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The prevalence and risk factors of conduct disorder among juvenile delinquents in China

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Conduct disorders (CDs) are common in juvenile justice cases, but their prevalence varies across regions. It is useful to help people comprehend the incidence and risk factors for CDs in the judicial environment. To determine the prevalence of CDs among juvenile delinquents in China and explore the risk factors for CDs in terms of demographic characteristics, individual characteristics, and social environmental factors. A total of 545 male juvenile delinquents and 297 typically developed adolescents from China were recruited for this study. The Conduct Disorder Screening Form was used to assess the symptoms of CD, and related measurements, including the Demographic Questionnaire, Short-Egna Minnen av Barndoms Uppfostran for Chinese (s-EMBU-C), the Short Form of the Childhood Trauma Questionnaire (CTQ-SF), the Parental Monitoring Scale, the Deviant Peer Affiliation Scale, the Inventory of Callous-Unemotional Traits (ICU), the Self-Control Scale (SCS), and the Moral Disengagement Scale (MDS), were carried out. Among the juvenile delinquents, 58.7% met the symptoms of CD, with adolescent-onset CD accounting for 90.94% of these cases. There was no statistically significant difference in the incidence of CD between the criminal group and the illegal group, but the criminal group scored higher on aggression than the illegal group. The adolescents with CDs differed from the typically developed adolescents in demographic characteristics, parenting style, individual characteristics, and deviant peer affiliation. Discriminant analysis revealed that deviant peer affiliation had the greatest impact on the CDs of adolescents (structural matrix = 0.85), followed by the level of parental monitoring and moral disengagement. CD is widespread in Chinese juvenile delinquents. CD symptoms differ between criminal and illegal juvenile delinquents. Risk factors such as deviant peer affiliation, inadequate parental monitoring, moral disengagement, and low parental warmth all contribute to the high prevalence of CD.

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Introduction

Juvenile delinquency not only hinders the growth of young people but also threatens social stability. In recent years, the legal protection for minors and measures to fight crime in China have been strengthened, resulting in a decrease in juvenile delinquency across the country (Zhang, 2019). Although the crime rate in China is decreasing with time, juvenile delinquency and crime remain a thorny issue, featuring youthful and violent involvement and gang affiliation (Chen, 2021). Studies have consistently revealed that the incidence of mental disorders in the juvenile delinquent population is higher than that in typically developing adolescents (Colley et al., 2018; Underwood and Washington, 2016). It has been found that approximately 65% to 70% of juvenile offenders have at least one psychiatric diagnosis of mental illness (Colins et al., 2010; Wasserman et al., 2002). The prevalence of mental disorders among juvenile delinquents is concerning and can lead to a variety of negative outcomes, such as an increased risk of recidivism. Thus, mental health could be an important factor influencing the recidivism of juvenile delinquents.

Conduct disorder (CD) is a common mental disorder in childhood and adolescence that is characterized by persistent and repeated violations of the rights of others and age-appropriate social norms through aggressive and antisocial behavior, such as physical or verbal aggression, theft, or vandalism (Dodge and Pettit, 2003). In clinical psychiatric diagnosis, CD is classified in the Diagnostic and Statistical Manual of Mental Disorders (DSM) as a type of disruptive, impulsive and behavioral disorder that includes four symptom categories: cruel treatment of humans and animals, destruction of property, swindling or pilfering, and major breaches of rules (such as skipping school and running away from home). CD has been found to be inextricably linked to juvenile delinquency and recidivism. Previous studies have demonstrated that adolescents with CD tend to have cognitive impairments, such as deficits in perception, cue interpretation, and information processing (Dodge and Pettit, 2003; Elahe and Hassan, 2016; Frick and Viding, 2009), and they are more likely to perceive their environments as hostile and to react aggressively to others in the environment (Baker and Scarth, 2002). Studies have revealed that adolescents with CD demonstrate more deviant behavior and misbehavior, intense violent inclinations, aggressive behaviors, and unlawful activities (Frick et al., 2005), and their risk of recidivism is higher than that of juvenile delinquents without CD (Vermeiren et al., 2002). Frick et al. (2005) demonstrated that adolescents with CD tend to encounter difficulties in social and academic aspects, which may result in exclusion from their peers and disciplinary action from their schools. Adolescents with CD may experience many difficulties in their development, including mental health issues, maladaptive behaviors, and physical health problems (Odgers et al., 2008; Rivenbark et al., 2018), and some of them are even at risk of developing antisocial personality disorder in adulthood (Hill, 2018; Robins, 2009). Although juvenile delinquency is strongly associated with CD symptoms, it cannot be exactly likened to CDs. The law typically recognizes delinquency through one or more individual actions, while the antisocial behaviors associated with CD exhibit a consistent pattern. Additionally, the correlation between CD and juvenile delinquency varies according to the legal systems of nations and regions. Even though some adolescents with CDs display antisocial behaviors, they may be able to escape legal penalties due to their age or sufficient "tact". Thus, it is necessary to focus on the correlation between CD and juvenile delinquency.

Unfortunately, the prevalence of CD among adolescents is high, with a global estimate of 2–2.5%, and twice as high in boys (3–4%) than in girls (Polanczyk et al., 2015). CD is an extremely common mental illness in juvenile justice settings. CD is also prevalent in juvenile justice settings, with approximately 53% of adolescents in detention centers and correctional institutions diagnosed with CD (Fazel et al., 2008). An analysis of 47 studies from 19 countries over the period 1966–2019 found that the prevalence of CD among male adolescents in detention was 61.7% (95% CI: 55.4%–67.9%), while for female adolescents, it was 59.0% (95% CI: 44.9%–73.1%). An increasing prevalence of CD was reported in studies published since 2006 (Beaudry et al., 2021). The incidence of CD also differs across regions. Teplin et al. (2002) conducted a survey on juvenile offenders in the United States and found that approximately 40% of them met the diagnostic criteria for CD. However, Maru et al. (2003) found that the prevalence of CD among juvenile offenders in the Nairobi Juvenile Court in Kenya was 20%. A study of Korean adolescents by Choi et al. (2017) revealed that 55% of juvenile delinquents had been diagnosed with CD.

The ecological model emphasizes that individuals are nested in a series of interacting environmental systems that interact with individuals and influence their development (Bronfenbrenner, 1979). CD or deviant behavior is a complex social behavior that involves the physiological, psychological and social characteristics of adolescents. Its production is the result of multiple factors, including biological and physical factors, social and family environment factors, and individual psychological and conscious factors (Fairchild et al., 2019; Moffitt and Scott, 2008). For example, some factors related to the family environment, including inadequate parental supervision, living with a divorced parent and living with a parent who is incarcerated or has reported drug use, place adolescents at an elevated risk for CD (Yockey et al., 2019). Freeze et al. (2014) compared parenting practices between adolescents with CD and those without CD, revealing that children in the CD group had parents who exhibited high control, low emotional expressiveness, minimal engagement with their children, and insufficient supervision and monitoring. The researchers summarized previous studies and found that the most important risk factors that predict CD include poor parental supervision, punitive or erratic parental discipline, cold parental attitude, childhood physical abuse, parental conflict, disrupted families, antisocial parents, large family size, low family income, antisocial peers (Murray and Farrington, 2010), antisocial parents, broken home, and abusive parenting, particularly neglect (Bassarath, 2001). Furthermore, a previous study on social environment factors revealed that adolescents with CD often originate from dysfunctional families and frequently encounter rejection from peers; thus, they may establish attachments to delinquent acquaintances or other youths with lengthier criminal histories (Hill and Maughan, 2001). The robust correlation between peer rejection and deviant peer affiliation is strongly associated with the development and maintenance of conduct problems (Chen et al., 2015). From the perspective of personal factors, callous-unemotional traits and moral disengagement can act together to produce a chronic antisocial affective-cognitive system, and in particular, moral disengagement may provide a way for adolescents with disruptive behavior disorders to engage in disruptive behavior (Choi and Kim, 2010).

In Western countries, CD has become one of the most important reasons for referrals to child and adolescent mental health services due to its high incidence and harmful effects, and numerous epidemiological investigations, risk factor assessments, and interventions for CD have been conducted (Canino et al., 2010). However, compared with other mental disorders in adolescence, such as attention deficit hyperactivity disorder (ADHD), there is a lack of studies on CD in China. Chinese culture is characterized by the suppression of aggressive, angry, and intense

emotions and actions, causing Chinese parents to be less tolerant of externalizing behaviors and to be more capable of controlling them. This may lead to different perceptions and expectations of children's behaviors between Chinese and Western parents, which could be a contributing factor to the higher rates of internalizing syndromes and lower rates of externalizing disorders (e.g., CD) in China than in Western countries (Canino et al., 2010; Wang et al., 2022). However, since the beginning of the 21st century, studies have revealed that the incidence of CD in Chinese adolescents is on the rise (Wang et al., 2022). Therefore, considering that CD is inextricably associated with juvenile delinquency and that the correlation between CD and juvenile delinquency varies according to the legal systems of nations and regions, it is necessary to study the prevalence of and risk factors for CD among juvenile delinquents in the context of Chinese culture.

To mitigate the impact of CD and optimize healthcare resource allocation among juvenile delinquents, it is important to enhance our understanding of its epidemiology in China. Thus, this study first aims to investigate the prevalence and characteristics of CD among Chinese juvenile delinquents, which can provide a reference for facilitating targeted interventions. Notably, juvenile delinquency includes both illegal activities and criminal activities. The difference between illegal activities and criminal activities primarily lies in the severity of delinquent acts and the age of juvenile delinquents. Illegal activities usually involve less serious offenses, such as infringement of public security administration penalties, while criminal activities may include more serious charges, such as intentional homicide and robbery. Juveniles who commit delinquent activities are sent to supervisory sites, depending on the specific activity. Reformatory schools are educational institutions specifically designed for juvenile delinquents who have committed illegal activities (Guo, 2023), whereas correctional facilities are institutions intended to detain and rehabilitate juvenile delinquents who have committed criminal activities (Zhu, 2023). Juveniles between the ages of 12 and 16 who commit criminal activities will be sent to a correctional facility for education and rehabilitation, and those between the ages of 12 and 16 who commit illegal activities will be sent to a reformatory school. Thus, we further focus on the prevalence and characteristics of CD among Chinese juvenile delinquents in various supervisory settings, and compared the differences in sociodemographic, parental parenting factors, social environment factors and personality traits between juvenile delinquents with CD and typically developed adolescents without any CD

symptoms to explore the risk factors for CD among Chinese juvenile delinquents to help supervisory authorities identify high-risk groups and intervene in a timely manner to reduce the various negative outcomes that may arise. We hypothesized that the incidence and severity of CD in the criminal group was higher than in the illegal group. Furthermore, sociodemographic factors such as parental divorce, a father/mother's history of drug use or imprisonment, and a father/mother's low level of education can all contribute to the development of CDs. Parenting factors, such as high levels of childhood trauma, low levels of parental monitoring, and low levels of parental emotional warmth, may also play a role. Additionally, social environment factors, such as deviant peer affiliation, and personal characteristics, such as high levels of callous-unemotional traits, low self-control, and high levels of moral disengagement, can further contribute to the development of CDs.

Methods
Sample
Delinquent group. The delinquents sample was from a juvenile correctional facility (298) and five reformatory schools (247) in a province of China. Their ages ranged from 12 to 18 years (mean = 15.69 years, SD = 1.48). The types of offenses included public physical conflicts (8.07%), deliberate injury (8.81%), homicide (2.02%), larceny (40.92%), rape (10.83%), robbery (26.79%), provocation (1.10%) and others (1.47%). A total of 45 participants (8.26%) reported that their fathers had a drug use or prison history, 14 (2.57%) of them reported that their mothers had a drug use or prison history, 294 (53.94%) of them reported that their fathers' education levels were primary school or below, 343 (62.94%) of them reported that their mothers' education levels were primary school or below, and 149 (27.34%) of them reported that their parents had divorced. More detailed demographics was shown in Table 1.

Typically developed group. Three hundred male adolescents without any CD symptoms from a township middle school, whose educational levels and family economic characteristics matched with those of delinquent group, were included in the typically developed group. Two hundred and ninety-seven valid questionnaires were obtained. Their ages ranged from 14 to 17 years (mean = 15.12 years, SD = 0.63). A total of 15 adolescents (5.05%) reported that their fathers had a history of drug use or prison, and 4 adolescents (1.35%) reported the same for their

Table 1 Descriptive analysis of the subject (M (SD)/N(%)).

		Total	Criminal group	Illegal group	TD group
Age		15.69 (1.48)	16.72 (0.67)	14.44 (1.22)	15.12 ± 0.63
The types of offenses	Public physical conflicts	44 (8.07)	15 (5.03)	29 (11.74)	
	Deliberate injury	48 (8.81)	48 (16.11)		
	Homicide	11 (2.02)	11 (3.69)		
	Larceny	223 (40.92)	37 (12.42)	186 (75.30)	
	Rape	59 (10.83)	59 (19.80)		
	Robbery	146 (26.79)	114 (38.26)	32 (12.96)	
	Provocation	6 (1.10)	6 (2.01)		
	Others	8 (1.47)	8 (2.68)		
A drug or prison history of father		45 (8.26)	28 (9.40)	17 (6.88)	15 (5.05)
A drug or prison history of mother		14 (2.57)	10 (3.36)	4 (1.62)	4 (1.35)
A low educational level of father		294 (53.94)	195 (65.44)	99 (40.08)	87 (29.29)
A low educational level of mother		343 (62.94)	222 (74.50)	121 (48.99)	154 (51.85)
Parental divorce		149 (27.34)	58 (19.46)	91 (36.84)	54 (18.18)

TD Typically developed.

mothers. Eighty-seven adolescents (29.29%) reported that their fathers had a primary school education or lower, and 154 adolescents (51.85%) reported the same for their mothers. Fifty-four adolescents (18.18%) reported that their parents were divorced. More detailed demographics was shown in Table 1.

Measurements

Sociodemographic factors. This questionnaire was self-designed and was used to obtain the age, sex and family physical environment characteristics of the subjects (e.g., "parental divorce", "a drug or prison history of the father", "a drug or prison history of the mother", "a low educational level of the father", "a low educational level of the mother").

Parenting factor

Short-Egna Minnen av Barndoms Uppfostran for Chinese (s-EMBU-C) (Jiang et al.): Perris et al. (1980) created the original version of the Parenting Style Questionnaire, which consists of two sections, the father subscale and the mother subscale, each with 81 questions. Respondents are asked to recall how their parents raised them when they were young to evaluate their parents' parenting styles. Jiang et al. (2010) revised the s-EMBU-C, which consists of 21 items for each subscale. The coefficients in the subscales range from 0.74 to 0.84. In this study, we used only the emotional warmth dimension. The higher the scores, the more emotional warmth participants feel from their parents. In this study, the Cronbach's α coefficient for the dimension of paternal emotional warmth was 0.84, while for maternal emotional warmth, it was 0.90.

The Short Form of the Childhood Trauma Questionnaire (CTQ-SF): The Short Form of the Childhood Trauma Questionnaire created by Bernstein et al. (2003) is used to assess one's experience of abuse before the age of twelve. It consists of 28 items, 25 of which are clinical items and 3 of which are validity items, and it is divided into five subscales: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. Each item is assessed on a Likert scale ranging from 1 to 5, with the validity items not included in the total score calculation. Higher scores indicate more abuse encounter by respondents during childhood. Zhao et al. (2005) translated it to Chinese and found the Cronbach's α to be 0.77 in a Chinese sample. In this study, it was 0.83.

The parental monitoring scale: This is a self-designed scale that is used to assess the monitoring of parents over their children's daily behaviors. The questionnaire comprises 11 items (e.g., "Do your parents know what you do after school every day"), and each item is rated on a 5-point Likert scale ranging from 1 = never to 5 = always. Higher scores indicate more parental monitoring. The CFA results show that the one-factor model fit the data well, indicating a high construct validity of the scale ($\chi^2/df = 2.67$, GFI = 0.98, CFI = 0.98, RMSEA = 0.05). The Cronbach's α in this study was 0.84.

Personal factors

The Inventory of Callous-Unemotional Traits (ICU): Essau et al. (2006) designed the Callous-Unemotional Traits scale, comprising 24 items. It has three subscales: callousness, uncaring, and unemotional. All items are assessed on a 4-point Likert scale ranging from 0 = not at all true to 3 = definitely true. Previous studies have shown that the scale is effective in assessing CU traits in adolescents (Barry et al., 2013). Cronbach's α was 0.75 in a sample of Chinese adolescents(Yang and Huang, 2013). In the present study, the Cronbach's α was 0.68.

The Self-Control Scale (SCS): Tangney et al. (2004) compiled the Self-Control Scale. It contains 36 items and consists of five subscales: self-discipline, deliberate/nonimpulsive action, healthy habits, work ethic, and reliability. Items are rated on a 5-point Likert scale ranging from 1 = not at all like me to 5 = very much like me. The Chinese version of the SCS consists of 19 items, and its Cronbach's α was 0.86 in a Chinese sample (Tan and Guo, 2008). The Cronbach's α in this study was 0.83.

The Moral Disengagement Scale (MDS): It was created by (Bandura et al., 1996). There are 32 items, including eight disproving mechanisms: moral justification, euphemistic labeling, advantageous comparison, distortion of consequences, displacement of responsibility, diffusion of responsibility, dehumanization, and attribution of blame for different forms of transgressive conduct. All items are rated on a 5-point Likert scale ranging from 1 = not at all to 5 = completely agree. The Chinese form of the MDS was translated by Yue (2013), and its Cronbach's α was 0.91. The Cronbach's α in this study was 0.90.

Social environment factors

The deviant peer affiliation scale: We created this scale based on previous studies (Elliott et al., 1982; Tian et al., 2018; Wang et al., 2014) and interviews with juvenile delinquents. It was used to assess adolescents' interactions with their delinquent peers in the 12 months before they entered the supervised facility. There are 13 items in the scale, and each item represents a deviant behavior, including running away from home, smoking, truancy, drinking, stealing, fighting, and robbery. The participants were asked to rate each item on a 3-point Likert scale ranging from 1 = no friend has a similar situation to 3 = two or more people have a similar situation. The total score of this scale represents the degree of keeping deviant companions, and higher scores indicate the respondent has more deviant companions. The CFA results show that the one-factor model fit the data well, indicating a high construct validity of the scale ($\chi^2/df = 3.48$, GFI = 0.96, CFI = 0.96, RMSEA = 0.05). In this study, the Cronbach's α was 0.88.

Diagnostic assessment

Conduct disorder

The conduct disorder screening form: It was used to assess CD among the respondents in the present study. The Conduct Disorder Screening Form was taken from the DSM-IV-TR Axis of Clinical Testing Guidelines for Disorder I (Scientific Edition, SCID-I), which consists of 15 items (e.g., "having used a weapon capable of causing serious bodily injury, such as a stick, brick, broken bottle, knife, or firearm?"), and four dimensions including attacking on humans and animals (seven symptoms, such as bullying and fighting and physical harm to pets), destruction of property (two symptoms, intentional arson and vandalism), deception or theft (three symptoms, including breaking and entering, lying for personal gain), and serious violations (three characteristics, including truancy and staying out at night). Respondents who have exhibited three of these criteria in the past 12 months or at least one within six months are considered to have CD. Because most participants in this study had been in the supervision center in the 12 months prior to the interview, their basic information in the 12 months before they entered the supervision center (special school or unsupervised place) was investigated. The participants were asked about the earliest occurrence of any of the above problematic behaviors. If any of the adverse behaviors occurred before the age of 10, the respondent was classified as having childhood-onset CD. Otherwise, the respondent was classified as having adolescent-onset CD

(Moffitt and Scott, 2008). According to the research of (Kim-Cohen et al., 2005), respondents who report five or more symptoms are judged to have moderate to severe CD. In the present study, the scores of each item were summed to calculate the total score of the scale. Higher scores indicate more serious CD symptoms. Participants scoring more than five were considered to have moderate to severe CD (Kim-Cohen et al., 2005).

Procedures. For typically developed group, participants were asked to anonymously complete all questionnaires, which took approximately 20 to 40 min, followed by 20–30 min interviews to measure the score of CD. Participants, of whom CD scores are greater than 0 were excluded from final analysis. For juvenile delinquents, interviews were conducted first and only participants met the criteria of CD (≥3) completed the self-report questionnaire. Self-report questionnaires were administered in a classroom with a group of less than 50 participants and supervised by six trained researchers. The interviews were completed by three psychology professors who had been trained in advance. To enhance reliability of the interview, a pre-interview training was conducted, in which ten participants were graded by three raters based on the grading criteria. Only when there was agreement among the raters were CD interviews carried out for all participants.

Statistical analysis. SPSS 22.0 was used for data statistics. Chi-square tests were conducted to examine the prevalence and symptoms of CD in juvenile delinquents. Independent sample T tests and chi-square tests were used to examine the differences in the family environment, social environment, and personal characteristics between juvenile delinquents with CD and typically developed adolescents without CD symptoms. Discriminant analysis (DA) is utilized to determine the classification of a research object based on its various eigenvalues, which can ascertain the optimal weightings of predictive variables that effectively differentiate between two or more groups of cases and do so with greater accuracy than chance (Press and Wilson, 1978). Klecka (1980) proposed that DA provides a powerful technique for examining differences between two or more groups of objects with respect to several variables simultaneously. Additionally, a stepwise discriminant classification analysis was employed to assess the predictive value of each risk factor for CD.

Results
The prevalence of CD among juvenile delinquents. According to the diagnostic criteria for CD, 320 of the 545 juvenile delinquents met the criteria, accounting for 58.72% of the total sample. The distribution of the number of CD symptoms in juvenile delinquents is shown in Fig. 1.

Analysis revealed that 171 of the juvenile delinquents had moderate to severe CD, which accounted for 31.38%. The earliest
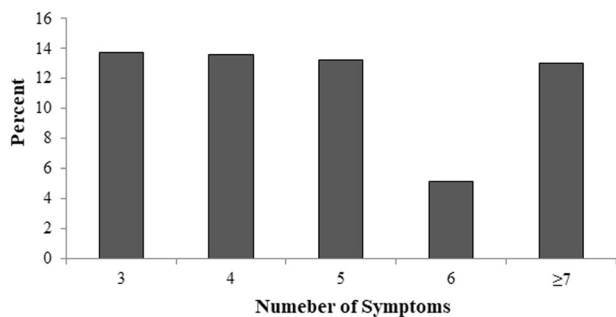

Fig. 1 The distribution of the number of CD symptoms among juvenile delinquents.

onset of CD was 5 years of age, with an average age of 12.04 years (SD = 1.98). Of these, 29 juvenile delinquents met the criteria for childhood-onset CD (onset before 10 years of age), and 291 juvenile delinquents showed adolescent-onset CD.

The results revealed that the prevalence of CD among the adolescents from reformatory schools and those from juvenile correctional facilities were 57.09% and 60.07%, respectively, with no statistically significant difference between the two groups ($\chi^2 = 0.49$, $p = 0.481$). However, when considering the severity of CD, the incidence of severe CD was higher in juvenile correctional facilities than in reformatory schools. Specifically, 27.94% of the adolescents from reformatory schools had mild CD, and 29.15% of them had moderate to severe CD. In juvenile correctional facilities, the percentages were 26.85% and 33.22%, respectively (see Table 2).

Differences in CD symptoms between the criminal group and the illegal group. The results of the study showed that there was no statistically significant difference between the criminal group and the illegal group in the dimension of serious violations of rules ($p > 0.05$). However, the criminal group scored significantly higher on aggression to humans and animals ($p < 0.001$, Cohen's $d = 0.44$) than the illegal group. Conversely, the criminal group scored significantly lower on deceitfulness or theft ($p < 0.001$, Cohen's $d = 0.46$) and destruction of property ($p = 0.031$, Cohen's $d = 0.09$) than the illegal group (shown in Table 3).

According to the evaluation criteria for CD, the five most common deviant behaviors among juvenile delinquents were running away from home (52.48%), staying out at night (48.99%), injuring another person with a weapon (47.71%), skipping school (39.45%), and stealing (37.25%) (see Table S1). The criminal group exhibited a higher rate of positive responses in the items of "using a weapon that can cause serious physical harm to others", "stealing while confronting a victim" and "forcing someone into sexual activity" ($p < 0.05$). However, the criminal group had significantly lower rates in the three items of "deliberately destroying others' property", "breaking into someone else's house, building or car", and "stealing items of nontrivial value without confronting a victim" than the illegal group ($p < 0.05$).

Risk factor analysis of CD. First, a chi-square test was used to compare the demographic characteristics between the delinquent-CD group and the typically developed group. In comparison to typically developed adolescents (see Table S2), the juvenile delinquents with CD had a significantly higher incidence of "a drug or prison history of the father" (odds ratio = 2.38, 95% CI = [1.28, 4.45]), "a low educational level of the father" (odds ratio = 2.74, 95% CI = [1.96, 3.82]), "a low educational level of the mother" (odds ratio = 1.51, 95% CI = [1.09, 2.08]), and parental divorce (odds ratio = 2.02, 95% CI = [1.38, 2.94]). Additionally, an independent sample t test showed that the juvenile delinquents with CD reported significantly higher levels of childhood trauma ($t = 2.97$, Cohen's $d = 0.24$), deviant peer affiliation ($t = 22.36$, Cohen's $d = 1.80$), callous-unemotional ($t = 2.58$, Cohen's $d = 0.21$), and moral disengagement ($t = 7.69$, Cohen's $d = 0.62$) but significantly lower levels of parental monitoring ($t = -11.80$, Cohen's $d = 0.95$), father's warmth ($t = -3.84$, Cohen's $d = 0.31$), mother's warmth ($t = -3.83$, Cohen's $d = 0.31$) and self-control ($t = -5.07$, Cohen's $d = 0.41$) than the typically developed adolescents ($P < 0.001$).

Stepwise discriminant classification analysis was conducted to examine the two groups of adolescents based on their responses to the independent variables. The analysis resulted in a significant discriminant function (Wilks' Lambda = 0.470, $\chi^2(5) = 462.96$, $P < 0.000$). Deviant peer affiliation, parental monitoring, educational level of father, moral disengagement, and self-control were identified as significant predictors. The discriminant equation had

Table 2 The incidence rate and severity of CD in juvenile delinquents.

		Total N(%)	Illegal group n(%)	Criminal group n(%)	$\chi2$	p
incidence rate		320 (58.70)	141 (57.09)	179 (60.07)	0.49	0.481
Severity	Mild	149 (27.30)	69 (27.94)	80 (26.85)	0.57	0.450
	Moderate to severe	171 (31.38)	72 (29.15)	99 (33.22)		

Table 3 The differences in CD symptoms between the illegal group and the criminal group.

	Illegal group (n = 247)		Criminal group (n = 298)		t	p	Cohen's d
CD symptoms	M	SD	M	SD			
Aggression to people and animals	0.94	1.20	1.47	1.25	−5.03	<0.001	0.44
Destruction of property	0.19	0.43	0.12	0.35	2.13	0.031	0.09
Deceitfulness or theft	0.89	0.90	0.51	0.73	5.39	<0.001	0.46
Serious violations of rules	1.45	1.14	1.38	1.08	0.70	0.488	0.06

Table 4 Results of discriminant classification analyses for CDs (N = 617).

Predictor	Predictor correlations with function	Standardized function coefficients	Pooled within-group correlations among predictors			
			2	3	4	5
1 Deviant peer affiliation	0.85	0.86	−0.23	0.24	0.03	−0.36
2 Parental monitoring	−0.45	−0.40	-	−0.12	−0.03	0.27
3 Moral disengagement	0.29	0.23		-	0.06	−0.52
4 Educational level of father	−0.23	−0.28			-	−0.11
5 Self-control	−0.19	0.24				-

Group	Predicted group	
Initial classification results, n (%)[a]	Typically developed adolescents	Delinquent juveniles with CD
Typically developed adolescents	263 (88.55)	34 (11.45)
Delinquent juveniles with CD	52 (16.25)	268 (83.75)
Cross-validation results, n (%)[b,c]	Typically developed adolescents	Delinquent juveniles with CD
Typically developed adolescents	262 (88.22)	35 (11.78)
Delinquent juveniles with CD	52 (16.25)	268 (83.75)

[a]Of total cases, 86.10% were correctly classified.
[b]Each case is classified according to a function derived from all cases except its own.
[c]Of total cases, 85.90% were correctly classified.

a single eigenvalue of 1.129, which accounted for all of the variation.

The loading matrix of correlations between predictors and the discriminant function indicated that deviant peer affiliation and parental monitoring differentiated most strongly between groups (see Table 4). Compared to a 50% chance rate of classification, the sample was correctly classified at a rate of 86.10%, including 88.55% of the typically developed adolescents (263) and 83.75% (268) of those with CDs. In a cross-validation analysis where each case was classified from functions derived from all cases except its own, 85.90% of the samples were correctly classified, with 88.22% of the typically developed adolescents (262) and 83.75% (268) of the juvenile delinquents with CD being correctly classified (see Table 4).

Discussion
According to Underwood(Underwood and Washington, 2016), the juvenile justice system, including detention, probation, and youth correction facilities, should be responsible for administering mental health assessment and treatment services to juvenile delinquents.

CD is a common mental disorder in juvenile supervision centers. Thus, this study takes juvenile delinquents as the research object to understand the occurrence of CD and its risk factors to provide a basis for the correction of juvenile delinquency.

Adolescents with CD are more likely to show deviant behaviors, violations of discipline and serious tendencies of violence, aggressive behaviors and criminal behaviors (Frick, 2012; Frick et al., 2005; Frick and Viding, 2009). Furthermore, their risk of recidivism is higher than that of juvenile delinquents without CD (Bessler et al., 2019). Interventions for adolescent mental health problems have been found to be effective in reducing the recidivism rate of adolescents with externalizing disorders (Underwood and Washington, 2016). Although CD is a mental disorder, not all CDs are intended for ongoing clinical treatment. A previous study indicated that some young adults who meet the criteria of CD experience psychological symptoms temporarily and need temporary help, and approximately 10% of them have a continuous need for mental health services that may persist into adulthood and even require ongoing clinical care (Roberts et al., 1998). In summary, the characteristics of CD symptoms among juvenile offenders vary. The juvenile justice system, including

detention, probation, and youth correction facilities, should provide tailored levels of help based on the specific characteristics of youth.

Consistent with the results of previous studies (Abid and Liaquat, 2015; Frick, 2016; James, 2017; Pardini and Fite, 2010; Pechorro et al., 2021; Ray et al., 2016), this study also found that paternal drug abuse or incarceration, a low level of parental culture, parental divorce, childhood abuse, parental monitoring level, parental warmth level, deviant peer affiliation, CU traits, self-control and moral disengagement were all correlated with the incidence of CD. To more deeply comprehend the effects of these factors on CD, a stepwise discriminant analysis was used in this study. In comparison to traditional discriminant analysis, it can eliminate predictors weakly correlated with the category to be discriminated. The results indicated that deviant peer affiliation was the strongest predictor in distinguishing adolescents with CD from typically developed adolescents and positively predicted the incidence of CD in adolescents. Parental monitoring and moral disengagement followed, parental monitoring negatively predicted the occurrence of CD in adolescents, but moral disengagement positively predicted it. Having contact with peers with antisocial behaviors is a significant risk factor in the development of deviant behavior in adolescents. Studies have demonstrated that compared to those who do not associate with peers who have antisocial tendencies, adolescents who have contact with such peers are more likely to engage in antisocial behaviors (Liu et al., 2019; Odgers et al., 2008). Deviant peer affiliation has become an incubator for problem behaviors of adolescents to some extent and can contribute to the development of CD symptoms in adolescents by praising the benefits of deviant behaviors, imitating such behaviors, exerting pressure to make adolescents engage in illicit activities, or directly teaching those behaviors. On the other hand, parental monitoring can effectively reduce teenagers' contact with deviant peers. Therefore, parental monitoring becomes the second important predictor of CD. Moreover, this study found that moral disengagement is a critical predictor in distinguishing adolescents with CD from typically developed adolescents. Mathew (2016) also indicated that children with CD frequently use cognitive distortions to rationalize their inappropriate behaviors. This is consistent with Sutherland's differential association theory (Sutherland, 2014), which suggests that one's definitions of illegal and criminal behaviors may be a major factor in committing crime. Additionally, social cognitive theory (Bandura, 1991) postulates that one's self-serving cognitive modes may lead to antisocial behavior. The theory of moral disengagement suggests that some individuals detach their behaviors from their inner values to minimize their guilt over their immoral behaviors and facilitate the perpetration of antisocial activities (Bandura et al., 1996). Nevertheless, this does not imply that the family atmosphere, parenting style, etc., are not important risk factors for CD. First, during adolescence, individuals strive for independence and autonomy while they are still in the process of forming their own identities (Santrock, 2008). This, in combination with ineffective discipline, lack of parental monitoring, lack of communication with parents, and deviant peer pressure, can lead to an increased risk for problem behaviors. Second, in the present study, the family atmosphere of adolescents with CD, such as the warmth of parents, parental drug abuse or imprisonment, and parental divorce, was also investigated and found to significantly differ from those of typically developed adolescents. However, in comparison to risk factors such as deviant peer influence, the effect of these family factors was relatively minor. The main reason is probably that as children age, their contact with adults diminishes while their interactions with peers become more frequent. Therefore, the direct influence of family on adolescents decreases, and the direct influence of deviant peers and individuals' cognitive attitudes increases. Furthermore, studies have shown that the family environment is related to the influence of deviant peers and the attitude of moral disengagement (Hart et al., 1999; Tian et al., 2018). Therefore, we still believe that family factors are important in the development of CD.

Practical implications. Garascia (2005) suggested that the juvenile justice system was initially created with the aim of rehabilitation and prevention, paying greater attention to the rights and needs of juvenile delinquents instead of punishing them. This study contributes to our knowledge of the behavioral problems encountered by adolescents in the juvenile justice system in China, thus advancing our understanding of antisocial behaviors and CD in adolescents. First, the results indicate that CD is widespread in the Chinese juvenile justice system. The characteristics of CD symptoms of juvenile offenders vary across supervision centers, and the juvenile justice system or psychological assistance agencies should provide tailored levels of assistance (e.g., care, referral, or treatment) based on adolescents' specific mental health needs. Second, factors such as negative peer influence, inadequate parental monitoring, moral disengagement, and low parental warmth contributed to the high prevalence of CD. It can be postulated that the symptoms of CD in adolescents can be decreased by improving the family atmosphere, increasing parental monitoring, reducing exposure to deviant peers, and rectifying moral cognition. However, in actual practice, mental assessment and risk factor analysis in the juvenile justice system should be established, and individualized intervention strategies based on these should be adopted. Third, individuals with CD should be provided with opportunities for early prevention, as it can be detected earlier, and early intervention is more effective (Fairchild et al., 2019). This study also indicated that multiple family factors have an important impact on the formation of CD. It is crucial to enhance parents' educational levels and parenting skills, improve the parenting environment, reinforce parental monitoring, and minimize interactions with deviant peers. All of these are crucial measures in the early prevention of juvenile delinquency and the formation of CDs.

Limitation. First, this study adopted a cross-sectional design, thus precluding the inference of causal relationships between risk factors and CD. Furthermore, a retrospective method was utilized to explore the risk factors for CD, which may have resulted in some deviation due to the participants' recollections of past experiences. In the future, prospective longitudinal studies starting from the prenatal period, combined with multilevel analysis (e.g., assessment of environmental, genetic, neuroimaging, and behavioral factors), are needed to identify and quantify how various risk factors contribute to the onset and trajectory of CD symptoms.

Second, there is a lack of established adverse deviant peer affiliation scales and parental monitoring scales in China. Therefore, both scales were self-designed in this study. Future research should focus on refining these measures and assessing their validity across diverse populations.

Third, the sample of this study comprised male adolescents in the judicial setting, so the results may not be applicable to female adolescents. Previous studies have indicated that female adolescents have a lower incidence of CD than male adolescents (Polanczyk et al., 2015). However, some research has shown that female adolescents with CD tend to have more persistent problem behaviors beyond puberty, which can lead to an increased risk of suicidal behavior, substance abuse, violent relationships, inability to care for their children, and even premature death (Poe-Yamagata and Butts, 1996; Teplin et al., 2002). Therefore, it is important to conduct further research on female adolescents and develop interventions according to their specific characteristics and risk factors.

Finally, this study did not compare early-onset CD and adolescent-onset CD. However, childhood-onset CD is a serious form of CD that can have a lasting impact on adolescents (Moffitt, 2008). Gottlieb and Friedman (1991) found that childhood-onset CD strongly correlated with recidivism, while adolescent-onset CD moderately correlates with recidivism. In the present study, only twenty-nine cases met the criteria of childhood-onset CD, so we did not have a sufficient number of childhood-onset participants to analyze the risk factors associated with childhood-onset CD. Future research should compare the risk factors of early-onset CD and adolescent-onset CD.

Data availability
The author confirms that all data generated or analysed during this study are included in this published article. Furthermore, primary and secondary sources and data supporting the findings of this study were all publicly available at the time of submission.

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Acknowledgements

Author contributions

All authors contributed to the study conception and design. Material preparation, data collection were performed by Qinhong Xie, Taiyong Bi, Xue Li, Wei Luo, Bo Yang and Hui Kou.Analysis were performed by Qinhong Xie, Taiyong Bi and Hui Kou. The first draft of the manuscript was written by Qinhong Xie and Taiyong Bi and Hui Kou commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The Ethical approval was requested by Qinhong Xie, and was granted by the Human Research Ethics Committee of Zunyi Medical University ([2022]4-006).

Informed consent

All participants and their legal guardians gave written consent after being informed of the details in 2022.

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1057/s41599-024-02775-2.

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