016, p. 481). Moreover, the connection between the two is not only one of a parallel nature, but also of a causal nature, given that among the psychiatric consequences of pathological gambling are substance use disorders (Fong, 2005).

In both substance use and ludomania, some of the diagnostic criteria refer to the individual's inability to control that behavior, despite his intention and the efforts made (APA, 2013/2016, pp. 483-585). In such cases, cognitive-behavioral therapy, short-term treatment models, and pharmacological interventions have proven their usefulness (Jazaeri & Habil, 2012).

Aggressiveness, victim experience - low self-control

Aggressiveness usually appears as a consequence of a high level of anger, doubled by the limited ability to control the behavioral reaction triggered in response to this emotion (Ekman, 2003/2019, pp. 194-195). However, aggressiveness can also be of an instrumental nature, aiming to achieve some material gains (Worchel, Cooper, & Goethals, 1991, as cited in Mitrofan, 1996, p. 435). Mitrofan (1996) also distinguishes between two types of aggressiveness, depending on the form in which it manifests itself: violent aggression and nonviolent aggression.

As some of the analyzed studies have shown, adolescents can manifest themselves aggressively in different social contexts, such as romantic encounters, intimate relationships, gang, school, but also in the relationship with the self (Chapple & Hope, 2003; Gover, Jennings, Tomsich, Park, & Rennison, 2011; Beckmann, Bergmann, Schneegans, & Baier, 2019; Chang et al., 2018; Finkel, DeWall, Slotter, Oaten, & Foshee, 2009; Huang et al., 2017). In turn, aggressors can become victims, and the violence manifested and suffered can take various forms, such as physical violence and psychological violence (Gover et al., 2011). It should be noted, however, that the co-occurrence of low self-control and victim experience is contributed by both specific environmental factors, i.e. the particular experiences of a person (37%), as well as genetic factors (63%) (Boutwell et al., 2013).

Aggression can be adaptive, appearing as a natural consequence of evolution, in order to protect the individual, the group, individual objectives, etc. (Connor, 2002, as cited in Connor et al., 2019), but also can become maladaptive, such as impulsive aggression (Connor et al., 2019). In the treatment of maladaptive aggression, psychosocial interventions and medication treatments are recommended (Center for Education and Research on Mental Health Therapeutics, Rutgers University, 2010; Connor et al., 2019).

Delinquency - low self-control

Delinquency was defined as a behavior outside the bounds of the law, usually carried out by a young person, who is not yet considered an adult, and to whom a different punishment is applied to that of adult offenders (The Editors of Encyclopaedia Britannica, 2013, para. 1). Early-onset antisocial behavior (around the age of 11) is more likely to lead to chronic juvenile delinquency during adolescence, while antisocial behavior with onset after puberty usually involves less serious offenses, being considered a temporary response to the changes characteristic of adolescence (Schulenberg & Zarrett, 2006, as cited in Papalia et al., 1978/2010, p. 414).

It is important to mention that most cases of juvenile delinquency do not evolve towards a criminal trajectory in adulthood, and most of the time, this is due to the subsequent psycho-socio-economic development of the person (Kosterman, Graham, Hawkins, Catalano, & Herrenkohl, 2001, as cited in Papalia et al., 1978/2010, p. 416; Moffitt, 1993, as cited in Papalia et al.,

1978/2010, p. 416; The Editors of Encyclopaedia Britannica, 2013, para. 2). Actually, it was found that labeling young people as potential delinquents encouraged them to commit crimes (The Editors of Encyclopaedia Britannica, 2013, para. 4).

Given that the basis of juvenile delinquency is built in early childhood, intervention should begin in the same period of development (Papalia et al., 1978/2010, p. 416). Programs from early childhood need to be accompanied by programs carried out during adolescence. In this regard, rather than being separated from the rest of their peers, it is recommended that adolescents at risk of delinquency participate in activities together with their counterparts who do not pose such a risk, in order to avoid companionship between adolescents with antisocial conduct (Dodge, Dishion, & Lansford, 2006, pp. 10-11).

Risk sexual behaviors - low self-control

Risky sexual behaviors associated with a low level of self-control were unprotected sex, having sexual relations with numerous partners, and the early onset of sexual activity (MacKellar et al., 2000; Moilanen & Manuel, 2018; Hernandez & Diclemente, 1992; Quinn & Fromme, 2010; Moilanen, 2015; Kogan et al., 2013).

In the USA, while the number of high school students who have already had sex with at least four partners is on a downward trajectory, the percentage of those who did not use a condom during the last sexual intercourse has remained high over the past decade (over 40%) (Centers for Disease Control and Prevention, n.d.). In Europe, although the percentage of 15-year-olds who had sexual intercourse decreased to 19% in 2018 compared to 21% in 2014, only 61% of them used a condom at the last sexual intercourse, suggesting a decrease of one percent compared to 2014 (World Health Organization [WHO] Regional Office for Europe, 2020, pp. 76-77).

Training adolescents about the dangers of these practices is therefore becoming a priority. As they go through a period of sexual exploration, adolescents should benefit from education and counseling classes on this topic.

Gender differences

Regarding the period between 2013-2019, the average of girls who did not use a condom at the last sexual intercourse tends to be higher than that of boys, both among students in grades 9-12 in the USA and among 15-year-olds in Europe (Centers for Disease Control and Prevention, n.d.; WHO Regional Office for Europe, 2020, p. 77). However, the association between low self-control and low condom use is questionable from a gender perspective. While the study of Moilanen and Manuel (2018) did not reveal gender differences in the correlation between low self-control and low condom use, results obtained by MacKellar et al. (2000) showed that low self-control was associated with condom non-use only in boys. Regarding alcohol consumption, the results obtained by Piquero et al. (2002) showed that boys in the USA (university students) were more likely to engage in binge drinking than girls. Nevertheless, these results also showed that while self-control was a predictor of binge drinking (in boys and girls) and alcohol-related behaviors (only in girls), however, in the relationship between binge drinking and alcohol-related behaviors, the effect of self-control was insignificant, the result being similar for both gender groups. For this reason, it was recommended to consider some situational factors.

Cultural differences

The research conducted by Ellis et al. (2015) revealed that criminal activity associated with low self-control was supported more strongly by USA data and weaker by those from Malaysia.

Also relevant is the example of Duell et al.'s (2016) research, which showed that low self-control correlated with risk-taking only for participants in Western countries, not for those from Asia. It is known that the USA ranks 1st in terms of the degree of individualism in society, followed by Anglo World and countries in northern and northwestern Europe, while the countries of Asia are characterized by a collectivist culture (IBM Database Plus Extensions, n.d., as cited in Hofstede, Hofstede, & Minkov, 2010, pp. 95-97). Thus, these data may indicate the role that collectivist cultures have in keeping adolescents away from potential dangers. While adolescents in countries with an individualistic ideology may be more likely to meet their own needs, without taking into account the needs of others (an aspect revealed by the strong relationship between reduced self-control and crime), those in states with a collectivist social perspective may be likely to put the common good before the individual one.

However, the association of substance use with low self-control did not depend on cultural peculiarities, being observed both in the USA and in countries different from those on the American continent: the Netherlands, China, Australia, Italy. The fact that this behavior was found to be so widespread raises the issue of the availability and attractiveness that alcohol, tobacco, and other types of drugs have among adolescents. Also, the desire to be accepted and to integrate into the group of friends (an essential part of the psychosocial development during adolescence) (Papalia et al., 1978/2010, p. 411), is another reason why some adolescents consume these substances (National Institute on Drug Abuse, 2014, p. 16).

Conclusions

This paper highlighted the main categories of risky behaviors with which the diminished levels of self-control were associated: substance use, aggressive manifestations, delinquency, risky sexual behaviors, gambling, and other risky behaviors. Another important conclusion is that in the relationship between self-control and such behaviors, moderating and mediating variables intervened in some cases. These findings can contribute to the design of intervention programs at both individual and group level, in order to develop self-control among adolescents, emphasizing the need to address behavioral self-regulation. The importance of such programs is supported by results such as those obtained by Allemand, Job, and Mroczek (2019) in a longitudinal study involving 1527 participants. Participants were assessed annually for their level of self-control, between 12-16 years of age, and love and work outcomes (dependent variables) were assessed at age 35. It was found that regardless of the level of self-control achieved by the participants in early adolescence, the development of self-control during adolescence led to better satisfaction in terms of intimate relationships and professional life.

Parents can have a crucial role in the harmonious transition of adolescents to adulthood. A longitudinal research in which 215 families were evaluated highlighted the role of maternal coaching of emotions in reducing children's externalizing behavior (Shortt, Stoolmiller, Smith-Shine, Eddy, & Sheeber, 2010). At Time 1 (T1), the oldest of the siblings had an average age of 13.33 years, and the youngest 10.87 years. The next evaluation took place after about three years. Shortt et al. (2010) found based on longitudinal assessments that anger coaching by mothers was associated with diminished externalizing behaviors for younger siblings. Therefore, the intervention of parents in training children in the direction of managing emotions from an early age (from preadolescence or early adolescence) can have a high impact on the development of their behavioral self-regulation, with the chance of avoiding their involvement in risky behaviors during adolescence.

However, the family's efforts need to be continued in school. The slogans in the campaigns to prevent and reduce risky behaviors addressed to secondary and high school students call for their self-control capacity. Some examples in this regard of some educational institutions in Romania are the following: „Say NO to drugs!” (Universitatea „Aurel Vlaicu” din Arad [Aurel Vlaicu University of Arad], 2019), „Say NO to violence in school!” (Inspectoratul de Poliție al Județului Olt [Olt County Police Inspectorate (I.P.J. Olt)], 2019). However, it is important for teenagers to be taught how to resist temptation. According to the national legislation, students in Romania should benefit, at least semesterly, from educational programs aimed at health, development of psycho-emotional abilities, social and interpersonal skills (Parlamentul României [Romanian Parliament], 2004/2014). It is essential that in such sessions, students learn behavior control strategies in relation to themselves and others: how to react when challenged to beat by other colleagues, to who to turn to when they identify suicidal thoughts or the need to consume alcohol or drugs, etc.

Taking into account the social and economic impact generated by the behaviors manifested as a result of the limited capacity of some adolescents to self-control, it is recommended to speed up the adoption of the necessary measures for the development of emotional and behavioral self-control, through intervention programs adapted to the age and the degree of understanding of the beneficiaries.

It should be noted that no study was identified regarding low self-control and associated risk behaviors involving quantitative or qualitative field data collected from among the population of adolescents in Romania during the analyzed period. Therefore, this is a topic that should be addressed in future research.

Limits

The range of potentially risky behaviors involving a low level of self-control could be broader compared to that obtained by carrying out this systematic review, as each of the analyzed studies focused on specific variables (e.g. delinquency, aggressiveness, substance use, etc.). For example, Motie, Heidari, and Sadeghi (2012), in a study conducted on 250 students in the first year of high school in Iran, showed that metacognitive self-regulation and effort regulation correlated negatively with academic procrastination. Another behavioral model encountered during adolescence is staying awake until late at night (Dörner, Plog, Teller, & Wendt, 1978/2014). Kadzikowska-Wrzosek (2018) found from research on 304 students in two universities in Poland, aged between 18 and 38, that bedtime procrastination can be explained by reduced self-regulation skills.

In other cases, low self-control, as a one-dimensional variable, could not indicate the variance of certain behaviors, as was the case with the investigation conducted by Conner, Stein, and Longshore (2009), in which criminal behaviors and drug use were determined by risk-seeking and volatile temperament, but not by global self-control.

Also, moderation and mediation relationships were only considered in the case of those studies that explicitly mentioned the role of each variable included in the equation. Thus, in the event of the development of prevention or intervention programs, it is necessary to take into account the existence of some additional variables, which may influence the link between the level of self-control and risky behaviors. It is therefore noted that further research in this direction is needed.

Table 3

Presentation of studies included in the systematic analysis, focusing on the risk behaviors to which adolescents with low levels of self-control are exposed

Authors and year	N	Gender	Place of study	Study design	Characteristics of the sample
Jennings, Higgins, Tewksbury, Gover, and Piquero (2010)	170	41.7% male	Philadelphia, Portland, Phoenix, Omaha, Lincoln, Las Cruces	Longitudinal, data collection since 1995	<i>Gang Resistance Education and Training (G.R.E.A.T.)</i>
Risky behaviors: following a delinquent trajectory; following a victim trajectory.					
Neaverson, Murray, Ribeaud, and Eisner (2020)	11 years n=1144 13 years n=1366 15 years n=1447	51/52% male	Zürich	Longitudinal 2004-2018	<i>Zurich Project on the Social Development from Childhood to Adulthood (zproso)</i>
Risky behaviors: aggressive behavior.					
Cho (2019)	2272	49% male	South Korea	Longitudinal 2010-2015	<i>Korean Child Youth Panel Survey (KCYPs)</i>
Risky behaviors: engaging in delinquency.					
Yun et al. (2016)	3059	50% male	South Korea	Longitudinal 2003-2008	<i>The Korea Youth Panel Survey (KYPS)</i>
Risky behaviors: delinquent activities.					
Pahl et al. (2014)	838	(T4) 41% male	East Harlem, New York	Longitudinal, started in 1990	- African Americans - Puerto Ricans - pupils, urban
Risky behaviors: high level of marijuana use.					
Chapple and Hope (2003)	1139	49.8% male	Collegeville	Cross-sectional, with data collected in 1997	- students in grades 9-11, white - 82% of families that did not benefit from social aid
Risky behaviors: dating violence and gang violence (as aggressors).					
Samek et al. (2017)	2769	48% male	Minnesota	Longitudinal	<i>The Minnesota Twin Family Study (MTFS)</i> - 1382 pairs of monozygotic twins (5 pairs of triplets)
Risky behaviors: low aggressiveness control is a predisposing factor of alcohol consumption disorder.					

Authors and year	N	Gender	Place of study	Study design	Characteristics of the sample
Kumar, Kumar, and Benegal (2018)	68	76.47% male	Bangalore	Cross-sectional	- two groups of 34 participants (high and low risk for alcoholism, depending on family history)
Risky behaviors: high levels of impulsivity in the group with a predisposition to alcoholism were associated with executive dysfunctions.					
Burt, Boddy, and Bridgett (2015)	160	48.12% male	Midwestern	Cross-sectional	- psychology students
Risky behaviors: more symptoms of eating disorders.					
Huang et al. (2017)	5879	42.3% male	Northern Taiwan	Cross-sectional	- students in the first class of high school
Risky behaviors: lack of self-control correlated with suicide attempt (in boys); there was a stronger association between impulsivity and deliberate self-harm, respectively suicide attempt for males.					
Kahn, Holmes, Farley, and Kim-Spoon (2015)	219	55% male	Southwest Virginia	Longitudinal 2007	- 91.6% caucazieni -Appalachian population - two groups (low vs. high self-control)
Risky behaviors: risky sexual behavior.					
Eiden et al. (2016)	227	48.89% male	Erie County, New York	Longitudinal	- two groups (non-alcoholic parents vs. alcoholic father)
Risky behaviors: externalizing behavior problems, alcohol consumption under the legal age, companionship with delinquent peers.					
Brook, Zhang, and Brook (2011)	806	50.9% male	New York	Longitudinal T1 - 1975 T7 - 2005/2006	- 94.6% white
Risky behaviors: chronic marijuana use.					
Wojciechowski (2019)	1354	86.41% male	Maricopa and Philadelphia	Longitudinal 2000-2010	- juvenile offenders convicted of serious crimes - offence committed between 14-17 years
Risky behaviors: increased risk for opioid use among participants with low acceleration and high acceleration of the use of these substances.					
Kim-Spoon, Falrey, Holmes, and Longo (2014)	220	55% male	Southwestern Virginia	Cross-sectional	<i>Youth Healthy Development (YFID)</i>

Authors and N year	Gender	Place of study	Study design	Characteristics of the sample
Risky behaviors: cigarette use, alcohol use, marijuana use.				
Asselmann, Wittchen, Lieb, Höfler, and Beesdo-Baum (2016)	3017 50.71% male	Munich	Longitudinal 1995-2003	<i>Early Developmental Stages of Psychopathology Study (EDSP)</i>
Risky behaviors: substance use disorder, alcohol abuse/addiction, nicotine addiction, illicit drug abuse/addiction.				
Piquero et al. (2002)	241 35% male	SUA	Cross-sectional	- university students
Risky behaviors: binge drinking, alcohol-related problems.				
Lopez-Vergara et al. (2019)	104 63.5% male	-	Cross-sectional	- frequent cannabis consumers - an average of consumption twice a day
Risky behaviors: more cannabis use, issues related to cannabis use.				
Clark et al. (2015)	674 50% male	Sacramento and Woodland, California	Longitudinal	<i>California Families Project</i> - participants of Mexican origin
Risky behaviors: substance use.				
Mason et al. (2011)	1945 49% male	Washington and Victoria (Australia)	Longitudinal, data collection starting in 2001-2002	- pupils - 961 participants from the USA
Risky behaviors: peer deviance, alcohol use, alcohol problems.				
Esposito et al. (2017)	768 46.61% male	Naples	Longitudinal	- Italian teenagers living in a high-risk context
Risky behaviors: aggressive behavior.				
Tackett et al. (2015)	105 45% male	Southern Ontario	Longitudinal	- urban area
Risky behaviors: more externalizing behaviors.				
Conner et al. (2009)	317 100% male	SUA	Longitudinal 1991-1995	- offenders, data from five cities - 54.5% African American, 31.8% Caucasian, 8.9% Hispanic/Latino
Risky behaviors: risk seeking was a predictor for violent crimes and crimes against property, volatile temperament was predictor of violent crime and drug use.				
Crandall et al. (2017)	450 48% male	SUA	Longitudinal 2007-2013	<i>Flourishing Families Project</i>

Authors and N year	Gender	Place of study	Study design	Characteristics of the sample
- 70.28 % European American				
Risky behaviors: risky sexual behavior.				
Winstok (2009)	660 50.6% male	Northern Israel	Cross-sectional	- pupils in urban schools, grades 7-12 - 90.6% Jewish, 4.8% Christian, 0.3% Moslem
Risky behaviors: reactive violence (in particular), proactive aggression.				
MacKellar et al. (2000)	879 46% male	New York, Ft. Lauderdale, Houston, and San Francisco	Cross-sectional	- fleeing from home in history and homeless people - 40% white, 37% black, 12% Hispanic
Risky behaviors: non-use of condoms (in boys).				
Ellis et al. (2015)	3350 34.15% male	Malaysia and SUA	Cross-sectional	- Students - 2059 participants from Kuala Lumpur (31.7% male) and 1291 from SUA (36.6% male)
Risky behaviors: committing crimes – against property, crimes without victims, total crimes (supported stronger by USA data and weaker than those from Malaysia).				
Wertz et al. (2018)	2232 1037 49% male 52% male	England and Wales, Dunedin	Longitudinal 1999 – 2013 1975 - 2010	<i>Environmental Risk (E-Risk) cohort</i> + <i>Dunedin cohort</i> - 56% pairs of monozygotic twins and 44% dizygotes
Risky behaviors: committing offences.				
Liu et al. (2020)	225 46.7% male	-	Longitudinal	- low socio-economic status - rural sample, without university education - electrocardiogram during a social stress task
Risky behaviors: alcohol use problems.				
Tangney, Baumeister, and Boone (2004)	Study 1: 351 Study 2: 255 28% male 19% male	East Coast (SUA)	Cross-sectional	- university students - 58% white, 13% Asian, 11% African American
Risky behaviors: binge eating, alcohol abuse.				
Beckmann et al. (2019)	5673 49.7% male	Lower Saxony	Cross-sectional 2012/2013 – 2014/2015	- secondary school students from 702 schools

Authors and N year	Gender	Place of study	Study design	Characteristics of the sample
Risky behaviors: aggression targeting teachers.				
Duell et al. 5227 (2016)	49.3% male	Guang-Zhou and Shanghai, Medellin, Nicosia, Delhi, Naples and Rome, Amman and Zarqa, Kisumu, Myersla, west of Sweden, Chang Mai, Durham and WinstonSalem	Cross- sectional	- only participants from the USA identified themselves as belonging to an ethnic minority group
Risky behaviors: taking risk (for Western countries, not for Asian ones).				
Brook, 607 Brook, and Zhang (2014)	32.7% male	New York	Longitudinal 1975 – 2005/2006	
Risky behaviors: chronic cigarette smoking.				
de Winter, 2230 Visser, Verhulst, Vollebergh, and Reijneveld (2016)	T2: 781– 799 male T3: 759– 775 male	North of the Netherlands	Longitudinal 2001 - 2008	<i>Tracking Adolescents' Individual Lives Survey (TRAILS)</i>
Risky behaviors: health risk behaviors (e.g. irregular meals, physical inactivity, smoking).				
Cheung (2014)	4734 50.7% male	Hong Kong	Cross- sectional 2007 – 2010	To Bet or Not to Bet: Structural Disadvantage, Social Capital, Individual Mentality and Adolescent Gambling in Hong Kong - public and private schools
Risky behaviors: at-risk/probable pathological gambling, frequent gambling, strong permissiveness towards gambling, intense consumption of tobacco and alcohol, involvement in delinquency.				
Bergen, Newby- Clark, and Brown (2012)	Study 1 2208 Study 2 296 27% male 42% male	Canada	Cross- sectional	- university students
Risky behaviors: high risk for gambling.				

Authors and year	N	Gender	Place of study	Study design	Characteristics of the sample
Moilanen and Manuel (2018)	274	39.8% male	SUA	Cross-sectional 2013-2014	- Internet survey - never married
Risky behaviors: substance use, low level of condom use.					
Hooker, Gyurak, Verosky, Miyakawa, and Ayduk (2010)	27	13 male	-	Longitudinal	- 11 couples and 5 participants whose partners have not been fMRI scanned
Risky behaviors: substance use the next day after the onset of an interpersonal conflict.					
Nivette et al. (2021)	737	51% male	Zurich	Longitudinal 2004 – 2020	<i>z-proso</i> - people assessed at 20 years were invited to this study at 22 years
Risky behaviors: non-compliance with public health measures aimed at reducing the spread of COVID-19.					
Rising and Bol (2017)	179	17.3% male	SUA	Cross-sectional	- university students
Risky behaviors: selection of high-calorie foods.					
Cheetham et al. (2017)	107	58 male	Melbourne	Longitudinal	<i>The ORYGEN Adolescent Development Study</i> - pupils - at T3, 24 of the participants received a diagnosis of substance use disorder
Risky behaviors: substance use disorder.					
Davis et al. (2018)	1354	86.4% male	Philadelphia and Phoenix	Longitudinal 7 years	<i>The Pathways to Desistance Study</i> - juvenile offenders - three classes of victimization: poly-victimized, indirectly victimized, and lowly victimized
Risky behaviors: binge drinking (only for the class of indirect victims, made up of those who were observers of violence).					
Chang et al. (2018)	469	138 male	Southeast USA	Cross-sectional	- college students - 84.9% white
Risky behaviors: suicidal behaviors.					
Jiang and Shi (2016)	601	282 male	Yantai	Cross-sectional 2015 – 2016	- college students

Authors and year	N	Gender	Place of study	Study design	Characteristics of the sample
Risky behaviors: compulsive buying, problematic Internet use, problematic mobile phone use.					
Innamorati and Maniglio (2015)	6363	48% male	Italy	Cross-sectional	<i>Self-Report Delinquency study (ISR2-2)</i> - students from 15 Italian cities and towns
Risky behaviors: alcohol use and abuse (recently).					
Tillyer and Tillyer (2016)	11070	49% male	USA	Longitudinal 1994 – 1996	<i>The National Longitudinal Study of Adolescent to Adult Health</i> - seventh to ninth grade students from 80 high schools and 52 secondary schools
Risky behaviors: history of violence as a victim.					
Hernandez and Diclemente (1992)	176	100% male	USA	Cross-sectional	- university students
Risky behaviors: sexual intercourse without a condom, consumption of alcoholic beverages, more sexual partners.					
Baker, Klipfel, and van Dulmen (2018)	113 couples	50% male	USA	Longitudinal	- Heterosexual - 88% Caucasian - 52% had been dating for over a year
Risky behaviors: committing emotional and verbal aggression.					
Lindgren et al. (2014)	300	136 male	-	Cross-sectional	- undergraduates - 57% white
Risky behaviors: higher alcohol consumption, more alcohol-related problems.					
Otten, Barker, Maughan, Arseneault, and Engels (2010)	428	About 50% male	Netherlands	Longitudinal, five waves	<i>The Family and Health Study</i>
Risky behaviors: following a pathway of high cannabis use.					
Fine et al. (2016)	930	100% male	Philadelphia, Jefferson Parish, Orange County	Longitudinal	<i>The Crossroads Study</i> - juvenile offenders - ethnic diversity
Risky behaviors: short-term offences, long-term offences, a greater variety of long-term offences.					
Quinn and Fromme (2010)	1136	34% male	Texas	Longitudinal	- members of the University of Texas at Austin

Authors and year	N	Gender	Place of study	Study design	Characteristics of the sample
Risky behaviors: heavy episodic drinking, alcohol problems, unprotected sex.					
Finkel et al. (2009)	Study 2 936 Study 4 66	Study 4 50% male	Study 2 North Carolina	Study 2 Longitudinal Study 4 Experimental	Study 4 -33 romantic heterosexual couples, undergraduates
Risky behaviors: committing more acts of violence between intimate partners (Study 2), participants whose self-regulating resources have been exhausted in an experimental context have responded more violently to the partner's challenge (Study 4).					
Moilanen (2015)	287	38% male	USA	Cross-sectional	- unmarried heterosexual participants - 87% European American - 81% psychology students
Risky behaviors: early initiation into oral sex and coitus, more lifetime coital partners, low probability of using contraception in the last sexual intercourse (low level of long-term self-control).					
Meldrum et al. (2015)	825	50% male	USA	Longitudinal 1991-2007	<i>National Institute of Child Health and Human Development's Study of Early Child Care and Youth Development (SECCYD)</i> - 59% of families with two parents
Risky behaviors: involvement in delinquency.					
Sussman et al. (2016)	3356	45.29% male	Southern California	Cross-sectional	- 9 th grade students - 45% Hispanic
Risky behaviors: tobacco use, use of other drugs (social self-control).					
Kogan et al. (2013)	315	100% male	Georgia	Longitudinal	- African American - pupils in public schools - rural areas
Risky behaviors: unconventional trajectories of sexual partners (more partners).					
Gover et al. (2011)	2987	39.5% male	South Korea and USA	Cross-sectional	- undergraduates - 1399 participants from Korea (34% male) and 1588 participants from USA (45% male) - response rate: 96.5% Korea, 99% USA
Risky behaviors: psychological relationship violence, physical relationship violence (aggressor + victim).					

Authors and year	N	Gender	Place of study	Study design	Characteristics of the sample
Novak and Clayton (2001)	25186	About 50% male	Kentucky	Cross-sectional	- secondary and high school students from 38 public schools
Risky behaviors: initiation of experimental smoking, transition to advanced stages of cigarette smoking.					
Boutwell et al. (2013)	3502 - 2728 individual twins	-	USA	Longitudinal, data collection since 1994	<i>National Longitudinal Study of Adolescent Health (Add Health)</i> - 289 pairs of monozygotic twins - 450 pairs of diszygotic twins
Risky behaviors: history of victim of crime.					
Hankonen, Kinnunen, Absetz, and Jallinoja (2014)	854 at T1 and 679 at T2	100% male	Finland	Longitudinal	- military recruits
Risky behaviors: higher consumption of fast food.					

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