





Psychology and Education


# Relationship between executive functions and bullying: An integrative literature review


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### Abstract

Executive functions are cognitive skills required to perform complex, adaptive, and socially acceptable behaviors. The existence of deficits in these functions may imply behavioral problems and violence. Thus, the objective of this integrative review of the literature was to identify relationships between executive functions and school bullying. The keywords “executive functions” and “bullying” were cross-referenced in the databases: LILACS, PsycINFO, ScieELO, Scopus and Web of Science. The methodological quality of the investigations was evaluated through the Checklist for Analytical Cross Sectional Studies. Among the 22 identified studies, seven met the inclusion criteria and were selected. All studies analyzed identified associations between practicing or suffering bullying with deficits in executive functions. It was concluded that the improvement of the executive functions of the students can help in the prevention or reduction of school bullying.

**Keywords:** bullying; executive functions; violence; integrative review; students.

## RELAÇÕES ENTRE FUNÇÕES EXECUTIVAS E BULLYING: REVISÃO INTEGRATIVA DA LITERATURA

### Resumo

Funções executivas são habilidades cognitivas necessárias à realização de comportamentos complexos, adaptativos e socialmente aceitáveis. A existência de deficits nessas funções pode implicar problemas comportamentais e violência. Assim, o objetivo desta revisão integrativa da literatura foi identificar relações entre funções executivas e bullying escolar. Realizou-se o cruzamento das palavras-chave executive functions e bullying nas bases de dados: Lilacs, PsycInfo, ScieELO, Scopus e Web of Science. A qualidade metodológica das investigações foi avaliada por meio do Checklistfor Analytical Cross Sectional Studies. Dentre os 22 estudos identificados, sete atenderam aos critérios de inclusão e foram selecionados. Todos os estudos analisados identificaram associações entre praticar ou sofrer bullying com déficits nas funções executivas. Concluiu-se que a melhoria das funções executivas dos estudantes pode auxiliar na prevenção ou redução do bullying escolar.

**Palavras-chave:** *bullying*; funções executivas; violência; revisão integrativa; estudantes.

# RELACIONES ENTRE FUNCIONES EJECUTIVAS Y BULLYING: UNA REVISIÓN INTEGRADORA

## Resumen

Las funciones ejecutivas son habilidades cognitivas necesarias para realizar comportamientos complejos, adaptativos y socialmente aceptables. La existencia de déficit en estas funciones puede implicar problemas conductuales y violencia. Así, el objetivo de esta revisión integradora de la literatura fue identificar relaciones entre funciones ejecutivas y bullying escolar. Se realizó el cruce de las palabras clave executive functions y bullying en las bases de datos: Lilacs, PsycInfo, SciELO, Scopus y Web of Science. La calidad metodológica de las investigaciones fue evaluada a través del Checklist for Analytical Cross Sectional Studies. Entre los 22 estudios identificados, siete atendieron a los criterios de inclusión y fueron seleccionados. Todos los estudios analizados identificaron asociaciones entre practicar o sufrir bullying con déficits en las funciones ejecutivas. La mejora de las funciones ejecutivas puede auxiliar en la prevención o reducción del bullying escolar.

**Palabras clave:** bullying; funciones ejecutivas; violencia; revisión integrativa; estudiantes.

## 1. Introduction

Because bullying is one of the most frequent types of violence observed in schools, it has received greater attention in recent years from countless Brazilian and international researchers (Aguar & Barrera, 2017). Bullying refers to intentional and repetitive aggression among peers. It involves unbalanced power between victims and bullies regarding age, size, strength, number of friends, or emotional development, rendering victims potentially vulnerable to bullies without means to defend themselves (Olweus, 2013). Bullying may assume the form of nicknames, name-calling, shoves, humiliations, and malicious comments, among others (Sampaio et al., 2015).

The following roles are identified in bullying dynamics: victims, bullies, bully-victims, and bystanders (Olweus, 2013). Victims are students who suffer aggression and have difficulties to self-defend. Bullies perpetrate direct (physical and verbal) aggressions or indirect aggressions (e.g., social exclusions, spreading rumors, among others) toward victims (Mello et al., 2017). Bully-victims are bullied, but also perpetrate bullying themselves. Bystanders do not directly take part in bullying; however, they may intervene in favor of the victims, side with bullies, or passively observe a bullying situation (Medeiros, Alves, Diniz, & Minervino, 2016).

The occurrence of bullying varies among countries. For example, the mean prevalence in Caribbean and Latin American countries is approximately 51%, 32% in France, and 20.2% in the United States (Organização das Nações Unidas para a Educação, a Ciência e a Cultura, 2019). The percentage of children and adolescents experiencing bullying in Brazil is approximately 43% (Nações Unidas Brasil, 2016). In addition to its prevalence, bullying has negative consequences to all the students involved (Olweus, 2013), such as difficulties at school, stress, social isolation, depression, suicide, among others (Ortega, Ardila, Celis, & Ballestas, 2014).

Even though bullying is considered a group phenomenon, empirical evidence shows that it is associated with deficits in cognitive functions at an individual level (Raaijmakers et al., 2008; Riccio, Hewitt, & Blake, 2011), many of which associated with the frontal lobes. Note that “in the division of the nervous system into functional units proposed by Luria, the frontal regions appear responsible for behavior planning, regulation, control and execution” (Corso, Sperb, Jou, & Salles, 2013, p. 25). Therefore, the good functioning of frontal lobes represents the basis for socially appropriate behaviors and inhibition of inappropriate behaviors (Grigsby & Stevens, 2000), considering that cognitive functions and their components are related to neural systems. However, it is essential to discriminate cognitive functions (e.g., perception, memory, and thinking) from other functions that organize them and are called executive functions.

Executive functions comprise “the cognitive skills needed to perform complex behaviors directed to a given object, and ability to adapt to various environmental demands and changes” (Loring, 1999, p. 64). The basic executive functions include inhibitory control, cognitive flexibility, and working memory (Diamond & Lee, 2011). Inhibitory control corresponds to the ability to inhibit inappropriate responses or responses to distracting stimuli, enabling control of impulsiveness, thinking before acting, and keeping focused attention, abstaining from irrelevant stimuli (León, Rodrigues, Seabra, & Dias, 2013). Cognitive flexibility refers to the ability to rapidly replace a response with another one or change objectives when they are unsuccessful or when unforeseen events occur, and flexibly to adjust to new demands, which implies learning from mistakes and analyzing the consequences of one’s actions (León et al., 2013). On the other hand, working memory holds information for very brief periods, lasting long enough to memorize a phone number and forget it immediately after dialing. It temporarily

stores information and integrates long-term memory and environmental stimuli, giving meaning to recent events and integrating them to more remote events (Mourão & Melo, 2011). The literature reports that inhibitory control and cognitive flexibility deficits are associated with aggressiveness and poor social competence of children and adolescents (Ríos, Solís, & Aragón, 2013).

The Cognitive Complexity and Control (CCC) theory proposed by Zelazo is adopted in this study. It proposes that executive functions involve all brain areas and not only pre-frontal regions. Hence, “to execute an objective-driven task, it is necessary that the PFC [prefrontal cortex] temporarily integrates separate units such as perception, action, and cognition in a logic sequence in favor of a given objective, also involving some subcortical structures” (Kluwe-Schiavon, Viola, & Grassi-Oliveira, 2012, p. 6). Based on this framework, Kerr and Zelazo (2004) proposed a new division of executive functions, classifying them as “hot” or “cool”. Cool executive functions are related to more logical and cognitive aspects (e.g., planning, problem-solving, inhibitory control, cognitive flexibility, and working memory). Hot executive functions, in turn, involve emotional aspects (e.g., emotional decision making, emotional regulation, and moral judging).

This theory also considers changes in neurological development, especially during childhood, in terms of improved ability to perform increasingly complex judgments about the world. For this reason, younger children perform less competently hot and cool executive functions compared to older children. Differences also occur during adolescence, when cool functions develop and increase with age, while hot functions improve at early adolescence, peaking between 14 and 15 years of age, declining between the middle and the end of adolescence (Wilson, Andrews, Hogan, Wang, & Shum, 2018; Poon, 2018).

Ríos et al. (2013) noted that there are many researchers interested in studying associations between executive functions’ cognitive-emotional aspects and aggressive behavior. However, few researchers address these functions from a bullying perspective. Monks, Smith, and Swettenham (2005) addressed the executive functions, specifically planning and inhibitory control, of British children aged between four and six, with a profile of victim, bully, or defender. The results showed that victims and bullies scored lower in the executive functions assessed, though the latter showed non-significant levels. The students who defended the victims scored higher than victims and bullies, though with no statistical significance. Considering

that cognitive functions influence the quality of interpersonal relationships and appropriate coping of relational conflicts, the results indicate that bullies and victims need interventions intended to improve their executive functions and the quality of their social interactions and stop practicing and suffering bullying, respectively.

Ríos et al. (2013) investigated the cognitive flexibility and inhibitory control of Colombian students aged between 11 and 17 in the condition of victims, bullies, bully-victims, or bystanders. Opposed to the expected, the victims presented better cognitive flexibility and inhibitory control than the remaining groups, while the bully-victims presented the lowest levels. The unexpected results concerning the victims suggest, perhaps, in the context under study, that bullying more frequently occurs due to the victims' lower social level, compared to their peers, than to their personal characteristics related to executive functions. However, concerning the bullies, the results were in line with the expected, suggesting that these children had difficulty providing flexible responses adapted to social challenges.

Medeiros et al. (2016) addressed children aged from 10 to 12 and identified that hot executive functions were most compromised among bullies, while cool executive functions were most compromised among victims. Ji and Wang (2018) conducted a longitudinal study and identified that bullying, together with other adverse experiences during childhood, impact inhibition, cognitive flexibility, and working memory in adulthood.

Even though these studies addressed distinct functions, they show that individual differences in executive functions may imply behavioral problems among children and adolescents (Prencipe et al., 2011). Hence, the objective of this literature review was to identify relationships between executive functions and school bullying. Thus, the Cognitive Complexity and Control Theory was adopted to guide the analysis of results and discussion.

## 2. Method

### 2.1 Study design

This integrative review's objective was to eliminate biases in the search on databases, to gather studies addressing a given subject, and to synthesize the results (Ferenhof & Fernandes, 2016). According to Souza, Silva, and Carvalho (2010), an integrative review is a methodological approach that enables including empirical or

theoretical studies to address a concept, theory, or topic comprehensively. Hence, a specific or more comprehensive guiding question is established to support the bibliographic search, including inclusion and exclusion criteria, the variety of search resources, and the studies' methodological quality is assessed.

## **2.2 Databases and bibliographic search**

Four international databases were consulted regarding bullying and executive functions: Scopus, by selecting the place: Title, abstract and keywords; Web of Science: topic; PsycINFO (Psychological Information Database): abstract; and LILACS (Latin-American and Caribbean Health Sciences Literature): words. To specifically address the Brazilian literature, ScieELO (Scientific Electronic Library Online/Brazil) was assessed by selecting the place: subject. The keywords “executive functions” and “bullying” were cross-referenced in all the databases. The following guiding question supported the survey: “Are there relationships between executive functions and school bullying?” which was based on the PVO strategy (Population or Problem, Variables, and Outcomes) (Fram, Marin, & Barbosa, 2014).

## **2.3 Inclusion and exclusion criteria**

Only peer-reviewed papers were included in the review. Papers written in Portuguese, English, or Spanish were considered because these are the languages in which these authors are proficient. All the papers that directly addressed the relationship between executive functions and bullying were included. Clinical and non-clinical populations were considered, as both populations may become involved with bullying. Likewise, all the population of students, from childhood to adolescence, was included. Papers not addressing the topic under study (executive functions and bullying) or that only secondarily addressed the topic; were published in a language other than the ones previously mentioned; and books, book chapters, theses, dissertations, editorials, editor letters, or conference proceedings were excluded. No time frame was established for the search and inclusion of studies.

## **2.4 Procedures**

Two reviewers independently searched the databases in October 2018. Both initially read the titles and abstracts and selected the studies based on the

guiding question and inclusion and exclusion criteria. Later, both reviewers read the full texts of the papers selected. Divergences were discussed until reaching a consensus.

The papers' main information was synthesized on a spreadsheet, including title, authorship, year of publication, journal, study setting, objectives, study design, sample characteristics (participants), main results, and conclusions. The objective of this systematization was to facilitate the descriptive analyses and considerations of the studies included in this review.

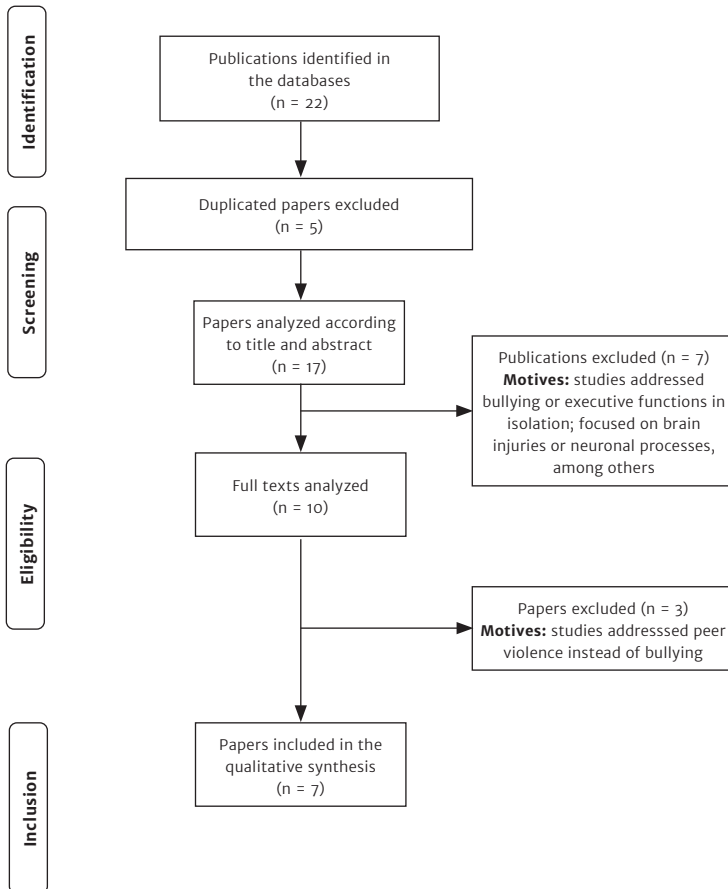
Finally, the studies' methodological quality was verified using the *Checklist for Analytical Cross-Sectional Studies* (Joanna Briggs Institute, 2016). This instrument comprises eight questions assessing inclusion criteria, the participants' characterization, instruments' reliability, potential confounding factors, adequacy of statistical analyses, among other aspects. One point was assigned whenever a criterion was met, with a total score of eight points; the higher the score, the higher the studies' methodological quality.

### 3. Results

The bibliographic survey conducted in the five databases resulted in 22 papers. Five of which were duplicated, and seven were excluded for not meeting the inclusion criteria. The full texts of the ten papers that remained were read. Three papers were excluded in this stage for addressing peer violence rather than bullying specifically. Hence, seven papers composed the qualitative synthesis. The search and selection process is presented in Figure 3.1, and the characteristics of the studies selected are synthesized in Figure 3.2.



Figure 3.1. PRISMA flowchart of the search and selection process.



As presented in Figure 3.2, the investigation of the relationship between executive functions and bullying is relatively recent; 86% of the studies were published in the last five years (2014–2018). The sample sizes of the studies ranged from 41 to 1,377 participants. The United States presented the highest number of studies ( $n = 3$ ), followed by Brazil ( $n = 1$ ), Canada ( $n = 1$ ), Holland ( $n = 1$ ), and Taiwan ( $n = 1$ ). Cross-sectional ( $n = 6$ ) and Longitudinal ( $n = 1$ ) methods were adopted. The age of the participants ranged from 4 to 18 years old, though most studies addressed adolescents ( $n = 6$ ).

Figure 3.2. Characteristics of the papers included in the systematic review.

Authorship (year)	Country	Sample	Age of participants	Method	MQ
Jenkins, Tennant, & Demaray (2018)	USA	689	8 to 14 y/o	Cross-sectional	8
Liu, Guo, Hsiaod, Hue, & Yen (2017)	Taiwan	105	6 to 12 y/o	Cross-sectional	6
Medeiros et al. (2016)	Brazil	60	10 to 11 y/o	Cross-sectional	8
Crowley, Knowles, & Riggs (2016)	USA	49	12 to 14 y/o	Cross-sectional	7
Verlinden et al. (2014)	Holland	1377	4 to 7 y/o	Longitudinal	8
Kloosterman, Kelley, Parker, & Craig (2014)	Canada	92	11 to 18 y/o	Cross-sectional	8
Coolidge, DenBoer, & Segal (2004)	USA	41	11 to 15 y/o	Cross-sectional	8

MQ = Methodological Quality.

The scores concerning the studies' methodological quality, assessed with the Checklist for Analytical Cross-Sectional Studies (Joanna Briggs Institute, 2018), ranged from 6 to 8, eight being the maximum score. The studies' most frequent weaknesses were: not properly describing the participants' characteristics and not explicitly presenting the executive functions assessed (Figure 3.2).

The papers were published in six different journals: *Frontiers in Psychology*, *Journal of Abnormal Child Psychology*, *Journal of School Violence*, *Personality and Individual Differences*, *Research in Autism Spectrum Disorders*, *School Psychology International*, and *Research in Developmental Disabilities*. The journals' fields of knowledge were either Interdisciplinary (n = 2) or Psychology (n = 5).

Even though few studies reported the theoretical frameworks used, we inferred that five of them (Medeiros et al., 2016; Jenkins, Tennant, & Demaray, 2018; Crowley, Knowles, & Riggs, 2016; Kloosterman, Kelley, Parker, & Craig, 2014; Verlinden et al., 2014) were based on theories of the multiple constructs model. Two studies were based on the single construct model of executive functions. The studies

that did not address this multifaceted nature included Liu, Guo, Hsiaod, Gue, & Yen (2017), which addressed a clinical sample (children with Attention Deficit Hyperactivity Disorder – ADHD) and intended to identify relationships between being a victim or a bully and executive functions, intelligence levels and attention. The results indicated that high executive functions levels were significantly associated with a lower likelihood of becoming a victim ( $p = 0.006$ ) or a bully ( $p = 0.04$ ).

Likewise, Coolidge, DenBoer, & Segal (2004) intended to verify the psychological and neurological correlation in bullies' behavior. In synthesis, the results showed a significant correlation between bullies' behaviors and deficits in executive functions ( $p < 0.001$ ) related to decision-making, planning, and working memory.

Next, we present the results and conclusions of the five studies based on the multiple constructs model. These are subdivided into two thematic categories: 1. Relationships between cool executive functions and bullying; and 2. Relationships between hot executive functions and bullying.

### **3.1 Relationships between cool executive functions and bullying**

Jenkins et al. (2018) examined gender-based differences between executive functions and bullying. The results showed a significant negative association between the boys' self-monitoring and not taking part in bullying ( $p = 0.01$ ), and a significant negative association was also found between boys' self-monitoring and victimization ( $p < 0.01$ ) and between inhibitory control and victimization ( $p < 0.001$ ). Cognitive flexibility was also negatively and significantly associated with victimization ( $p < 0.01$ ) and not taking part in bullying ( $p = 0.01$ ) among boys and with aggression ( $p < 0.001$ ) among girls.

Medeiros et al. (2016) assessed executive functions between children involved and not involved with bullying. The authors identified that victims presented less cognitive flexibility, differing from bullies ( $p = 0.001$ ), bully-victims ( $p = 0,049$ ), and those not involved ( $p = 0.04$ ). Bullies presented better inhibitory control than victims ( $p = 0.006$ ) and bully-victims ( $p = 0.006$ ). No significant differences were found regarding working memory.

Crowley et al. (2016) intended to verify whether executive functions mediated the expressive writing of adolescents reporting bullying. The results indicated that the executive functions (working memory, inhibitory control, planning, and self-

monitoring) mediated the self-monitoring processes that emerged in the reports ( $p < 0.05$ ) and the processes of executive functions facilitated the adolescents' self-monitoring ability through expressive writing ( $p < 0.05$ ).

The only longitudinal study in this review was developed by Verlinden et al. (2014) to verify associations between bullying and executive functions. The results indicate that executive functions may influence peer interaction; and first-grade students with inhibitory problems are more likely to become bullies (OR: 1.35; 95%CI: 1.09-1.66), victims (OR: 1.21; 95%CI: 1.00-1.45) or victims-bullies (OR: 1.55; 95%CI: 1.10-2.17).

Kloosterman et al. (2014) developed a study to verify whether executive functions predicted bullying victimization. The sample was composed of male high-functioning adolescents with autism spectrum disorder, typically developing adolescents, and adolescents with no autism, but with special school needs. Lower levels of executive functions (initiation, planning, and working memory) were associated with more frequent physical ( $p < 0.05$ ), verbal ( $p < 0.05$ ) and social ( $p < 0.05$ ) victimization for the three groups of adolescents.

### **3.3 Relationship between hot executive functions and bullying**

Jenkins et al. (2018) identified that emotional regulation and victimization are significantly and negatively associated with younger boys ( $p < 0.01$ ). Kloosterman et al. (2014) report that lower levels of executive functions (emotional regulation) were associated with more frequent physical ( $p < 0.05$ ), verbal ( $p < 0.05$ ) and social ( $p < 0.05$ ) victimization among male adolescents with autism spectrum disorder, typical developing adolescents, and adolescents without autism, but with special school needs. In contrast, Medeiros et al. (2016) did not report significant differences concerning emotional decision-making among victims, bullies, bully-victims, or those not involved with bullying. Crowley et al. (2016) identified that emotional regulation mediated self-monitoring processes that emerged in expressive writing in bullying behaviors reports ( $p < 0.05$ ), as well as facilitates self-monitoring skills through expressive writing ( $p < 0.05$ ).

## **4. Discussion**

The objective of this literature review was to identify relationships between executive functions and school bullying. The studies' results indicate that interest

in studying these relationships is relatively new, considering that most studies were published in the last five years. A potential explanation for the small number of studies would be the emphasis in the last decades on bullying being a group phenomenon or a socially determined phenomenon (Silva et al., 2018a). This emphasis (group) would also prevent students from being held responsible for the violence perpetrated or experienced, considering it is a complex process with multiple causes (Olweus, 2013).

Hence, the most effective anti-bullying interventions are multidimensional or multicomponent implemented at community, school, or individual level (Silva et al., 2017). From this perspective, research on executive functions can support the planning of interventions implemented at an individual level to improve inhibitory control, problem-solving capacity, and emotional regulation while, at the same time, not merely considering bullying from a biological perspective or holding its participants accountable.

In general, the results reported by the studies addressed in this review indicate that the executive functions of students not involved in bullying were in line with the expected for their ages or development stages. In contrast, deficits in executive functions were associated with perpetrating or experiencing bullying at any age. Executive functions start developing in early childhood and mature over time; these functions are expected to improve during adolescence. However, they may be unstable because other physical, social, and emotional changes occur (e.g., bullying), possibly resulting in increased sensitivity to affective environmental signs that may impair such functioning (Harms, Zayas, Meltzoff, & Carlson, 2014; Downes, Bathelt, & Haan, 2017; Wilson et al., 2018). These indicate that cool or hot executive functions are essential to regulate behavior in social situations (Smith & Jones, 2012).

Specifically regarding victimization, the studies show that bullying victims experienced problems regarding cognitive flexibility (Medeiros et al., 2016), inhibition (Verlinden et al., 2014), initiation, planning, and working memory (Kloosterman et al., 2014). Additionally, appropriate levels of self-monitoring, inhibitory control, and cognitive flexibility were negatively associated with victimization (Jenkins et al., 2018). This set of cool executive functions, which are related to logical and rational aspects, are directly involved with self-regulation and social problem-solving, as they enable victims to analyze how they can

respond to aggression in socially acceptable ways or ask for help when necessary, for instance, which would impede bullying and prevent new aggressions (McQuade, 2017).

In contrast, there is also evidence that some students' behaviors may render them vulnerable to bullying victimization (Silva et al., 2016). For instance, acting impulsively with school peers may encourage aggression. Responding aggressively to intimidation, provocations, or attacks (Kloosterman et al., 2014) may increase intimidation frequency over time (Sentse, Kretschmer, & Salmivalli, 2015). In this sense, cool executive functions may also collaborate to develop more flexible thinking that decreases victims' likelihood of indistinctively assigning hostile intentions to their peers' behaviors or considering retaliation an effective form of self-defense (Kloosterman et al., 2014). Aspects especially important for bully-victims are that, in general, they present disorganized and impulsive behavior, tend to interpret classmates' behavior aggressively, and respond ineffectively to aggression, or lack interpersonal problem-solving skills (Hussein, 2013; Silva et al., 2018a).

Hot executive functions related to emotional aspects were also associated with victimization in two studies included in this review (Jenkins et al., 2018; Kloosterman et al., 2014). Peers see victims with poor emotional regulation as socially inappropriate or inconvenient, and for this reason, are ignored or rejected (Silva et al., 2016). Additionally, it influences how they respond to aggression, such as with fear or anger, which may be gratifying to bullies as they feel their actions are successful (Kloosterman et al., 2014). Higher self-regulation levels attenuate the frequency of reactive physical aggression in victimized children (Cooley & Fite, 2016).

Regarding aggression, this review's results indicate that higher levels of executive functions result in a lower likelihood of students becoming bullies (Liu et al., 2017), but only regarding cool executive functions. Aggression appears associated with inhibitory problems (Verlinden et al., 2014), cognitive flexibility (Jenkins et al., 2018), decision-making, planning, and working memory (Coolidge et al., 2004). In contrast to what was expected, Medeiros et al. (2016) found that bullies presented better inhibitory control than victims or bully-victims.

This result diverges from the previous studies that identified bullies with lower levels of inhibitory control (Monks et al., 2005; Ríos et al., 2013), which is an

executive function that influences aggressive behavior and poor social competence (Rhoades, Greenberg, & Domitrovich, 2009). A potential explanation is that bullies have neuropsychological problems, poor inhibitory control, and low empathy levels toward their victims, not at a cognitive level, though, but in terms of having low affective responsiveness levels (Espelage, Hong, Kim, & Nan, 2018). However, in general, the literature reports divergent results regarding bullying or bullies' characteristics (Silva et al., 2018b).

The relationships between executive functions and bullying remained in the two studies with clinical samples, involving Autism Spectrum Disorder (Kloosterman et al., 2014) and Attention Deficit Hyperactivity Disorder – ADHD (Liu et al., 2017). However, these results need to be interpreted with caution, considering that deficits in these functions may be linked to the disorder rather than bullying *per se*. For instance, the literature shows that children and adolescents with autism spectrum disorder have deficits in inhibitory control, planning, cognitive flexibility, verbal fluency, working memory, among others (Czermainski, Bosa, & Salles, 2013). Thus, it is possible to understand the characteristics of each clinical sample. It should be emphasized that the samples are different and are not limited to a single set of characteristics. Liu et al. (2017) consider the characteristics of each clinical sample, as they differ from each other, but not limited to them, and found that high levels of executive functions in these samples decrease the likelihood of an individual becoming a victim or a bully, which corroborate the evidence that cognitive risk factors tend to cross diagnostic thresholds (Sanislow et al., 2010).

The results with clinical samples are essential because these populations are often vulnerable to bullying as victims, which results in psychological distress and physical pain (Chen, Ho, Hsiao, Lu, & Yen, 2020; Morton, Gillis, Mattson, & Romanczyk, 2019). Additionally, the development of these individuals' executive functions needs to be assessed, as these have implications in social interactions and play an essential executive function in successful relationships with peers (Kloosterman et al., 2014).

The studies adopted different theoretical models to address executive functions, which resulted in different strategies of measurement. The investigations that adopted theories from the single construct theoretical model, which assumes that executive functions are organized and compose a cognitive construct mainly linked to the frontal lobe, reported general indexes of executive functions instead

of more specific results or detailing each of the functions found (Liu et al., 2017; Coolidge et al., 2004). In turn, the studies based on theories linked to the multiple processes model provided more detailed information, considering cognitive functions a set of distinct factors (Medeiros et al., 2016; Jenkins et al., 2018; Crowley et al., 2016; Kloosterman, 2014; Verlinden et al., 2014). This theoretical differentiation, consequently, methodological differentiation, prevents comparing the studies and obtaining a broader and deeper perspective of the set of results reported.

Note that, in general, validated instruments or instruments previously used were adopted. Three studies adopted versions of the *Behavior Rating Inventory of Executive Function*, which assesses executive functions such as inhibition, inflexibility, emotional control, working memory, planning, among others (Verdelin et al., 2014; Crowley et al., 2016; Kloosterman et al., 2014) and two studies used the *Wechsler Intelligence Scale for Children – WISC* (Medeiros et al., 2016; Liu et al., 2017). Jenkins et al. (2018) adopted a different instrument but assessed the same executive functions previously mentioned, while the instrument adopted by Coolidge et al. (2004) did not specify which executive functions were assessed.

These results have important implications. The lack of studies verified in the bibliographic search reveals a need for more studies addressing this topic. Additionally, future research can also establish differences between boys and girls regarding the relationship between executive functions and bullying, an aspect seldom explored in the studies included in this review. Additionally, most studies were cross-sectional studies, which prevents the establishment of causal relationships between the variables or verifying whether poor executive functioning results from aggressive behaviors or vice-versa (Crowley et al., 2015; Medeiros et al., 2016). More longitudinal studies are also needed because executive functions continue developing throughout adulthood (Hamdan & Pereira, 2009) and not only age needs to be considered at the time of assessments, but also the changes that occur over time and how these are associated with potential behavior problems such as violence.

This study contributes to practice by showing that preventive interventions or interventions intended to decrease school bullying can include neuropsychological development components. From another perspective, deficits in executive functions can be indirectly addressed by considering the development of social



skills as a problem-solving capacity and emotional self-control. The development of empathic skills may be necessary for students who do not have executive function problems, but practice bullying regardless. They may use their skills to manipulate social situations and people, showing low affective responsiveness levels toward their victims.

## 5. Final Considerations

These studies' results indicate a relationship between bullying and executive functions. Because bullying is a violent event that occurs in peer interaction, we may infer that executive functions (emotional regulation, cognitive flexibility, working memory, and inhibitory control) influence how students initiate and respond to social interactions within the school environment. Note that this review enables recommending further studies to devise different interventions to help students develop social skills related to executive functions at an individual level. Further studies are needed, considering the few studies identified in the databases included here, including studies providing greater detail of results to better understand the relationship between bullying and executive functions.

## References

- Aguiar, L. G. F., & Barrera, S. D. (2017). Manifestações de *bullying* em diferentes contextos escolares: Um estudo exploratório. *Psicologia: Ciência e Profissão*, *37*(3), 669–682. doi:10.1590/1982-3703002922016
- Chen, Y.-L., Ho, H.-Y., Hsiao, R. C., Lu, W.-H., & Yen, C.-F. (2020). Correlations between quality of life, school bullying, and suicide in adolescents with attention-deficit hyperactivity disorder. *International Journal of Environmental Research and Public Health*, *17*(9), 1–12. doi:10.3390/ijerph17093262
- Cooley, J. L., & Fite, P. J. (2016). Peer victimization and forms of aggression during middle childhood: The role of emotion regulation. *Journal of Abnormal Child Psychology*, *44*, 535–546. doi:10.1007/s10802-015-0051-6
- Coolidge, F. L., DenBoer, J. W., & Segal, D. L. (2004). Personality and neuropsychological correlates of bullying behavior. *Personality and Individual Differences*, *36*, 1559–1569. doi:10.1016/j.paid.2003.06.005

- Corso, H. V., Sperb, T. M., Jou, G. I., & Salles, J. F. (2013). Metacognição e funções executivas: Relações entre os conceitos e implicações para a aprendizagem. *Psicologia: Teoria e Pesquisa*, 29(1), 21–29. doi:10.1590/S0102-37722013000100004
- Crowley, J. P., Knowles, J. A. H., & Riggs, N. R. (2016). Message processes and their associations with adolescents' executive function and reports of bullying. *School Psychology International*, 37(1) 32–50. doi:10.1177/0143034315605574
- Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science*, 333(6045), 959–964. doi:10.1126/science.1204529
- Downes, M., Bathelt, J., & Haan, M. (2017). Event-related potential measures of executive functioning from preschool to adolescence. *Developmental Medicine & Child Neurology*, 59(6), 581–590. doi:10.1111/dmcn.13395
- Czermainski, F. R., Bosa, C. A., & Salles, J. F. (2013). Funções executivas em crianças e adolescentes com transtorno do espectro do autismo: Uma revisão. *Psico*, 44(4), 518–525.
- Espelage, D. L., Hong, J. S., Kim, D. H., & Nan, L. (2018). Empathy, attitude towards bullying, Theory-of-Mind, and non-physical forms of bully perpetration and victimization among U.S. middle school students. *Child & Youth Care Forum*, 47(1), 45–60. doi:10.1007/s10566-017-9416-z
- Ferenhof, H. A., & Fernandes, R. F. (2016). Desmistificando a revisão de literatura como base para redação científica: Método SSF. *Revista ACB: Biblioteconomia em Santa Catarina*, 21(3), 550–563.
- Fondo de las Naciones Unidas para la Infancia (2017). Informe anual 2017. Recuperado de [https://www.unicef.org/Informe\\_Anuar\\_2017\\_UNICEF.pdf](https://www.unicef.org/Informe_Anuar_2017_UNICEF.pdf)
- Fram, D., Marin, C. M., & Barbosa, D. (2014). Avaliação da necessidade da revisão sistemática e a pergunta do estudo. In D. Barbosa (Org.), *Enfermagem baseada em evidências* (pp. 21–28). São Paulo: Atheneu.
- Grigsby, J., & Stevens, D. (2000). *Neurodynamics of personality*. New York: The Guilford Press.
- Hamdan, A. C., & Pereira, A. P. A. (2009). Avaliação neuropsicológica das funções executivas: Considerações metodológicas. *Psicologia: Reflexão e Crítica*, 22(3), 386–393. doi:10.1590/S0102-79722009000300009

- Harms, M. B., Zayas, V., Meltzoff, A. N., & Carlson, S. M. (2014). Stability of executive function and predictions to adaptive behavior from middle childhood to pre-adolescence. *Frontiers in Psychology*, 5, 1–11. doi:10.3389/fpsyg.2014.00331
- Hussein, M. H. (2013). The social and emotional skills of bullies, victims, and bully-victims of Egyptian primary school children. *International Journal of Psychology*, 48, 910–921. doi:10.1080/00207594.2012.702908
- Jenkins, L. N., Tennant, J. E., & Demaray, M. K. (2018). Executive functioning and bullying participant roles: Differences for boys and girls. *Journal of School Violence*, 17(4), 1–17. doi:10.1080/15388220.2018.1453822
- Ji, S., & Wang, H. (2018). A study of the relationship between adverse childhood experiences, life events, and executive function among college students in China. *Psicologia: Reflexão e Crítica*, 31(28), 19. doi:10.1186/s41155-018-0107-y
- Joanna Briggs Institute (2016). Reviewers' manual: 2016. Recuperado de <https://reviewersmanual.joannabriggs.org/>
- Kerr, A., & Zelazo, P. D. (2004). Development of “hot” executive function: The children’s gambling task. *Brain and Cognition*, 55(1), 148–157. doi:10.1016/S0278-2626(03)00275-6
- Kloosterman, P. H., Kelley, E. A., Parker, J. D. A., & Craig, W. M. (2014). Executive functioning as a predictor of peer victimization in adolescents with and without an autism spectrum disorder. *Research in Autism Spectrum Disorders*, 8(3), 244–254. doi:10.1016/j.rasd.2013.12.006
- Kluwe-Schiavon, B., Viola, T. W., & Grassi-Oliveira, R. (2012). Modelos teóricos sobre construto único ou múltiplos processos das funções executivas. *Neuropsicologia Latinoamericana*, 4(2), 29–34. doi:10.5579/rnl.2012.00106
- León, C. B. R., Rodrigues, C. C., Seabra, A. G., & Dias, N. M. (2013). Funções executivas e desempenho escolar em crianças de 6 a 9 anos. *Revista Psicopedagogia*, 30(92), 113–120.
- Liu, T. L., Guo, N. W., Hsiaod, R. C., Hue, H. F., & Yen, C. F. (2017). Relationships of bullying involvement with intelligence, attention, and executive function in children and adolescents with attention deficit/hyperactivity disorder. *Research in Developmental Disabilities*, 70, 59–66. doi:10.1016/j.ridd.2017.08.004
- Loring, D. (1999). *INS Dictionary of neuropsychology*. New York: Oxford University Press.

- McQuade, J. D. (2017). Peer victimization and changes in physical and relational aggression: The moderating role of executive functioning abilities. *Aggressive Behavior*, 43, 503–512. doi:10.1002/ab.21708
- Medeiros, W., Alves, N. T., Diniz, L. F. M., & Minervino, C. M. (2016). Executive functions in children who experience bullying situations. *Frontiers in Psychology*, 7, 1–9. doi:10.3389/fpsyg.2016.01197
- Mello, F. C., Silva, J. L., Oliveira, W. A., Prado, R. R., Malta, D. C., & Silva, M. A. I. (2017). A prática de *bullying* entre escolares brasileiros e fatores associados, Pesquisa Nacional de Saúde do Escolar 2015. *Ciência & Saúde Coletiva*, 22(9), 2937–2946. doi:10.1590/1413-81232017229.12762017
- Monks, C. P., Smith, P. K., & Swettenham, J. (2005). Psychological correlates of peer victimisation in preschool: Social cognitive skills, executive function and attachment profiles. *Aggressive Behavior*, 31(6), 571–588. doi:10.1002/ab.20099
- Morton, H. E., Gillis, J. M., Mattson, R. E., & Romanczyk, R. (2019). Conceptualizing bullying in children with autism spectrum disorder: Using a mixed model to differentiate behavior types and identify predictors. *Autism*, 23(7) 1853–1864. doi:10.1177/1362361318813997
- Mourão, C. A., Júnior, & Melo, L. B. R. (2011). Integração de três conceitos: Função executiva, memória de trabalho e aprendizado. *Psicologia: Teoria e Pesquisa*, 27(3), 309–314. doi:10.1590/S0102-37722011000300006
- Nações Unidas Brasil (2016). Pesquisa da ONU mostra que metade das crianças e jovens do mundo já sofreu *bullying*. Recuperado de <https://nacoesunidas.org/pesquisa-da-onu-mostra-que-metade-das-criancas-e-jovens-do-mundo-ja-sofreu-bullying/>
- Olweus, D. (2013). School bullying: Development and some important challenges. *Annual Review of Clinical Psychology*, 9, 751–780. doi:10.1146/annurev-clinpsy-050212-185516
- Organização das Nações Unidas para a Educação, a Ciência e a Cultura (2019). Violência escolar e *bullying*: relatório sobre a situação mundial. Recuperado de <https://unesdoc.unesco.org/ark:/48223/pf0000368092>
- Ortega, F. R., Ardila, A. C., Celis, Z. L., & Ballestas, L. F. (2014). Factores de riesgo y protectores del bullying escolar en estudiantes con bajo rendimiento de cinco instituciones educativas de Santa Marta, Colombia. *Psicogente*, 18(33), 188–205. doi:10.17081/psico.18.33.65

- Poon, K. (2018). Hot and cool executive functions in adolescence: Development and contributions to important developmental outcomes. *Frontiers in Psychology*, 8, 1–18. doi:10.3389/fpsyg.2017.02311
- Prencipe, A., Kesek, A., Cohen, J., Lamm, C., Lewis, M. D., & Zelazo, P. D. (2011). Development of hot and cool executive function during the transition to adolescence. *Journal of Experimental Child Psychology*, 108(3), 621–637. doi:10.1016/j.jecp.2010.09.008
- Raaijmakers, M. A., Smidts, D. P., Sergeant, J. A., Maassen, G. H., Posthumus, J. A., Engeland, H., & Matthys W. (2008). Executive functions in preschool children with aggressive behavior: Impairments in inhibitory control. *Journal of Abnormal Child Psychology*, 36(7), 1097–1107. doi:10.1007/s10802-008-9235-7
- Rhoades, B., Greenberg, M., & Domitrovich, C. (2009). The contribution of inhibitory control to preschoolers' social-emotional competence. *Journal of Applied Developmental Psychology*, 30, 310–320. doi:10.1016/j.appdev.2008.12.012
- Riccio, C., Hewitt, L., & Blake, J. (2011). Relation of measures of executive function to aggressive behavior in children. *Applied Neuropsychology*, 18(1), 1–10. doi:10.1080/09084282.2010.525143
- Ríos, O. L. H., Solís, K. O., & Aragón, C. J. R. (2013). Flexibilidad cognitiva y control inhibitorio: un acercamiento clínico a la comprensión del maltrato entre iguales por abuso de poder. *Revista Argentina de Clínica Psicológica*, 22(3), 219–227. doi:10.1080/09084282.2010.525143
- Sampaio, J. M. C., Santos, G. V., Oliveira, W. A., Silva, J. L., Medeiros, M., & Silva, M. A. I. (2015). Emotions of students involved in cases of bullying. *Texto & Contexto – Enfermagem*, 24(2), 344–352. doi:10.1590/0104-07072015003430013
- Sanislow, C. A., Pine, D. S., Quinn, K. J., Kozak, M. J., Garvey, M. A., Heinssen, R. K., ... Cuthbert, B. N. (2010). Developing Constructs for Psychopathology Research: Research Domain Criteria. *Journal of Abnormal Psychology*, 119(4), 631–639. doi:10.1037/a0020909
- Sentse, M., Kretschmer, T., & Salmivalli, C. (2015). The longitudinal interplay between bullying, victimization, and social status: Age-related and gender differences. *Social Development*, 24(3), 659–677. doi:10.1111/sode.12115
- Silva, J. L., Oliveira, W. A., Braga, I. F., Farias, M. S., Lizzi, E. A. S., Fagundes, M. G., Pereira, B. O., & Silva, M. A. I. (2016). The effects of a skill-based intervention for victims of bullying in Brazil. *International Journal of Environmental Research and Public Health*, 13, 1042–1052. doi:10.3390/ijerph13111042

- Silva, J. L., Oliveira, W. A., Carlos, D. M., Lizzi, E. A. S., Rosário, R., & Silva, M. A. I. (2018a). Intervenção em habilidades sociais e *bullying*. *Revista Brasileira de Enfermagem*, 71(3), 1085–1091. doi:10.1590/0034-7167-2017-0151
- Silva, J. L., Oliveira, W. A., Mello, F. C. M., Andrade, L. S., Bazon, M. R., & Silva, M. A. I. (2017). Revisão sistemática da literatura sobre intervenções antibullying em escolas. *Ciência & Saúde Coletiva*, 22(7), 2329–2340. doi:10.1590/1413-81232017227.16242015
- Silva, J. L., Oliveira, W. A., Zequinão, M. A., Lizzi, E. A. S., Pereira, B. O., & Silva, M. A. I. (2018b). Resultados de intervenções em habilidades sociais na redução de *bullying* escolar: Revisão sistemática com metanálise. *Trends in Psychology*, 26(1), 509–522. doi:10.9788/TP2018.1-20Pt
- Smith, P. K., & Jones, A. P. (2012). The importance of developmental science for studies in bullying and victimization. *International Journal of Developmental Sciences*, 6(1), 71–74. doi:10.3233/DEV-2012-11093
- Souza, M. T., Silva, M. D., & Carvalho, R. (2010). Integrative review: what is it? How to do it? *Einstein*, 8(1), 102–106.
- Verlinden, M., Veenstra, R., Ghassabian, A., Jansen, P. W., Hofman, A., Jaddoe, V. W. V., Verhulst, F. C., & Tiemeier, H. (2014). Executive functioning and non-verbal intelligence as predictors of bullying in early elementary school. *Journal of Abnormal Child Psychology*, 42, 953–966. doi:10.1007/s10802-013-9832-y
- Wilson, J., Andrews, G., Hogan, C., Wang S., & Shum, D. H. K. (2018). Executive function in middle childhood and the relationship with theory of mind. *Developmental Neuropsychology*, 3, 163–182. doi:10.1080/87565641.2018.1440296
- Winton, S., & Tuters, S. (2015). Constructing bullying in Ontario, Canada: A critical policy analysis. *Educational Studies*, 41(1–2), 122–142, doi:10.1080/03055698.2014.955737

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