The Relationship Between Social Exclusion and Aggression: A Meta-Analysis

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Abstract

Social exclusion represents a significant antecedent of aggression. Although numerous studies have examined the underlying relationship between these constructs, findings have shown considerable heterogeneity. To clarify this relationship and identify sources of inconsistency, a random-effects model meta-analysis was conducted on 92 studies (99 independent samples, N = 65,564). Results revealed a significant positive correlation between social exclusion and aggression (r = 0.38, 95% CI [0.34,0.41]); the magnitude of this association was moderated by age, measurement instruments for social exclusion and aggression, research methodology, aggression type (proactive aggression vs. reactive aggression), and design type (cross-sectional vs. longitudinal), but not by gender or individualism index. These findings partially clarify the controversy regarding the significance of the social exclusion-aggression relationship, demonstrating that excluded individuals typically exhibit elevated aggression levels. Future efforts should strengthen prevention and control of increased aggressive behavior due to social exclusion in younger age groups (early childhood stage).

Full Text

The Relationship Between Social Exclusion and Aggression: A Meta-Analysis

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Abstract

Social exclusion is a significant factor that induces aggression, and numerous studies have explored the intrinsic connection between the two constructs, yet the findings show considerable inconsistency. To clarify their relationship and reveal the causes of these discrepancies, this meta-analysis employed a random-effects model to analyze 92 studies (99 independent samples, totaling 65,564 participants). The results revealed a significant positive correlation between social exclusion and aggression (r = 0.38, 95% CI [0.34, 0.41]). The strength of this association was moderated by age, measurement tools for social exclusion and aggression, research methods, aggression type (proactive vs. reactive aggression), and study design (cross-sectional vs. longitudinal), but not by gender or individualism index. These findings partially resolve the controversy regarding whether social exclusion and aggression are significantly correlated, demonstrating that excluded individuals typically exhibit higher levels of aggression. Future research should strengthen prevention and control efforts for aggression increases caused by social exclusion in younger age groups (preschool and primary school stages).

Keywords: social exclusion, aggression, aggressive behavior, meta-analysis

Aggression is a crucial indicator of individuals' social adjustment and has long been a focus of researchers' attention. Surveys indicate that youth violence has become the third leading cause of death among individuals aged 10-24, causing over $21 billion in medical losses annually (National Center for Injury Prevention and Control (U.S.). Division of Violence Prevention, 2019). In China, the number of juvenile violent crimes has rebounded over the past five years, showing a trend toward younger ages (Supreme People' s Procuratorate, 2022), threatening campus and social safety. To reduce aggression and violence, numerous studies have examined its inducing factors, finding that individual factors such as narcissistic personality (Rasmussen, 2016) and anger (Scott, 2015), as well as environmental factors like violent media exposure (Bushman & Anderson, 2015) and social exclusion (Twenge et al., 2007), can elevate aggression levels. Among these factors, social exclusion is considered a significant risk factor for youth violence (Office of the Surgeon General et al., 2001), and substantial research has investigated their relationship (Ettekal & Ladd, 2020; Li et al., 2019; Rajchert & Winiewski, 2016; Zhang et al., 2020). However, conclusions remain inconsistent. Some studies have found a close relationship between social exclusion and aggression (Ettekal & Ladd, 2020; Poon & Teng, 2017), while others report non-significant correlations (Geniole et al., 2011; Ostrov, 2013). Moreover, the reported correlation coefficients vary widely, ranging from -0.02 to 0.74 (Chen et al., 1992; Fite et al., 2013; He, 2019). It remains unclear whether these differences stem from variations in participant characteristics (e.g., gender, age, cultural background) and study features (e.g., assessment tools, research methods, and designs). Given these issues, this study employs meta-analysis to examine the overall correlation between social exclusion and aggression and potential moderating factors, aiming to derive more general and precise con-

clusions from a macro perspective and provide additional evidence for in-depth research and prevention of aggression.

1.1 Concepts and Assessment of Social Exclusion and Aggression

Social exclusion refers to the phenomenon and process where an individual' s needs for belonging and relationship are obstructed when rejected or excluded by others (or groups), manifesting in various forms such as ostracism, neglect, rejection, and isolation. Its measurement methods primarily include sociometric methods, questionnaire methods, and experimental methods (see Table 1). Sociometric methods, mainly in the form of peer nomination, aim to understand exclusion status through mutual choices among peers, though this approach may involve individual differences in judgment criteria. The most representative questionnaire method is the social exclusion scale, which uses Likert-type self-report scales to measure the frequency of exclusion in daily life. Experimental paradigms for assessing social exclusion mainly include human-computer interaction, face-to-face interaction, and written material paradigms. The human-computer interaction paradigm, represented by Cyberball, is widely used due to its operational simplicity, characterized by the absence of explicit rejection information, though its limitation lies in the lack of interaction in virtual environments, reducing the authenticity of exclusion scenarios. Face-to-face interaction paradigms, such as the "getting-acquainted" paradigm, overcome this limitation by enabling genuine communication and interaction between people. Written material paradigms, such as the imagination paradigm, require participants to imagine exclusion scenarios described in written materials; the more vivid and specific the imagination, the easier it is to activate exclusion experiences. While convenient to use, such paradigms may negatively impact participants' physical and mental health (Bernstein & Claypool, 2012). Overall, these paradigms differ considerably from one another, resulting in diverse measurement outcomes.

Due to different research perspectives, the conceptual definition of aggression varies significantly. However, consensus has been reached regarding its core features (e.g., harmfulness, intentionality). Zhang and Miao (2019) propose that aggression includes state aggression and trait aggression. The former refers to behaviors intended to harm others (Anderson & Bushman, 2002), emphasizing the situational specificity of aggression (Campbell et al., 1985); the latter represents personality traits related to state aggression, exhibiting stability across time and consistency across situations (Tremblay & Belchevski, 2004). Aggression measurement also primarily employs sociometric methods, questionnaire methods, and experimental methods (see Table 2). Sociometric methods mainly use the Revised Class Play method, considered a highly reliable and valid approach for measuring adolescent aggression (Zhou & Wan, 2005). The most representative questionnaire methods are the Aggression Questionnaires developed by Buss and Perry (1992) and Buss and Warren (2000), with the latter adding an indirect aggression dimension based on the former. Subsequently,

Raine et al. (2006) developed the Reactive-Proactive Aggression Questionnaire to investigate the causes of aggression. However, meta-analytic results indicate that these two types of aggression are highly correlated (r = 0.68) and often co-occur, making them difficult to distinguish (Polman et al., 2007). In contrast, the scales developed by Buss' s team measure different aspects and forms of aggression with high reliability and validity, gaining widespread usage. Experimental paradigms for measuring aggression mainly include the Competitive Reaction Time Task and the Hot Sauce Allocation Paradigm. The Competitive Reaction Time Task has been questioned because its competitive nature may lead participants to believe their behavior aims to win the game rather than deliberately harm opponents. Researchers have adapted this paradigm to create variants such as the Noise Punishment Paradigm (Buckley et al., 2004) and Cold Water Punishment Paradigm (Aydin et al., 2010). Compared to the Competitive Reaction Time Task, the Hot Sauce Allocation Paradigm requires no sophisticated equipment and allows easy quantification of aggression, making it widely adopted. Overall, each method has its advantages and limitations, and researchers should choose complementary approaches based on research purposes to control for common method bias.

1.2 The Relationship Between Social Exclusion and Aggression

Two main perspectives currently exist regarding the relationship between social exclusion and aggression. The first posits that social exclusion and aggression are significantly correlated. The General Aggression Model suggests that environmental and individual factors, as input variables, trigger aggressive behavior by altering individuals' internal states (emotion, cognition, arousal) (Anderson & Bushman, 2002). This perspective emphasizes that social exclusion may enhance aggression levels. As a negative stimulus, social exclusion induces negative emotions and hostile cognition, leading to aggressive behavior. Empirical studies have found that excluded individuals are more likely to choose less attractive food for interaction partners (Chow et al., 2008), deliver louder noises (Gaertner et al., 2008), and allocate more hot sauce (Warburton et al., 2006). Moreover, social exclusion may increase aggression toward unrelated others (Rajchert et al., 2018; Zhang et al., 2019). Additionally, social exclusion can serve as a punitive measure to reduce individuals' aggression. One study intervened with high-aggression individuals by subjecting them to peer rejection and exclusion, finding that social exclusion effectively reduced their aggression levels (Poon & Teng, 2017).

The alternative perspective argues that social exclusion and aggression are not significantly correlated. According to the Emotional Numbness Hypothesis, social exclusion does not evoke negative emotions like anger or pain but instead leads to a state of physiological or emotional numbness. This cognitive deconstruction state further causes delayed reactions and avoidance of self-awareness among excluded individuals, buffering negative responses to exclusion threats (Baumeister et al., 2009; Twenge et al., 2003). Additionally, some empirical

studies have found non-significant correlations between social exclusion and aggression, suggesting that excluded individuals may actively suppress aggressive impulses considering the high potential costs of aggressive behavior (Chester, 2016; DeBono et al., 2017; Denson, 2015; Geniole et al., 2011). These results indicate that social exclusion does not increase aggression.

In summary, the first perspective supports that social exclusion may trigger negative emotions, hostile cognition, and high physiological arousal, driving aggressive behavior. The General Aggression Model based on this perspective has received extensive support (Anderson & Bushman, 2002; Ettekal & Ladd, 2020; Poon & Teng, 2017) and demonstrates broad applicability. The second perspective, supported by the Emotional Numbness Hypothesis, suggests that social exclusion does not trigger negative emotions or cognition, and physiological/emotional numbness leads to self-avoidance, thereby preventing aggressive impulses caused by negative emotions or cognition. However, some research indicates that emotional numbness is a phenomenon specific to certain types of exclusion and only applies to severe exclusion, not representing a general response (DeWall et al., 2011). Therefore, the applicability of this theory requires further verification. Overall, although aggression is not a universal response to all exclusion events, it may represent a common reaction among most excluded individuals. Thus, this study proposes Hypothesis H1: There exists a moderate positive correlation between social exclusion and aggression.

1.3 Moderating Variables in the Social Exclusion-Aggression Relationship

For the entire field, any individual study represents an estimate based on researchers' personalized designs and samples, which may deviate from the overall situation. Therefore, the high heterogeneity in empirical research conclusions about the social exclusion-aggression relationship may be related to differences in sample characteristics (e.g., gender, age, cultural background) and study features (e.g., aggression type, assessment tools, research methods, and designs) chosen by different researchers.

Gender may influence the social exclusion-aggression relationship. Research indicates that males have stronger needs for control or power and may exhibit higher aggression levels when facing threats compared to females (Knight et al., 2002; Orue & Calvete, 2011). Females' self-concept contains more social components, and they often show earlier self-regulation behaviors and lower aggression when excluded (Kochanska et al., 2001). However, Crick et al. (1997) argue that females place greater emphasis on relationship issues in social interactions and therefore use relational aggression to achieve greater harm. These controversial perspectives necessitate examining gender' s moderating role. Thus, this study proposes Hypothesis H2: Gender moderates the relationship between social exclusion and aggression.

Age may affect the social exclusion-aggression relationship. Although social ex-

clusion occurs throughout the lifespan (Kann et al., 2018), the link between exclusion and aggression is more pronounced in childhood than adolescence (Cillessen & Mayeux, 2004). From a lifespan developmental perspective, as individuals mature physically and psychologically with age, they better understand differences between friendship and peer status and are more inclined to adopt constructive interaction methods when facing interpersonal crises (Stenseng et al., 2014). Therefore, the relationship between social exclusion and aggression weakens with age. This study proposes Hypothesis H3: Age moderates the relationship between social exclusion and aggression.

Cultural background may also influence this relationship. As a social behavior, aggression exhibits cultural differences (Bergeron & Schneider, 2005). In individualistic cultures, excluded individuals are more likely to adopt direct confrontation, whereas in collectivistic cultures emphasizing "forbearance brings peace," this relationship tends to be weakened. Moreover, compared to collectivistic cultures, aggression is considered an effective means to achieve personal goals (within acceptable limits) in individualistic cultures, resulting in higher acceptance and tolerance of aggression (Amad et al., 2021). Thus, this study proposes Hypothesis H4: Cultural background moderates the social exclusion-aggression relationship, with lower individualism associated with stronger correlations.

Aggression type may affect the relationship. Based on personality characteristics, aggression can be divided into trait and state aggression. Research finds that social exclusion correlates more strongly with trait aggression, as excluded individuals are more likely to exhibit negative emotional and cognitive tendencies such as trait anger and hostile attribution (Boykina, 2019; DeWall et al., 2009). Therefore, this study proposes Hypothesis H5a: Aggression type (trait vs. state aggression) moderates the relationship. Second, based on causes, aggression can be categorized as proactive or reactive. Research shows that social exclusion correlates more strongly with reactive aggression than proactive aggression (Baumeister et al., 2000). Social exclusion often creates obstacles in forming social connections, weakening or interrupting social relationships and causing frustration and harm. According to Frustration-Aggression Theory, aggressive behavior represents a hostile response to frustration, with excluded individuals retaliating passively (Dollard & Miller, 1939). Thus, this study proposes Hypothesis H5b: Aggression type (proactive vs. reactive aggression) moderates the relationship. Finally, based on form, aggression can be direct or indirect. Excluded individuals tend to use indirect aggression more than direct aggression (Bukowski et al., 2009; Golmaryami & Barry, 2009; Klimstra et al., 2014). Indirect aggression achieves harm in less identifiable and preventable ways. Although individuals violate social norms, their behavior is less likely to be detected, making indirect aggression safer and less costly. Additionally, indirect aggression serves as an alternative strategy that is more adaptive under specific social conditions (modern civilized norms or rule-of-law societies) by concealing aggressive intentions and reducing retaliation risk (Archer & Coyne, 2005). Therefore, this study proposes Hypothesis H5c: Aggression type (direct vs. indirect aggression) moderates the relationship.

Measurement tools for social exclusion may influence the relationship. Research shows that participants' psychological experiences during measurement tasks significantly affect results (Gerber & Wheeler, 2009). Social exclusion paradigms are numerous and varied, representing different types and degrees of exclusion with different psychological impacts, making the paradigm itself an important variable affecting outcomes (Bernstein & Claypool, 2012). Additionally, as social exclusion is a complex social phenomenon, results from single paradigms may lack external validity, while the diversity of paradigms may lead to task-dependent results. However, no comprehensive comparative analyses exist. Thus, this study proposes Hypothesis H6: Social exclusion measurement tools moderate the relationship.

Aggression measurement tools may also affect the relationship. First, questionnaire items' quantity and structure influence results. For instance, the BWAQ includes one more dimension than the BPAQ, providing more comprehensive aggression assessment, while abbreviated versions inevitably lose important information, creating measurement differences. Second, experimental paradigms produce different effects due to individual understanding differences. For example, the Competitive Reaction Time Task may lead participants to believe electric shocks aim to win rather than harm, affecting accuracy. Sociometric results may also be influenced by individual differences in understanding nomination criteria. Thus, this study proposes Hypothesis H7: Aggression measurement tools moderate the relationship.

Furthermore, research methods and designs may affect the relationship. Regarding methods, single-method approaches cannot control common method bias, potentially overestimating or underestimating results. Self-report measures of socially unacceptable behaviors may suffer from social desirability bias, while strict laboratory controls may differ substantially from real-world situations. Combining multiple methods may provide more comprehensive understanding and results closer to true levels. Regarding design, longitudinal studies show that both social exclusion and aggression may change over time through improved peer relationships or aggression interventions, affecting their relationship (Chen et al., 2022; Polman et al., 2007). Based on previous meta-analyses, this study proposes Hypothesis H8: Research method moderates the relationship, and Hypothesis H9: Study design moderates the relationship.

2.1 Literature Search and Screening

First, we searched English databases (Web of Science, Elsevier SD, Medline, EBSCO-ERIC, SAGE Online Journals, PsycINFO, PsycArticles, and ProQuest Dissertations and Theses) for literature with social exclusion and aggression terms in titles or abstracts. Social exclusion search terms included "exclusion," "ostracism," or "rejection" ; aggression search terms included "aggression," "aggressive," "violence," "violent," or "bullying." Second, we searched Chinese databases (CNKI, Wanfang, and VIP) using Chinese terms: "排斥" (exclusion), "拒绝" (rejection) for social exclusion, and "攻击" (aggression), "暴力"

(violence), "欺负" (bullying), "欺凌" (bullying) for aggression. These keywords were combined pairwise for joint searches. The literature search was conducted through May 2022, yielding 30,683 articles.

We imported literature into EndNote X9 and applied the following inclusion criteria: (1) Must be empirical studies, excluding pure theory, reviews, and qualitative research; (2) Must measure both social exclusion and aggression and report at least one Pearson correlation coefficient (r) between questionnaire dimensions or total scores, or provide convertible statistics (F, t, ^{2}, or from simple linear regression); (3) Experimental studies must include experimental and control groups, excluding those with acceptance groups as controls; (4) Sample size must be clearly stated; (5) Include journal articles, dissertations, conference papers, and book chapters; (6) For duplicate publications, select the one with more comprehensive reporting; (7) Participants must be general populations, excluding special groups such as impoverished students, left-behind children, or psychiatric patients; (8) Investigation contexts must involve real-life social exclusion and general aggression, excluding cyber exclusion, cyberbullying, or exclusion/aggression in intimate relationships. The screening process is shown in Figure 1 [Figure 1: see original paper]. Ultimately, 92 studies met meta-analysis criteria, comprising 99 independent studies with 65,564 participants.

2.2 Literature Coding and Effect Size Extraction

We coded author information, publication year, participant nationality, individualism index, age, correlation coefficients, sample size, male proportion, measurement tools, research methods, and study design (see Table 3). Pearson correlation coefficients (r) served as effect sizes, extracted following these principles: (1) Extract effect sizes and code by independent sample, coding separately if one article included multiple independent samples; (2) Extract separately if correlations were reported by participant characteristics (e.g., male/female); (3) For longitudinal studies, extract effect sizes from the first measurement; (4) For experimental studies without reported correlations, enter means, standard deviations, and sample sizes for experimental and control groups; (5) If original articles only reported Pearson correlation matrices between dimensions of social exclusion and aggression, synthesize the correlation using formulas (Hunter & Schmidt, 2004). If articles only reported t-values from independent samples t-tests, ^{2} values from independence tests, F values from ANOVA, or values from simple linear regression, convert them to r values using formulas [r = ×0.98 + 0.05 (0); r = ×0.98 (< 0)] before coding (Card, 2012; Peterson & Brown, 2005). Additionally, given the high correlation between proactive and reactive aggression, if original studies did not control for this, we corrected the correlation between social exclusion and proactive/reactive aggression using the formula (Gravetter et al., 2020). To approximate normal distribution, we first applied Fisher's Z transformation to correlation coefficients r. After analysis, Z values were converted back to r values for interpretation

(automatically performed by CMA software). Two raters independently completed all coding, achieving 93% consistency. Discrepancies were resolved by reviewing original literature and consulting with meta-analysis experts before finalizing codes. Detailed information for included studies is openly accessible (https://osf.io/j9rd8/).

2.3 Publication Bias Control and Assessment

Publication bias refers to the tendency for studies with significant results to be more likely accepted and published, making it difficult to obtain non-significant studies during literature collection and affecting meta-analysis accuracy (Rothstein et al., 2005). In addition to published journal and conference papers, we made efforts to include unpublished dissertations, partially controlling publication bias. Furthermore, we employed multiple methods (funnel plot, fail-safe N, Egger' s regression) to assess publication bias. For funnel plots, symmetry indicates minimal publication bias (Light & Pillemer, 1984). Fail-safe N represents the number of additional null studies needed to negate meta-analysis results; if greater than 5k + 10 (where k = number of studies), publication bias is minimal (Rosenthal, 1995). For Egger' s regression, non-significant linear regression results indicate minimal publication bias (Egger et al., 1997).

2.4 Model Selection

Current meta-analyses primarily use fixed-effect and random-effects models to calculate effect sizes. Fixed-effect models assume different studies share the same true effect, with random error causing result differences. Random-effects models assume true effects may differ across studies, with variations influenced not only by random error but also by study participants and measurement tools (Schmidt et al., 2009). Based on our literature review, included studies differed in participant selection (gender, age), research methods (cross-sectional vs. longitudinal), and variable measurement tools, which likely affect the social exclusion-aggression relationship. Therefore, this study adopted a random-effects model.

2.5 Data Processing

We used Comprehensive Meta-Analysis Version 3.0 software to test main and moderating effects. Moderation analyses employed meta-regression or subgroup analysis with maximum likelihood estimation. This study involved two types of moderators: (1) Continuous moderators, including male proportion in each study and participants' country/region individualism index (Du et al., 2022; Zhang et al., 2021); (2) Categorical moderators, including age (preschool, primary, middle school, and university students), social exclusion measurement tools, aggression measurement tools, research methods (sociometric, questionnaire, experimental, sociometric + questionnaire), study design (cross-sectional, longitudinal), and aggression type. For subgroup analysis, to ensure each level

represented its category, we required at least 3 effect sizes per level, following previous research (Zhang et al., 2021).

3.1 Heterogeneity Test

Heterogeneity test results (Table 4) showed a Q value of 3073.69 ($p < 0.001$) and I-squared value of 96.81%, exceeding the 75% threshold for high heterogeneity proposed by Huedo-Medina et al. (2006). This indicates high heterogeneity among effect sizes, with 96.81% of variance attributable to true differences between effect sizes. Additionally, Tau-squared estimates total effect size variance between studies, indicating between-group differences in total variance. This suggests moderating variables exist in the social exclusion-aggression relationship, necessitating moderation analysis.

3.2 Publication Bias Assessment

The funnel plot (Figure 2 [Figure 2: see original paper]) shows most effect sizes for the social exclusion-aggression relationship located at the top of the funnel, evenly distributed on both sides of the centerline. Fail-safe N analysis revealed that at $p = 0.05$, the fail-safe N was 1,286, far exceeding the critical value of 505 ($k = 99$). This indicates that 1,286 additional null studies would be needed to render the relationship non-significant. Egger' s regression intercept was non-significant at 0.84 ($p = 0.44$). These results collectively indicate no significant publication bias.

3.3 Main Effect Test

Using a random-effects model, the main effect analysis revealed a significant positive correlation between social exclusion and aggression ($r = 0.38$, 95% CI [0.34, 0.41]), with 99 independent effect sizes and 65,564 participants (Figure 3 [Figure 3: see original paper]). According to Lipsey and Wilson's (2001) criteria, correlations between 0.1 and 0.4 represent moderate relationships. Sensitivity analysis showed that removing any single sample yielded effect sizes ranging from 0.371 to 0.380, indicating high stability of meta-analytic estimates.

3.4 Moderation Effect Tests

For continuous moderators: (1) Gender showed no significant moderation effect. Meta-regression revealed that male proportion did not significantly predict effect sizes ($b = 0.10$, 95% CI [-0.20, 0.40]). (2) Individualism index showed no significant moderation effect. Meta-regression revealed that individualism index did not significantly predict effect sizes ($b = -0.0012$, 95% CI [-0.0026, 0.0002]).

For categorical moderators: (3) Age showed significant moderation ($Qb = 9.51$, $p = 0.02$). Subgroup analysis indicated the strongest correlation in primary school students and weakest in university students. Pairwise comparisons revealed that, except for the preschool stage, primary school correlations were sig-

nificantly higher than middle school and university stages, indicating that the relationship weakens with age. (4) Social exclusion measurement tools showed significant moderation (Qb = 33.40, p < 0.001). The Teacher Report Form (TRF) showed the strongest correlation, while Cyberball showed the weakest. Pairwise comparisons revealed that Cyberball results were significantly lower than peer nomination (p = 0.004), rejection paradigm (p = 0.025), and teacher report (p = 0.003), except for the OES-A scale (p = 0.64). (5) Aggression measurement tools showed significant moderation (Qb = 82.30, p < 0.001). The Revised Class Play method showed the strongest correlation, while the noise paradigm showed the weakest. (6) Research method showed significant moderation (Qb = 17.69, p = 0.001). Sociometric methods yielded higher results, while experimental methods yielded lower results. (7) Study design showed significant moderation (Qb = 4.47, p = 0.03). Longitudinal studies showed significantly weaker correlations than cross-sectional studies. (8) Aggression type (state vs. trait) did not significantly moderate the relationship (Qb = 0.67, p = 0.41). Aggression type (proactive vs. reactive) significantly moderated the relationship (Qb = 6.45, p = 0.01). Aggression type (direct vs. indirect) did not significantly moderate the relationship (Qb = 0.32, p = 0.57). Detailed moderation results for categorical variables are shown in Table 5 .

4.1 The Relationship Between Social Exclusion and Aggression

This meta-analysis estimated the overall correlation strength between social exclusion and aggression, revealing a moderate positive correlation (r = 0.38) consistent with most previous findings, supporting Hypothesis H1 and clarifying controversies about correlation magnitude.

These results support the General Aggression Model. As a negative stimulus, social exclusion disrupts individuals' balanced internal states (changing cognition, emotion, or arousal), inducing angry emotions and hostile cognition that lead to aggressive behavior (Fontaine et al., 2014; Scott, 2015)—essentially "fighting fire with fire." Additionally, exclusion experiences may lead individuals to perceive that gaining social approval through compliance is futile, believing that only proactive control or dominance can prevent further harm (McQuade et al., 2016). This increasing desire for control over others ultimately leads excluded individuals to exhibit higher aggression levels. Notably, while aggression is only one possible response to exclusion—prosocial reactions may also occur from an evolutionary adaptive perspective—research finds that when given choices between aggressive or prosocial behaviors, social exclusion more easily triggers strong aggression and inhibits prosocial behavior (Hales et al., 2016). Prosocial reactions essentially result from effective control of antisocial impulses, suggesting that even when prosocial responses occur after exclusion, antisocial (aggressive) tendencies may still emerge. In specific situations, individuals may be forced to treat excluders in socially desirable ways. This implies that prosocial reactions triggered by social exclusion may be superficial and temporary, potentially masking underlying aggression.

4.2 Moderation Effect Analysis

Results showed that gender did not significantly moderate the social exclusion-aggression relationship, failing to support Hypothesis H2. This indicates cross-gender consistency and universality in the relationship, supporting some empirical findings (Liu, 2012; Salmivalli et al., 2000; Tseng et al., 2013) but contradicting traditional gender stereotypes. Possible reasons include that social exclusion produces similar negative impacts across genders, such as inducing anger, revenge motives, or desire for dominance (Stenseng et al., 2014). Research also shows that social exclusion threatens belonging and relationship needs, which are equally important for males and females, making defensive aggression unaffected by gender (Liu, 2012). Additionally, some researchers note that males and females may differ in aggression forms after exclusion, with males more likely to use direct physical and verbal aggression (Bevans et al., 2013; Pistella et al., 2020), while females more often use indirect relational aggression (Bevans et al., 2013; Bradshaw et al., 2013). Averaging across aggression types may obscure gender differences (Wang, 2008).

Age significantly moderated the relationship, supporting Hypothesis H3. Correlation coefficients from highest to lowest were: primary school $r = 0.45$, preschool $r = 0.34$, middle school $r = 0.35$, university $r = 0.29$. Primary school showed the strongest correlation, university the weakest. The relationship gradually weakened with grade level (except preschool), consistent with some empirical findings (Haselager et al., 2002; Liu, 2020; Pedersen et al., 2007; Twenge & Campbell, 2001). Possible explanations include that preschoolers' motor skills develop first, with abundant energy and activity levels, making them prone to aggression during conflicts (Li, 1994). However, their relatively weak physical strength results in lower aggression. In primary school, self-awareness develops rapidly but cognitive abilities remain vulnerable, making aggression likely when facing interpersonal threats. For primary students, implementing aggression is easy but inhibiting aggressive impulses is difficult (Morales & Guerra, 2006). With age, peer relationships become crucial in middle school. Compared to primary students, middle school students have improved cognitive abilities and self-monitoring, consciously controlling behavior and emotions to avoid damaging relationships (Wang & Lu, 2004). In university, self-awareness development promotes socialization, recognizing that aggression is socially unacceptable. Combined with increasing moral constraints and institutional regulations, individuals are more likely to consciously control emotional responses during interpersonal conflicts, reducing aggression (Fontaine et al., 2014). This suggests aggression prevention should begin at younger ages.

Individualism index did not significantly moderate the relationship, failing to support Hypothesis H4, suggesting possible cross-cultural convergence. Other meta-analyses on peer victimization and internalizing problems (Liao et al., 2022) and narcissism-aggression relationships (Zhang & Zhu, 2021) also found no cultural differences. This may relate to global cultural integration, as humanity shares a common destiny and cultural differences gradually diminish, with

individualism rising and collectivism declining (Huang et al., 2018). Therefore, the social exclusion-aggression relationship is less affected by culture. More importantly, most international social exclusion and aggression assessment tools were developed based on Western culture, and translated/revised tools may not reflect true levels in Eastern collectivistic cultures (Finneran et al., 2020). Although researchers have noted cultural differences in post-exclusion behavioral reactions and aggression as a social behavior (Bergeron & Schneider, 2005), cross-cultural research remains lacking. Future studies need more cross-cultural analyses.

Aggression type (proactive vs. reactive) significantly moderated the relationship, supporting Hypothesis H5b but not H5a or H5c. This indicates social exclusion affects different aggression types differently, with potentially stronger effects on reactive aggression. Social exclusion is an external stimulus, and individuals' defensive reactions following stimulation are inherently reactive. Social exclusion also causes frustration and harm when forming social connections. According to Frustration-Aggression Theory, aggression stems from frustration, with strong frustration driving excluded individuals to aggress for revenge purposes. Proactive aggression has clear goals and plans (Centifanti et al., 2013) and is not caused by external threat-induced frustration, resulting in weaker relationships. Notably, the high correlation between proactive and reactive aggression substantially affects results. Future research should control for one type when analyzing social exclusion's relationship with the other. As with any meta-analysis, results are limited by existing evidence and cannot comprehensively compare exclusion's impact across all aggression types. Some aggression types had fewer than 3 effect sizes (e.g., implicit aggression) and could not be analyzed, potentially affecting results. More work is needed to clarify aggression type moderation.

Measurement tools significantly moderated the relationship. First, social exclusion measurement tools significantly moderated the relationship, supporting Hypothesis H6. Peer nomination showed results closest to the overall effect, possibly because peers understand actual situations better than parents or teachers and can more accurately identify excluded peers. Other methods overestimated or underestimated the relationship. Cyberball showed the weakest correlation ($r = 0.17$), possibly because strict laboratory manipulation of social exclusion reduces external validity. Second, aggression measurement tools significantly moderated the relationship, supporting Hypothesis H7. The Revised Class Play method showed the strongest correlation ($r = 0.62$), while the noise paradigm showed the weakest ($r = 0.18$). This may occur because in experiments, participants use noise primarily to win rather than harm, causing measurement bias. Additionally, in laboratory settings, individuals' behavior is under observation, preventing authentic behavioral responses (Klimstra et al., 2014). While questionnaire measures avoid experimental manipulation limitations, they provide thinking time, and thoughtful responses may be biased (Wang, 2008). Overall, measurement tools substantially affect results, requiring careful consideration in future research, especially for different aggression forms and natures.

Research method and design significantly moderated the relationship, supporting Hypotheses H8 and H9. Regarding methods, single-method results were either overestimated (sociometric) or underestimated (experimental), while combined methods yielded results closer to the overall effect. This occurs because single methods share data sources, reporters, and measurement environments, unable to control common method bias. Combined methods complement each other, reducing or controlling bias. Experimental methods' strict control of extraneous variables isolates other interfering effects, yielding lower measurements. Regarding design, longitudinal studies showed significantly weaker correlations than cross-sectional studies, demonstrating clear attenuation effects, consistent with similar meta-analyses (Chen et al., 2022). Social exclusion severity and aggressive impulses may increase or decrease over time (Kochenderfer-Ladd & Wardrop, 2001; Pouwels et al., 2016) and become relatively independent (Pouwels & Cillessen, 2013), weakening correlation strength (Ettekal & Ladd, 2017; Pouwels & Cillessen, 2013). Additionally, during longitudinal time spans, parents and teachers may strengthen aggression interventions, affecting relationship strength (Troop-Gordon & Ladd, 2015).

4.3 Limitations and Future Directions

This meta-analysis explored the overall correlation between social exclusion and aggression and potential moderators, providing evidence for in-depth research. However, limitations remain: (1) Some studies did not report social exclusion-aggression correlations or convertible statistics, and some experimental studies lacked control groups (using acceptance groups as controls), causing literature loss. Future research should emphasize comprehensive reporting for more complete assessment. (2) This meta-analysis only included general child and adolescent populations, limiting generalizability to special child/adolescent groups, working adults, and elderly populations. Future research should expand sample ranges to examine external validity. (3) Subgroup analysis showed large differences in effect size numbers between some subgroups, occasionally failing to meet subgroup analysis conditions. For example, implicit aggression, which according to dual aggression theory models is independent of explicit aggression and more covert, could not be analyzed due to limited studies. Future research with richer data should confirm subgroup analysis robustness.

5 Conclusions

This study found: (1) Social exclusion and aggression are moderately positively correlated; (2) The relationship is not moderated by gender or culture but is moderated by age, weakening with age (except preschool); (3) Aggression type significantly moderates the relationship, with stronger effects for reactive than proactive aggression; (4) Measurement tools, research methods, and designs significantly moderate the relationship. Cyberball and noise paradigm showed the weakest correlations; single-method results were overestimated or underestimated, while combined methods yielded results closer to overall effects; longi-

tudinal studies showed weaker correlations than cross-sectional studies, demonstrating attenuation effects.

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