



Intergenerational transmission of aggression: A meta-analysis of relationship between interparental conflict and aggressive behavior of children and youth

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Abstract

The intergenerational transmission of aggression indicates that conflicts between parents play a vital role in the young generation's aggressive behaviors. However, studies of the relationship between Interparental Conflict and Aggressive Behavior among children and youth remain inconsistent. The present study searched for studies published in the last 30 years via fifteen databases and conducted a meta-analysis with 35 articles. The results proved a statistically significant and positive link between Interparental Conflict and the young generation's Aggressive Behavior. Additionally, we found that this relationship was moderated by the Interparental Conflict Scale, the Reporter of Interparental Conflict Scale, and the year of publication and survey. Firstly, the results showed that Interparental Conflict Scale did moderate this correlation ($r_{CPS} < r_{CTS} < r_{CPIC}$). Secondly, the correlation between Interparental Conflict and Aggressive Behavior was statistically significant lower for parent-report than for child-report in Interparental Conflict Scale. Thirdly, it showed a increasing trend with the increase of years. The study highlights the critical role of parental relationships on children's externalizing problems from theoretical and empirical perspectives. Future studies may focus on the children's perception of interparental conflicts, family prevention/intervention strategies, and moderating/mediating mechanisms between Interparental Conflicts and children's Aggressive Behaviors.

Keywords Interparental conflict · Aggressive behavior · Meta-analysis

Introduction

Children and adolescent aggression is regarded as a serious and socially significant problem by modern society. According to a worldwide survey conducted in 71 countries in 2018, 23% of school-age children and adolescents reported being bullied by their peer friends at least a few

times per month (OECD, 2019). When measuring disorders of conduct and oppositional provocation in young people, the rate of aggression as measured standard was pretty high in the past decades (Angold & Costello, 2000). Aggressive behaviors of young people generate substantial social and economic costs to our society (Fung, 2019). Simultaneously, the aggressors' and victims' quality of life would be greatly influenced, predicting mental and physical health problems later in life (Frick, 2012).

What triggers the developing children and adolescents to commit aggression? Theoretical and empirical studies suggest that living in a family environment with violence may be a potential risk to increase young people's likelihood of delinquency (Steketee et al., 2019). Parents' and caregivers' direct violence to children has been proved to be a major factor that increases children's aggression. Besides that, a growing body of research suggests conflicts between parents could facilitate the young generations to behave aggressively (Erath & Bierman, 2006). In other words, children and adolescents who grow up in hyper parental-conflict contexts

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tend to be more emotionally damaged and exhibit more aggressive behaviors than others (Lindsey et al., 2009a, b). This phenomenon is consistently recognized by the idiomatic phrase "intergenerational transmission of aggression" (Hare et al., 2009). However, not all studies of interparental conflict among children and adolescent aggression have yielded consistent results (Breslend et al., 2016; Koçak et al., 2017). Existing meta-analyses related to this issue are primarily concerned with the relationship between what parents do with children (i.e., parenting styles) and children's externalized/internalized outcomes (Depner et al., 1992; Harold & Sellers, 2018). To the authors' knowledge, none of them focused on the pure relationship between interparental conflicts and their children's aggressive behaviors. To test inconsistencies in research results and fill up the research gap, it is essential to conduct a comprehensive meta-analysis to gain more understanding of the impact of interparental conflicts on the young generation's aggressive behaviors.

Interparental Conflict (IC)

Typically, we realize that due to the influence of the environment, personal character, social pressure, and other factors, all interpersonal relationships involve conflicts, not to mention the intimate marital relationship (Garrison & Curtis, 2019). Suppose a couple who are also parents perpetrate disputes with each other. In that case, an interesting and important question appears: do their children know they are in a conflicting relationship, and what do they know? When we talk about this question from the young generation's perspective, to discuss whether they are exposed to or influenced by their parents' or caregivers' intimate partner conflict, we are talking about Interparental Conflict (IC) (Peisch et al., 2016).

IC refers to a kind of intimate partner conflict involving all sorts of psychological, physical, and verbal conflict committed by fathers against their mothers or mother-to-father conversely, due to conflicting opinions or other complicated reasons (McTavish et al., 2016). It is often defined by the frequency of conflict, the intensity of conflict, or whether the conflict is resolved or not (Cui & Fincham, 2010). Buehler and colleagues (1998) differentiated IC as overt/covert according to the disparate types of aggressive strategies parents use. Overt IC refers to direct hostile language or behavior, including insult, belligerence, and beating. Covert IC is the indirect hostile conflict between parents, such as triangulating children, keeping silent, and withdrawing. The latter is similar to relational aggression, which is not easy to expose to children directly. Our present study will include both overt and covert IC.

Generally, there are two categories of scales to measure IC. The first type is the scales reported by the mother or father in a family. A simple and intuitional one is

O'Leary-Porter (OPS), developed by Porter and O'Leary (1980), consisting of 10 items to ask parents about how often their children are exposed to their marital conflict. After that, the Conflict and Problem-Solving Scales (CPS) (Kerig, 1996) and the Conflict Tactics Scale (CTS, CTS2) (Straus, 1979; Straus et al., 1996) are widely promoted to record different types of behaviors to solve conflicts in an intimate relationship. In the CPS, the resolution, efficacy severity, and frequency of IC are measured. Also, the subscales of verbal/physical aggression, child involvement, cooperation, avoidance, and stalemate are included. In the CTS, reasoning, hostility, conflict of interest, verbal aggression, and violence are assessed. The CTS2 is a modified format of CTS with better performance in validity and reliability. The new scale contains the measurement of psychological and physical aggression, negotiation, and also sexual coercion. The other type of measuring IC is to assess from the child's viewpoint. The most popular scale would be the Children's Perception of Interparental Conflict Scale (CPIC), developed by Grych et al. (1992), and was designed to measure what children know about the conflicts between their parents. Children or adolescents would report themselves on three sub-dimensions: conflict properties, threat, and self-blame. This scale has also been translated into other languages and revised for use (Zhao & Mo, 2006).

Aggressive Behavior (AB)

Aggressive Behavior (AB) refers to heterogeneous behavior and condition (Lovett & Sheffield, 2007). Crick and Grotpeter (1995) defined AB from a broad perspective. They believed that AB is an individual's intentional physical and psychological retaliation against others, common among most species in nature. In a specific view, Anderson and Bushman (2002) focused AB on behavior that somebody perpetrates intently to cause internal or external injuries, and the victims would try to avoid harm.

Early studies focused on the perpetrators who behave AB or the victims only, and did not consider the categories of aggression much. However, research on aggression in the past three decades has classified AB into different categories in a sophisticated and precise way. Dodge and Coie (1987) distinguished aggression as reactive aggression and proactive aggression. Proactive aggression refers to coercive behavior to exhibit dominance and superiority or achieve selfish goals. Contrarily reactive aggression is an emotional response to feelings of Intimidation and harm. Besides, in a meta-analytic summary, Frick and colleagues (1993) conceptualized children and adolescents' behavior in two dimensions: overt/covert and destructive/non-destructive. The typical AB is recognized as both overt and destructive, such as physical beating, assault, fights. Additionally, aggression is also found in the other three

forms, overt/non-destructive (e.g., stubbornness), covert/destructive (e.g., being spiteful), and covert/non-destructive (e.g., stopping talking to family members). In the 1980s and 1990s, people also divided aggression into direct and indirect AB (Card et al., 2008). Indirect aggression was introduced by Feshbach (1969) and further developed and explained as relational aggression (e.g., social manipulation, malicious gossip) (Crick, 1995) or social aggression (Cairns et al., 1989). All kinds of preceding aggression are possible to be perpetrated by children and youth in daily life.

Among the included articles of our meta-analysis, the most common measure of aggression in children and adolescents is the Buss-Warren aggression questionnaire (BWAQ) (Buss & Warren, 2000) and the aggression subscale of the Child Behavior Checklist (CBCL) (Achenbach, 1991). The former aggression questionnaire was initially developed in 1992 and then updated by Buss and Warren in 2000. In this scale, the young people's aggression would be assessed on several sub-dimensions, such as hostility, anger, verbal aggression, physical aggression, and indirect aggression. The later scale, CBCL, aims to measure children's internalizing and externalizing problems. The aggression subscale is one of the dimensions of externalizing symptoms.

The relationship between IC and AB in children and youth

A great amount of research has demonstrated various aspects of adjustment could be influenced by IC in children and youth, such as internalizing problems (e.g., depressive symptoms), externalizing problems (e.g., AB), trauma symptoms (e.g., PTSD), etc. (Xiang et al., 2020). Thus, we can find great support for the direct relationship between the young's perception of IC and AB. The results proved that people who grew up in an environment with high frequent parental conflicts tend to be more aggressive than others (David & Murphy, 2007; Espelage et al., 2014; Lindsey et al., 2009a, b). For example, some studies on childhood experiences and AB in romantic relationships found that the more adolescents were exposed to parental conflict when they were children, the more AB they would behave when getting along with an intimate partner (Kinsfogel & Grych, 2004; Ruel et al., 2020). In the same breath, IC is identified as a vital predictor of a child's overt AB no matter at home or school (Cummings et al., 2004). Specifically, covert IC is more relevant to children's relational aggression, and overt IC provokes more direct aggression in children (Li et al., 2011).

Several theories are proposed to account for this association between IC and aggression in children and youth. The social learning theory indicates that children may learn to perpetrate aggressively by observing how their parents react to each other (Bandura, 1977). From the cognitive context

theory perspective, children living in a conflicting environment are prone to shape their cognition to regard aggression as an acceptable and effective strategy to solve problems (Grych & Fincham, 1990). The emotional security theory proves this argument through children's emotional control and regulation when experiencing IC (Davies et al., 2013). In addition, some studies in the view of the spillover hypothesis emphasize that IC would relate to children or adolescent aggression by generating poor parenting practices and parent-child interaction (Buehler & Gerard, 2002; Erel et al., 1995).

However, not all studies succeed in finding a statistically significant association between IC and AB among children and adolescents. Breslend and colleagues (2016) expressed that for both males and females and found that IC had important implications on youth internalizing problems but not externalizing ones, such as AB. Similarly, a study did not find a positive link between IC and relational aggression among children and adolescents in time 1, but it did in time 2, which showed instability of the connection (Breslend et al., 2016; Koçak et al., 2017). Thus, it is meaningful to conduct the present study to test the direct association between IC and AB.

Influencing factors of IC and AB

Based on the prior studies, we realized that the association between IC and AB was not stable. Thus, we suppose it may be influenced by some moderating factors (Formoso et al., 2000). The potential moderators may be as follows:

Culture. Studies indicate that culture may be an essential factor that affects the association of IC and children's AB (Chen & French, 2008). The cultural context may affect AB's expression and socialization (Li et al., 2011). We find the link between IC and children's AB under different cultural backgrounds showing different trends (Davies et al., 2012; Steketee et al., 2019; Zhang, 2020). However, other studies suggest the link between youth outcomes and parental conflict does not differ depending on ethnic culture (Stutzman et al., 2011). In a temporal meta-analysis conducted in China, we also found that the aggression decrease did not differ across cultures in different regions (Lei et al., 2019). Due to most of the studies about aggression and IC being conducted in a specific location, lacking the possibility of comparison, we would test whether the categories of cultural context influence the association between IC and AB in the present systematic analysis.

Scale. Measuring instruments may affect the reliability of meta-analysis findings. When analyzing the relationship between IC and AB, it can be found that the scales used by researchers are different. The following tools are used primarily to measure IC: CPIC designed by Grych

et al. (1992), CTS prepared by Straus et al. (Straus, 1979; Straus et al., 1996), CPS compiled by Kerig (1996) and other self-made IC questionnaires. The following instruments are used primarily to measure AB: BWAQ compiled by Buss and Warren (2000), CBCL prepared by Achenbach (1991), the relational aggression subscale (RAS) compiled by Crick (1996), and other self-made AB questionnaires. Different scales have different theoretical bases, dimension construction, and number of questions, which may affect the relationship between IC and AB to a certain extent. Therefore, we would like to test the moderating effect of scale on IC and AB.

Reporter. There is a debate on whether parents' report of intimate partner violence is consistent with what the children have experienced or reported in the home (Kinsfogel & Grych, 2004; Lichter & McCloskey, 2004). Some studies suggested that in terms of the adolescents' development, the IC reported by teenagers was more accurate than the parents reported themselves (Grych et al., 2004; Kitzmann, 2000). Koçak and colleagues (2017) did not find a statistically significant relationship between the IC and adolescents' AB when a mother reported the IC. Still, if her children reported it, the result was the opposite. However, another study suggested that when children self-measured their aggressiveness, the relationship between aggression and IC still held across different informants (mothers and children) of the conflict scales (Shin et al., 2014). Meanwhile, we noticed that different studies also measured aggression scales separately by children or parents. Mueller and colleagues (2015) showed that no matter the problematic behaviors reported by children or their mothers, they are positively related to the IC. On the contrary, Breslend and colleagues (2016) found the association would be statistically significant when the youth reported their externalizing symptoms rather than the parents did so. To figure out the inconsistency, we would like to test whether the reporters would affect the link between IC and AB.

Age. Most empirical studies fix the research subjects at a certain age, such as pre-school children, elementary school students, or middle school students. Thus, different research results were proposed. Zhang (2020) indicated that compared with the youngest students, junior high school students are more sensitive to the frequency and intensity of the IC. Still, no statistically significant difference was found in AB between these two groups. Besides, compared with elementary or high school students, the aggressiveness of junior high school students changes more in time (Lei et al., 2019). Additionally, compared with school-aged children, pre-school children seem to be more exposed to IC (Fantuzzo et al., 1997). Thus, we would like to test whether the subjects' age would moderate the association between IC and AB.

Gender. Card and colleagues (2008) conducted a meta-analytic and found that gender showed differences in direct and indirect aggression during childhood and adolescence. Namely, boys were more directly aggressive than girls, but they performed consistently in indirect aggression. However, an empirical study showed that boys' aggression is more severe than girls' in both physical and indirect conditions (Angold & Costello, 2000). Zhang (2020) proved boys are more sensitive to IC intensity compared to girls. Specifically, research indicated that boys and girls might show different aggression in romantic relationships according to the maternal or paternal interparental violence they are exposed to (Ruel et al., 2020). Wolfe and colleagues (1985) found that girls expressed less externalized aggressive behavior but more internalized response than boys when living in a violent home. Conversely, Crick (1995) suggested that the effect of IC on children's AB would not be invariant across both boys and girls. Under such a debate, we suppose that IC may affect boys' aggressiveness more than girls and test it in the current study.

Year. According to a worldwide survey, the bullying rate among school-age students decreased from 42% in 2015 to 23% in 2018 (OECD, 2016, 2019). Similarly, a meta-analysis based on China's context saw less student aggression as the years went from 2003 to 2016 (Lei et al., 2019). We suppose the year (both year of survey and year of publication) would also be a moderating variable of the association between IC and AB among children and adolescents. Some previous studies have shown that the correlation would decrease gradually with the increase of year (Shin et al., 2014; Steketee et al., 2019; Xia et al., 2016). However, an opposite upward trend was found in other studies (Avci & GÜÇRay, 2013; Dehon & Weems, 2010; Koçak et al., 2017). Thus, in this study, we will explore how the association would be affected by increasing years.

Aims of the study

Referring to the absence and inconformity of preceding studies, we conduct the current systematic review and synthesizes nearly 30 years of research on this topic to (1) test the direct correlation between IC and children and youth' AB, (2) explore whether the relationship between them would be moderated by culture, scale, reporter, age, gender, year, and (3) provide some further research suggestion for this vital topic, and help targeted prevention and intervention work of reducing child and adolescent aggression.

Methods

Literature search

We searched fifteen databases: PsychINFO, Web of Science, ERIC, SCOPUS, ProQuest dissertations, SAGE Online Journals, Elsevier SDOL, Taylor & Francis, Springer, Google Scholar, EBSCO, CNKI, Wanfang Data, Chongqing VIP Information Co., Ltd., Baidu scholar. for studies on the association between IC and children and youth's AB, published in the past thirty years, from January 1990 to October 2022. For the IC, we searched for the terms "interparental conflict" "interparental relationship" "interparental violence" "marital violence" "marital conflict" "parental conflict" "family conflict" "parents argue" "parents fight" and a Boolean operator "OR" was used among them. For AB, we used the term "aggression" "aggressive behavior" "violence" "bullying" "aggressive action" "behavior disorder" "behavior problems" "aggressiveness" "conduct disorder" "anti-social behavior" "oppositional defiant disorder" "impulsiveness" "anger" "hostility" "assault" "irritability" "negativism" "resentment" "physical Aggression" "verbal aggression" and a Boolean operator "OR" was used among them. These two categories of key words were linked by the Boolean operator "AND" on all the databases mentioned above.

The following criteria were used to screen the literature: (a) The subjects were children and adolescents who were not receiving medical treatment or had committed crimes; (b) Articles were written in English or Chinese; (c) Studies used both the IC scale and the AB scale, and at least reported the correlation coefficient between the dimensions or total score of one scale and another scale; (d) Studies clearly reported the Pearson's product-moment coefficients r , or T and F values which could be converted into r values; (e) Studies provided actual sample size; (f) When some periodicals used the same data set, we used the one published in an academic journal, but not a thesis. We reviewed and screened the searching records under the Meta-Analyses (PRISMA) guidelines (see Fig. 1). Finally, 35 papers met the selection criteria and were included in the meta-analysis.

Coding variables

We did a feature coding to the collected literature, including author information, year of publication and suvery, culture, age, sample size, correlation coefficients between IC and AB, IC and AB measurement tool, reporter of IC and AB measurement tool, and percentage of the female population (see Table 1). Effect values are generated in

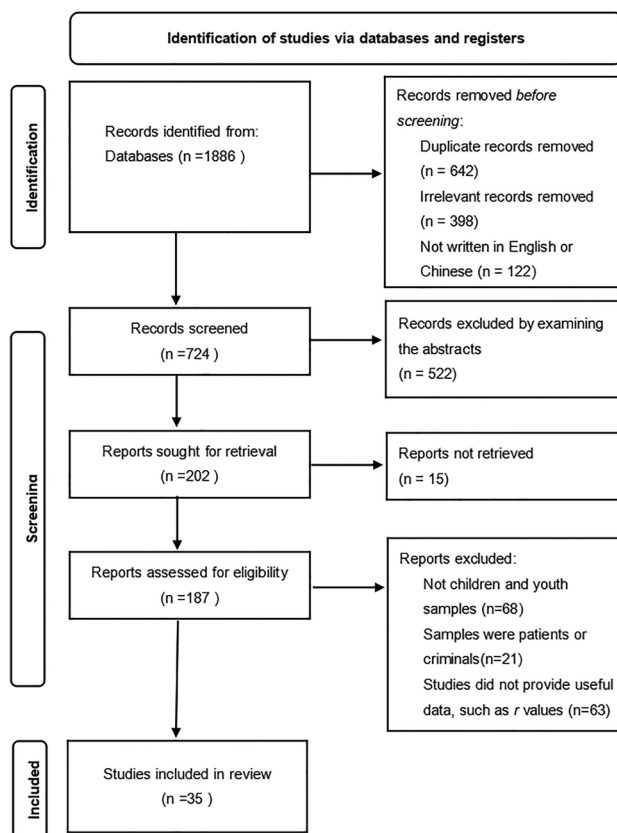


Fig. 1 The PRISMA flow chart used to identify studies for detailed analysis of IC and AB

independent samples, each of which was encoded once: (a) the correlation between IC and AB was encoded; (b) independent samples were encoded once, or we only once encoded if multiple independent samples were reported in the same article at the same time. We combine multiple data in the cross-sectional studies. For longitudinal studies with multiple data at different time periods, only the data collected at the first time were used. (c) when calculating the effect values for each category, there was no overlapping data we used in. In other words, each raw data appeared only once under every category to make sure the independence of the effect value calculation.

Quality assessment of included studies

Literature quality assessment was performed using the Joanna Briggs Institute (JBI) Critical Appraisal Tool (Moola et al., 2017). The checklist consists of eight items, each with four options. The questions such as "Were the study subjects and the setting described in Detail?" "Was appropriate statistical analysis used?" were asked of the studies. The "Yes" option scores 2 points, "Unclear" scores 1 point,

Table 1 Characteristics of the 35 samples included in the meta-analysis

Name (Published year)	Survey year	culture	Age	IC scale	Reporter of IC	AB scale	Reporter of AB	Female%	N	r
Avci and GÜÇRAY (2013)	2011	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	45.47%	2120	0.195
Alves et al. (2019)	2017	Europe	University	CPIC	Child-report	BWAQ	Child-report	58.07%	520	0.162
Avci et al. (2021)	2020	Asia	University	Others	Child-report	BWAQ	Child-report	60%	160	0.255
Breslend et al., (2016)	2014	America	Primary school	CPIC	Child-report	Others	Mixed	49.4%	180	0.155
Chen et al.(2020)	2018	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	56.26%	487	0.29
Dehonand Weems (2010) ^a	1995	America	Primary school	CTS	Parent-report	CBCL	Child-report	44%	100	0.185
Davies et al. (2012) ^a	2009	America	Pre-school	CPS	Parent-report	CBCL	Parent-report	45.77%	201	0.13
Doh et al. (2012)	2010	Asia	Pre-school	CPIC	Parent-report	Others	Parent-report	47.27%	349	0.183
Feng (2020)	2019	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	32.85%	904	0.73
Guo and Yang (2018)	2016	Asia	Middle school	CPIC	Child-report	Others	Child-report	48.01%	856	0.41
Hu (2020)	2019	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	50.25%	597	0.19
Jiang. (2021) ^a	2020	Asia	Primary school	CPIC	Child-report	BWAQ	Child-report	48.42%	318	0.38
Koçak et al. (2017) ^a	2008	Asia	Middle school	Others	Child and Parent report	RAS	Child-report	45.8%	555	0.084
Luo (2008)	2007	Asia	University	CPIC	Child-report	BWAQ	Child-report	36.52%	564	0.14
Li et al. (2011)	2009	Asia	Primary school	CPS	Parent-report	Others	Child-report	54.25%	671	0.042
Lemola et al.(2012) ^a	2008	Europe	Primary school	Others	Parent-report	Others	Child-report	50.56%	176	0.17
Lei and Wen (2021)	2019	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	48.94%	807	0.262
Liu and Du(2021)	2020	Asia	University	CPIC	Child-report	BWAQ	Child-report	61.17%	188	0.39
Moretti et al. (2014) ^a	2007	America	Middle school	Others	Child-report	Others	Child-report	100%	139	0.136
Mueller et al. (2015) ^a	2011	America	Primary school	CPIC	Child-report	CBCL	Parent-report	48.59%	531	0.17
Miao et al. (2021) ^a	2020	Asia	University	CPIC	Child-report	BWAQ	Child-report	67.52%	388	0.466
Narayan et al. (2014) ^a	2012	America	Middle school	CTS	Parent-report	Others	Child-report	45.60%	182	0.21
Olatunji and Idemudiat(2021)	2019	Others	Middle school	CPIC	Child-report	Others	Child-report	42.39%	394	0.26
Pendry et al. (2013)	2011	America	Pre-school	CTS	Parent-report	CBCL	Parent-report	47.29%	74	0.336
Stutzman et al. (2011)	2009	America	Middle school	Others	Child-report	Others	Child-report	53.73%	1539	0.241
Shin et al. (2014) ^a	2008	Asia	Primary school	CPIC	Child and Parent report	RAS	Mixed	46.69%	227	0.181
Wee and Park (2015)	2013	Asia	Primary school	CTS	Child-report	Others	Child-report	51.9%	532	0.24
Wang (2017)	2016	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	49.67%	463	0.165
Xia et al. (2016)	2014	Asia	Middle school	CPIC	Child-report	Others	Child-report	46.44%	506	0.129
Yang and Wang (2011)	2009	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	54.86%	370	0.26
Ye(2018)	2017	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	46.46%	551	0.116
Zheng(2013)	2012	Asia	Middle school	CPIC	Child-report	BWAQ	Child-report	58.75%	1096	0.232
Zhou et al. (2017) ^a	2013	Others	Pre-school	Others	Parent-report	Others	Parent-report	51%	212	0.23
Zhang (2018)	2017	Asia	Middle school	CPIC	Child-report	Others	Child-report	39.14%	705	0.234
Zhang (2020)	2019	Asia	Mixed	Others	Child-report	Others	Child-report	49.01%	659	0.185

a = a longitudinal study, unlabeled is a cross-sectional study.

"No" or "Not applicable" scores 0 points. The lowest score is 0 points, and the highest score is 16 points. The literature quality assessment process was completed independently by two researchers. In case of disagreement, a consensus was reached through discussion. As a result, all the 35 included studies scored more than 11 points. 24 of the 35 studies were higher than 14 points, indicating high quality. This quality assessment was not used to exclude any studies but to contribute to the evaluation and discussion.

Effect size calculation

The meta-analysis method of correlation coefficient was used in this study (Borenstein et al., 2005). It signifies that we use Pearson product-moment correlation coefficient r as the calculated data of the effect value. Calculated the weight based on the sample size and calculated the 95% confidence interval, got the result of the r value transformed by Fisher Z . The specific formula is as follows: $Z = 0.5 \cdot \ln[(1+r)/(1-r)]$, the variance of Z is $VZ = 1/n-3$, standard error of Z is $SEz = \sqrt{1/n-3}$.

Data processing and analysis

We used the meta-analysis software CMA 3.0 to analyze the data. Homogeneity testing was required to test whether each finding could represent a sample estimate of the total effectiveness. First of all, the homogeneity test provided the basis for using the fixed effect model or random effect model. The fixed effect model was chosen if the test results show that the effect values were homogeneous. If heterogeneity was high, a random effect model was required. Secondly, the homogeneity test also provided the basis for analyzing the regulatory effects, and the more statistically significant heterogeneity indicated the existence of the moderating effects (Lipsey & Wilson, 2001).

Results

Effect size and the homogeneity test

In this study's meta-analysis, there were 35 documents reflecting the relationship between IC and AB, including 35 sample sizes involving 18,321 subjects. At the same time,

the homogeneity test related to IC and AB in 35 independent samples, with Q stats of 582.189, $p < 0.001$, $I^2 = 94.160$, indicating that included literature was heterogeneous. Using random models to analyze the correlation between IC and AB, we found that the correlation between them was statistically significant, with a correlation coefficient of 0.240, 95% CI (0.181, 0.297). The Z -value relationship between IC and AB was 7.771, $p < 0.001$, which indicated that the correlation between IC and AB was steady (see Table 2).

Moderator analysis

As mentioned above, random effect models should also be used in intermediary effect analysis. Meta-ANOVA analysis is suitable for analyzing the moderating effects of classified variables, such as the reporter of measurement tools, the subject groups, and regional differences. Meta-regression analysis, by contrast, is suitable for analyzing the moderating effects of continuous variables (the proportion of females and the year).

Meta-ANOVA analysis

Analyzing the moderating effects of the relationship between IC and AB, Meta-ANOVA analysis was used to analyze the regulatory effects of classification variables (see Table 3). Firstly, in the case of age, the homogeneity test results ($Q = 2.805$, $df = 4$, $P > 0.05$) showed that age had no moderating effect on this correlation. Secondly, the results of homogeneity test ($Q = 4.021$, $df = 3$, $P > 0.05$) showed that culture did not influence this correlation. Thirdly, the results of homogeneity test ($Q = 7.135$, $df = 2$, $P < .05$) showed that the reporter of IC scale had a moderating effect on this correlation. The correlation coefficients between IC and AB of Parent-report and Child-report subjects were respectively 0.166 (95% CI = [0.101, 0.230]) and 0.265 (95% CI = [0.194, 0.333]), namely $r_{\text{Parent-report}} < r_{\text{Child-report}}$. Fourthly, the homogeneity test results ($Q = 2.771$, $df = 2$, $P > 0.05$) showed that the reporter of AB scale had no moderating effect on this correlation. Fifth, the homogeneity test results ($Q = 15.764$, $df = 3$, $P < .01$) showed that IC scale regulated this correlation. The correlation coefficients between IC and AB of CPIC and CTS and CPS subjects were respectively 0.269 (95% CI = [0.187, 0.347]) and 0.236 (95% CI = [0.172, 0.297]) and 0.066 (95% CI = [-0.011, 0.143]), namely

Table 2 Random model of correlations between IC and AB

Aggression	k	N	Mean r	95% CI for r		Homogeneity test			Tau-squared			Test of null
				LL	UL	$Q(r)$	p	I^2	Tau^2	SE	Tau	Z -value
Overall	35	18,321	0.240	0.181	0.297	582.189	0.000	94.160	0.032	0.010	0.178	7.771***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, the same as follows.

Table 3 Meta-regression analyses of age, culture, scale, and reporter

	$Q_{Between}$	k	Mean r	SE	I^2	Tau	95% CI for r		Q_{Within}
							LL	UL	
<i>Age</i>	2.805								
Pre-school		4	0.196	0.004	0.000	0.000	0.130	0.261	2.858
Primary school		8	0.191	0.008	76.931	0.102	0.111	0.270	30.343***
Middle school		17	0.256	0.018	96.674	0.204	0.161	0.346	480.993***
University		5	0.285	0.022	90.030	0.163	0.141	0.418	10.119***
Mixed		1	0.185	0.000	0.000	0.000	0.110	0.258	0.000
<i>Culture</i>	4.021								
Asia		23	0.260	0.015	96.083	0.203	0.179	0.337	561.599***
America		8	0.210	0.002	0.000	0.000	0.175	0.244	6.645
Europe		2	0.164	0.005	0.000	0.000	0.091	0.236	0.009
Others		2	0.250	0.005	0.000	0.000	0.173	0.323	0.139
<i>Reporter of IC scale</i>	7.135*								
Parent-report		8	0.166	0.005	47.893	0.064	0.101	0.230	13.434
Child-report		25	0.265	0.012	95.379	0.184	0.194	0.333	519.329***
Parent and Child-report		2	0.120	0.007	35.731	0.042	0.027	0.210	1.556
<i>Reporter of AB scale</i>	2.771								
Parent-report		5	0.186	0.003	0.000	0.000	0.134	0.237	3.092
Child-report		28	0.250	0.012	95.254	0.187	0.182	0.316	568.892***
Mixed		2	0.170	0.007	0.000	0.000	0.073	0.263	0.071
<i>IC scale</i>	15.764**								
CPIC		22	0.269	0.015	95.910	0.201	0.187	0.347	513.400***
CTS		4	0.236	0.005	0.000	0.000	0.172	0.297	1.264
CPS		2	0.066	0.006	16.808	0.026	-0.011	0.143	1.202
Others		7	0.187	0.003	50.989	0.050	0.133	0.239	12.242
<i>AB scale</i>	6.186								
BWAQ		15	0.294	0.024	96.978	0.230	0.182	0.399	463.265***
CBCL		4	0.177	0.005	0.000	0.000	0.112	0.239	2.562
RAS		2	0.120	0.007	35.731	0.042	0.027	0.210	1.556
Others		14	0.207	0.005	81.519	0.095	0.152	0.261	70.343***

Table 4 Meta-regression analyses of gender and year

Variable	Parameter	Estimate	SE	z-value	95% CI for b	
					LL	UL
Female (%)	β_0	-0.2157	0.2931	-0.74	-0.7903	0.3588
	β_1	0.3542	0.1518	2.33	0.0566	0.6518
	$Q_{Model}(1, k=35)=0.54, P>0.05$					
published year	β_0	0.0178	0.0078	2.29	0.0026	0.0330
	β_1	-35.6714	15.6706	-2.28	-66.3852	-4.9576
	$Q_{Model}(1, k=35)=5.25, p<0.05$					
Collective year	β_0	0.0133	0.0055	2.43	0.0025	0.0240
	β_1	-26.4887	11.0204	-2.40	-48.0882	-4.8891
	$Q_{Model}(1, k=35)=5.88, p<0.05$					

$r_{CPS} < r_{CTS} < r_{CPIC}$. Finally, the homogeneity test results ($Q=6.186, df=3, P>0.05$) showed that the AB scale had no moderating effect on this correlation.

Meta-regression analysis

To examine whether continuous variables (gender and year) moderated the effect sizes between IC and AB, the r effect size was meta-regressed onto the percentage of female participants and year in each sample. In Table 4, the result of meta-regression ($Q_{Model [1, k = 35]} = 0.54, P > 0.05$) showed that there was no gender difference. The results of meta-regression ($Q_{Model [1, k = 35]} = 5.25, p < 0.05$) showed that there was a difference in the publication year. The results

of meta-regression ($Q_{Model [1, k = 35]} = 5.88, p < 0.05$) showed that there was a difference in the survey year. The relationship between IC and AB increases with the increase of the year.

Publication bias

We draw a funnel plot to examine whether the results were biased due to the effect sizes from various sources (Fig. 2). The result showed that the 35 effects were symmetrically distributed on both sides with the average in terms of size. In addition, to detect publication bias, we drew a forest plot (Fig. 3) showing that the studies did not exhibit publication bias. And then, an Egger's regression analysis was conducted

Fig. 2 Funnel plot of the 35 studies included in the meta-analysis

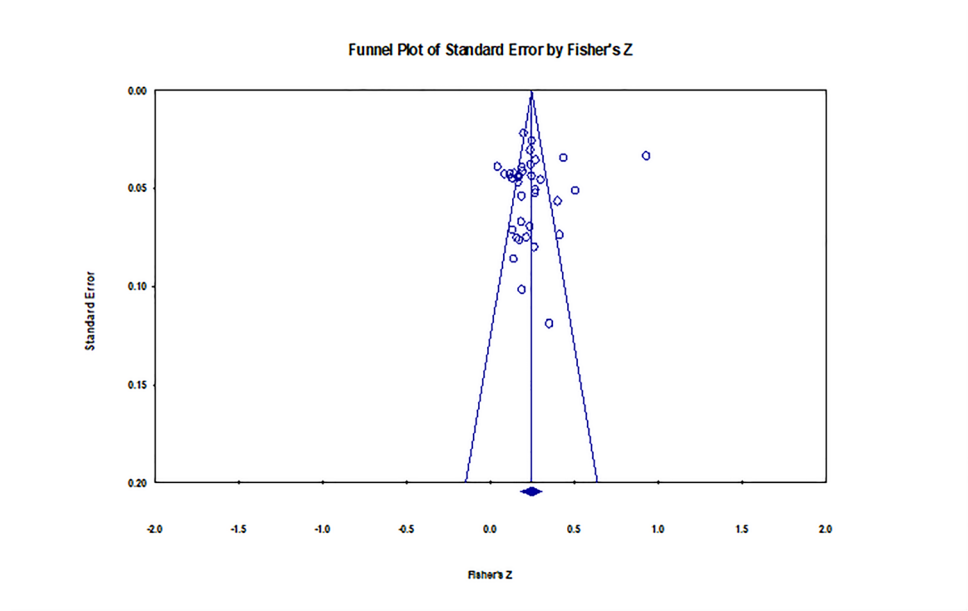
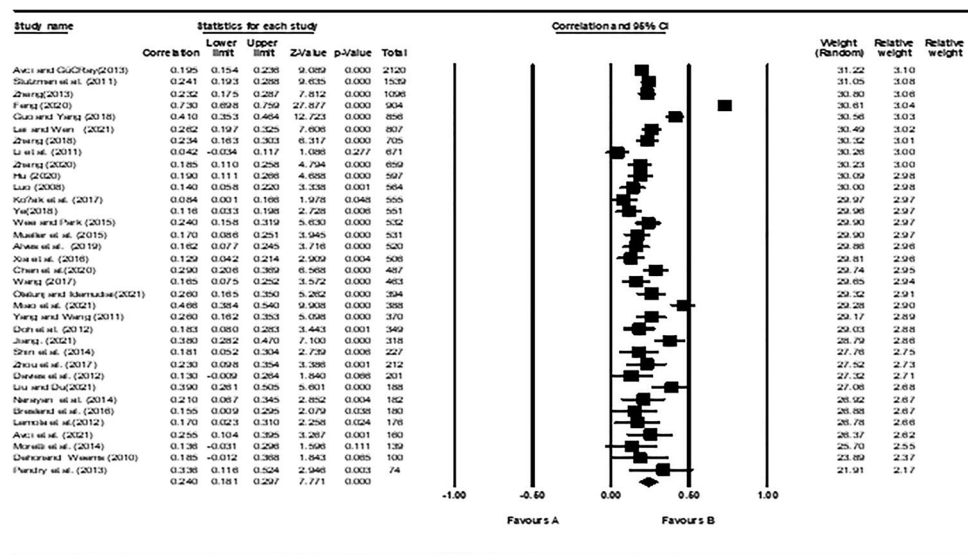


Fig. 3 Forest plot of the 35 studies included in the meta-analysis



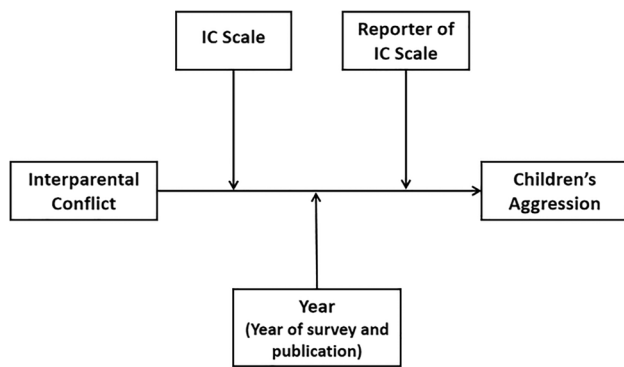


Fig. 4 The positive relationship between IC and Children's AB, which is moderated by the IC scale, the reporter of IC scale, and the year

on IC and AB, no publication bias appeared ($t_{(33)} = 0.498$, $p > 0.05$). To further test for publication bias, this study calculated that the $Z = 31.647$ ($p < 0.001$) of Classic Fail-safe N, The inclusion of 9091 missed studies made the analysis result not statistically significant (Rosenthal, 1979). Therefore, this study was not prone to publication bias, and the relationship between IC and AB was stable.

In conclusion, the results of the data analysis showed a positive and stable relationship between IC and AB. At the same time, this relationship was moderated by the IC scale, the reporter of IC scale, and the year (both survey year and publication year). The relationships are depicted in Fig. 4.

Discussion

The relationship between IC and AB

In line with the previous studies, the current meta-analysis suggested a statistically significant positive correlation between IC and AB in children and youth. That is to say, living in an environment of parental conflict, children are prone to perpetrate more aggressive behaviors in their relationships (e.g., peer relationships, intimate relationships, and family relationships). This result is aligned to a concept "intergenerational transmission of aggression", indicating a strong link between interparental behavior and their offspring's behavior (Hare et al., 2009). Also, our finding supports the view that if the IC, as an adverse life event, was poorly resolved, children in the family would express enormous social adjustment and regulation problems, including AB (Feldman et al., 2010; Schiffet et al., 2014).

As the included articles in our meta-analysis show, conflicts between parents may vary from different dimensions, such as frequency, intensity, resolution, or overt and covert way (Koçak et al., 2017). In a family, whether the conflict between parents is verbal, psychological, or physical, and

whether their children encounter the conflict or not, the interparental conflict is forceful and harmful to children and adolescents. It is possible to increase the child's aggressive behavior (Jourileset et al., 1998). Two mechanisms shed light to explain this phenomenon: a direct path and an indirect way.

The direct effects

Living in partner-conflictual homes, children and adolescents have a high probability of directly witnessing physical or verbal violence between their parents. Exposure to interparental violence, children and youth's cognitive, emotional, and behavioral problems would be influenced accordingly (Visser et al., 2015). The social learning theory, cognitive context theory, and emotional security theory provide some arguments to explain the direct effects of interparental conflict on their children.

First, from the perspective of social learning theory, children develop the ability to socialize in general, especially in managing conflicts, by observing or participating in the communication between their parents (Bandura, 1977). Thus, in a conflictual family, children would observe, learn, and imitate their caregivers' AB towards challenging problems and then exacerbate their own similar behaviors (Bandura, 1977).

Second, the cognitive context theory argues that children shape their cognitive construction under parental violence's affection. They may value aggression more positively and gradually believe that perpetrating aggressive behavior would help address confusing problems (Graham-Bermann et al., 2007; Grych & Fincham, 1990). On the other hand, Grych and Fincham (1990) indicated that children might feel incompetent or powerless when facing their parents' conflict, causing a more sensitive and vigilant cognition to threat-related cues in daily life. In the social information processing model, Crick and Dodge (1996) analyzed that the positive evaluation of aggression may encourage individuals to perpetrate AB instrumentally. Meanwhile, the hostile and deficient encoding of social cues would be high-risk factors that provoke peoples' reactive aggression. As a result, children and adolescents involved in the IC may behave more aggressively than other kids.

Third, the emotional security theory suggests some ideas from the emotional perspective of children. Based on this theory, children develop their emotional security from a family's integrity (Davies et al., 2006). Once exposed to the IC, their trust and security would get the high risk of being broken. They would be less competent in controlling or adjusting emotions (Davies et al., 2013; Katz et al., 2007). The under-development emotion competence may lead to revengeful, resentful, defensive responses to a perceived threat, which promotes children and youth's AB (Dodge & Coie, 1987).

The indirect effects

We notice the indirect effects on two aspects. First, although children have not seen or heard what happened between their parents, the IC can also affect them. Second, no matter if children are exposed to their parents' conflict or not, the IC would covertly influence children. A spillover hypothesis endorses that the important factors that mediate the indirect effect may be ineffective parenting behavior and poor parent–child relationship parenting (Buehler & Gerard, 2002; Erel et al., 1995).

Parents are likely to be hurt and traumatized in a conflicting marital relationship and generate a wide range of cognitive, emotional, and behavioral problems. During what, their parenting availability would deteriorate, and the parent–child interaction would be harmed accordingly (Visser et al., 2015). For example, parents in conflict or violent families may fail to communicate openly, warmly, and non-defensively with their children. They are prone to ignore their children's motives, needs, and behavior (Koren-Karie et al., 2008) and interact with them unsafely (Margolin et al., 2004). Meanwhile, a conflictual interparental relationship may cause different parenting practices for their children because they will change their own behaviors depending on their partners' presence (Erel & Burman, 1995). These groups of parents are characterized by negative parenting, who show more harsh discipline and aggressive manners towards their children in a parent–child relationship, and finally affects their behaviors (Appel & Holden, 1998; Osofsky, 2003).

Moderating effects

Moderator of scale

The results of the study showed that the IC measurement moderated the relationship between IC and AB. Specifically, the CPIC scale had the largest moderating effect on the relationship between IC and AB, followed by CTS and then CPS. The following reasons may explain it: First of all, this phenomenon may be related to the different reporters of measurements. Usually, the CPIC was reported by children, while parents reported the CTS and CPS. Studies have shown that child-report of IC scored higher than parent-report (Lemola et al., 2012; Li et al., 2011). In the current study, we also verified the moderating role of reporters. Thus, this may be a potential reason that make the IC measurement as a moderator. Secondly, it may be explained by the accuracy of measurements in predicting children's AB. The CPIC scale mainly focuses the mental health of children, thus, it may be more accurate to predict children's AB, and then adjust the relationship between IC and AB (Fincham, 1998; Katz & Low, 2004; Kitzmann & Cohen, 2003). Thirdly, this may be explained by the sample size. In this study, the sample sizes of CTS and CPS were smaller

than CPIC, which may affect the accuracy of the assessment, thereby affecting the relationship between IC and AB.

Moderator of reporter

The results showed that the IC reporter moderated the relationship between IC and AB. Specifically, children reported IC results moderated the relationship between IC and AB more strongly than those reported by parents. This result may be related to the cognitive level of varied subjects. For IC, children and parents' perception is inconsistent. Children who perceive IC strongly can more accurately point out their AB (Chi & Xin, 2003). Additionally, this may be related to different subjects' reporting scope. Children usually can only perceive overt conflicts, while IC reported by parents contains overt conflicts and covert conflicts (Rutter et al., 1975; Zhao, 2005). As a result, the relationship between IC and AB would be affected.

Moderator of year

The results show that both the publication year and the survey year moderated the relationship between IC and AB. Specifically, the relationship between IC and AB increases with the increase of year. This may be explained by the fact that couples experienced and reported more conflicts than before (Tasew & Getahun, 2021) and children's aggression increases yearly (Fung et al., 2018). That would be an essential reason to generate an impact on the relationship between IC and AB.

Moderators of other latent variables

We supposed that age, gender, and cultural context source might also affect the influence of interparental conflict on aggressive behaviors being exhibited and socialized. However, a non-statistically significant effect of these factors was found. The association does not vary depending on these three factors. These results are consistent with some prior findings (Mueller et al., 2015; Shin et al., 2014; Stutzman et al., 2011; Zhang, 2020). One possible explanation may be what we tested was the general score of IC and AB, but not the specific types. Knowing the definition of IC and AB, they can be categorized as various sub-dimensions. IC contains father-to-mother and mother-to-father conflicts, overt and covert conflicts, etc. Similarly, AB contains physical aggression, verbal aggression, relational aggression, sexual aggression, online aggression, dating aggression, reactive aggression, proactive aggression, and so on. Age, gender, and culture get a great possibility to relate to the sub-dimensions of IC and AB. For example, gender may influence the AB because boys are prone to be closer to hyperactive/impulsive aggression than girls (Connor et al., 2003).

Some moderating variables mentioned in the articles but not tested in our meta-analysis still deserve attention. Xia et al. (2016) pointed out that aggressive belief mediated the association between IC and AB. Besides, studies also showed that maternal psychological control (Koçak et al., 2017), parental disinhibited social engagement disorder, parental psychopathology, and parenting stress (Overbeek et al., 2014), poverty and marital status (Yoo & Huang, 2012), mothers' maltreatment (Doh et al., 2012) would account for the correlation between interparental conflict and aggressive behavior among children or youth. What's more, many studies have provided sufficient evidence for the genetic underpinnings of people's AB (Veroude et al., 2016). The above variables have a high potential in moderating parental conflict's impact on children's aggression.

Limitations and implications for further research

Although our meta-analysis reveals a meaningful phenomenon, some limitations need to be recognized in this review. First, due to the authors' limited knowledge of languages, only articles published in English and Chinese were identified in this study. Thus, there may be some crucial studies and data, such as the master's theses and doctoral theses in non-English or non-Chinese countries, were missed in our search process. Second, we did not include qualitative research, causing the review to lack vital viewpoints of the qualitative conclusions of the association between interparental and aggression among children and adolescents. Third, only the moderating effects of culture, age, gender, reporter identities, and publication/survey year were tested in this study. Some latent moderating variables, such as aggressive beliefs, parenting styles, and genetic factors, still need to be recognized and tested.

Our study provides some insights for future research. First, the reporter's moderating role draws attention to the difference between children's perception of their parents' conflicts and couple's own evaluation of their conflicts. The covert conflict or relational conflict in a family need to be attached importance in the future theoretical and practical study. Second, our results highlighted the necessity of family therapy for the prevention and intervention programs to decrease children's aggressive behavior. Family prevention and intervention strategies aim at reducing children and adolescents' aggression by adjusting parental relationships and parenting styles are advocating. Third, researchers would also be paying attention to exploring the moderating and mediating mechanisms between IC and AB, helping us learn how parents affect their children's adjustment and developmental trajectories. In a word, more therapeutic preventions and interventions related to parents to reduce child and adolescent aggression could be designed and applied.

Conclusion

The current study has tested previous studies' contradictions and gained more attention to the parental conflict's deleterious effects on children's behavior. Additionally, we find that this relationship is affected by interparental conflict scale, the reporter of interparental conflict scale and year. By conducting the meta-analysis and interpreting with various theories (e.g., the social learning theory, the cognitive context theory, and the emotional security theory), our findings highlight the important role of parental relationships on children's externalizing problems from theoretical and empirical perspectives. Future academic studies are encouraged to focus on the issues of children's perception of interparental conflicts, family prevention/intervention strategies, and moderating/mediating mechanisms between interparental conflict and children's aggressive behavior.

CRedit authorship contribution statement Shunyu Li: Conceptualization, Methodology, Software, Writing—Review & Editing. Xiaonan Ma: Data Curation, Writing—Original Draft, Writing—Review & Editing. Yuxuan Zhang: Conceptualization, Data Curation, Writing—Original Draft, Writing—Review & Editing.

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Data Availability All data analyzed during this study can be found in the articles that were included in the meta-analysis in this published article.

Declarations

Ethical approval and Informed consent Ethical approval and informed consent are not applicable for the meta-analysis.

Competing interest The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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*Indicates studies used in the meta-analysis

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