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Exploring aggressive emotions in women in prison: the role of empathy and perceived social support in moderating the effects of childhood discrimination experiences

Lili Liu¹, Xiaobin Ding^{1*}, Shuang Li^{2*} and Xiaomei Chen³

Abstract

Background The recent increase in the population of women in prison within the societal context of China has shifted attention towards understanding the unique psychological and social dynamics distinct from those traditionally associated with man offenders. Growing evidence suggests that childhood experiences of discrimination play a crucial role in shaping the aggressive behaviors observed among women in prison. This underscores the necessity for an in-depth examination of the psychological and societal foundations of these behaviors.

Objective This study seeks to elucidate the roles of empathy and perceived social support (PSS) in moderating the effects of childhood discrimination on aggression among women in prison. It aims to provide insights that could inform effective intervention and prevention strategies. **Participants and Setting:** The study involved 411 women in prison from correctional facilities across two provinces in China. Data were collected through paper-based surveys distributed from May to June 2024.

Methods Participants responded to the Everyday Discrimination Scale, Interpersonal Reactivity Index, Perceived Social Support Scale, and Aggression Questionnaire. Statistical analyses included descriptive statistics, Pearson's correlations, analysis of variance, and parallel multiple mediation models. These analyses were conducted using SPSS and a PROCESS macro to test statistical hypotheses.

Results Results demonstrated significant associations between high levels of childhood discrimination and increased aggressive emotions and behaviors in adulthood. Mediation analysis indicated that both affective empathy and PSS significantly mediated these relationships. Affective empathy was found to intensify emotional responses leading to aggression, while PSS acted as a buffering mechanism that mitigated these adverse outcomes.

Conclusions The findings highlight the pivotal moderating roles of empathy and social support in the aggression dynamics observed among women in prison, influenced by early experiences of discrimination. The study advocates for targeted interventions that enhance empathic abilities and bolster social support networks to reduce aggression.

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and aid in rehabilitation. These insights foster the development of nuanced approaches to addressing the needs of women in prison and have significant implications for policy and practice in correctional and rehabilitative settings.

Keywords Childhood discrimination experiences, Aggression emotion, Empathy, Perceived social support, Mediation analysis, Women in prison

Introduction

In the evolving societal landscape of China, the significant increase in the population of women in prison has sparked considerable scholarly and societal concern [1]. Traditionally, incarceration has been predominantly associated with men, due to their higher incidence rates and incarceration prevalence [2]. However, the recent rise in the number of women in correctional facilities calls for a re-evaluation of our understanding and approaches to this issue. Empirical evidence suggests that childhood discrimination may influence emotional and behavioral outcomes in adulthood, potentially contributing to heightened aggression among women in prison [3]. The limited societal recognition and support for these underlying factors underscore the need for a comprehensive study of the unique challenges faced by women in prison, incorporating insights from law, psychology, sociology, and gender studies. By exploring the root causes and broader social contexts of these issues, we can develop more effective preventative and intervention strategies aimed at reducing aggressive behaviors, improving rehabilitation outcomes, and ultimately enhancing public safety.

The exploration of aggressive behaviors in women in prison reveals crucial psychological dynamics and behavioral patterns. Aggression in this context is defined as behaviors intended to harm others, manifesting in physical, verbal, and indirect forms [4]. This study pays particular attention to the emotional dimensions of hostility and anger—often direct precursors to aggressive actions. Hostility encompasses long-standing feelings of antagonism and negative judgments towards others, which frequently catalyze persistent aggressive behaviors [5]. Anger represents an intense, ephemeral emotional reaction that can quickly precipitate aggressive incidents. These emotional states are critical in understanding women in prison, who often exhibit elevated levels of hostility and anger due to specific societal and psychological pressures, including gender discrimination, past abuses, and other traumatic experiences [6].

Discrimination, defined as the unfair treatment of individuals based on various identifiers such as race, gender, or sexual orientation, extends beyond mere actions to include systemic restrictions on opportunities and rights [7]. Studies have shown that different types of discrimination—such as racial, gender, and socioeconomic discrimination—can uniquely affect the long-term emotional and behavioral trajectories of women in prison

[8, 9]. For instance, gender-based discrimination often reinforces negative stereotypes and increases the social and economic vulnerabilities of women, potentially amplifying feelings of isolation and marginalization [10]. Racial or ethnic discrimination, on the other hand, may exacerbate cultural and identity-based conflicts, while socioeconomic discrimination may intensify feelings of inferiority and lack of control, contributing to aggressive responses under stress [11]. According to Lazarus et al. (1984), discrimination acts as a potent stressor that can trigger responses such as depression, anxiety, and aggression upon perception [12]. This stress response mechanism helps explain the behavioral patterns observed in women in prison who have experienced childhood discrimination. Research indicates that perceived discrimination fosters hostility and aggression, with affected individuals often displaying withdrawal, insecurity, and hostility towards society [13, 14]. Adolescents, in particular, are highly sensitive to environmental factors, and the impact of perceived discrimination during this developmental period can be especially pronounced [15]. Harts-horn et al. (2012) found a significant association between perceived discrimination, anger, and aggressive behavior, suggesting that early unfair treatment profoundly shapes emotional and behavioral outcomes [16]. Further studies indicate that rumination can partially mediate the effects of perceived discrimination, amplifying emotional distress and contributing to aggressive behaviors [17]. Additionally, perceived discrimination has been shown to heighten aggression among Chinese migrant adolescents through hostile attribution bias, a mechanism likely to be present in women in prison who have faced social exclusion and discrimination from a young age [18]. These insights underscore the importance of mitigating the long-term adverse effects of discrimination through robust psychological and social support frameworks. Providing comprehensive emotional and psychological support to women in prison can not only aid them in coping with and overcoming the detrimental impacts of early discrimination but also facilitate their successful rehabilitation and social reintegration.

The General Aggression Model [19] offers a comprehensive theoretical framework to analyze how situational factors, particularly childhood discrimination, influence individual emotions, cognition, and arousal, which in turn affect decision-making and aggressive behavior. Within this model, perceived discrimination is identified as a crucial situational input that triggers

specific emotional responses, such as anger or fear, and cognitive biases like hostile attribution biases, thereby increasing the likelihood of aggressive behavior. Furthermore, empathy is highlighted as a significant psychological regulatory mechanism that may mediate the impact of discrimination experiences on aggressive behaviors. Empathy, defined as the ability to perceive, understand, and respond to the emotions of others, is divided into two main types: cognitive empathy, the ability to understand others' emotions and perspectives, and affective empathy, the capacity to emotionally resonate with others [20–22]. Individuals with high empathic abilities are generally more adept at understanding and resonating with the emotional states of others, which can reduce aggressive behaviors by fostering understanding and sympathy [23]. Empathic skills enable individuals to interpret and respond to potential threats or conflicts in more constructive ways, reducing hostility and aggressive responses. Empirical studies confirm that elevated levels of empathy can diminish aggressive behaviors and enhance support and understanding for others [24], and promote positive social interactions and effective conflict resolution [25–27]. Notably, women in prison with a history of severe discrimination in childhood may exhibit reduced empathy, complicating their ability to manage conflicts effectively, potentially leading to higher aggressive tendencies. Therefore, enhancing empathy in this population could significantly improve their behavioral outcomes.

Perceived social support, defined as the perceived availability of emotional, informational, or practical assistance from others when needed [28–30], plays a crucial moderating role in the relationship between childhood discrimination experiences and aggressive behaviors among women in prison. Discrimination during childhood markedly increases aggressive behaviors, a relationship that can be moderated by the level of social support. Studies such as those by Wright and Wachs (2019) and Simons (2006) demonstrate that social support significantly alleviates the impact of perceived discrimination on aggressive behaviors, underscoring the importance of social networks in mitigating the adverse effects of discrimination [31, 32]. This indicates that social support not only provides direct emotional and resource support but also helps to reduce the psychological impact of discrimination by improving coping strategies. For women in prison, the enhancement of social support is particularly critical due to their substantial psychological burdens from past experiences. Research supports the importance of developing and maintaining a social support system within correctional facilities to promote their psychological health and behavioral adjustment, ultimately aiming to reduce recidivism rates [33, 34]. This refined understanding suggests that intervention

measures for women in prison should focus on both enhancing empathy and strengthening social support networks, targeting the unique challenges posed by early experiences of discrimination to effectively reduce aggressive behaviors and facilitate successful reintegration into society.

In examining the aggressive behaviors of women in prison, the roles of empathy and perceived social support are critically influential, especially in mitigating the long-term effects of discrimination experienced during childhood. Studies reveal that early-life discrimination not only elicits intense emotions such as hostility and anger but also perpetuates adverse behavioral patterns into adulthood. Perceived social support serves as a vital buffering mechanism, alleviating the effects of discrimination on aggression by providing both emotional backing and practical resources. This support helps the women manage stress and conflicts more effectively. Furthermore, the cultivation of empathy, encompassing both cognitive and affective components, is pivotal in curbing aggressive behaviors. High levels of empathy enhance one's capacity to understand and sympathize with the emotions of others, equipping these women to handle societal pressures and personal challenges in healthier, more constructive ways. Notably, enhancing empathic skills influences not just their emotional and behavioral reactions but also fosters improved social interactions and conflict resolution. Therefore, fortifying empathic abilities and bolstering social support networks are essential strategies for addressing the ramifications of childhood discrimination among women in prison. These strategies not only mitigate aggressive tendencies but also promote mental health and aid in their reintegration into society. Moving forward, research and intervention programs should concentrate on the broad impacts of these psychological and social dynamics to formulate more effective treatment and support frameworks. This focus will facilitate the successful reentry of this specific demographic into society and contribute to lower rates of recidivism.

Method

Participants

This study employed a cross-sectional design, utilizing data collected via paper-based surveys. Initially, all eligible provinces were listed to ensure a representative sample of the women prison population. A simple random sampling method, using a random number generator, was then applied to select one province from eastern China and one from western China, with each province having an equal chance of selection. This process was meticulously documented to ensure transparency and reproducibility.

From May to June 2024, surveys were distributed to women in prison in correctional facilities within the

selected provinces. Among a total prison population of 2,503, 457 women in prison were invited to participate. Of the 450 responses initially collected, 411 were deemed valid after a thorough review for clarity and completeness, resulting in a questionnaire validity rate of 89.93%. Questionnaires excluded from analysis contained ambiguous answers or illegible handwriting.

Participants were women in prison aged between 18 and 65 years, all of whom were drawn from mental health units within the prison facilities. To ensure data accuracy and consistency, individuals with active psychotic symptoms were excluded based on a preliminary screening conducted by prison medical staff.

Sample size calculations

A priori power analysis was conducted using G*Power software [35]. For a two-tailed independent t-test aimed at detecting an effect size of 0.5, the analysis indicated that a sample size of 100 participants per group would be required to achieve a significance level of $\alpha=0.05$ and a power of 0.80. The actual sample size of 411 participants was sufficient to detect mediation effects employing a bias-corrected bootstrapping method, ensuring a power of 0.80 with the effect sizes of constituent paths being $\alpha=0.71$ and $\beta=0.71$ [36].

Measures

All respondents completed a demographic section and a set of self-report measures assessing various outcomes, including discrimination, empathy, perceived social support, and aggression.

Everyday discrimination scale (EDS)

EDS by Wang (2020) is designed to assess the frequency of discrimination experienced by study participants in everyday life before the age of 18 [37]. It includes 9 items with a scoring range from 0 (never) to 5 (nearly every day), and the total score ranges from 0 to 45. Based on the interquartile range, participants are categorized into low (<2 points), medium (2–16 points), and high (>16 points) levels of everyday discrimination, Cronbach's alpha was 0.911. In the current study, Cronbach's alpha was 0.926, indicating excellent internal consistency.

Interpersonal reactivity index (IRI)

IRI was developed by Zhang et al. (2010), specifically designed to measure empathy [38]. This questionnaire consists of 22 items, scored on a 5-point scale from 0 (does not describe me well) to 4 (describes me very well). Higher scores indicate better empathy skills. Perspective taking and fantasy are dimensions of cognitive empathy, while empathetic concern and personal distress are dimensions of emotional empathy, with Cronbach's alpha values of 0.800 and 0.885, respectively. In the current

sample, reliability for the affective empathy scale was $\alpha=0.802$ and for cognitive empathy, it was $\alpha=0.896$, indicating good internal consistency.

Perceived social support scale (PSSS)

The PSSS is a scale developed by Xie et al. (1999) that measures the level of support adolescents perceive from their family, friends, and teachers, reflecting their overall perceived social support through a total score [39]. The scale consists of 12 items divided into three subscales: Family Support, Friend Support, and Teacher Support, with four items in each subscale. It employs a seven-point rating scale (1=very strongly disagree, 7=very strongly agree). The overall Cronbach's alpha for the scale was found to be 0.876, and in this study, the Cronbach's alpha was 0.889, indicating excellent internal consistency.

Aggression questionnaire

AQ used in this study adopts the Anger and Hostility subscales of the AQ revised by Li et al. (2011), originally developed by Buss and Perry [40]. The Anger dimension includes 7 items, and the Hostility dimension consists of 8 items, totaling 15 items. It employs a 5-point scale ranging from "1=Not Applicable" to "5=Completely Applicable." The higher the cumulative score across all items, the greater the level of aggressive emotions indicated, the Cronbach's alpha values for each dimension of the scale range from 0.870 to 0.900. In this study, the internal consistency coefficients for the overall questionnaire and the subscales were 0.911, 0.886 and 0.891.

Procedure and ethics

This study employed a paper-based survey method, conducted from May to June 2024. Participants were women in prison aged between 18 and 65 years, all from mental health units within correctional facilities. To ensure representativeness, stratified random sampling was applied, with two prisons randomly selected from eastern and western regions of China. The selected sample included 457 eligible participants, representing approximately 38% of the total women prison population, which averages 1,200 inmates per facility.

On designated education days, participants were gathered in a large classroom within each correctional facility to complete the survey. Seating arrangements ensured adequate spacing to provide each participant with a degree of privacy, minimizing external interference. Each session was facilitated by two psychology graduate students who provided standardized instructions on the study's purpose, procedures, and the voluntary nature of participation, ensuring full comprehension among all participants. To maintain participant privacy and dignity, efforts were made to create a quiet environment,

minimizing the stress or distraction that might arise from others' presence.

Each survey session was designed to be completed within approximately 15 min, optimizing efficiency in data collection. Ethical approval for this study was obtained from the Psychology Department and the Research Ethics Committee of Northwest Normal University (Approval Number: 2024035). All procedures adhered strictly to the Declaration of Helsinki and relevant Chinese regulations, emphasizing voluntary participation and informed consent. Written informed consent was obtained from all participants at the time of survey completion, with prior approval from departmental heads and prison authorities.

Data analysis

Data analysis was performed using SPSS Statistics 24.0. Initially, the dataset was screened for missing values, with Little's Test yielding a non-significant result ($\chi^2=7.989$, $p=0.09$), indicating randomness in the missing data across the paper-and-pencil dataset. In the sample of 450 women in prison, missing values were observed in 8.67% of the MSPSS scale responses. Due to limitations in handling multiple imputations within the PROCESS macro, list-wise deletion was applied to maintain unbiased regression slopes as recommended by Salgado et al. (2016) [41]. The normality of variables was evaluated using the Kolmogorov-Smirnov test. Pearson's correlations were utilized to explore the relationships between study variables, and independent t-tests were conducted to examine associations between discrimination experiences (EDS) and key variables of interest. The PROCESS macro for SPSS was employed to construct and analyze parallel mediation models [42]. To assess indirect effects,

5,000 bootstrap samples were analyzed with 95% bias-corrected confidence intervals (CIs). R^2 was employed as a valid measure of effect size [43]. Diagrams illustrating the suggested models are presented in Figs. 1 and 2.

Results

Descriptive statistics

Table 1 presents the demographic characteristics of women in prison, including age, whether they are an only child, education level, and types of charged offenses. In terms of charged offenses, non-violent offenses such as fraud, robbery, and theft are the most common, with 183 instances, accounting for 44.5% of the sample.

Analysis of variance

Table 2 presents the impact of childhood discrimination experiences on various types of charged offenses by women in prison. The analysis reveals that for most crime categories, the mean values for the group with high discrimination experiences are significantly higher than those for the group with low discrimination experiences. Women in prison who reported higher levels of childhood discrimination tended to score higher on violent offense behaviors ($M=54.12$, $SD=9.17$) compared to those with lower discrimination experiences ($M=38.25$, $SD=8.38$), with a notable effect size ($t=-3.061$, $p=0.006$, $d=2.564$). This result suggests a potential association between childhood discrimination and increased aggression, particularly in violent offenses, though causal relationships cannot be inferred from this study.

Correlations analysis

Table 3 provides descriptive statistics and bivariate correlation analysis among variables. The correlation analysis

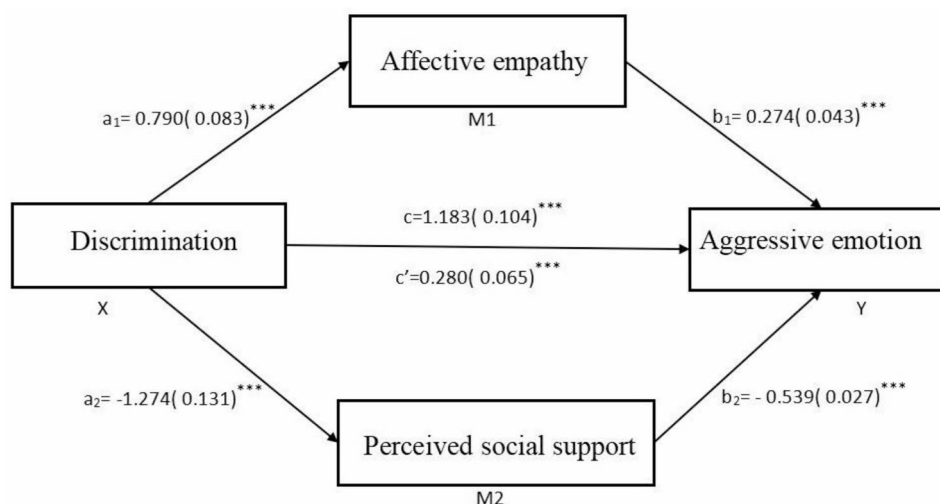


Fig. 1 Parallel multiple mediation model with discrimination as the independent variable, affective empathy (M1) and perceived social support (M2) as mediators and aggressive emotion as the dependent variable. Figures represent unstandardized beta-coefficients with the standard error (SE) shown in parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

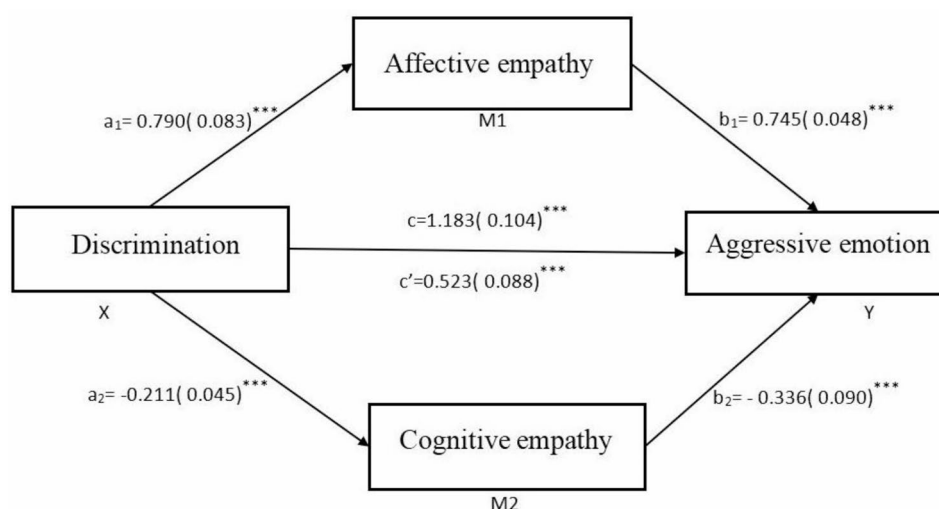


Fig. 2 Parallel multiple mediation model with discrimination as the independent variable, affective empathy (M1) and social support (M2) as mediators and aggressive emotion as the dependent variable. Figures represent unstandardized beta-coefficients with the standard error (SE) shown in parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 1 Demographic characteristics of participants $N = 411$

Variable	Category	Total sample N/%
Age	18–30	127(30.9%)
	31–40	109(26.5%)
	41–50	95(23.1%)
	51–65	80(19.5%)
Only Child	Yes	94(22.9%)
	No	317(77.1%)
Education	Junior High or below	217(52.8%)
	High School (Vocational High)	147(35.8%)
	Bachelor's Degree	41(10.0%)
	Graduate Degree or above	8(1.5%)
Types of Crime	Violent offense (assault, homicide, etc.)	54(13.2%)
	Non-violent offense (fraud, robbery, theft, etc.)	183(44.5%)
	Public disorder offenses (causing traffic accidents, disturbing public order, etc.)	174(42.3%)

revealed significant positive correlations between discrimination experiences in childhood and aggressive emotions ($r = 0.492$, $p < 0.001$), anger ($r = 0.496$, $p < 0.001$), and hostility ($r = 0.460$, $p < 0.001$), indicating that higher perceptions of discrimination are associated with stronger manifestations of these aggressive emotions. Cognitive empathy was significantly positively correlated with perceived social support ($r = 0.343$, $p < 0.001$) but showed

significant negative correlations with aggressive emotions and anger, suggesting that individuals with higher cognitive empathy exhibit lower aggressive behaviors and anger when perceiving social support. Affective empathy was positively correlated with social support ($r = 0.672$, $p < 0.001$), aggressive emotions ($r = 0.704$, $p < 0.001$), and anger ($r = 0.708$, $p < 0.001$), indicating that individuals with higher affective empathy experience more social support and exhibit stronger aggressive emotions and anger.

Mediation analyses

Parallel multiple mediation model examining the indirect effect of discrimination on aggressive emotion

Table 4 presents the path and effect values of the intermediary model examining the indirect effects of discrimination on aggressive emotion through multiple mediation pathways. Two multiple mediation models were employed to explore the putative effects of empathy and PSS. First, correlations among predictor variables were examined for multicollinearity [44]. As correlations did not exceed recommended cut offs, all predictor variables were included in the models.

Table 2 Analysis of differences in childhood discrimination experiences among women in prison by type of crime

Types of crime	Low discrimination (M ± SD)	High discrimination (M ± SD)	t	SE	p	d
Violent offense	(38.25 ± 8.38)	(54.12 ± 9.17)	-3.061	5.199	0.006	2.564
Non-violent offense	(14.50 ± 9.25)	(51.37 ± 11.17)	-3.938	4.949	0.000	1.780
Public disorder offenses	(32.68 ± 9.12)	(49.45 ± 9.75)	-4.054	4.215	0.003	1.797

Table 3 Descriptive statistics & bivariate correlations between EDS, IRI, PSS, and aggressive emotion

Variable	M	SD	1	2	3	4	5	6
1. EDS	31.92	4.55	-					
2. IRICE	26.18	4.23	-0.227***	-				
3. IRIAE	31.19	8.47	0.425***	-0.271***	-			
4. PSS	39.96	13.39	-0.433***	0.343***	0.672***	-		
5. Hostility	22.17	5.65	0.460***	-0.314***	0.660***	-0.864***	-	
6. Anger	25.58	5.61	0.496***	-0.338***	0.708***	-0.760***	0.887***	-
7. Aggressive emotion	47.75	10.94	0.492***	-0.336***	0.704***	-0.862***	0.972***	0.971***

Note IRICE=Cognitive empathy, IRIAE=Affective empathy

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 4 Path and effect values of the intermediary model

Path	Effect	SE	Boot LL CI	Boot UL CI	Relative mediation effect
Total indirect effect	0.903	0.084	0.739	1.068	76.33%
Discrimination - Affective empathy -Aggressive emotion	0.216	0.047	0.138	0.329	18.30%
Discrimination - Cognitive empathy -Aggressive emotion	0.071	0.027	0.028	0.135	6.00%
Discrimination-Social support-Aggressive emotion	0.687	0.084	0.529	0.858	58.03%

Parallel multiple mediation model examining the indirect effect of discrimination on aggressive emotion

The first multiple mediation model tested whether the impact of the cumulative score of childhood discrimination experiences on aggressive emotions was mediated by affective empathy and perceived social support (Fig. 1). The study found that childhood discrimination experiences significantly predicted higher levels of affective empathy ($a_1=0.790$) and reduced perceived social support ($a_2 = -1.274$). The total effect (C) of childhood discrimination experiences on aggressive emotions was significant ($b=1.183$, $SE=0.104$, $p < 0.001$, 95% CI [0.980, 1.387]), even without considering these two mediators. The specific indirect effects through affective empathy (axb) ($b=0.217$, $SE=0.048$, 95% CI [0.138, 0.329]) and perceived social support ($b=0.687$, $SE=0.084$, 95% CI [0.529, 0.858]) were also significant. Thus, both variables mediated the relationship between childhood discrimination experiences and aggressive emotions ($b=0.280$, $SE=0.065$, $p < 0.001$, 95% CI [0.152, 0.408]), together accounting for about 52.6% of the variance ($R^2=0.526$).

Separate multiple parallel mediation analyses were conducted with the total score of childhood discrimination experiences as the independent variable. The analyses revealed significant indirect effects of childhood discrimination experiences on aggressive emotions through affective empathy ($b=0.216$, $SE=0.048$, 95% CI [0.135, 0.324]) and perceived social support ($b=0.687$, $SE=0.083$, 95% CI [0.533, 0.858]). The model accounted for about 76.8% of the variance. Further analyses showed significant indirect effects of childhood discrimination experiences on hostility through affective empathy ($b=0.066$, $SE=0.022$, 95% CI [0.029, 0.118]) and perceived social support ($b=0.400$, $SE=0.045$, 95% CI [0.316, 0.492]), explaining approximately 76.41% of the

variance in hostility scores. Lastly, the analysis indicated significant indirect effects on anger through affective empathy ($b=0.151$, $SE=0.030$, 95% CI [0.099, 0.218]) and perceived social support ($b=0.286$, $SE=0.044$, 95% CI [0.203, 0.378]), explaining more than half of the variance in anger ($R^2=69.77\%$).

Parallel multiple mediation model examining the indirect effect of discrimination on aggressive emotion

The second multiple mediation model conducted an exploratory analysis of the indirect effects of childhood discrimination experiences on aggressive behavior through the two dimensions of empathy (Fig. 2). The total effect of childhood discrimination experiences was significant ($b=1.183$, $SE=0.104$, $p < 0.001$, 95% CI [0.980, 1.387]), with higher levels of childhood discrimination associated with stronger affective empathy ($b=0.790$, $SE=0.083$, $p < 0.001$, 95% CI [0.627, 0.954]) and lower cognitive empathy ($b = -0.211$, $SE=0.045$, $p < 0.001$, 95% CI [-0.299, -0.123]). Both variables were found to mediate the link between childhood discrimination experiences and aggressive emotion ($b=0.523$, $SE=0.088$, 95% CI [0.350, 0.697]). The total effect model suggested that the three predictor variables explained about 55.66% of the variance in the outcome variable.

Discussion

The current study underscores the high prevalence of childhood discrimination experiences among women in prison, with approximately 75.7% reporting such histories. This prevalence aligns with findings from the United States, where 57% of a comparable population reported similar experiences [45]. This comparison highlights a critical and persistent issue that spans different societal contexts, emphasizing the heightened vulnerability of

women in prison to adverse experiences from an early age. This vulnerability is often more pronounced in populations that are already marginalized or facing systemic challenges [46]. The findings underscore the need for targeted interventions to address specific traumas related to discrimination and other social adversities within the women prison population. Furthermore, the international similarities in data suggest that the issues of childhood discrimination and its long-term effects on behavior and mental health are not confined by cultural or national boundaries, demanding comprehensive international strategies and policies to mitigate these impacts.

The differential analysis underscores the significant impact of childhood discrimination on the behavioral patterns of women in prison, with a particular focus on violent offenses. Women in prison who experienced higher levels of childhood discrimination scored significantly higher in violent offenses compared to their counterparts with lower discrimination experiences. This finding highlights a strong connection between early discriminatory experiences and heightened aggression, particularly in the form of physical aggression. These findings align with prior research suggesting that early exposure to discrimination may lead to more heightened aggressive tendencies behaviors in adulthood [47, 48]. Heightened aggressive emotions, fostered by discrimination during formative years, often drive these tendencies. Discrimination can cultivate deep-seated hostility and distrust toward societal structures, amplifying aggressive emotional responses. These emotions frequently manifest as confrontational or violent behaviors, often serving as a retaliatory response to perceived injustices. Moreover, chronic exposure to discrimination increases psychological stress and diminishes self-esteem, both of which are strongly associated with maladaptive behaviors and intensified aggression [49, 50].

Correlation analysis suggests that childhood discrimination is associated with later aggressive behaviors, highlighting the potential for early adverse experiences to influence emotional responses and aggression in adulthood [51]. Cognitive empathy is significantly positively correlated with perceived social support and negatively with aggressive emotions and anger. This suggests that higher cognitive empathy might buffer against aggressive behaviors by enhancing the perception of social support, aiding in better management of adverse emotions. Conversely, affective empathy, while enhancing the perception of social support, may also intensify emotional responses to negative stimuli, leading to increased aggression and anger. These findings align with previous research indicating that high levels of affective empathy can increase sensitivity to others' distress, which may in turn amplify personal emotional responses [52, 53].

This study demonstrates that childhood discrimination not only directly heightens aggressive emotions but also indirectly influences aggressive emotions through the mediation of affective empathy. This underscores the crucial role of affective empathy in modulating emotional responses triggered by early discrimination experiences. High levels of affective empathy may make individuals more sensitive to emotional stimuli, particularly those that are negative or threatening. Among women in prison, frequent discrimination experiences during childhood could enhance their sensitivity to negative emotions, prompting them to adopt aggressive behaviors as a coping mechanism in the face of conflict or stress. However, enhanced affective empathy does not always lead to positive social outcomes. In certain social and psychological contexts, such as environments characterized by persistent discrimination or inequality, high levels of affective empathy may result in more frequent emotional resonance, particularly when these resonances are negative [54]. This excessive emotional resonance can increase the psychological burden on individuals, making them more likely to vent accumulated emotional stress through aggressive behaviors.

The results suggest that childhood discrimination may be associated with reduced levels of perceived social support, which in turn may contribute to heightened aggressive emotions. This underscores the pivotal role of social support in mitigating the adverse emotional effects caused by early negative experiences. Social support is widely regarded as a crucial resource for alleviating psychological stress and negative emotions. For women in prison who experienced considerable discrimination during childhood, a strong network of social support can effectively help manage the emotional repercussions. However, in the absence of adequate social support, these women may lack the resources to cope with these negative emotions, increasing their tendency to express dissatisfaction and frustration through aggressive behaviors. Moreover, the study identified a significant moderating relationship between reduced social support and increased aggressive emotions, suggesting that bolstering social support can directly enhance mental health and reduce aggressive behaviors by decreasing the psychological stress triggered by discrimination. This implies that for women in prison, enhancing their social support networks and providing effective social resources are essential strategies for mitigating aggressive behavior and promoting mental health [55, 56].

The second multiple mediation model provides an exploratory analysis of the indirect effects of childhood discrimination experiences through two dimensions of empathy—cognitive and affective—on aggressive emotion. The notable association between higher levels of discrimination and increased affective empathy suggests

that individuals who have endured more discrimination may become more emotionally sensitive to the plights of others. This heightened emotional empathy could intensify emotional reactions when facing challenges or injustices, potentially leading to more aggressive behavior as these individuals become more emotionally involved and may be overwhelmed by emotional contagion. Conversely, the link between higher discrimination and lower cognitive empathy indicates a diminished capacity to analytically understand others' emotions and perspectives. This reduction in cognitive empathy could restrict an individual's ability to effectively regulate emotional responses, leading to impulsivity and aggressive actions. Although affective empathy enhances emotional sensitivity, excessive adverse experiences, such as discrimination, may impair the cognitive processes required for adopting perspectives and responding rationally to social cues [57, 58].

The mediation analysis shows that cognitive and affective empathy play significant but opposing roles in how childhood discrimination influences aggressive behavior [59]. Affective empathy exacerbates emotional responses, which could lead to aggression, whereas insufficient cognitive empathy hinders constructive management of these responses. This highlights the complex interaction between types of empathy and aggressive behavior within the context of discrimination. The findings suggest that interventions aimed at reducing aggression in individuals with high levels of discrimination should not only focus on enhancing cognitive empathy to improve perspective-taking and decrease impulsiveness but also manage affective empathy to prevent excessive emotional reactions. Addressing these nuanced aspects of empathy may help mitigate the effects of early adverse experiences on later aggressive behaviors, offering more targeted behavioral interventions.

In studying women in prison, the relationship between social support and empathy reveals unique dynamics. Observations indicate that individuals with higher levels of social support often also exhibit higher levels of cognitive empathy, potentially due to their advanced interpersonal skills [60, 61]. Women in prison with enhanced cognitive empathy are likely more adept at interpreting social cues, which aids in establishing reciprocal relationships and thus enhances their perception of social support. Conversely, the emotional intensity associated with affective empathy might prompt these women to establish emotional boundaries, which could affect their perception of social support. Because affective empathy makes individuals more sensitive and responsive to the emotional states of those around them, they might maintain a certain distance in relationships to shield themselves from negative emotions. Therefore, for women in prison, enhancing cognitive empathy could help

strengthen their social support networks, while managing the intensity of affective empathy is equally crucial to ensure they can effectively receive and utilize this support. This area necessitates more empirical research to validate and further clarify these nuanced dynamics, particularly how interventions can enhance these women's social and emotional capabilities to improve their overall well-being and reduce the likelihood of reoffending.

Limitations & future directions

This study examines the complex relationships between childhood discrimination, empathy, perceived social support, and aggression among women in prison, offering valuable insights. However, several limitations must be acknowledged. First, the study focuses on a specific subgroup of women in prison, specifically those in mental health units, which may limit the generalizability of the findings to broader populations of women in prison or other demographic groups. Second, the cross-sectional design of the study precludes the ability to draw causal conclusions, as the temporal relationships among the variables cannot be established. Third, the reliance on self-reported data to measure experiences of discrimination, empathy levels, social support, and aggressive behaviors may introduce potential biases, including social desirability bias and recall bias, which could affect the reliability and accuracy of the data. Fourth, the study does not account for potential confounding variables such as socioeconomic status, cultural factors, or pre-existing mental health conditions, which may influence the relationships observed.

Future research should adopt longitudinal designs to better assess causal relationships between childhood discrimination, empathy, social support, and aggression, and monitor these variables over different developmental stages. Expanding the sample to include women from diverse correctional settings, demographic backgrounds, and varying offense severities would improve the generalizability of the findings. Additionally, future studies should incorporate objective measures alongside self-reported data, such as behavioral assessments or physiological indicators, to enhance the validity of the findings. Further investigation is needed to identify the specific neurobiological and psychological mechanisms underlying the observed relationships, including how empathy and social support mediate or moderate the impact of childhood discrimination on aggression. Lastly, policymakers and practitioners should consider these findings when developing preventive and rehabilitative strategies, ensuring that interventions target the root causes of aggression, such as unresolved childhood trauma and social isolation, to better support women in prison and improve their long-term outcomes.

Clinical & theoretical implications

This study delves into the intricate dynamics of childhood discrimination, empathy, and perceived social support and their effects on aggression among women in prison, offering crucial clinical and theoretical insights. From a clinical perspective, the findings underscore the need for specialized interventions that are carefully tailored to address the unique emotional and social challenges encountered by these women, often rooted in early discriminatory experiences. Effective strategies could include the enhancement of empathy and strengthening of social support networks, which are vital for moderating aggressive behaviors associated with past discrimination. Furthermore, the implementation of emotional regulation training could assist these individuals in managing their reactions to discriminatory stimuli more effectively, potentially reducing aggressive outbursts and enhancing overall mental health. Correctional facilities are encouraged to establish comprehensive support systems that provide robust social, psychological, and emotional support, fostering healthier interpersonal relationships and facilitating the rehabilitation process.

Theoretically, the research enriches our understanding of aggression by demonstrating how discrimination experienced during childhood can profoundly influence emotional responses and behavioral patterns in adulthood. It supports the concept that aggression can be a learned response to environmental stressors, heavily influenced by emotional and social factors. The study challenges traditional views on empathy by illustrating that while affective empathy enhances sensitivity to emotional cues, it could also lead to increased aggression if not managed appropriately. This nuanced understanding of empathy adds significant depth to theoretical models of social behavior and aggression. Additionally, the role of perceived social support as a critical mediator in these models highlights the therapeutic importance of social relationships and supports policy initiatives aimed at creating inclusive, supportive environments from an early age to reduce the long-term impacts of discrimination and aggression. By addressing these clinical and theoretical issues, the research lays the groundwork for developing more effective strategies to mitigate aggression and improve rehabilitation outcomes for women in prison, emphasizing the transformative potential of empathy and social support within correctional settings.

Conclusion

This study contributes to our understanding of how childhood discrimination may influence aggressive emotions in adult women in prison, particularly through the potential mediating effects of affective empathy and perceived social support. The findings suggest an association between childhood discrimination experiences and adult

aggression, indicating that affective empathy and social support may play mediating roles in this relationship. The research suggests that enhanced affective empathy may amplify emotional reactions to negative stimuli, which could potentially contribute to aggression under specific circumstances. Meanwhile, perceived social support serves as a vital buffering mechanism that may help moderate and mitigate the impact of early adversities on current behavior, highlighting the importance of carefully tailored interventions. Future interventions could explore the potential benefits of enhancing empathy skills and strengthening social support networks to address the emotional and behavioral needs of women in prison. Further research is needed to evaluate the effectiveness of such strategies.

Furthermore, this study provides insights into the psychological mechanisms underlying aggressive behaviors and advances theoretical understandings of how to mitigate the long-term effects of childhood discrimination through improved adaptability and psychological interventions. Future research should continue to explore these dynamics and develop targeted interventions aimed at reducing the adverse impacts of negative childhood experiences. By promoting the potential for long-term rehabilitation and social reintegration, these efforts may inform the development of prevention and rehabilitation programs, ultimately contributing to strategies aimed at addressing the root causes of aggression and enhancing public safety.

Author contributions

Author Lili Liu was responsible for drafting of the manuscript and data analysis. Author Xiaobin Ding include contributed to data collection and analysis. Author Shuang Li handled experimental operations and review manuscript. Author Xiaomei Chen contributed to data collection.

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Data availability

The data supporting the findings of this study are managed by the National Prison Administration and are not publicly available due to privacy and ethical considerations. Access to these data can be requested from the corresponding author, subject to approval by the relevant authorities.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Review Committee of Northwest Normal University (Approval Number 2024035). All of the procedures were performed in accordance with the Declaration of Helsinki and relevant policies in China. All participants agreed to participate voluntarily, with informed consent when they fled in the survey.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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