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Effect of self-control on aggression among students in China: A meta-analysis

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ABSTRACT

Although several theories argue that self-control is negatively related to aggression, studies show mixed results. Hence, our meta-analysis determined the overall relation between self-control and aggression (or their related measures) and moderation effects. Our data consists of 58 studies of 39,116 students in mainland China without physiological or psychological illnesses (effect sizes measured via *r* or equivalent). Self-control and aggression have a medium negative correlation. Moderator analysis showed that this correlation was stronger (a) among middle-school students and university undergraduates than among primary school students, (b) among samples with more males (rather than females), and (c) when using the Aggression Questionnaire rather than other aggression measures. Self-control measure and publication type did not moderate the link between self-control and aggression. Hence, self-control has a substantial negative link with aggression, moderated by age, gender, and aggression measure.

1. Introduction

Many students report being physically attacked at least once within the last year in school (28% in 42 countries, Gu & Huang, 2017; 19% in Organisation for Economic Cooperation and Development countries, Huang & Zhao, 2018). These data suggest that the behavioral tendency to intentionally cause physical or psychological harm to others (*aggression*, Anderson & Bushman, 2002) is a widespread problem. Students who are more aggressive than others often show negative or antisocial behaviors (e.g., truancy, crime, or substance abuse) in later life, and their victims are more likely than others to show low self-esteem, low self-worth, or other psychological problems such as anxiety, depression, or suicidal thoughts.

To address this problem, scholars have studied how people consciously control impulsive behaviors to act toward long-term goals and benefits (*self-control*, Duckworth, 2011), which might reduce their aggression (Dewall, Deckman, Gailliot, & Bushman, 2011). However, empirical studies of the relation between self-control and aggression show mixed results (e.g., Bao, Li, Zhang, & Wang, 2015, vs. Lu, Yu, Ren, & Marshall, 2012), possibly due to moderators like age, gender, etc. Hence, a meta-analysis synthesizes the results of many such studies and accounts for moderators. A multi-country meta-analysis requires at least five such studies per country to model different histories, political systems, and so on, but few countries have enough studies within a similar time frame; thus, we conduct a single-country meta-analysis.

We meta-analyze data from 58 studies of self-control and aggression in China. Like other countries, aggression is prevalent in China: 33% of rural students and 26% of urban students have suffered aggression (Zhang, Zhu, Cai, & Xia, 2018). We determine the overall relation between self-control and aggression, and test for five moderators: age, gender, self-control measure, aggression measure, and publication type.

1.1. Self-control and aggression

Although aggression and self-control both have subordinate components, both are coherent constructs. Psychometric analyses of aggression show that it is a hierarchical factor with subcomponents of physical aggression, verbal aggression, anger, and hostility (Buss & Perry, 1992). Likewise, self-control is a single construct with good internal consistency and high retest reliability (Tangney, Baumeister, & Boone, 2004), which includes several components, such as initiatory and inhibitory self-control, effortful control, self-regulation, and so on.

The *general aggression model* (GAM, Anderson & Bushman, 2002) consists of distal and proximate processes. GAM's distal processes detail how biological and persistent environmental factors can affect the likelihood of aggression (Anderson & Bushman, 2002). By contrast, GAM's proximate processes are immediate person (e.g., self-control) and local situation *inputs* that influence a person's internal state

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(cognitions, feelings, and arousal), which affect appraisal and decision *routes*, which in turn influence aggressive (vs. non-aggressive) behavioral *outcomes*. For example, some studies suggest that students with less self-control show more aggression (e.g., Dewall et al., 2011).

Scholars have argued that people with more self-control show less aggression via a general model (Finkel, 2014) or specific models (Baumeister, Vohs, & Tice, 2007; Gottfredson & Hirschi, 1990). In Finkel (2014) instigator, impellent and inhibitor (I^3) model, these three orthogonal processes account for all behaviors, including aggression. First, exposure to a target experience in a specific context (e.g., classmate takes my toy at the playground) can afford aggressive behavior (*instigator*). Second, situational or individual factors (e.g., heat- and humidity-driven discomfort) increase the likelihood of the aggressive behavior (*impellent*) while opposing factors (e.g., self-control) reduce its likelihood (*inhibitor*).

Gottfredson and Hirschi (1990) *general theory of crime* elevates the inhibitor role of self-control above instigators and impellents. They argue that people with inadequate self-control fail to adequate consider long-term costs, and hence are much more likely to commit crimes for the short-term gains.

Fitting within the I^3 and general theory of crime frame, Baumeister et al. (2007) *strength model of self-control* conceptualizes it as a limited resource. In the face of instigator(s) and impellent(s) to aggression, a person with sufficient self-control resources can expend them to resist aggressive action. By contrast, a person with inadequate self-control resources exhausts them and acts aggressively.

All of these theories suggest a negative link between self-control and aggression, and no published theory suggests a positive link, yet empirical results are mixed (e.g., Li, Li, & Zhang, 2017, vs. Lu et al., 2012). Possible explanations for these mixed results include outlier small samples in some studies (which this meta-analysis will determine) or moderation effects.

1.2. Moderators

Demographics, measurement tools, or publication type might moderate the link between self-control and aggression. Demographic moderators can include age or gender. Also, various measures of self-control or of aggression might yield different results. Lastly, journal articles or dissertations might differ in quality or publication bias.

1.2.1. Age

As human brains biologically mature, older children often show greater self-control compared to younger children, both in the United States and in China (Wang & Lu, 2004; Yang & Song, 2003). Specifically, as children age, their *anterior insulas* become thinner (Churchwell & Yurgelun-Todd, 2013), so they have greater potential for self-control (Kasen, Cohen, & Chen, 2011; Steinberg et al., 2008). This greater potential among older children allows greater variance in their self-control and hence might yield a stronger link between self-control and aggression. Thus, we hypothesize that the link between self-control and aggression might be stronger in older students than in younger students.

1.2.2. Gender

Peer influences and societal expectations differ by gender. Compared to females, males rely more on their own judgments. By contrast, females attend, monitor, and influence one another more than males do. While males mostly rely on themselves, females substantially rely on their peers, which dilutes the influence of their own attributes, such as self-control. Hence, self-control is more likely to affect behaviors (e.g., aggression) among males than females.

Also, mainland China's society traditionally expects (a) boys to be assertive and aggressive and (b) girls to be passive and obedient; thus, aggression is more acceptable for boys than for girls (Wang & Lu, 2004). As a result, girls with poor self-control are more likely to suffer from emotional dysregulation (Husain et al., 2020) and harm themselves rather than others (Lim et al., 2019). Thus, the link between self-control and aggression is likely stronger for males than females (Wang & Li, 2010).

1.2.3. Aggression measurement tools

Studies of aggression in China primarily used two surveys: the Aggression Questionnaire (AQ, Buss & Perry, 1992) and the Bullying and Cyberbullying Questionnaire (CBQ). AQ has 29 items that form a hierarchical factor with four components: physical aggression, verbal aggression, anger, and hostility (Buss & Perry, 1992). (In China, few studies examine self-control and implicit aggression, but many examine self-control and explicit aggression, so this meta-analysis only includes the latter.) Unlike AQ, the 42-item CBQ is specific and focused on behavior targeted against at least one victim, bullying or cyberbullying. Hence, CBQ likely captures a smaller subset of aggression compared to AQ; thus, we hypothesize that the link between self-control and aggression is larger when the latter is measured by AQ than by CBQ. Too few studies used other measures of aggression to separately test for moderation effects (Tabachnick & Fidell, 2012).

1.2.4. Self-control measurement tools

Studies of self-control in China primarily used three surveys: Tangney's Self-Control Scale (TSCS, Tangney et al., 2004), the Self-Control Ability Questionnaire (SCAQ, Wang & Lu, 2004), and the Self-Control Scale (SCS, Grasmick, Tittle, Bursik, & Arneklev, 1993). TSCS has 36 items that form an index with five components: thought control, emotion control, impulse control, execution control, and changes in habits. The 36-item SCAQ forms an index with three components: self-control of emotions, self-control of behaviors, and self-control of thoughts. The 24-item SCS forms an index with six components: impulsivity, self-centeredness, tendency to favor easy tasks, physical activity, emotion, and risk-seeking behaviors. Too few studies used other measures of self-control (e.g., Dual-Modes of Self-Control Scale, Dvorak & Simons, 2009) to separately test for moderation effects (Tabachnick & Fidell, 2012).

1.2.5. Publication type

Dissertations and journal articles might differ in quality or publication bias. As peer review is often stricter for journal articles than dissertations, the range of correlation coefficients is often smaller in the former than in the latter (Zhang et al., 2018; Zhu, Xie, & Gao, 2014; Jiang, 2012; Zhao, 2019). Also, journals might prefer to publish studies that have statistically significant findings (*publication bias*, Card, 2011).

1.3. Study purpose

As past studies of self-control and aggression yielded mixed results, this meta-analysis (a) quantitatively synthesizes past studies to determine the overall effect size between self-control and aggression, and (b) tests whether demographic, measurement, or publication moderators account for the mixed results.

2. Method

2.1. Literature search and category coding

2.1.1. Literature search

This meta-analysis included Chinese- and English-language publications during January 2004 to January 2020. The Chinese-language articles were retrieved from the China Academic Journals Full-text Database, the China Selected Doctoral Dissertations and Masters' Thesis Full-text Database, and Wanfang Data. The English-language articles were retrieved from the Education Resources Information Center, ProQuest Dissertations & Theses Global, PubMed, PsycINFO, Web of Science, and Google Scholar. The keywords used to search for self-

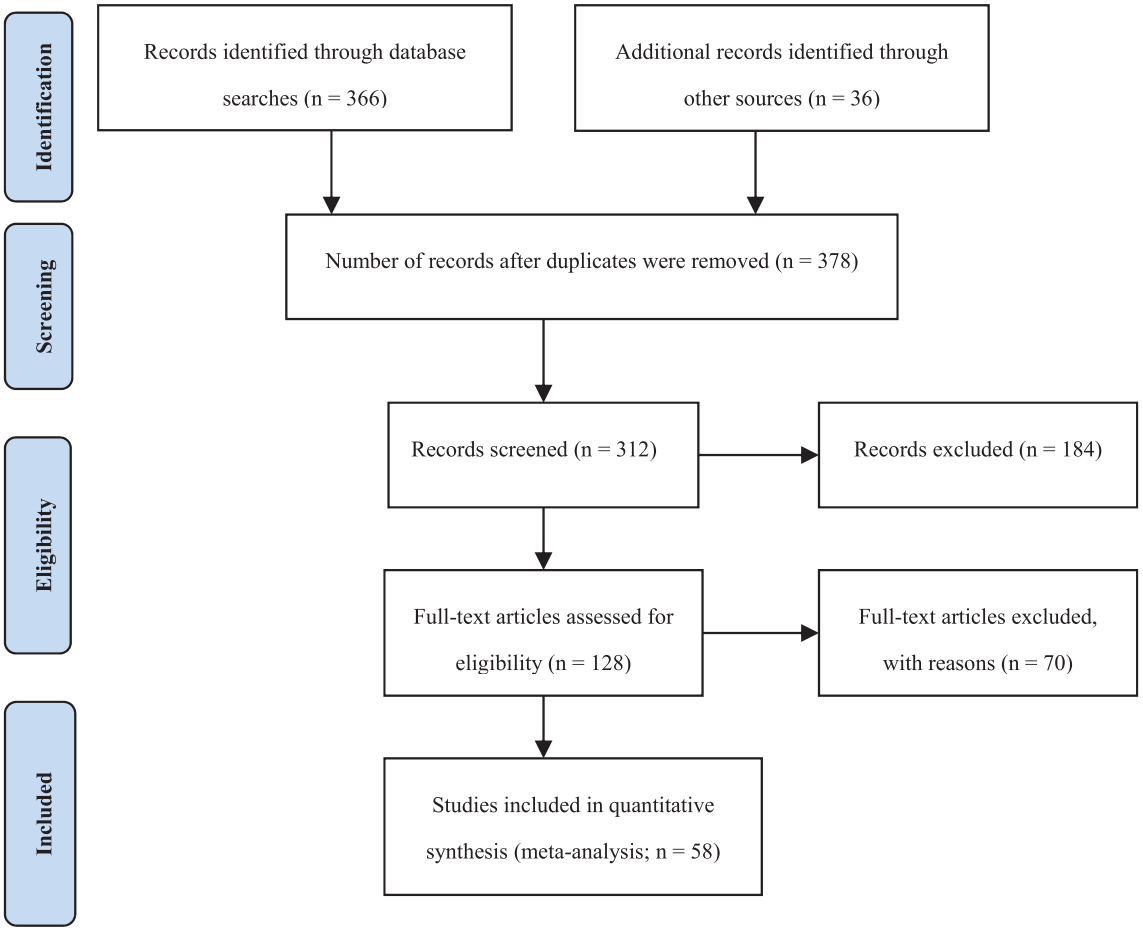

Fig. 1. PRISMA 2009 flow diagram.

control were: "self-control," "self-regulation," "effortful control," and "self-discipline." The keywords used to search for aggression were: "violence," "aggression," "bully," "torment," "intimidate," "aggression questionnaire," "verbal aggression," "hostile," and "anger." These searches yielded 378 articles.

2.1.2. Inclusion criteria

Next, we applied the following inclusion criteria to these articles (see flow chart in Fig. 1):

1) The study examined the relation between self-control and aggression (aggressive behaviors, violence, and bullying behaviors);
2) The assessment tools and research methods were clearly reported;
3) The study provided the effect size or sufficient statistical information to compute it (e.g., sample size, mean values, standard deviations or t-values, p-values, correlation between two focal variables);
4) Data from a single sample cannot be duplicated across multiple studies. If the same research data were published more than once, we used the article with the most comprehensive information;
5) The study participants do not have physiological and/or psychological illnesses.

Two researchers reviewed the titles, abstracts, and full texts of the articles, and removed duplicate reports and papers that did not meet the inclusion criteria. Both selected the same 58 papers. Of these, 49 were in Chinese and 9 were in English. Together, these studies had 39,116 participants and 58 effect sizes.

2.1.3. Category-coding the articles

Next, we created the following variables and stored the appropriate value of each selected article: author, year, sample size, correlation coefficient, region (eastern, central, and western), grade (primary school, middle school, university undergraduates), aggression scale (AQ, BCQ, vs. others), self-control scale (SCS, TSCS, SCAQ, vs. others), percent of males in each sample, and publication type (journal article, dissertation). Please see Table 1 for more details. Each independent sample was treated as a single unit and was coded once.

Then, the correlation between self-control and aggression was encoded. When a study of one sample reports multiple effect sizes for self-control and aggression measurement (e.g., direct and indirect effects for different specification models), we use its *total effect size* (sum of its direct effect and indirect effects, Cohen, West, Aiken, & Cohen, 2003). if the same study used multiple methods for measuring the relationship between self-control and aggression, we selected the method that made the fewest assumptions. Next, we encoded the relationships between self-control and aggression for each group to test for moderation. To ensure consistency of the coding, multiple rounds of coding were conducted by two different researchers. Their initial coding consistency exceeded 86%. When they disagreed, they discussed their differences until they reached consensus.

2.2. Meta-analysis process

The meta-analysis determines the overall relation between self-control and aggression. Then, it tests for moderation by demographics, measurement tool and publication type. We used Comprehensive Meta-Analysis Version 3.3 (CMA 3.3) software (Borenstein, Hedges, Higgins, & Rothstein, 2005).

Table 1
Characteristics of the 58 studies included in the meta-analysis.

Author (year)	*N*	*r*	Region	Grade [a]	Aggression scale [b]	Self-control[c]	Male % [d]	Article Type [e]
Bao et al. (2015)	2785	−0.230	Eastern	Mid	Other	Other	0.461	Journal
Cao and Zhang (2018a,b)	634	−0.410	Central	Mid	Aggression	Other	0.513	Journal
Cao and Zhang (2018a,b)	354	−0.510	Central	Mid	Aggression	Other	0.489	Journal
Chen (2015)	376	−0.440	Eastern	Univ	Aggression	TSCS	0.375	Diss
Chen, Cui, Lei, and Liu (2012)	303	−0.231	Western	Univ	Aggression	Other	0.690	Journal
Chen et al. (2018)	464	−0.450	Western	Univ	Aggression	TSCS	0.304	Journal
Chiu and Chan (2015)	365	−0.420	Eastern	Mid	Other	SCS	1.000	Journal
Chui and Chan (2013)	365	−0.410	Eastern	Mid	Other	SCS	1.000	Journal
Dai, Ying, and Liu (2008)	181	−0.289	Eastern	Mid	Aggression	Other	0.470	Journal
Feng (2011)	373	−0.522	Central	Mid	Aggression	SCAQ	0.515	Diss
Han, Dou, Zhu, Xue, and Gao (2016)	510	−0.340	Central	Univ	Aggression	TSCS	0.412	Journal
Han, Zhang, and Zhang (2018)	918	−0.405	Central	Mid	Bully	SCAQ	N	Journal
Jiang (2012)	443	−0.231	Western	Mid	Other	SCAQ	0.483	Diss
Jiang (2015)	410	−0.600	Western	Mid	Aggression	TSCS	0.483	Diss
Jin (2019)	451	−0.620	Western	Univ	Aggression	TSCS	0.351	Diss
Ke (2017)	285	−0.263	Central	Mid	Other	Other	0.418	Diss
Li, Nie, Boardley, Situ, and Dou (2014)	946	−0.260	Eastern	Univ	Aggression	TSCS	0.576	Journal
Li et al. (2017)	505	−0.450	Western	Mid	Aggression	TSCS	0.513	Journal
Li, Zhang, and Zhang (2019)	457	−0.408	Mixed	Mid	Bully	SCAQ	N	Journal
Liu (2017)	215	−0.317	Western	Univ	Aggression	TSCS	0.216	Diss
Liu et al. (2017)	76	−0.443	Western	Univ	Aggression	TSCS	N	Journal
Lu et al. (2012)	1043	−0.042	Eastern	Mid	Other	SCS	0.525	Journal
Lu et al. (2019)	575	−0.150	Central	Univ	Other	TSCS	0.507	Journal
Ma (2012)	96	−0.270	Western	Mid	Other	SCS	0.509	Diss
Meng (2016)	696	−0.580	Mixed	Univ	Aggression	Other	0.648	Journal
Qi, Zhang, and Zhang (2019)	497	−0.600	Central	Univ	Aggression	TSCS	0.370	Journal
Qi and Zhang (2019)	228	−0.460	Eastern	Mid	Aggression	Other	0.614	Journal
Qiao (2019)	846	−0.205	Eastern	Prim	Other	Other	0.527	Diss
Sheng (2016)	806	−0.527	Western	Mid	Other	SCAQ	0.501	Diss
Situ (2019)	372	−0.450	Eastern	Univ	Other	TSCS	0.530	Journal
Song (2018)	677	−0.223	Central	Mid	Other	SCAQ	0.479	Diss
Song et al. (2017)	631	−0.426	Eastern	Mid	Aggression	TSCS	0.583	Journal
Wang et al. (2011)	1526	−0.155	Central	Prim	Other	Other	0.584	Journal
Wang (2019)	867	−0.160	Eastern	Mid	Other	Other	0.464	Journal
Wang and Li (2010)	320	−0.454	Eastern	Mid	Aggression	SCAQ	0.556	Journal
Wang, Chen, Xiao, Ma, and Zhang (2012)	1719	−0.429	Central	Mid	Other	Other	N	Journal
Xie (2015)	360	−0.242	Eastern	Prim	Other	Other	N	Journal
Xie (2017)	810	−0.423	Eastern	Mid	Aggression	SCS	0.446	Diss
Xu (2018)	590	−0.329	Central	Prim	Aggression	Other	0.557	Diss
Xu, Farver, and Zhang (2009)	401	−0.241	Eastern	Prim	Other	Other	0.494	Journal
Yao (2018)	1312	−0.217	Eastern	Univ	Other	Other	0.551	Diss
Yu (2019)	642	−0.570	Central	Mid	Other	SCAQ	0.476	Diss
Yuan (2017)	1694	−0.560	Eastern	Univ	Other	TSCS	0.498	Diss
Zhang (2016a)	115	−0.387	Eastern	Univ	Other	Other	0.515	Diss
Zhang (2016b)	145	−0.304	Eastern	Univ	Other	TSCS	N	Journal
Zhang (2019)	1165	−0.300	Eastern	Mid	Other	TSCS	0.416	Journal
Zhang et al. (2018)	986	−0.490	Eastern	Univ	Aggression	TSCS	0.465	Journal
Zhang, Huo, and Gu (2019)	326	−0.500	Central	Mid	Aggression	Other	0.571	Journal
Zhang and Zhang (2018)	1081	−0.330	Mixed	Mid	Bully	SCAQ	0.470	Journal
Zhang and Zhang (2019)	1300	−0.375	Eastern	Mid	Bully	SCAQ	0.416	Journal
Zhao (2019)	806	−0.600	Eastern	Mid	Aggression	SCAQ	0.515	Diss
Zhao, Jin, and Wu (2018)	1390	−0.388	Central	Mid	Other	Other	0.528	Journal
Zheng, Shi, and Zheng (2008)	245	−0.213	Central	Prim	Other	Other	N	Journal
Zhou (2018)	455	−0.320	Eastern	Prim	Other	Other	0.545	Diss
Zhou, Eisenberg, Wang, and Reiser (2004)	425	−0.285	Eastern	Prim	Other	Other	0.445	Journal
Zhu (2005)	918	−0.399	Eastern	Mid	Other	Other	0.490	Diss
Zhu et al. (2014)	323	−0.480	Eastern	Univ	Aggression	TSCS	0.198	Journal
Zhu, Zheng, Zhu, Yao, and Zheng (2019)	1312	−0.217	Eastern	Univ	Other	TSCS	N	Journal

2.2.1. Assessment of study quality

We assessed the quality of these studies via the revised Jadad Scale that ranges from 0 (lowest) to 5 (highest) based on randomization, double-blind, and lost participant descriptions. A detailed description of the randomization process yielded two points, while simply mentioning its use yielded one point. Likewise, detailed description of the double-blind implementation yielded two points, while mentioning its use yielded one point. Also, identifying the number of lost or withdrawn participants yielded one point. High-quality studies received more than two points. As all 58 articles earned more than two points, they were all rated high-quality studies.

2.2.2. Calculating the effect sizes

This meta-analysis used each study's Pearson product difference correlation coefficient *r* for their effect sizes (Borenstein et al., 2005). As the sample sizes of the studies differed substantially, we applied the Fisher Z-transformation with weights based on study sample sizes to compute the final r and 95% confidence intervals ($Z = 0.5 * \ln [(1 + r) / (1 - r)]$; variance of Z or $V_Z = 1/n - 3$; standard error of Z or $SE_z = (1/n - 3)^{0.5}$.

2.2.3. Homogeneity test

We also determined whether the studies' average effect sizes differed significantly (*homogeneity* test) via Cochrane's *Q* and I^2 (Huedo-

Medina, Sánchez-Meca, Marín-Martínez, & Botella, 2006). If I^2 exceeds 75, it shows substantial heterogeneity, indicating the suitability of a random-effects model (rather than a fixed-effects model) for this meta-analysis (for a random-effects model, we assume that the selected studies are random samples from a larger population to help generalize the findings). Also, substantial heterogeneity suggests the need for moderation tests.

2.2.4. Publication bias assessment

To assess the risk of publication bias, we created a funnel chart, computed the fail-safe number (N_{fs}) and ran Egger, Smith, Schneider, and Minder (1997) regression. As the funnel chart indicates the expected symmetric distribution of effect sizes around its mean, extreme asymmetries would suggest publication bias. N_{fs} is the minimum number of unpublished studies that would render the mean effect size non-significant. When N_{fs} falls below 5 k + 10 (k = number of studies), publication bias is a serious concern (Rothstein et al. 2005). If the intercept in Egger's linear regression is near 0 and is not significant, publication bias is minimal (Egger et al., 1997).

3. Results

3.1. Results of literature retrieval and description of the data

The 58 studies had 58 independent samples with total 39,116 participants (range: 76 … 2785 participants in a study; see details in Table 1). Among these studies, the correlation between self-control and aggression ranged from −0.04 to −0.62. As most of the studies showed a significant negative link between self-control and aggression, Lu et al. (2012) was an outlier (see forest plot in Fig. 2).(See Fig. 3)

3.2. Homogeneity test and effect size

The homogeneity test (Q = 1085; $p < 0.001$, I^2: 95 > 75) showed that the data in the self-control and aggression studies were heterogeneous (see Table 2), which suggested the use of a random-effects model (Lipsey & Wilson, 2001). The random-effects model showed an overall negative correlation (−0.380) between self-control and aggression (95% CI: −0.471 to −0.341; $z = -17.712$; $p < 0.001$; see Table 2).

3.3. Assessment of publication bias

The funnel plot, fail-safe N (N_{fs}), and Egger's regression tested for evidence of publication bias. The symmetric funnel plot of the results of the 58 studies did not show publication bias. As the N_{fs} of 2,491 far exceeded the threshold of 300, it did not show publication bias (300 = 5 × 58 + 10; 5 k + 10, Card, 2011, p. 270). Lastly, Egger et al. (1997) regression test was not significant and did not show publication bias ($t_{56} = 1.719$, $p = .092$). Hence, all three tests showed no evidence of publication bias.

3.4. Moderator analysis

The homogeneity test showed significant heterogeneity (Q = 1085; $p < 0.001$, I^2: 95 > 75; see Table 2). Thus, we tested for moderation effects by measurement tools, publication type, and demographics.

3.4.1. Measurement tool

We tested whether self-control measures (SCAQ, TSCS, SCS, vs. Other) or aggression measures (AQ, BCQ, vs. Other) moderated the link between self-control and aggression. Self-control measurement tools showed no significant moderation ($Q_{BET} = 7.363$, $df = 3$, $p > .05$, see Table 3). By contrast, aggression measures showed significant moderation $Q_{BET} = 16.701$, $df = 2$, $p < .001$, see Table 3). The negative link between self-control and aggression was stronger when measuring aggression with AQ than with other questionnaires ($|r_{AQ}| > |r_{BCQ}| > |r_{Other}|$: $|-0.457| > |-0.379| > |-0.310|$).

3.4.2. Publication type

The homogeneity test did not show a significant heterogeneity across dissertations and journal articles ($Q_{BET} = 1.829$, $df = 1$, $p > .05$). Hence, publication type did not moderate the link between self-control and aggression.

3.4.3. Age

The homogeneity test showed significant heterogeneity across primary school, middle school, and university ($Q_{BET} = 7.287$, $df = 2$, $p < .05$), suggesting that age influenced the link between self-control and aggression. These negative links were stronger for older students ($|r_{university}| > |r_{middle}| > |r_{primary}|$: $|-0.407| > |-0.395| > |-0.249|$). However, the links between self-control and aggression did not differ significantly between university undergraduates and middle school students.

3.4.4. Gender

To examine whether a continuous variable (gender) moderated the link between self-control and aggression, the r effect size was meta-regressed onto the percentage of male participants in each sample. Studies with proportionally more male participants showed stronger negative correlations between self-control and aggression (Q_{Model} [1, k = 49] = 5.458, $p < .001$, see Table 4). Extrapolating this result to its implied extremes for hypothetical single-gender samples, the expected correlation between self-control and aggression would be much higher for an all-male sample ($r = -0.445$) than an all-female sample ($r = -0.323$ [$= -0.445 + 0.122$], see Table 4).

4. Discussion

As past studies of self-control and aggression showed mixed results, this meta-analysis synthesizes 58 such studies in China to determine the overall relation and test whether demographics, measurement tools, or publication types moderate it. Our results showed that self-control and aggression have a medium negative correlation. Furthermore, grade-level, gender, and aggression measure all moderate this correlation. The funnel plot, fail-safe N, and Egger's regression showed no evidence of publication bias.

4.1. Self-control and aggression

This meta-analysis shows a significant, medium negative link between self-control and aggression. All past studies in China show this result except for the outlier with the non-significant effect, Lu et al. (2012).

This result also supports the I^3 model, general theory of crime, and strength model of self-control. The negative link between self-control and aggression supports the importance of the inhibitor component of the I^3 model (Finkel, 2014). Furthermore, the medium size of the link ($r = -0.380$) suggests the importance of other factors in the I^3 model (such as the instigator[s] and impellent[s]).

While this meta-analysis result supports the general theory of crime (Gottfredson & Hirschi, 1990), the moderate size of the link raises doubts about its completeness. As the general theory of crime highlights the critical role of greater self-control for reducing aggression and crime, the negative link between self-control and aggression supports its core theoretical mechanism. However, a much larger negative correlation would provide much stronger evidence for this theory. Instead, the medium size of the link ($r = -0.380$) suggests that other factors aside from self-control influence the likelihood of aggression. Hence, this result suggests that the general theory of crime must be broadened to incorporate other explanatory factors.

Lastly, this result supports Baumeister et al. (2007) strength model

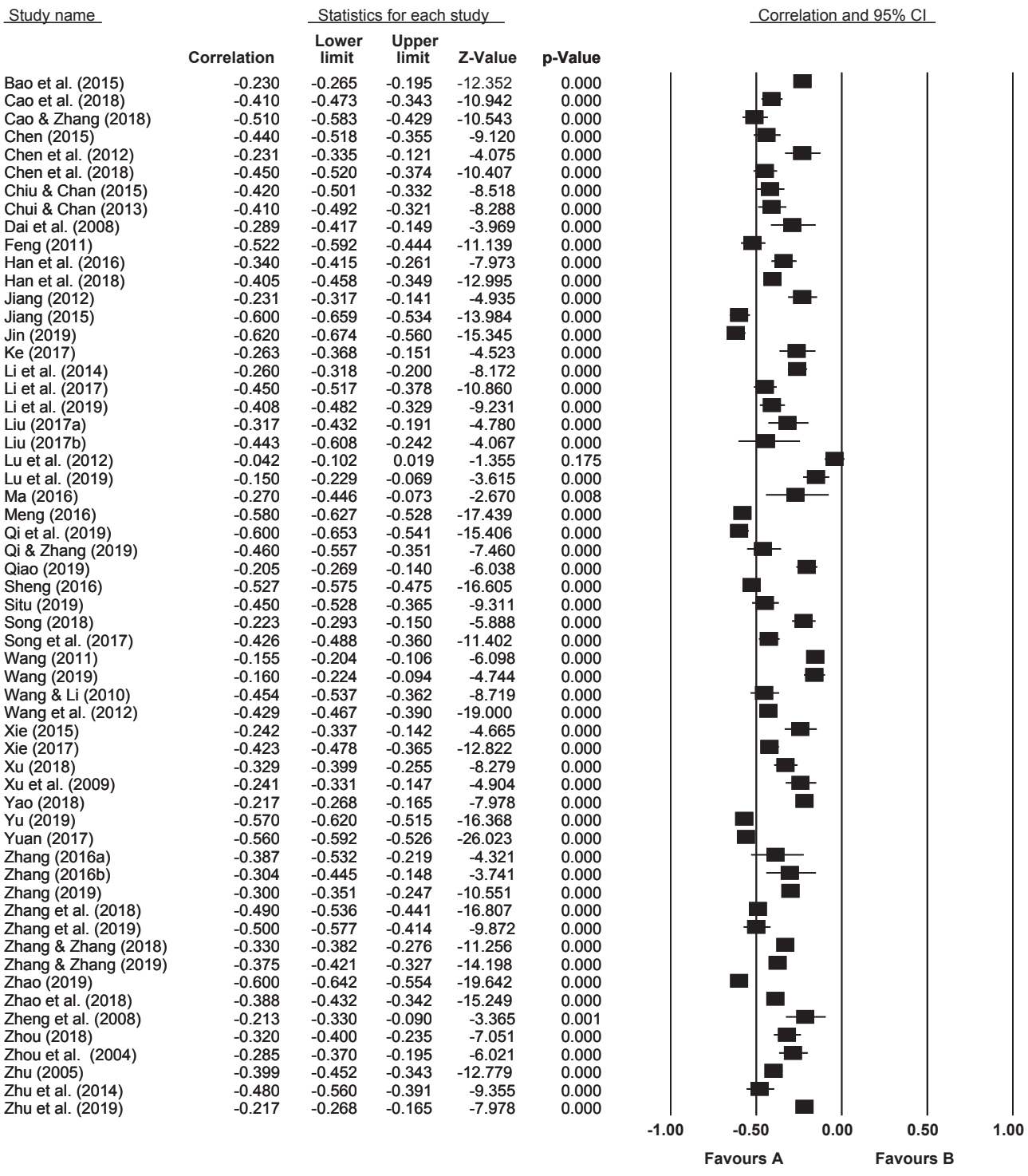

Fig. 2. Forest plot for the random-effects model.

of self-control. Students with more self-control reported less aggression, consistent with the view that self-control is a limited resource that must be expended to resist aggressive action.

4.2. Moderation

Age, gender and aggression measure moderated the link between self-control and aggression. By contrast, self-control measures and publication type did not moderate this link.

4.2.1. Age

The negative link between self-control and aggression was stronger among older students, though the difference between middle school students and university undergraduates was not significant. This result

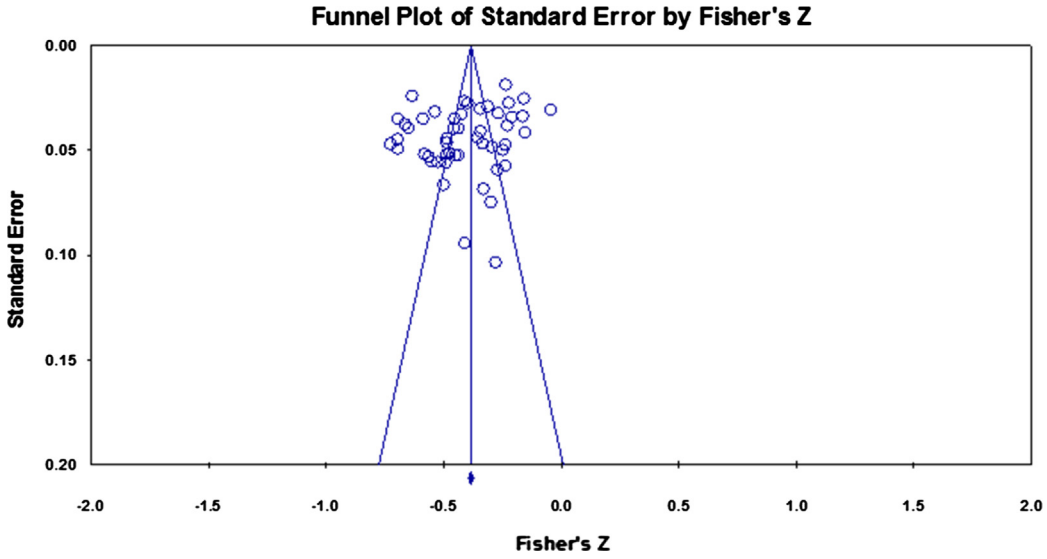

Fig. 3. Funnel plot of the effect sizes of the beta coefficients for the findings regarding self-control and aggression.

supports the view that as human brains biologically mature, their anterior insulas become thinner (Churchwell & Yurgelun-Todd, 2013) and self-control generally increases (Kasen et al., 2011; Steinberg et al., 2008), creating greater variation in self-control among older children. This greater variation in self-control among older students enables greater coverage of the range of aggression and thereby yields a stronger link between self-control and aggression. As this link does not differ across middle school students and university undergraduates, it suggests that the variation in self-control might not increase substantially between middle school students and university undergraduates. Future studies can test this hypothesis.

4.2.2. Gender

The negative link between self-control and aggression was stronger among boys than girls. Hence, it is consistent with past studies, gender differences in peer influences, and gendered societal expectations. This result is consistent with the view that males rely on their own self-control more than females do, and that peer influence dilutes the impact of a female student's self-control on her aggression.

Also, this result is consistent with gendered societal expectations that aggression is more acceptable for boys than for girls (Wang & Lu, 2004). Specifically, this result fits the view that girls with poor self-control are more likely to suffer from emotional dysregulation (Husain et al., 2020) and harm themselves rather than others (Lim et al., 2019).

4.2.3. Aggression measure

The different results across aggression measures highlight their importance. The negative link between self-control and aggression is stronger when aggression is measured by AQ than by CBQ, consistent with the former's greater coverage of aggression. AQ can capture physical aggression, verbal aggression, anger, and hostility, whereas CBQ focuses on bullying and cyberbullying, a much smaller subset of aggression. Hence, the stronger link when measuring aggression by AQ than by CBQ is not surprising. Future meta-analyses with more such studies using different aggression measures can determine whether similar phenomena account for the stronger negative link between self-control and aggression when aggression is measured by AQ than other non-CBQ questionnaires.

In any case, researchers must consider the consequences of different aggression measures. Specifically, they must consider whether their theoretical definition of aggression aligns with the items of the measurement tool. Some research questions might be more suitable to one aggression questionnaire (or subsets of it) than another.

4.3. Limitations and future research directions

This meta-analysis's limitations in its sample, study design and measures can be addressed by future studies. This sample only includes primary school students, middle school students, and university undergraduates in China. Future studies can include pre-schoolers, kindergarteners, high school students, school drop-outs, and non-undergraduate adults in China and in other countries. As these studies did not report the cultural background of the participants (e.g., cultural minorities in China), we could not test for cultural differences. Hence, future studies can collect these data and test whether the negative link between self-control and aggression differs across cultures. As most of these studies are cross-sectional studies, future studies can include longitudinal data and examine relations between self-control and aggression across time. Lastly, these were all questionnaire response data. Future studies can include other types of assessments, such as peer nominations, teacher or parent evaluations, video, and so on.

5. Conclusion

Past studies of self-control and aggression showed mixed results, so this meta-analysis of 58 such studies in China showed an overall medium, negative correlation between these two constructs. Furthermore, moderator analyses showed that this negative correlation was stronger among older students (university undergraduates or middle school students vs. primary school students), among males (vs.

Table 2
Random-effects model of the correlation between self-control and aggression.

k	*N*	*r*	*95% CI*	*Homogeneity test*			*Tau-squared*			*Test of null (2-tailed)*	
				Q(r)	*p*	I^2	Tau^2	*SE*	*Tau*	*z*	*p*
58	39,116	−0.380	[−0.471, −0.341]	1085	0.00	95	0.027	0.007	0.165	−17.712	< 0.001

Table 3
Self-control and aggression: Univariate analysis of variance for the moderator variables (categorical variables).

	Between -group effect(Q_{BET})	*k*	*r*	*SE*	*95% CI*	*Homogeneity test within each group(Q_W)*	I^2
SCAQ		11	−0.430	0.011	[−0.501, −0.352]	164.578***	93.924
TSCS		19	−0.424	0.012	[−0.489, −0.355]	339.207***	94.693
SCS		5	−0.319	0.044	[−0.443, −0.183]	101.514***	96.060
Others		23	−0.328	0.007	[−0.386, −0.267]	305.925***	92.809
Aggression scale	16.701***						
AQ		25	−0.457	0.006	[−0.504, −0.407]	228.471***	89.495
BCQ		4	−0.379	0.001	[−0.499, −0.246]	4.676	35.844
Others		29	−0.310	0.009	[−0.360, −0.258]	599.489***	95.329
Publication type	1.829						
Dissertation		20	−0.414	0.013	[−0.473, −0.352]	409.438***	95.359
Journal article		38	−0.361	0.006	[−0.406, −0.314]	584.231***	93.667
Grade	7.287*						
Primary school		8	−0.249	0.004	[−0.353, −0.140]	22.560***	68.971
Middle school		31	−0.395	0.023	[−0.443, −0.345]	531.261***	94.353
University		19	−0.407	0.037	[−0.467, −0.342]	400.400***	95.504

** $p < .01$.
* $p < .05$.
*** $p < .001$.

Table 4
Univariate regression analysis of continuous variables (random-effect model).

	Parameter	Estimate	SE	Z-value	95%CI for *b*
Male (%)	β_0	−0.445	0.027	−16.624	[−0.498, −0.393]
	β_1	0.122	0.052	2.336	[0.020, 0.225]
	Q_{Model} (1, k = 49) = 5.458, p < .05				

females), and when using the Aggression Questionnaire (vs. other aggression measures). The funnel plot, fail-safe N, and Egger's regression showed no evidence of publication bias.

Declaration of Competing Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.childyouth.2020.105107.

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