

PREDICTORS OF AGGRESSIVE BEHAVIOUR IN CHILDREN AND ADOLESCENTS

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Abstract: *This narrative review synthesises evidence on predictors of aggressive behaviour in children and adolescents, with a focus on how risk and protection accumulate across development. Aggression is conceptualised broadly, including physical, relational, indirect, reactive, and proactive forms. The review integrates longitudinal studies, meta-analyses, and key theoretical contributions that address individual, family, peer, school, and broader contextual influences.*

Developmental research shows that physical aggression typically declines from early childhood, while a minority of youths follow stable or increasing trajectories that predict later conduct problems, peer difficulties, and risky intimate relationships. Individual-level predictors include temperamental negative emotionality, low self-regulation, specific personality facets, hostile attribution biases, dominance-oriented social goals, and reduced theory of mind and mentalisation.

At the family level, harsh, inconsistent, and psychologically controlling parenting, as well as insecure attachments and high conflict climates are linked to elevated and persistent aggression, whereas warm, structured, and responsive parenting can buffer risk. Peer and school factors, such as bullying roles, status dynamics, classroom norms, and attitudes toward violence, further shape aggressive trajectories, especially when aggression is socially rewarded.

The review supports a biopsychosocial perspective in which aggression emerges from transactions between vulnerabilities and environments. Implications include the need for early, multi-level interventions that combine child skills training, parent-focused components, and school-wide approaches, alongside future research that improves measurement, increases cultural diversity, and integrates biological and social levels of analysis.

Keywords: *Aggressive behaviour, Children and adolescents, Risk and protective factors, Bullying and peer relations, Biopsychosocial predictors*

INTRODUCTION

Aggressive behaviour in childhood and adolescence is a multifaceted construct that includes physical, verbal, and relational forms of harm that are expressed directly or indirectly toward others (Eron, 1994; Hubbard et al., 2010). The literature also distinguishes between reactive aggression, which is typically impulsive and driven by perceived threat or frustration, and proactive aggression, which is more deliberate, goal oriented, and instrumental (Hubbard et al., 2010; Kempes et al., 2005; Romero-Martínez et al., 2022). Because these forms and functions often co-occur, but may differ in their antecedent factors and outcomes, predictors of aggression should be examined in

a differentiated way (Brugman et al., 2015; Lohbeck, 2022).

From a developmental perspective, aggression is not a static trait. Physical aggression tends to peak in toddlerhood and early childhood, and it should gradually decline as children acquire language skills, emotion regulation strategies, and social problem solving (Lansford, 2018; Nærde et al., 2024). Longitudinal research shows that some children follow persistently high or increasing trajectories of physical, relational, or indirect aggression from childhood into adolescence, and these trajectories are associated with a range of later problems, including externalising disorders, peer difficulties, and risky romantic relationships

(Cleverley et al., 2012; Di Giunta et al., 2010; Ehrenreich et al., 2014, 2016; Farrell & Vaillancourt, 2019; Girard et al., 2019; Perry & Ostrov, 2023; Vaillancourt & Farrell, 2021). These findings show that early and persistent aggression represents a key developmental risk marker, rather than a transient phase.

Aggression also has broader consequences for peers, families, and schools. Bullying perpetration and related aggressive behaviours have been linked to poorer mental health, academic difficulties, and later antisocial outcomes, while victimisation is associated with depression, anxiety, and suicidality (Cook et al., 2010; Moore et al., 2017). Meta-analytic and systematic reviews also highlight a broad set of individual and contextual risk factors associated with different roles in bullying involvement (Álvarez-García et al., 2015; Kljakovic & Hunt, 2016). Meta-analytic research on bullying and peer status suggests that aggression, particularly in the form of bullying, can be socially strategic and used to gain or maintain status within the peer group (Samson et al., 2012; Samson et al., 2022; Wiertsema et al., 2023; Zych et al., 2021). At the same time, aggressive behaviour is often embedded in broader networks of risk, including exposure to war or community violence, disadvantaged neighbourhoods, and school climates that tolerate or normalise aggression (Keresteš, 2006; Pina López et al., 2022; Robles-Haydar et al., 2021).

Theoretical and empirical work suggests that aggression develops through interactions between individual vulnerabilities and environmental contexts. At the individual level, temperament, personality traits, and social cognition have been linked to aggressive behaviour. High negative emotionality, low effortful control, and specific personality facets predict more stable aggressive and rule-breaking trajectories across childhood and adolescence (Becht et al., 2016; Farrell & Vaillancourt, 2019; Fauzi et al., 2023). Deficits in social problem solving, hostile attribution biases, antisocial social goals, and reduced theory of mind or mentalisation capacities further contribute to both reactive and proactive forms of aggression (Brugman et al., 2015; Samson et al.,

2012; Taubner et al., 2013; Wang et al., 2023). Recent work using machine learning highlights how psychosocial, chronotype, and environmental variables jointly shape aggressive behaviour, underlining the value of integrative models (Nguyen-Louie et al., 2025).

Family and peer relationships are equally central in understanding why some children become chronically aggressive. Harsh, inconsistent, and psychologically controlling parenting, as well as an insecure attachment to parents predict higher levels and more persistent trajectories of aggression (Gallarin & Alonso-Arbiol, 2012; Malonda et al., 2019; Murray et al., 2010, 2014). At the same time, warm, responsive parent-child relationships can buffer the effects of risk, including high maternal psychological control, particularly for temperamentally vulnerable children (Sun et al., 2024). In adolescence, romantic attachment begins to play a role, and insecure romantic bonds can mediate links between earlier attachment to parents and later aggressive behaviour in intimate relationships (Santona et al., 2019). Peer dynamics add another layer, as relational aggression, bullying, and social status processes in the classroom shape both the expression and reinforcement of aggressive behaviour over time (Hensums et al., 2023; Natesan et al., 2018; Spieker et al., 2012).

Taken together, existing evidence points to aggression as a product of interacting biological, psychological, and social factors, rather than a single-cause phenomenon (Adesanya et al., 2022; Hendriks et al., 2018; Matthys & Schutter, 2022). However, previous reviews have often focused on specific segments of the literature, such as bullying perpetration and victimisation, psychobiological profiles of reactive and proactive aggression, social goals, theory of mind, or intervention-relevant mechanisms (Álvarez-García et al., 2015; Cook et al., 2010; Hendriks et al., 2018; Romero-Martínez et al., 2022; Samson et al., 2012, 2022; Wang et al., 2023; Wiertsema et al., 2023). The field, therefore, still lacks an integrative developmental synthesis that brings together different forms and functions of aggression, longitudinal trajectory research, and predictors operating

across individual, family, peer, school, and broader social levels.

The present narrative review addresses this gap by synthesising evidence on predictors of aggressive behaviour in children and adolescents across individual, family, peer, school, and broader contextual levels. Its scientific contribution lies in organising a fragmented literature within a biopsychosocial developmental framework that differentiates forms and functions of aggression, highlights risk and protective processes, and links these processes to prevention, intervention, and future research. The theoretical contribution of the review is to conceptualise aggression not only as a set of behavioural forms or isolated risk factors, but as a developmentally organised and context-dependent pattern shaped by individual vulnerabilities, relational experiences, and broader social environments. For example, similar aggressive behaviours may reflect different mechanisms depending on when they occur and where they are embedded. Early physical aggression may be closely tied to immature self-regulation, whereas proactive or relational aggression may reflect status-oriented social goals, while persistent multi-form aggression may indicate cumulative risk across child, family, peer, and school contexts.

Methodological approach

This article is a narrative review that integrates findings from empirical and theoretical work on predictors of aggressive behaviour in children and adolescents. The choice of a narrative approach reflects the heterogeneity of the field. Studies differ in how they define aggression, in the age ranges they examine, and in the methods they use to assess both predictors and outcomes. A purely systematic or meta-analytic approach would have required narrow inclusion criteria and might have obscured important conceptual links across subfields such as bullying, child-to-parent aggression, and relational aggression (Álvarez-García et al., 2015; Calvete et al., 2015; Spieker et al., 2012).

Targeted searches were conducted in PubMed, PsycINFO, Scopus, and Web of Science, along

with supplementary searches in Google Scholar. The searches were conducted between August 2025 and October 2025. Search terms were selected to capture the main conceptual domains of the review, including forms and functions of aggression, developmental populations, individual and biopsychological predictors, family and parenting factors, peer and school contexts, and broader social risks. The search strategy included combinations of terms such as (“aggression” OR “aggressive behavi*” OR “physical aggression” OR “relational aggression” OR “indirect aggression” OR “reactive aggression” OR “proactive aggression” OR “bullying perpetration” OR “child-to-parent aggression”) AND (“child*” OR “adolescen*” OR “youth” OR “childhood” OR “adolescence”) AND (“predict*” OR “risk factor*” OR “protective factor*” OR “developmental trajectory*” OR “longitudinal” OR “developmental course”). Additional studies were identified through backward citation searching of key reviews and meta-analyses, as well as through forward citation searching of influential longitudinal studies.

The review includes studies that examine physical, relational, indirect, reactive, and proactive forms of aggression, as well as bullying perpetration and related aggressive roles in the peer group (Cook et al., 2010; Hubbard et al., 2010; Kempes et al., 2005; Lohbeck, 2022). Predictors of interest span several levels. At the individual level, the review considers temperament, personality, social cognition, and psychobiological factors (Becht et al., 2016; Brugman et al., 2015; Farrell & Vaillancourt, 2019; Romero-Martínez et al., 2022; Wang et al., 2023). At the relational and contextual levels, it includes parenting practices, attachment, peer dynamics, school context, and broader social risk and protection (Gallarin & Alonso-Arbiol, 2012; Keresteš, 2006; Murray et al., 2010, 2014; Pina López et al., 2022; Robles-Haydar et al., 2021; Wiertsema et al., 2023).

In selecting studies, priority was given to longitudinal designs and cohort-sequential studies that trace developmental trajectories over time and allow stronger inferences about prediction and temporal ordering (Cleverley et al., 2012; Di

Giunta et al., 2010; Ehrenreich et al., 2014, 2016; Girard et al., 2019; Henriksen et al., 2021; Nærde et al., 2024; Perry & Ostrov, 2023). Meta-analyses and systematic reviews were also emphasised because they synthesise evidence across many samples and contexts and help identify robust predictors (Álvarez-García et al., 2015; Cook et al., 2010; Hendriks et al., 2018; Kljakovic & Hunt, 2016; Moore et al., 2017; Samson et al., 2012, 2022; Wang et al., 2023; Wiertsema et al., 2023; Zych et al., 2021). Cross-sectional studies were considered when they offered unique information on specific mechanisms, contexts, or populations that are insufficiently represented in longitudinal work, such as adolescents exposed to war or those living in high-risk environments (Fauzi et al., 2023; Keresteš, 2006; Robles-Haydar et al., 2021).

The review also includes theoretical and conceptual contributions that offer frameworks for interpreting empirical results. Classic and contemporary theories of aggression, as well as models of reactive and proactive aggression and developmental perspectives on aggression, provide the backbone for organising the findings (Eron, 1994; Kempes et al., 2005; Lansford, 2018; Matthys & Schutter, 2022). These studies help link specific predictors to broader processes, such as social information processing, attachment and mentalisation, or social goal structures (Hensums et al., 2023; Hubbard et al., 2010; Taubner et al., 2013).

Rather than aiming for an exhaustive coverage of every study in the field, the goal of this review is to map patterns across high-quality and influential contributions. The synthesis is structured around key domains of predictors (individual, family, peer, and contextual) and around developmental questions regarding how aggression remains stable or changes from childhood to adolescence. By juxtaposing evidence from different methodological traditions, including longitudinal modelling, meta-analytic research, and emerging approaches such as machine learning (Nguyen-Louie et al., 2025), the review seeks to highlight converging findings, unresolved inconsistencies, and promising directions for research and practice.

Inclusion and exclusion criteria

Studies were considered eligible for inclusion if they met the following criteria: they examined aggressive behaviour, bullying perpetration, or closely related aggressive roles as an outcome in children or adolescents; they addressed predictors, risk factors, protective factors, developmental trajectories, or explanatory mechanisms of aggression; and they focused on individual, family, peer, school, or broader contextual factors relevant to the aims of the review. Eligible publications included longitudinal and cross-sectional empirical studies, systematic reviews, meta-analyses, and theoretical or conceptual papers that contributed to the interpretation of developmental and biopsychosocial predictors of aggression. Priority was given to longitudinal studies, meta-analyses, systematic reviews, and studies that clearly differentiated forms or functions of aggression, such as physical, relational, indirect, reactive, or proactive aggression.

The review focuses on aggression as a behavioural outcome measured in children and adolescents up to 18 years of age. Studies that included older adolescents or emerging adults were considered only when aggression was assessed during childhood or adolescence, when developmental trajectories originated before adulthood, or when the findings allowed conclusions about youth aggression. Age effects were synthesised narratively, rather than statistically. Findings were interpreted according to the developmental period covered by each study, including early childhood and preschool age, middle childhood, adolescence, and, where relevant, later outcomes of trajectories that originated before adulthood. Studies that combined children and adolescents were included when findings for these developmental periods were directly relevant to the objectives of the review or when aggression was assessed before adulthood. Studies that included older adolescents or emerging adults were considered only when the main focus remained on developmental trajectories originating in childhood or adolescence, or when the results were reported in a way that allowed conclusions about youth aggression. Developmental stage was not treated as a formal

moderator across the review, because the included studies differed substantially in design, age range, measurement intervals, and analytic strategy. However, when individual studies examined age, grade, developmental timing, or trajectory shape, these findings were incorporated into the narrative synthesis. When studies did not directly test age effects, their findings were interpreted based on their relation to the developmental period sampled, rather than as evidence of age-specific moderation.

The review primarily focused on general population, school-based, community, and longitudinal cohort samples of children and adolescents. High-risk non-clinical samples, such as children or adolescents exposed to war, community violence, socioeconomic disadvantages, or elevated family risk, were included when they were directly relevant to understanding developmental, family, peer, school, or broader contextual predictors of aggression. Empirical studies based exclusively on psychiatric inpatient samples or narrowly defined treatment-seeking clinical samples were not used as a main evidentiary basis for the review, because the aim was to synthesise predictors of aggression in broader developmental and social contexts. However, clinically oriented reviews or conceptual papers were retained when they contributed to the interpretation of aggression-related mechanisms or intervention implications.

No fixed minimum sample size threshold was applied, given the narrative nature of the review and the methodological diversity of the included literature. However, studies with very small or narrowly defined samples were considered only when they offered theoretically or empirically relevant insights into aggression-related mechanisms, and their limited generalisability was considered in the interpretation of findings.

Studies were excluded if they focused exclusively on adult samples, examined victimisation without relevance to aggressive behaviour, bullying perpetration, or broader aggression-related roles, dealt only with intervention efficacy without discussing predictors or mechanisms of aggression, or addressed violence, delinquency, or antisocial behaviour without a clear developmen-

tal focus on aggression in childhood or adolescence. Non-peer-reviewed sources, dissertations, conference abstracts, and publications, for which the full text was not available, were not included.

Assessment of methodological quality

A formal risk-of-bias assessment or standardised methodological quality appraisal was not performed, because the aim of the article was to provide a narrative synthesis, rather than to conduct a systematic review or meta-analysis. The included literature was methodologically heterogeneous and consisted of longitudinal and cross-sectional empirical studies, systematic reviews, meta-analyses, and theoretical or conceptual contributions, which would have required different appraisal tools and would not have produced a single directly comparable quality score. Instead, methodological rigour was considered narratively when interpreting the evidence. Greater emphasis was placed on longitudinal studies, systematic reviews, meta-analyses, studies with clearly defined samples and measures, and studies that differentiated forms or functions of aggression. Findings from cross-sectional, small-sample, narrowly defined, or highly specific studies were interpreted more cautiously. This approach increases conceptual breadth and enables integration across diverse areas of aggression research, but it also represents a limitation, because the review does not provide a formal ranking of study quality or a quantitative estimate of risk of bias across the included evidence.

To increase transparency, Table 1 provides descriptive information for the selected empirical studies that were central to the synthesis, including sample size, age range or mean age, gender composition (where reported), study design, and population type.

Table 1. Descriptive characteristics of selected empirical studies included in the narrative synthesis

Study	Country	Sample size	Age range / mean age	Gender	Study design	Population type	Main findings relevant to the synthesis
Kerešić (2006)	Croatia	694	Grades 6 to 8; M age = 13 years, 7 months; SD = 10 months; Range = 12 years to 15 years, 3 months	336 girls and 358 boys	Cross-sectional, retrospective war-exposure study with multi-informant behaviour reports	Croatian urban school sample with differential exposure to war; high-risk non-clinical context	War exposure was associated with children's aggressive and prosocial behaviour, with perceived parenting and child gender contributing to differences in adjustment.
Kerešić & Milanović (2006)	Croatia	151	Grades 4 to 6; ages 10 to 13 years	80 boys and 71 girls	Cross-sectional correlational study using peer reports and sociometric nominations	Croatian elementary school community sample	Direct and indirect aggression were related to peer acceptance, peer rejection, gender, and sociometric status, showing that peer-group context shapes the social meaning of aggression.
Di Giunta et al. (2010)	Italy	439	Physical aggression assessed from ages 11 to 14 years; overt and covert antisocial outcomes assessed at ages 18 to 19 years	55% boys in the child sample; outcome samples approximately 54-55% boys	Longitudinal staggered multiple-cohort trajectory study using self- and mother-reports	Community sample from two public schools in Genzano, Italy	Stable high physical aggression from ages 11 to 14 years predicted higher overt and covert antisocial behaviour in early adulthood, supporting the developmental significance of persistent aggression.
Murray et al. (2010)	United States	209	M age = 12 years	54% male	Short-term longitudinal predictive study using baseline and follow-up survey data	Low-income, urban, predominantly African American middle school sample	Moderate parental expectations for peaceful conflict resolution were associated with lower overt aggression and, under some conditions, protected against both overt and relational aggression.
Cleverley et al. (2012)	Canada	2338	Ages 10 to 15 years; outcomes examined in emerging adulthood	50% girls and 50% boys	Longitudinal trajectory study	Canadian longitudinal community sample, National Longitudinal Study of Children and Youth	Distinct physical and indirect aggression trajectories from late childhood to adolescence were associated with later psychosocial outcomes in emerging adulthood.
Gallarin & Alonso-Arbiol (2012)	Spain	554	Ages 16 to 19 years	330 girls and 224 boys	Cross-sectional predictive model	Community adolescent sample	Parenting practices and parental attachment predicted adolescent aggressiveness, supporting the role of family relational factors in aggression.
Spieker et al. (2012)	United States	1103	Middle childhood; ages 8 to 11 years / grades 3 to 6, with adolescent outcomes	558 boys and 545 girls	Longitudinal developmental study	Community sample from the NICHD Study of Early Child Care and Youth Development	Relational aggression in middle childhood was linked to developmental predictors and later adolescent adjustment, highlighting the importance of peer-related forms of aggression beyond physical aggression.

Taubner et al. (2013)	Germany	104	Ages 15 to 24 years; M age = 16.4, SD = 1.8	59 male and 45 female participants	Cross-sectional empirical study	Community sample recruited from schools in two German cities	Attachment-related mentalisation moderated the association between psychopathic traits and proactive aggression, suggesting that reflective functioning may buffer aggression risk.
Ehrenreich et al. (2014)	United States	296	Followed from age 9 to 18 years; teacher ratings from grades 3 to 12	158 girls and 138 boys	Longitudinal developmental trajectory study	Community sample; ethnically diverse youth sample	Family factors predicted continuity and change in social and physical aggression across childhood and adolescence.
Murray et al. (2014)	United States	163	Eighth and ninth grade	49% female	Longitudinal study across eighth and ninth grade	Mostly White and Asian adolescent community sample	Parental psychological control and parent-child relationship quality were associated with adolescent aggression, with both maternal and paternal relationships contributing to risk.
Calvete et al. (2015)	Spain	591	Ages 12 to 17 years; M age = 14.17, SD = 1.11 at Time 1	50.42% girls; parent respondent - mostly mothers, 80%	3-year longitudinal study	School-based community sample from Bizkaia, Spain	Exposure to violence, parenting variables, cognitive schemas, and externalising problems predicted child-to-parent aggression over time.
Becht et al. (2016)	Belgium	290	M age = 8.80 years at Time 1, SD = 0.53; range = 8 to 9.92 years at Time 1; followed across the transition from childhood to adolescence	141 boys and 149 girls	Longitudinal study, three time points separated by 2-year intervals	Belgian community sample, Flemish Study on Parenting, Personality, and Development	Child personality facets and overreactive parenting predicted aggression and rule-breaking trajectories from childhood into adolescence.
Ehrenreich et al. (2016)	United States	287	Grades 3 to 12; outcomes assessed after 12th grade, around age 18	149 girls and 138 boys	Longitudinal trajectory study	Community / school-based sample	Persistent social and physical aggression trajectories were associated with psychosocial maladjustment at age 18.
Natesan et al. (2018)	United States	11715	Kindergarten through eighth grade; bully/victim status assessed in eighth grade, age 13 to 14 years	Boys and girls; exact gender composition not reported in the article	Longitudinal study using parent, teacher, and student reports across seven collection points	Nationwide U.S. sample, Early Childhood Longitudinal Study, Kindergarten Class 1998–1999	Early child characteristics predicted later bully and victim status, while family characteristics were especially relevant for predicting bully status.
Fairrell & Vaillancourt (2019)	Canada	463	Grade 6 baseline, M age = 12.19 years; followed into post-high-school period, approximately age 19	208 boys and 255 girls	Longitudinal study	Community school-based sample from Southern Ontario, McMaster Teen Study	Temperament and bullying were longitudinally associated with later dating aggression, linking earlier aggression-related tendencies with later romantic relationship risk.

Girard et al. (2019)	Canada	787	Followed from birth to adolescence; aggression assessed between ages 6 and 13 years	338 boys and 449 girls	Longitudinal group-based multi-trajectory modelling study	Nationally representative Quebec longitudinal birth cohort, QLSCD	Multi-trajectory profiles across physical, indirect, proactive, and reactive aggression were associated with child, maternal, and family-level risk factors.
Malonda et al. (2019)	Spain	500 adolescents initially; 417 completed all three waves	M age = 14.70 years, SD = 0.68	192 boys and 225 girls in the final longitudinal sample	Three-wave longitudinal study	School-based adolescent sample from Valencia, Spain	Parents and peers predicted prosocial behaviour and aggression across adolescence, supporting the role of relational contexts in aggressive and prosocial development.
Santona et al. (2019)	Italy	411	Ages 14 to 18 years; M age = 16.85, SD = 1.41	243 girls and 168 boys	Cross-sectional study using path analysis	High-school student sample from Rome and Milan	Romantic attachment mediated links between attachment to parents and aggression, suggesting continuity between family attachment and later interpersonal aggression.
Henriksen et al. (2021)	Norway	2289	M age = 14.5 years at Young-HUNT 1 and 18.4 years at Young-HUNT 2	1,235 girls and 1,054 boys	Two-wave longitudinal population study	Norwegian adolescent population sample, Young-HUNT	Physical aggression followed a developmental course from mid- to late adolescence, with individual and contextual risk factors contributing to persistence.
Robles-Haydar et al. (2021)	Colombia	827	Ages 11 to 16 years	54% male and 46% female	Cross-sectional study using structural equation modelling	Latino adolescent sample	Personal and environmental variables, including personality, values, parenting, sex, and socioeconomic situation, jointly predicted adolescent aggression.
Vaillancourt & Farrell (2021)	Canada	704 participants in the analytic sample; childhood trajectory analyses n = 701; adulthood trajectory analyses n = 466	Followed from age 10 to 22 years; aggression assessed from ages 10 to 18 years; adulthood indirect aggression from ages 19 to 22 years	Childhood trajectory subsample: 330 boys and 371 girls; adulthood trajectory subsample: 194 men and 272 women	Longitudinal person-centred trajectory study	Canadian community sample, McMaster Teen Study	Indirect aggression showed continuity from childhood to emerging adulthood; increasing childhood trajectories predicted moderate stable indirect aggression in adulthood.

Zych et al. (2021)	Switzerland	916	Followed from ages 7 to 17 years across seven waves	50.0% boys	Prospective longitudinal cohort study	Zurich Project on the Social Development from Childhood to Adulthood, z-proso	Individual, family, peer, and school factors in childhood predicted adolescent bullying roles, supporting an ecological developmental model of bullying involvement.
Lohbeck (2022)	Germany	1468 participants at Time 1; 208 participants at Time 2	Ages 9 to 18 years; M age = 13.11, SD = 2.33	764 boys and 704 girls at Time 1	Latent profile analysis and latent transition analysis over six months	School-based child and adolescent sample from four German federal states	Reactive and proactive aggression profiles showed distinct configurations and transitions, supporting differentiation between aggression functions.
Fauzi et al. (2023)	Malaysia	463	16-year-old adolescents	219 male and 244 female students	Cross-sectional observational study	Public secondary-school students from Hulu Langat, Selangor	Biopsychosocial predictors were associated with adolescent aggressive behaviour, supporting an integrative model of individual and contextual risk.
Perry & Ostrov (2023)	United States	300	M age = 44.70 months, SD = 4.38	44.0% girls	Longitudinal early-childhood study, three time points	Community / preschool-age sample	Physical and relational aggression followed distinguishable early-childhood trajectories and were related to peer risk factors.
Nærde et al. (2024)	Norway	1159	Physical aggression assessed from age 1 to 5 years; Grade 2 outcomes assessed later	559 girls	Longitudinal latent trajectory study	Norwegian developmental cohort, BONDS	Early physical aggression trajectories were associated with early parenting predictors and later school-age outcomes.
Sun et al. (2024)	United States	259	M child age = 4.5 years, SD = 0.9	50% girls	Short-term longitudinal mediation/moderation study with six-month follow-up	Chinese American preschool child-mother dyads	A positive parent-child relationship buffered the association between maternal psychological control and aggression in temperamentally surgent children.

Developmental trajectories of aggressive behaviour

As summarised in Table 1, the empirical studies included in this synthesis vary considerably in the developmental period, design, population type, and aggression outcome, which supports the need for a narrative synthesis, rather than a strictly quantitative synthesis. Aggressive behaviour does not appear in a uniform way across development. Longitudinal work shows that physical aggression often emerges early in life, increases during toddlerhood, and then tends to decline as children acquire language, executive functions, and social skills (Lansford, 2018; Nærde et al., 2024). For many children, this decline is gradual and reflects a shift from overt physical acts to more regulated and socially acceptable strategies for managing conflict. At the same time, a minority of children follow persistently high or increasing trajectories of aggression. These children are at heightened risk for later conduct problems, delinquency, and broader psychosocial difficulties, including maladjustment in late adolescence, when elevated social and physical aggression persist over time (Di Giunta et al., 2010; Ehrenreich et al., 2016; Girard et al., 2019).

Research increasingly differentiates not only levels, but also forms and functions of aggression over time. Studies that track multiple forms of aggression show that children and adolescents may follow distinct profiles characterised by low aggression, elevated physical aggression, elevated social or relational aggression, or combinations of these forms (Ehrenreich et al., 2016; Perry & Ostrov, 2023). Indirect and relational forms, such as gossip or social exclusion, tend to become more prominent from late childhood onward, in parallel with advances in social cognition and the growing importance of peer status (Cleverley et al., 2012; Vaillancourt & Farrell, 2021). Work on reactive and proactive aggression further suggests that these functions have partly distinct developmental patterns and correlates, even though they overlap in practice (Hubbard et al., 2010; Kempes et al., 2005; Lohbeck, 2022). Reactive aggression is more strongly tied to emotional dysregulation and hostile attribution biases, whereas proactive aggression relates more to instrumental goals and

social dominance motives (Brugman et al., 2015; Samson et al., 2012).

Developmental trajectories are shaped by the broader ecological context. Exposure to war and community violence can increase the likelihood that children develop stable, high-aggression profiles, especially when combined with harsh or inconsistent parenting and limited social support (Keresteš, 2006; Murray et al., 2010; Robles-Haydar et al., 2021). School and peer environments also matter. Classrooms with weak norms against aggression and tolerant attitudes toward violence are more likely to sustain bullying and related behaviours over time, while supportive climates can promote desistance (Cook et al., 2010; Pina López et al., 2022). Meta-analytic findings indicate that children who occupy bullying roles, especially those who are both aggressive and socially central, often maintain or even strengthen their aggressive patterns into adolescence (Kljakovic & Hunt, 2016; Wiertsema et al., 2023; Zych et al., 2021).

Across these trajectories, some children appear more resilient or responsive to contextual changes than others. For example, warm and secure relationships with parents can redirect initially high aggression toward more adaptive pathways, whereas chronic exposure to psychological control and low warmth is linked to more persistent patterns (Gallarin & Alonso-Arbiol, 2012; Malonda et al., 2019; Murray et al., 2014; Sun et al., 2024). Similarly, peer experiences can either amplify aggression, when aggressive behaviour is rewarded with status, or dampen it, when prosocial norms and friendships are salient (Hensums et al., 2023; Spieker et al., 2012). These findings support a developmental view in which aggression is neither fixed nor random, but follows identifiable trajectories that emerge from the interplay of individual characteristics and environmental conditions across childhood and adolescence (Hendriks et al., 2018).

Individual and biopsychological predictors of aggressive behaviour

Individual differences in temperament and personality are among the most consistent predictors

of aggressive behaviour in childhood and adolescence. Children characterised by high negative emotionality and low effortful control, including difficulties with frustration tolerance, are more likely to follow stable or increasing trajectories of aggression and rule-breaking over time (Becht et al., 2016; Lansford, 2018). Longitudinal studies link temperamental surgency and low self-regulation with bullying perpetration and later dating aggression, suggesting that early dispositional tendencies shape how young people manage conflict and power in close relationships (Farrell & Vaillancourt, 2019). Recent work in school settings also shows that adolescents with higher levels of impulsivity, emotional instability, and sensation seeking report more frequent aggressive behaviour, even after accounting for contextual risks, which supports a biopsychosocial interpretation of these traits (Fauzi et al., 2023; Robles-Haydar et al., 2021).

Social-cognitive processes provide a second important layer of explanation. Models of social information processing propose that aggressive children are more likely to interpret ambiguous cues as hostile, generate fewer prosocial solutions, and evaluate aggression as more acceptable or effective (Hubbard et al., 2010; Matthys & Schutter, 2022). Empirical work supports these assumptions. Cognitive studies show that reactive aggression is associated with hostile attribution biases and problems in regulating anger, whereas proactive aggression is more strongly tied to instrumental beliefs and expectations of social gain (Brugman et al., 2015; Kempes et al., 2005). Meta-analytic findings on social goals indicate that youth who prioritise dominance, revenge, and antisocial goals are more prone to aggressive behaviour, while prosocial goals are linked to lower levels of aggression (Samson et al., 2012, 2022). At the same time, difficulties in understanding the mental states of others can contribute to aggressive behaviour by limiting perspective-taking and sensitivity to others' intentions and emotions. A recent meta-analysis suggests that weaker theory of mind is modestly, but reliably, associated with higher aggression, with some evidence that asso-

ciations are stronger for more demanding Theory of Mind tasks (Wang et al., 2023).

Emotion processing, empathy, and mentalisation further shape how individual vulnerabilities translate into aggressive acts. Children and adolescents with lower empathy and reduced capacity to reflect on their own and others' mental states tend to show more instrumental and proactive aggression, particularly when psychopathic traits are elevated (Romero-Martínez et al., 2022; Taubner et al., 2013). These profiles are often characterised by blunted emotional responses to others' distress and a stronger focus on personal gain, which may make aggressive strategies seem both acceptable and advantageous. In contrast, youth with high reactive aggression are more likely to experience intense negative affect and rapid escalation when they feel threatened, which suggests a different emotional pathway to aggression (Hubbard et al., 2010; Kempes et al., 2005).

Biopsychological models integrate these cognitive and emotional processes with neurobiological and contextual factors. Systematic reviews point to distinct psychobiological patterns for reactive and proactive aggression, including differences in stress reactivity, autonomic arousal, and hormonal profiles, although findings are not always consistent across studies (Hendriks et al., 2018; Romero-Martínez et al., 2022). Emerging work that uses machine learning approaches can illustrate how combinations of psychosocial, chronotype, and environmental variables jointly predict adolescent aggression, highlighting that no single biological marker is sufficient on its own (Nguyen-Louie et al., 2025). Clinical reviews also suggest that impaired social problem solving and deficits in emotion regulation represent key treatment targets for children and adolescents with conduct problems, especially when they co-occur with neurocognitive vulnerabilities (Adesanya et al., 2022; Matthys & Schutter, 2022).

Overall, the literature on individual and biopsychological predictors points to aggression as the outcome of multiple interacting processes, rather than a fixed "aggressive personality". Early temperament, personality traits, social-cognitive patterns, empathy, and neurobiological

functioning contribute as risk factors, but their impact depends on the social environments in which children grow up. This view is consistent with biopsychosocial frameworks that emphasise cumulative risk and the possibility that supportive family and peer relationships can buffer the effects of individual vulnerabilities on aggressive trajectories (Fauzi et al., 2023; Hendriks et al., 2018; Robles-Haydar et al., 2021).

Family and parenting predictors of aggressive behaviour

Family relationships form one of the earliest and most powerful contexts in which aggressive behaviour develops. Parenting practices, attachment, and broader family climate can shape how children learn to express and regulate anger, respond to conflict, and interpret others' intentions (Gallarín & Alonso-Arbiol, 2012; Lansford, 2018). Longitudinal studies indicate that harsh, inconsistent, or coercive parenting is linked to higher and more persistent levels of aggression, whereas warmth, sensitivity, and clear structure are associated with lower risk and more adaptive developmental trajectories (Ehrenreich et al., 2014; Malonda et al., 2019; Murray et al., 2010). Family-level predictors are particularly relevant because continuity and change in social and physical aggression from middle childhood to late adolescence appear to be shaped not only by child characteristics, but also by the relational climate in which aggressive behaviour develops (Ehrenreich et al., 2014). These associations are not only cross-sectional. They often predict changes in aggressive behaviour over time, which points to a potentially causal role of parenting in either escalating or dampening aggressive tendencies.

Work on specific parenting dimensions provides a more fine-grained picture. Psychological control, which involves guilt induction, love withdrawal, and intrusive attempts to manage the child's thoughts and feelings, has received particular attention. Adolescents who perceive higher psychological control from their mothers and fathers report more aggression, even when warmth and behavioural control are taken into account (Murray et al., 2014). Other studies suggest that

the combination of low parental warmth and high psychological control is especially problematic, and may create a relational climate in which children feel both emotionally unsupported and closely monitored in a controlling way (Gallarín & Alonso-Arbiol, 2012). In contrast, authoritative practices that blend warmth with consistent limits appear protective, promoting prosocial behaviour and reducing the likelihood of aggressive responses in everyday conflicts (Adesanya et al., 2022; Malonda et al., 2019).

Attachment processes are closely intertwined with these parenting dimensions. Secure attachment relationships offer a base from which children can explore, learn to regulate distress, and internalise expectations that others are available and responsive. These experiences tend to reduce the need for aggressive strategies to obtain attention or control (Gallarín & Alonso-Arbiol, 2012). Insecure attachment, particularly when combined with parental rejection or hostility, is associated with higher levels of aggression (Santona et al., 2019). Aggressive children are also more likely to be rejected by peers and have lower sociometric status (Keresteš & Milanović, 2006). As adolescents enter romantic relationships, early attachment patterns can carry over. Romantic attachment often mediates the link between attachment to parents and aggression in intimate relationships, which shows how early family bonds can shape later interpersonal styles (Santona et al., 2019).

Family context becomes even more salient in situations of chronic stress or trauma. Research on children exposed to war and political violence illustrates that such experiences can increase aggressive and antisocial behaviour. Yet the impact is not uniform. Perceived parenting plays a moderating role. Warm and supportive parenting can buffer some of the adverse effects of war exposure on aggression, whereas harsh or inconsistent parenting amplifies risk (Keresteš, 2006). Similar patterns emerge in studies of families facing socioeconomic adversity or high levels of neighbourhood violence, where supportive, engaged parenting predicts lower aggression, even under conditions of substantial contextual risk (Murray

et al., 2010; Robles-Haydar et al., 2021). These findings support transactional models in which family processes and broader environmental stressors interact across time.

Not all aggressive behaviour is directed toward peers or siblings. Child-to-parent aggression is an important, but often overlooked form of family violence. Longitudinal findings show that hostile attribution biases toward parents, exposure to peer aggression, and parental psychological control can predict increases in child-to-parent aggression over a three-year period (Calvete et al., 2015). This pattern suggests that aggressive behaviour can be embedded in reciprocal coercive cycles within the family, where parents and children respond to each other with escalating hostility and control. Over time, these cycles may stabilise into entrenched patterns that are harder to modify without targeted intervention.

Recent research also points to potential protective mechanisms within families. Studies of temperamentally surgent children, who are more active and sensation seeking, show that a close, positive parent-child relationship can buffer the effect of maternal psychological control on later aggression (Sun et al., 2024). In other words, when children feel emotionally connected and valued, controlling practices may be less likely to translate into chronic aggression. Similarly, parental styles that promote open communication, emotional validation, and clear, but flexible, rules are linked to more prosocial behaviour and fewer aggressive beliefs, partly through their impact on children's affective experiences and social cognitions (Malonda et al., 2019).

Taken together, family and parenting processes can help explain how individual vulnerabilities become either amplified or contained across development. Rather than functioning as isolated predictors, parenting practices, attachment relationships, and family climate can shape the emotional and relational conditions in which aggressive responses are learned, reinforced, or modified. This evidence also has practical implications. Interventions that support parents in developing sensitive, consistent, and non-coercive strategies, as well as those that strengthen parent-child relationships,

are likely to be a key component of comprehensive efforts to prevent and reduce aggressive behaviour in children and adolescents (Adesanya et al., 2022; Matthys & Schutter, 2022).

Peer, school, and broader social predictors of aggressive behaviour

Aggressive behaviour in children and adolescents often unfolds in social settings. Peers, classrooms, and wider community contexts can either reinforce or inhibit aggression. Bullying research is a central part of this picture. Meta-analytic research shows that a range of individual and contextual factors predict bullying perpetration, including impulsivity, low empathy, deviant peer affiliation, and weak school bonding (Álvarez-García et al., 2015; Cook et al., 2010; Kljakovic & Hunt, 2016). Longitudinal studies confirm that early bully roles are linked with later aggressive behaviour and other externalising outcomes, which suggests that bullying is not a transient school problem, but part of a broader pattern of maladjustment (Natesan et al., 2018; Zych et al., 2021).

Peer status and social goals are especially important for understanding why aggression may persist in some contexts. Children and adolescents who use aggression to gain or maintain influence may occupy central positions in the peer group and are not always simply rejected or marginalised. Meta-analytic findings indicate that bullies tend to be more popular, but less well-liked, than their peers, suggesting that aggression can be socially effective, even if it comes with interpersonal costs (Wiertsema et al., 2023). At the same time, direct and indirect aggression have also been linked to sociometric rejection, especially among girls and within same-gender peer groups (Keresteš & Milanović, 2006). These findings indicate that the social meaning of aggression depends on its form, the peer group context, and the distinction between perceived popularity and acceptance.

Social goals and classroom norms further clarify these processes. Youth who place a high value on dominance, reputation, or revenge are more likely to use aggressive strategies and to

view them as justified or effective (Hensums et al., 2023; Samson et al., 2012). When classmates perceive aggression as acceptable, funny, or useful for gaining respect, bullying and related behaviours are more likely to be reinforced. In contrast, classrooms where teachers and peers consistently communicate low tolerance for aggression tend to show lower rates of bullying and violent behaviour over time (Álvarez-García et al., 2015; Cook et al., 2010; Pina López et al., 2022). This pattern is consistent with studies on relational and indirect aggression, which suggest that some forms of aggression become more stable when they are embedded in status-oriented peer ecologies (Perry & Ostrov, 2023; Spieker et al., 2012; Vaillancourt & Farrell, 2021).

School victimisation also plays a paradoxical role. Children and adolescents who are frequent targets of bullying are at heightened risk for emotional problems, including depression, anxiety, and suicidality (Moore et al., 2017). At the same time, some victims respond with retaliatory aggression and may move into bully or bully-victim roles, especially in unstable or poorly supervised environments (Cook et al., 2010; Zych et al., 2021). Peer rejection and low sociometric status are linked with higher levels of overt and relational aggression, likely because rejected children have fewer opportunities to learn constructive conflict resolution and may resort to aggression when they feel excluded (Keresteš & Milanović, 2006; Spieker et al., 2012). These patterns show that peer experiences of exclusion, victimisation, and status competition can shape aggressive trajectories in complex ways.

Beyond the classroom, broader social and community contexts also contribute to aggressive behaviour. Studies in diverse cultural and socio-economic settings indicate that neighbourhood disadvantage, community violence, and exposure to war are associated with higher levels of aggression and antisocial behaviour in youth (Keresteš, 2006; Robles-Haydar et al., 2021). In such contexts, aggressive behaviour may be modelled as a survival strategy or as a normative response to threat. At the same time, school connectedness and supportive teacher relationships can act

as protective factors that mitigate some of these risks (Fauzi et al., 2023; Hendriks et al., 2018). These findings fit with biopsychosocial and ecological models that view aggression as the product of layered risk and protection across family, peer, school, and community levels.

Overall, peer, school, and social predictors do not operate in isolation. They interact with individual vulnerabilities and family processes. For example, children with high negative emotionality may be especially sensitive to peer rejection, while youth with strong dominance goals may be more likely to exploit tolerant classroom norms in order to use aggression strategically (Becht et al., 2016; Hensums et al., 2023). Conversely, positive peer relationships, prosocial norms, and safe school climates can buffer the impact of early risk and help redirect aggressive trajectories toward more adaptive forms of social engagement (Hendriks et al., 2018; Malonda et al., 2019). Understanding these multi-level influences is crucial for designing prevention and intervention efforts that extend beyond the individual child and address the social environments that sustain or discourage aggressive behaviour.

An integrated biopsychosocial perspective on aggressive behaviour

Findings across individual, family, peer, school, and broader contextual levels point to aggression as a genuinely biopsychosocial developmental phenomenon, rather than the outcome of any single factor. The central theoretical implication is that predictors of aggression should not be interpreted as parallel or independent risk factors. Instead, they form interacting pathways through which the child's characteristics, relational experiences, and social environments shape the probability, form, and persistence of aggressive behaviour. Temperamental vulnerabilities, hostile attribution biases, dominance-oriented goals, or reduced empathy may increase susceptibility to aggression, but their developmental significance depends on whether they are embedded in coercive parenting, insecure relationships, peer rejection, status-rewarding classrooms, or broader contexts of threat and disadvantage (Becht et al.,

2016; Brugman et al., 2015; Keresteš, 2006; Samson et al., 2012; Wiertsema et al., 2023).

This integrated perspective helps differentiate why similar aggressive behaviours may have different developmental meanings. Early physical aggression may primarily reflect immature self-regulation and limited conflict-resolution skills, whereas proactive, relational, or bullying-related aggression may be more closely tied to instrumental goals, peer status, and contextual reinforcement. Persistent multi-form aggression is likely to reflect cumulative risk across several systems, rather than one isolated vulnerability (Ehrenreich et al., 2016; Girard et al., 2019; Perry & Ostrov, 2023). In this sense, the biopsychosocial framework does not simply list predictors, but explains how they become developmentally organised into trajectories that may persist, change form, or decline over time.

Recent methodological developments reinforce this integrated view. Longitudinal trajectory and multi-trajectory models show that children do not follow a single developmental path; instead, they cluster into subgroups characterised by low, moderate, or high and persistent aggression, or by different combinations of physical, social, relational, reactive, and proactive forms of aggression (Ehrenreich et al., 2016; Girard et al., 2019; Perry & Ostrov, 2023; Vaillancourt & Farrell, 2021). Machine learning approaches similarly point to configurations of psychosocial, chronotype, and environmental variables that jointly predict aggression, rather than one dominant predictor (Nguyen-Louie et al., 2025). Clinical and preventive reviews translate these insights into practice by emphasising interventions that target multiple levels at once: strengthening emotion regulation and social problem solving, supporting parents in developing non-coercive strategies, and improving school climates (Adesanya et al., 2022; Hendriks et al., 2018; Matthys & Schutter, 2022).

This biopsychosocial perspective has two main implications. First, risk for aggressive behaviour is cumulative and dynamic. Small vulnerabilities in temperament or cognition may not lead to problems in supportive environments, but they may become consequential when combined

with harsh parenting, deviant peers, and violent contexts (Fauzi et al., 2023; Robles-Haydar et al., 2021). Second, the same multilevel structure that generates risk also offers multiple entry points for change. Interventions can therefore aim to reduce exposure to high-risk environments, strengthen protective relationships, and build individual skills that allow children and adolescents to navigate conflict without relying on aggression. The following sections consider the main limitations of the current evidence and translate this integrated perspective into implications for prevention, intervention, and future research.

Limitations of the current evidence

Although the literature on predictors of aggressive behaviour in children and adolescents is extensive, several limitations need to be considered when interpreting the current evidence. The first issue concerns how aggression is defined and measured. Studies differ in whether they focus on broad global indices of aggression, specific forms such as physical, relational, or indirect aggression, or functions such as reactive and proactive aggression (Hubbard et al., 2010; Kempes et al., 2005; Perry & Ostrov, 2023). Some studies treat bullying as a distinct construct, whereas others include bullying perpetration within broader measures of aggression (Álvarez-García et al., 2015; Cook et al., 2010; Kljakovic & Hunt, 2016). This diversity reflects the complexity of aggressive behaviour, but it also limits comparability across studies and makes it difficult to determine the predictors that are specific to particular forms or functions of aggression.

The second limitation concerns study design, measurement timing, and informants. Many influential studies are longitudinal, which strengthens developmental interpretation, but follow-up periods, measurement intervals, and analytic strategies vary considerably (Cleverley et al., 2012; Di Giunta et al., 2010; Girard et al., 2019; Henriksen et al., 2021; Nærde et al., 2024; Vaillancourt & Farrell, 2021). Attrition and selective drop-out may also bias estimates of aggressive trajectories and their predictors, particularly in studies involving socially disadvantaged, highly mobile,

or high-risk families. In addition, a large share of the evidence relies on single informants, often self-reports in adolescence or parent reports in childhood. Multi-informant designs that combine parental, teacher, peer, and self-reports remain less common, even though aggression may be perceived differently across home, school, peer, and community contexts (Keresteš & Milanović, 2006; Natesan et al., 2018; Spieker et al., 2012).

A related limitation concerns the treatment of age and developmental stage. Although many studies included in the review were longitudinal and therefore provided information about developmental change, age was not consistently examined as a formal moderator. Some studies modelled trajectories across specific age periods or school grades, whereas others treated aggression more broadly within childhood or adolescence. As a result, the present synthesis interprets age effects narratively, based on developmental timing, trajectory patterns, and the age ranges of included samples, rather than through formal moderation analysis. This limits the extent to which concrete conclusions can be drawn about whether specific predictors operate differently in early childhood, middle childhood, adolescence, or the transition to emerging adulthood.

The third limitation relates to sampling and cultural context. Much of the literature on aggression continues to be based on Western, often middle-income samples, which raises questions about generalisability. There are important exceptions, including studies of children exposed to war in Croatia, adolescents in Latin American and Asian contexts, and students from lower-income or socially disadvantaged backgrounds (Fauzi et al., 2023; Keresteš, 2006; Pina López et al., 2022; Robles-Haydar et al., 2021). At the same time, some patterns, such as associations between harsh parenting, insecure attachment, and aggression, appear across diverse contexts (Gallarín & Alonso-Arbiol, 2012; Malonda et al., 2019; Murray et al., 2010, 2014). Nevertheless, the field still lacks sufficient cross-cultural longitudinal research that can distinguish universal developmental processes from culturally or structurally specific pathways.

Conceptual and statistical models also have limitations. Many studies rely on additive regression models that treat predictors as relatively independent, even though theory and empirical findings suggest complex interactions and mediated pathways. For example, temperament may increase the risk of aggression primarily in the presence of coercive parenting, peer rejection, or tolerant school climates, but such interaction effects are not always directly tested (Becht et al., 2016; Robles-Haydar et al., 2021; Samson et al., 2022). Longitudinal person-centred approaches, such as group-based trajectory modelling and latent profile analysis, have started to clarify heterogeneity in developmental pathways, but they are not yet standard across the field (Girard et al., 2019; Lohbeck, 2022; Perry & Ostrov, 2023). Machine learning approaches offer additional possibilities for identifying configurations of risk and protection, but this line of research remains relatively new and often depends on single datasets (Nguyen-Louie et al., 2025).

Finally, the integration of biological and social levels of analysis remains limited. Reviews point to distinct psychobiological profiles for reactive and proactive aggression, as well as to associations with stress reactivity, autonomic functioning, and neuroendocrine processes, but findings are mixed and often based on relatively small or heterogeneous samples (Hendriks et al., 2018; Romero-Martínez et al., 2022). Few studies combine biological markers with detailed assessments of parenting, peer relationships, school climate, and broader social context over time. This makes it difficult to determine whether biological differences represent stable vulnerabilities, consequences of chronic stress and conflict, or processes that may change in response to intervention. The current evidence base also remains more focused on risk than on resilience. Longitudinal work that tracks prosocial behaviour, constructive conflict resolution, and supportive relationships alongside aggression is still relatively limited, despite evidence that protective processes are central for understanding why many children exposed to risk do not become chronically aggressive (Malonda et al., 2019; Sun et al., 2024).

Implications and directions for future research

The evidence reviewed in this article has several implications for prevention strategies, intervention programmes, and future research. From a prevention perspective, timing is essential. Because physical aggression often emerges early and typically declines as self-regulation, language, and social problem-solving skills develop, preventive efforts should begin in early childhood and continue across later developmental transitions (Lansford, 2018; Nærde et al., 2024). Longitudinal studies show that a smaller group of children follow stable high or increasing trajectories of aggression, and these children are at heightened risk for later maladjustment (Di Giunta et al., 2010; Girard et al., 2019; Vaillancourt & Farrell, 2021). Early identification and support should therefore focus not only on the child's behaviour, but also on the family, peer, school, and broader contextual conditions that may sustain aggressive trajectories.

At the individual level, findings on temperament, personality, social cognition, and emotion processing point to several modifiable intervention targets. Emotion regulation, social problem solving, hostile attribution biases, empathy, and perspective-taking are especially important mechanisms (Becht et al., 2016; Brugman et al., 2015; Matthys & Schutter, 2022; Wang et al., 2023). Cognitive behavioural programmes that help children recognise triggers, pause before reacting, generate alternative responses, and evaluate the consequences of aggression are, therefore, central, particularly for youth with reactive aggression (Adesanya et al., 2022; Matthys & Schutter, 2022). For proactive, relational, or bullying-related aggression, intervention may also need to address dominance-oriented goals, moral reasoning, empathy, and the social rewards that aggression can provide (Romero-Martínez et al., 2022; Samson et al., 2012, 2022).

Family-based interventions remain a key component of comprehensive prevention. Parenting programmes that strengthen warmth, positive involvement, consistent discipline, and non-coercive limit-setting are supported by evidence link-

ing harsh, inconsistent, and psychologically controlling parenting with higher levels of aggression (Adesanya et al., 2022; Gallarin & Alonso-Arbiol, 2012; Hendriks et al., 2018; Malonda et al., 2019; Murray et al., 2010, 2014). Particular attention should be given to parental psychological control, including guilt induction, love withdrawal, and intrusive monitoring, because these practices may contribute to aggression even when other parenting dimensions are considered (Murray et al., 2014). In families facing war exposure, community violence, poverty, or other chronic stressors, it is important to support parents' mental health and their coping mechanisms, because supportive parent-child relationships can buffer the impact of external risk on aggressive behaviour (Keresteš, 2006; Robles-Haydar et al., 2021; Sun et al., 2024).

Peer and school contexts provide another important level for intervention. Bullying perpetration and aggressive behaviour are shaped not only by individual traits, but also by peer status dynamics, classroom norms, attitudes toward violence, and school connectedness (Álvarez-García et al., 2015; Cook et al., 2010; Kljakovic & Hunt, 2016; Wiertsema et al., 2023). Effective school-based prevention should, therefore, change the social contingencies that reward aggression. This includes clear anti-bullying policies, consistent teacher responses, active bystander training, and classroom norms that value inclusion and discourage violence (Hendriks et al., 2018; Pina López et al., 2022). Because aggression can sometimes increase popularity or social influence, especially in bullying and relational aggression, prevention programmes should also provide alternative prosocial routes to status, leadership, and peer recognition (Perry & Ostrov, 2023; Samson et al., 2022; Vaillancourt & Farrell, 2021).

The biopsychosocial evidence also supports a tiered approach. Universal programmes can target broad risk factors such as emotion regulation, attitudes toward violence, and classroom climate across the whole student body (Moore et al., 2017; Pina López et al., 2022). Selective and indicated interventions can then be offered to children and adolescents who already show elevated

aggression or those who are exposed to high-risk environments, such as war exposure, community violence, severe family conflict, or socioeconomic disadvantages (Keresteš, 2006; Robles-Haydar et al., 2021). Within more intensive interventions, assessment should consider the function and context of aggression. Youth exhibiting primarily reactive aggression may benefit most from work on anger regulation and threat perception, whereas those with more proactive or planned aggression may require a stronger focus on empathy, moral reasoning, goal pursuit, and the social consequences of aggressive behaviour (Hubbard et al., 2010; Romero-Martínez et al., 2022).

Future research should build on these implications by improving conceptual clarity, developmental precision, and methodological integration. Studies should use clearer and more consistent operationalisations of aggression, distinguish between forms and functions of aggression, and incorporate multiple informants across contexts. More longitudinal research is needed to test whether specific predictors operate differently in early childhood, middle childhood, adolescence, and the transition to emerging adulthood. Developmental stage should be examined more explicitly as a moderator, particularly because the same behaviour may have different meanings depending on age, context, and function. For example, early physical aggression may reflect immature regulation, whereas persistent relational or proactive aggression may be more closely linked to status goals and contextual reinforcement.

Greater attention should also be given to cultural diversity and structural contexts. Future studies should examine aggression in non-Western, low- and middle-income, post-conflict, and socially disadvantaged settings, while also testing whether commonly identified predictors have the same implications across cultural contexts. Structural factors such as poverty, discrimination, neighbourhood violence, and digital environments should be integrated more fully into developmental models of aggression. In addition, future research should move beyond risk alone and examine protective processes, including prosocial behaviour, supportive relationships, constructive

conflict resolution, school connectedness, and resilience.

Methodologically, person-centred and machine learning approaches can complement traditional models by identifying configurations of risk and protection, rather than isolated predictors (Girard et al., 2019; Nguyen-Louie et al., 2025). However, such approaches should remain transparent and interpretable for developmental researchers, clinicians, educators, and prevention practitioners. Future studies would also benefit from multi-level designs that combine biological, psychological, family, peer, school, and broader contextual data in the same cohorts. Such work could clarify when biological differences reflect stable vulnerabilities, when they are shaped by social stress, and when they may change through intervention (Hendriks et al., 2018; Romero-Martínez et al., 2022). Overall, future research should frame aggression within a broader developmental picture that includes not only why aggressive behaviour emerges and persists, but also how children and adolescents can develop non-violent ways of managing conflict, pursuing goals, and maintaining social relationships.

CONCLUSION

Aggressive behaviour in children and adolescents is not a simple phenomenon. It includes physical, relational, indirect, reactive, and proactive forms, each with partially distinct predictors and consequences (Hubbard et al., 2010; Kempes et al., 2005; Perry & Ostrov, 2023). Developmental studies show that, for most children, physical aggression declines as self-regulation and social skills mature. For a smaller group, however, aggression remains high or even increases, and these trajectories are linked with later conduct problems, peer difficulties, psychosocial maladjustment, and risky romantic relationships (Cleverley et al., 2012; Ehrenreich et al., 2016; Girard et al., 2019; Vaillancourt & Farrell, 2021). Understanding who follows which path, and why, is therefore central for both theory and practice.

The evidence reviewed here supports a biopsychosocial view of aggressive behaviour. Tempera-

ment, personality traits, social-cognitive patterns, and psychobiological functioning contribute to vulnerability, but they do so in association with parenting, attachment, peer processes, and broader social contexts (Becht et al., 2016; Hendriks et al., 2018; Romero-Martínez et al., 2022). Harsh and psychologically controlling parenting, insecure relationships, and exposure to violence in families, schools, and communities tend to stabilise aggressive patterns (Keresteš, 2006; Murray et al., 2010, 2014; Robles-Haydar et al., 2021). In contrast, warm and structured parenting, secure bonds, prosocial peer norms, and supportive school climates can buffer risk and redirect trajectories toward more adaptive forms of social engagement (Gallarín & Alonso-Arbiol, 2012; Malonda et al., 2019; Pina López et al., 2022; Sun et al., 2024).

This multilevel picture has direct implications for prevention and intervention. Effective responses to aggression cannot focus only on individual children. They need to strengthen emotion regulation and social problem solving, support parents in using non-coercive and sensitive practices, and reshape peer and school environments that may reward bullying and violence (Adesanya et al., 2022; Cook et al., 2010; Matthys & Schutter, 2022; Wiertsema et al., 2023). Longitudinal and meta-analytic work further suggests that interventions should start early, follow children across key transitions, and reserve more intensive efforts for those on high-risk trajectories (Di Giunta et al., 2010; Nærde et al., 2024; Zych et al., 2021).

The main contribution of this review is its integration of evidence that is often examined separately. Rather than treating aggression as a unitary behaviour or focusing on one predictor domain in isolation, the review links developmental trajectories, individual vulnerabilities, family and parenting processes, peer and school dynamics, and broader contextual risks. The resulting conceptual contribution is a developmental-systemic understanding of aggression as a behaviour whose form, function, and persistence depend on transactions between child characteristics and social environments. This synthesis extends prior work by emphasising that prevention and intervention should target not only the child's skills, but also the relational and contextual systems that can contribute to sustaining or reducing aggression.

At the same time, the current evidence base has clear gaps. Definitions and measures of aggression remain fragmented, cultural diversity is limited, and biological and social levels are rarely integrated in the same designs (Hendriks et al., 2018; Moore et al., 2017). Future research should address these limitations, while paying more attention to resilience and positive adaptation, rather than focusing solely on risk. Bringing together rigorous longitudinal methods, multi-informant and multi-level data, and clinically relevant questions may help move the field toward a more nuanced and practically useful understanding of why some children become aggressive and how their trajectories can be changed.

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