Supplementary

Literature review and theoretical hypothesis. ***The concept and subtypes of ACEs.*** Adverse Childhood Experiences (ACEs) are negative events before the age of 18, including abuse, household dysfunction, and external violence. Studies differ in classification: some treat childhood abuse as a whole, while others divide it into subtypes. Yang *et al*. [1] identified five subtypes – physical, emotional, and sexual abuse, plus physical and emotional neglect – while Wang *et al*. [2] grouped the neglect categories. Other scholars also include harsh discipline, witnessing violence, and indirect negative events as ACEs subtypes.

The concept of aggressive behavior. Aggressive behavior involves intentional actions causing physical or psychological harm [3]. Classifications vary: Wang *et al*. [4] identified behavioral, verbal, and emotional aggression, while Xie *et al*. [5] distinguished physical aggression, verbal aggression, anger, and hostility. Logan-Greene *et al*. [6] measured aggression through low frustration tolerance, hostile assumptions, and conflict resolution via verbal or physical aggression.

The relationship between ACEs and aggressive behavior. For the past decade, numerous studies have indicated that ACEs can make individuals more susceptible to aggressive behavior. Yang *et al*. [7] used correlation analysis to demonstrate the relationship between the two, concluding that there is a significant correlation between ACEs and aggressive behavior. Garrido *et al*. [8] employed binary logistic regression and multivariate hierarchical logistic regression in their respective studies, finding that children who experienced ACEs were 1.27 times more likely to exhibit aggressive behavior than those who did not experience ACEs. Thus, the following hypothesis is proposed.

H1: There is a significant positive correlation between ACEs and aggressive behavior.

Moderating factors in the relationship between ACEs and aggressive behavior. Gender factors. Gender is frequently examined as a moderator in the ACEs–aggression link, but findings remain mixed. Some studies report no gender differences, while others highlight variation by ACEs subtype. For instance, Choe and Yu [9] found abuse had a stronger impact on aggression in girls, whereas neglect more strongly affected boys. Yang *et al*. [7] similarly reported that emotional neglect predicted male aggression, while emotional abuse predicted female aggression. These patterns suggest gender-specific responses to ACEs.

H2: Gender can moderate the relationship between ACEs and aggressive behavior.

Age factors. In addition to gender, age is also commonly considered a moderating factor. However, studies on this factor have produced mixed results. Garrido *et al*. [8] found that age does not moderate the relationship between ACEs and risky behaviors (including aggressive behaviors). Similarly, Piotrowski *et al*. [10] concluded that there was no age difference in sibling aggression initiated by children who witnessed violence. Thus, the following hypothesis is proposed.

H3: Age moderates the relationship between ACEs and aggressive behavior.

Measurement tool factors. ACEs measurement tools may influence the relationship between ACEs and aggressive behavior. The measurement tools for ACEs used in the studies included in this meta-analysis primarily focus on the Childhood Trauma Questionnaire (CTQ) and its simplified version. Other studies utilize targeted scales based on the specific ACEs subtypes being examined. In addition to questionnaire scales, some studies collect data on subjects' ACEs through interviews with primary caregivers or by dividing subjects into two groups – those who have experienced ACEs and those who have not – based on existing archival data for analysis. Thus, the following hypothesis is proposed.

H4: ACEs measurement tools play a moderating role in the relationship between ACEs and aggressive behavior.

Information reporter factors. It is important to note that the information provider or reporter can also moderate the relationship between ACEs and aggressive behavior. For example, in Piotrowski *et al*. [10] study on the negative impact of witnessing violence on children, including children's aggressive behavior, the data on aggressive behavior were provided by research observers, mothers, and the children themselves. The results showed that different information providers had very different perspectives on aggressive behavior, which in turn affected the relationship between witnessing violence and children's aggressive behavior. Thus, the following hypothesis is proposed.

H5: The cultural background of the study sample moderates the relationship between ACEs and aggressive behavior.

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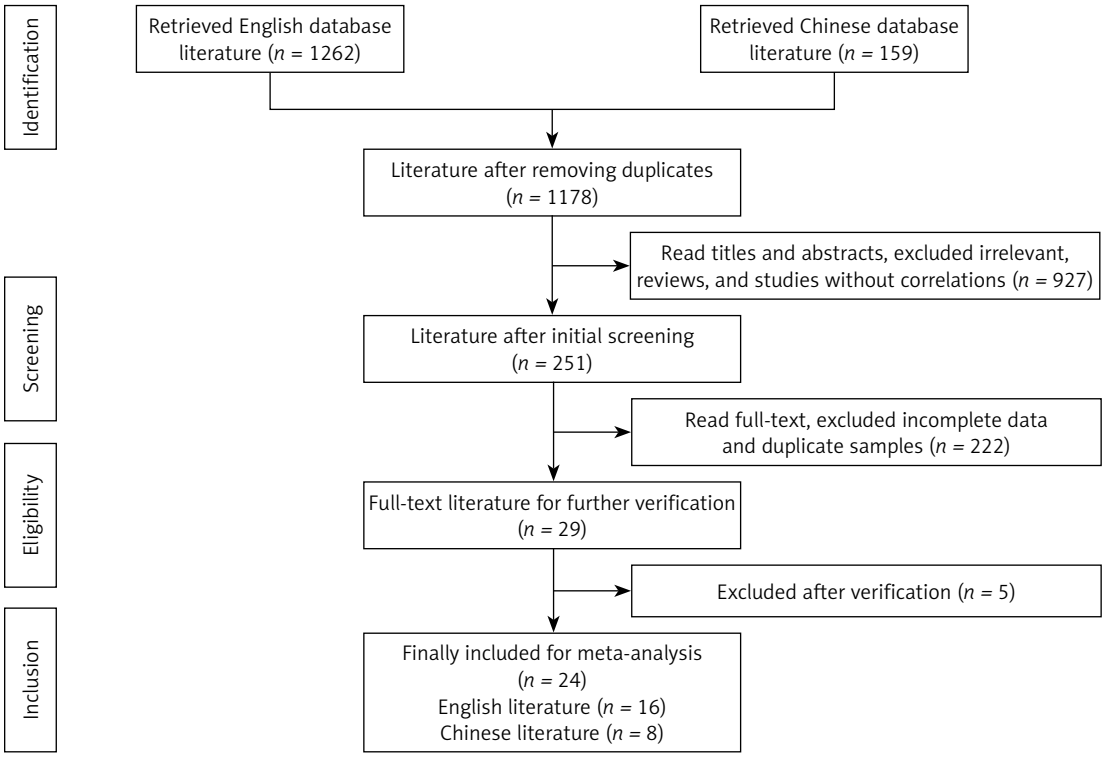
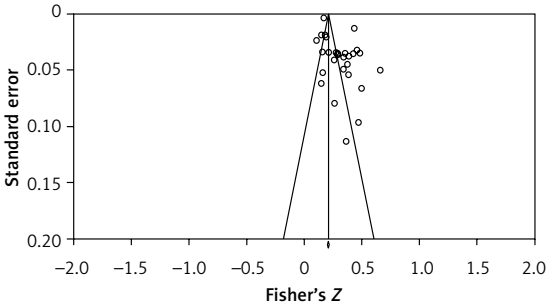
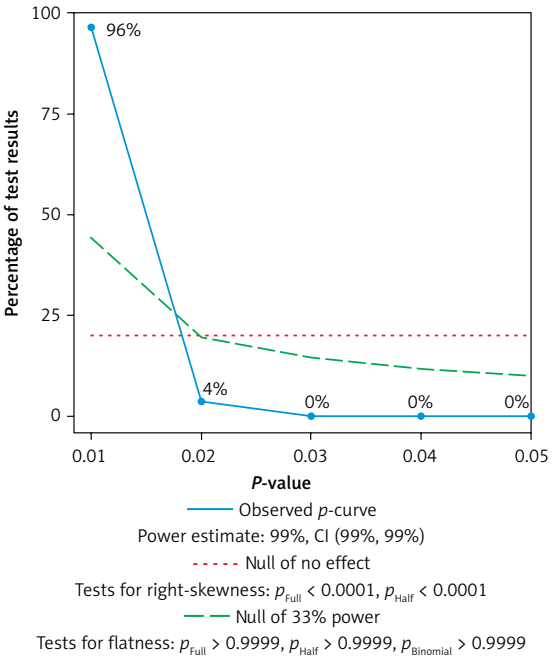


Supplementary Figure S1. Document selection through meta-analysis



Supplementary Figure S2. Funnel plot of standard error by Fisher's *Z*



Supplementary Figure S3. *P*-curve distribution. The observed *p*-curve includes 28 statistically significant ($p < 0.05$) results, of which 28 are $p < 0.025$. There were no non-significant results entered

Supplementary Table SI. Information of the included literature

Literature information	*N*	Age	ACEs measurement tool	Aggressive behavior measuring tools	Nation	Female ratio	*r*
Wenfu *et al*., 2023 [11]	5724	13.5	CTQ	BPAQ	China	0.48	0.41
Liu, 2018 [12]	2707	14	Other	Other	China	0.45	0.18
Liu, 2018 [12]	2707	14	Other	Other	China	0.45	0.15
Zhang, 2023 [13]	262	5.07	CTQ	CBCL	China	0.50	0.15
Wang *et al*., 2023 [2]	2285	15	Other	CBCL	USA	0.49	0.19
Haidan and Minyi, 2022 [14]	940	9.75	CTQ	BPAQ	China	0.49	0.43
Odacı *et al*., 2020 [15]	851	20.13	CTQ	BPAQ	Türkiye	0.56	0.27
Odacı *et al*., 2020 [15]	851	20.13	CTQ	BPAQ	Türkiye	0.56	0.21
Odacı *et al*., 2020 [15]	851	20.13	CTQ	BPAQ	Türkiye	0.56	0.16
Matsuura *et al*., 2013 [16]	81	17	ACEQ	BPAQ	Japan	1.00	0.35
Perez *et al*., 2018 [17]	64329	17	PACT	Other	USA	0.22	0.17
Baller *et al*., 2022 [18]	228	21	ACEQ	RCTS	USA	0.77	0.46
Sullivan, 2019 [19]	800	10	DBVS	MMSQ	China	0.44	0.40
Bifulco *et al*., 2014 [20]	160	23.5	CECA	Other	U.K.	0.52	0.26
Kircaburun *et al*., 2021 [21]	772	20	CTQ	CBOS	Türkiye	0.64	0.28
Kircaburun *et al*., 2021 [22]	344	20	CTQ	CBOS	Türkiye	0.82	0.37
Tache *et al*., 2018 [23]	367	15	Other	TOCA	USA	0.47	0.16
Hecker *et al*., 2014 [24]	409	10.5	Other	RPQ	Tanzania	0.48	0.33
Wong *et al*., 2018 [25]	1794	–	CBCL	RBPC	Mauritius	0.48	0.11
Tonglin, 2017 [26]	500	21.27	PMS	CBQ	China	0.48	0.36
Meiling *et al*., 2018 [27]	395	19.5	CPANS	BPAQ	China	0.62	0.58
Lijun *et al*., 2017 [28]	696	15.00	CPANS	BPAQ	China	0.52	0.33
Chen and Guanghua, 2016 [29]	706	16	CPANS	BPAQ	China	0.50	0.37
Xia *et al*., 2021 [30]	810	16	CPANS	WQ	China	0.52	0.45
Zhongrui *et al*., 2012 [31]	110	16	CTQ	BPAQ	China	0.00	0.44
Chen *et al*., 2015 [29]	809	19	Childhood Abuse Questionnaire (CAS) (Chinese version)	BPAQ	China	0.77	0.28
Chen *et al*., 2015 [32]	809	19	CAS (Chinese version)	BPAQ	China	0.77	0.34
Wenfu *et al*., 2023 [11]	590	19.44	ACEs questionnaire	BPAQ	China	0.85	0.26

Note: Age is the average age of the subjects. For studies reporting age ranges, the median age range was used.

Supplementary Table SII. Results of effect size heterogeneity test

Model	Effect size	Homogeneity test				τ^2			
		Q	d*f*(*Q*)	*P*-value	I^2	τ^2	SE	Variance	τ
Random effects model	28	784.95	27	0.00	96.56	0.02	0.01	0.00	0.13

Supplementary Table SIII. Results of random effects model analysis of ACEs and aggressive behavior

Model	Effect size	*N*	Effect size and 95% confidence interval			Two-tailed test	
			Point estimate	Lower limit	Upper limit	*Z*	*P*-value
Random effects model	28	91887	0.30	0.26	0.35	12.16	< 0.001

N represents the total sample size, and the point estimate represents the overall effect size.