Child Abuse & Neglect 141 (2023) 106191

Contents lists available at ScienceDirect

Child Abuse & Neglect

journal homepage: www.elsevier.com/locate/chiabuneg

Disruptive behaviors, antisocial attitudes, and aggression in young offenders: Comparison of Adverse Childhood Experience (ACE) typologies☆

Adam Oei [a,b,*], Dongdong Li [a,b], Chi Meng Chu [a,c], Irene Ng [b], Eric Hoo [a], Kala Ruby [d]

[a] Translational Social Research Division, National Council of Social Service, 170 Ghim Moh Road, #01-02, 279621, Singapore
[b] Department of Social Work & Social Service Research Centre, Faculty of Arts and Social Sciences, National University of Singapore, Blk AS3, Level 4, 3 Arts Link, 117570, Singapore
[c] Policy Research Office, Ministry of Social and Family Development, 512 Thomson Road, MSF Building, #07-00, 298136, Singapore
[d] Probation and Community Rehabilitation Services, Ministry of Social and Family Development, 1 Kay Siang Road, #01-10, 248922, Singapore

ARTICLE INFO

Keywords:
Adverse childhood experiences
Antisocial cognitions
Conduct disorder
Oppositional disorder
Aggression
Youth offenders

ABSTRACT

Background: Adverse Childhood Experiences (ACE) are associated with many deleterious outcomes in young offenders. There is a dearth of studies examining its effects on young offenders' antisocial attitudes, disruptive behaviors and aggression, risk factors for delinquency and reoffending.
Objective: This study examined ACE patterns and their association with the above factors in young offenders.
Participants and setting: 1130 youth offenders (964 males; M_{age} = 17.57 years), provided self-reports on ACEs, antisocial attitudes, disruptive behavior ratings and aggression.
Method: Latent Class Analysis was performed on 12 self-reported ACEs, followed by Analyses of Covariance on each of the measures.
Results: Four classes – Low ACE, Indirect Victims, Abusive Environment, and Polyvictimized – were identified. Polyvictimized youths had the highest levels of conduct problems ($M = 70.35$, $ps < .05$) and proactive aggression ($M = 0.45$, $ps < .05$) but did not differ from youths in Abusive Environment in reactive aggression ($M = 1.02$, $p = .69$), oppositional problems ($M = 65.15$, $p = .18$), and antisocial attitudes ($M = 26.95$, $p = .21$). Indirect Victims had lower levels of conduct problems ($M = 64.80$, $p < .05$) and antisocial attitudes ($M = 24.35$, $p < .05$) than Polyvictimized youths but higher levels of these outcomes than the Low ACE group.
Conclusions: Our findings showed that ACEs patterns vary in their effects on antisociality and disruptive behaviors. The novel finding was that childhood victimization does not have to be direct, as indirect victimization significantly impacted factors important to delinquency and reoffending.

☆ **Authors' Note:** The views and opinions expressed in this manuscript belong to the authors and do not represent the official position or policies of the Ministry of Social and Family Development, and the National Council of Social Service.

* Corresponding author at: Translational Social Research Division, National Council of Social Service, 170 Ghim Moh Road, #01-02, 279621, Singapore.
E-mail address: adam_oei@ncss.gov.sg (A. Oei).

https://doi.org/10.1016/j.chiabu.2023.106191
Received 21 November 2022; Received in revised form 9 March 2023; Accepted 3 April 2023
Available online 19 April 2023

1. Introduction

Adverse Childhood Experiences (ACE), defined as intense and frequently occurring sources of stress that individuals experience during childhood (World Health Organization, 2012), are a major risk factor for offending, delinquency, and antisocial behavior among youths (Baglivio et al., 2015; Baglivio & Epps, 2014; Li et al., 2015). Between 40 % and 95 % of young offenders experienced at least one adverse event during childhood (Baglivio & Epps, 2014; Vitopoulos et al., 2019).

Different ACEs are associated with different offending trajectories and delinquency in youths. For example, youth offenders who were sexually abused have higher likelihood of committing sexual offences (DeLisi et al., 2014; Miley et al., 2020), while family member's incarceration and substance abuse, physical neglect, emotional abuse, and/or family violence have been implicated in violent offending (Fox et al., 2015; Lantos et al., 2019; Miley et al., 2020).

While "direct" child maltreatment such as emotional, physical, and sexual abuse can have great impact on delinquency and offending trajectories in young persons (e.g., Fox et al., 2015; Lantos et al., 2019; Miley et al., 2020), childhood adversities not directly perpetrated on the child such as parental divorce and incarceration as well as domestic/spousal violence have significant impact on the child as well. For instance, children whose parents were separated or divorced have higher likelihood of later offending and delinquency (Amato, 2001; Juby & Farrington, 2001; van de Weijer et al., 2015). In addition, data from the Cambridge Study in Delinquent Development indicated that the effects of family member incarceration confers significantly greater risk for antisocial traits such as impulsivity, disobedience, hostility to police, as well as anti-establishment attitudes that persist decades later, even after controlling for other childhood risk factors (Murray & Farrington, 2005).

Findings from multiple birth cohorts in Singapore have also shown the parent incarceration and child offending link, such that children whose parents had offended had fewer crime free years than did those children whose parents that did not offend (Ting et al., 2022). These studies are just a few examples illustrating that non-direct child victimizations have profound impact on delinquency and offending behaviors.

Although the abovementioned studies indicated that specific ACEs increase the propensity of certain delinquent behaviors (Miley et al., 2020), examining the effect of individual ACE is sometimes limited because ACEs tend to overlap (Finkelhor et al., 2013; Saunders & Adams, 2014). The presence of one ACE multiplies the risk of subsequent ACEs (Dong et al., 2004; Finkelhor et al., 2013). Moreover, a recent study also confirmed that using a combination of ACEs better accounts for variations in externalizing and internalizing problems than did individual ACE (Méndez-López et al., 2021). It is thus critical to assess ACEs concomitantly to identify the effects of cumulative ACEs or constellation of certain types of ACEs (Wolff et al., 2018).

1.1. Approaches to study ACE

Consistent with the assumption that ACEs are likely to co-occur, studies that examined the effects of ACEs have commonly utilized two approaches to examine its effects - the cumulative risk approach and the person-centered approach. Both approaches were tested and were shown to be valid for studying the effects of ACEs (Lian et al., 2022). Consistent with cumulative risk, higher number of cumulative ACEs were shown to be associated with higher criminogenic needs, increased risk of antisocial behavior, substance use, psychiatric problems, offending and recidivism (Baglivio & Epps, 2014; Bellis et al., 2014; Degli Esposti et al., 2020; Dube et al., 2003; Oei et al., 2021; Vitopoulos et al., 2019). For example, Oei et al. showed that a higher number of cumulative ACEs in young offenders were associated with increased likelihood of substance use, age of substance-use initiation and greater substance use frequency. Moreover, Degli Esposti et al. demonstrated that each additional child maltreatment type was associated with increased risk of antisocial behaviors such as destroying of belongings, fighting and violent rages across the lifespan.

While the cumulative approach allowed researchers to test a graded, dose-dependent relationship between ACEs and outcomes, the person-centered approach gives insight on the types of ACEs that co-exist and how they impact outcomes in tandem. Studies have commonly shown more deleterious effects when exposed to multiple and diverse forms of ACEs in offenders (Aebi et al., 2015; Charak et al., 2019; Turner et al., 2021) and non-offenders (Lee et al., 2020; Shin et al., 2018; Sölva et al., 2020) in areas such as emotional regulation, externalizing and internalizing problems, and suicidal ideation.

1.2. ACE typologies among youth offenders

Although there have been a growing number of studies in the field of ACEs using person-centered approaches in recent years, studies focusing specifically on youth offenders are still limited. In Aebi et al. (2015) and Turner et al. (2021), three classes were found, although the typologies were quite different. For example, the proportion of the Low ACE class among youth offenders is 74 % in the Aebi et al. (2015) compared to 26.7 % in Turner et al. (2021). Such differences could be due to the small sample sizes, different ACE items used and different demographic compositions.

Despite these differences, these studies were informative of what maltreatment types tend to co-occur for youth offenders. Importantly, common in many of these studies was the presence of a class with diverse adversity types. The majority of these studies were also consistent in that youth offenders with multiple ACEs tended to have more elevated problems in emotional responding, behavioral and mental well-being as well as delinquency (Charak et al., 2019; Ford et al., 2010; Ford et al., 2013; Turner et al., 2021).

Given the impact of indirect victimization as alluded to earlier, some, but relatively few studies also examined a broader range of ACEs besides direct child maltreatment to include indirect victimization such as family/community violence or parental incarceration. Wolff et al. (2018) found that participants high in indirect victimization (mainly household substance abuse and incarceration) were more likely to be of lower socioeconomic status, relative to those with low levels of adversities. In Logan-Greene et al. (2016, 2020),

aside from High and Low ACEs classes, three other classes showed indirect victimization while only one class was on high child maltreatment. Indirect victimizations also appeared to result in poorer self-regulation, mental health, academic functioning and more social disadvantage (Logan-Greene et al., 2020). Taken together, these studies showed that uncovering ACE typologies in young offenders is important, as they may result in different criminogenic and psychological needs, which in turn may have implications for rehabilitation outcomes.

1.3. ACE in Asian context

Cross-cultural studies suggest that the concept of childhood adversities, parental discipline, developmental trends in the risk of reentry into child protection systems and offending behaviors differ considerably between Western and Asian cultures (Auemaneekul, 2013; Deater-Deckard & Dodge, 1997; Elliott et al., 1997; Lau et al., 1999; Li et al., 2014; Ngiam & Tung, 2016). For example, disciplinary methods such as caning or corporal punishment may be viewed as normative parenting behavior rather than child abuse in Asian societies (Elliott et al., 1997; Lau et al., 1999). Such sociocultural variations will not only change the antecedents but also moderate the effects of childhood adversities (Gershoff, 2002). It is important therefore to examine the effects of childhood adversities on offending behaviors and delinquency in non-Western populations.

Emerging studies from non-Western samples such as China and the Middle East have also confirmed that child maltreatment and household dysfunctions are associated with deleterious outcomes such as self-harm, suicidal behaviors (Li et al., 2019; Li et al., 2021; Tang et al., 2018), substance abuse (Wang et al., 2022; Xiao et al., 2008), psychopathology (AlHemyari et al., 2022; Alhowaymel & Alenezi, 2022; Zhang et al., 2020) and violent crimes (Wang et al., 2012). A recent large scale global impact study (involving Portugal, Spain, France, Iraq, Palestine, Thailand, Australia, Brazil, Mozambique, and South Africa) of ACEs on criminal behavior also indicated that childhood adversities increased the risk of criminal behaviors in the preceding 12 months (e.g., theft and burglary, drug trafficking, aggression). In particular, physical and sexual abuse, physical neglect, exposure to domestic violence, household member substance abuse, household member with mental illness and household member incarcerated were significantly predictive of criminal behaviors (Basto-Pereira et al., 2022).

Despite emerging research from Asian samples, few have examined the role of ACE typologies in justice-involved youths. Examining ACE effects in these samples is important given the high prevalence rates of ACEs in offenders (Baglivio et al., 2015; Baglivio & Epps, 2014), as well as the propensity of ACEs as an important predictor for reoffending (Yohros, 2022). Insights could thus have important implications in risk assessment in the rehabilitation context, especially in the non-Western jurisdictions.

1.4. The current study

Despite advances in the field of ACEs using person-centered approaches, significant gaps remain. First, as mentioned, most studies in this area were based on samples from Western countries. Although many studies are emerging from China on the effects of ACEs, these studies are still made up of predominantly participants of Chinese ancestry and are mainly non-offenders. Singapore, in which the current study is conducted addresses this cultural gap due to its make-up of a multi-ethnic Asian society.

Second, to our knowledge, aggression, disruptive behavior disorders and antisocial attitudes are yet to be studied in relation to ACE typologies. These are important risk factors for reoffending (Ang & Huan, 2008; Bonta & Andrews, 2017; Chu et al., 2014; Juarez & Howard, 2021). While the link between childhood adversities and offending behaviors are well established, Baglivio et al. (2020) have also demonstrated that the path may nevertheless be mediated by psychopathic traits. The factors we examined in the current study, namely, aggression, disruptive behavior disorders and antisocial attitudes are strongly related to psychopathy and would contribute to trauma-informed assessments and interventions for reoffending.

Third, there are few studies that examined effects of indirect victimization using person-centered approaches. To our knowledge, only three studies in the youth offending literature have examined latent classes on indirect victimization (Logan-Greene et al., 2016, 2020; Wolff et al., 2018) with only two (Logan-Greene et al., 2020; Wolff et al., 2018) making the link to deleterious outcomes. Moreover, as the Logan-Greene et al. studies only included probationers, their findings also had limited generalizability to non-probationers.

Considering these gaps, our study aimed to fulfill two objectives. First was to provide further empirical evidence of differentiated ACE typologies with an Asian sample of youth offenders. Specifically, we wanted to explore whether classes such as 'Low ACE', "High ACE", and those with mainly indirect victimization (e.g., witnessed domestic violence, parental incarceration, and/or parental separation) will emerge. Our second aim was to explore how ACE typologies differed on key factors associated with reoffending - namely, aggression, disruptive behavior disorder severity and antisocial attitudes.

We hypothesized that there are distinguishable ACE typologies. In line with previous studies (Charak et al., 2019; Ford et al., 2010; Ford et al., 2013; Grasso et al., 2016), we predicted that a class would emerge that is characterized by multiple and varied adversities. We also expected that those exposed to multiple and varied ACEs would have worse outcomes in disruptive behavior disorders, antisocial attitudes, and aggression. As indirect victimizations included ACEs such as family criminality (family violence, incarceration, and substance use), we also predicted that those with indirect victimization would have higher levels of antisociality and aggression than the low ACE group as aggression and offending behaviors are transmitted across generations (Chng et al., 2016; Junger et al., 2013; Murray & Farrington, 2005; Ting et al., 2022; van de Weijer et al., 2014). Overall, we expected that each class would show variations in our dependent measures, illustrating the need to have differentiated intervention depending on ACE typologies.

2. Method

2.1. Participants

Participants were youth offenders from the Enhancing Positive outcomes in Youth and the Community (EPYC; see Research design) study. 1130 youth offenders (964 males, $M_{age} = 17.57$ years, $SD = 1.51$, $Mdn = 17.73$ years, range = 12–20) provided data on their childhood adversities. 32.12 % ($n = 363$) of the participants are Chinese while the remainder ($n = 767$, 67.88 %) are non-Chinese (i.e., Malays, Indians, and Others, according to Singapore's main ethnic classifications). All participants were young offenders who received their court orders between 2016 and 2018. These youths were arrested for a number of offences such as theft, vandalism, drug abuse and sexual offences. They were recruited in the first year of their sentencing at various youth justice agencies. The majority of participants ($n = 704$, 62.30 %) were serving probation orders or at Juvenile Residential orders, while 21.95 % ($n = 248$) were serving sentences in prisons or the Reformative Training Centres administered by the Singapore Prisons Service. The latter is a rehabilitative sentencing option that includes a residential phase and a supervision phase. Those receiving these custodial sentences comprised of youths arrested for a variety of offences as well as moderate to high-risk drug offenders. Finally, 15.76 % ($n = 178$) of the sample were participating in the Youth Enhanced Supervision Programme for low-risk drug offenders. This is a 6-month programme for youths under 21 years old arrested for drug consumption for the first time. (Ministry of Social and Family Development, 2022). All participants were reimbursed S$60 worth of shopping vouchers for their participation.

2.2. Ethics statement

The study received ethical approval from the Ministry of Social and Family Development's Research Ethics Advisory Panel as well as the Agency for Science, Technology and Research (A*STAR)'s Institutional Review Board (IRB). All participants and their legal guardians provided written informed consent prior to their participation.

2.3. Research design

Results were from the first wave of data collection as part of the EPYC research program. The study is a 10-wave longitudinal study aimed at examining developmental trajectories of youth offenders and subsequently translating findings to policies on rehabilitation and crime prevention.

2.4. Measures

2.4.1. Adverse Childhood Experiences

We collected information on participants' past exposure to ACE through the Adverse Childhood Experiences International Questionnaire (ACE-IQ; World Health Organization, 2012). Participants responded to whether they experienced any of the following 12 ACEs - substance abuse, mental disorders, or incarceration in their household, parental divorce/separation/death, family violence, emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, community violence or bullying.

The ACE-IQ contained items that required a "Yes/No" response (e.g., living with a household member who was a problem drinker or misused drugs) and others (e.g., "*Did you see or hear a parent or household member in your home being slapped, kicked, punched, or beaten up?*") that required rating on a four-point scale according to the frequency of occurrence. Details on the scoring method can be found in Oei et al. (2021). The ACE-IQ questionnaire has been found to be reliable and valid across different samples (Christoforou & Ferreira, 2020; Kidman et al., 2019; Meinck et al., 2017).

2.4.2. Disruptive behavior disorders

Severity of disruptive behavior disorder was assessed from the oppositional and conduct disorder scales on the Youth Self Report (YSR; Achenbach & Rescorla, 2001). The YSR is a 112-item screening tool for emotional and behavioral problems as well as competencies for youths. Each item was rated on a three-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). We converted raw scores for Oppositional disorder (5 items) and Conduct disorder (15 items) to T-scores using the scoring template in the YSR manual (Achenbach & Rescorla, 2001).

2.4.3. Criminal attitudes

Criminal attitudes were assessed by the Measures of Criminal Attitudes and Associates (MCAA; Mills et al., 2002). This scale assesses youth attitudes towards criminal behavior and degree of criminal association. The questionnaire consists of two parts - one on a quantifiable measure of the number of criminal associates and the second (46-items), on the respondents' tolerance of instrumental violence, their sense of entitlement to do what they want, their behavioral intent on antisocial acts as well as their identification to peers involved with criminal activities. Questions on each of the second part was assessed using an "Agree/Disagree" dichotomy. We included only Part B scores and computed a total MCAA score as a measure of antisocial attitudes in this study as our focus was on general measures of criminal attitudes and antisociality.

2.4.4. Aggression

Aggression was measured using the Reactive-Proactive Aggression Questionnaire (Raine et al., 2006). This is a 23-item

questionnaire that required respondents to state how often they displayed different types of aggressive behavior on a three-point scale ("Never", "Sometimes", "Often"). Examples of these items include "*Yelled at others when they have annoyed you*" and "*Gotten angry when frustrated*". Proactive aggression is characterized by instrumental and organized aggressive acts that is goal-directed and motivated by objectives beyond physical violence. In contrast, reactive aggression is usually in response to a provocation (Walters, 2005).

2.5. Procedure

2.5.1. Data collection

Data collection using the above-mentioned psychometric instruments was done via face-to-face interviews in English by trained research assistants with a minimum social science bachelor's degree. The investigators in the study conducted audits to ensure fidelity in the interviews. Each interview took about 2 to 3 h long as it contained other psychometric measures (not reported here).

2.6. Analytical strategy

We first conducted a Latent Class Analysis (LCA) using the PoLCA package (Linzer & Lewis, 2011) in R (R Core Team, 2019) to identify distinct classes based on 12 ACEs. LCA is a statistical procedure to assign participants to their most likely subgroups based on observed data (McLachlan & Peel, 2000). We identified the preferred model using the Akaike's Information Criterion (AIC), the Bayesian Information Criterion (BIC), the Sample-adjusted Bayesian Information Criterion (SBIC) and the Lo, Mendell, Rubin Test (LMRT). Lower AIC, BIC and SBIC values reflect a better fit in general. We used the BIC for the best justification for the number of classes (Nylund et al., 2007). Also, entropy values closer to 1.00 reflect good classification (Celeux & Soromenho, 1996). Importantly however, we considered parsimony, conceptual meaningfulness and interpretability of various class solutions when deciding the number of classes. There must be a degree of congruence between the number of classes in the best fit model and the extant substantive theory (Nylund et al., 2007).

Having identified a latent class solution, we assigned participants to classes based on membership probability as indicated by the model. Between class comparisons using Analyses of Covariances (ANCOVA), with race, age, and sex as covariates were then conducted. Following a significant ANCOVA, we then made Tukey contrasts to compare scores on the dependent variables to test the hypotheses in the current study. This method of identifying distinct ACE typologies using LCA and subsequently comparing them in the variables of interest is adopted by several studies using offenders and non-offenders in the child maltreatment literature (Charak et al., 2019; Ford et al., 2013; Lee et al., 2020; Shin et al., 2018; Turner et al., 2021).

3. Results

3.1. Latent class analysis of ACEs

We estimated a series of LCA models with two to five classes. Based on goodness of fit indicators, a four-class solution appeared to be the best-fitting solution with higher BIC and SBIC values (see Table 1). Furthermore, although entropy for the 4-class model was lower than the 3-class model, the loss was only 0.01.

3.2. Comparison of ACE prevalence between classes

We also performed separate Chi-square difference tests to determine that each class is distinct from each other based on ACEs. Aside from sexual abuse, which generally had low prevalence in our sample, exposure to all other ACEs were significantly different between the classes (see Table 2).

Class 1 was labeled as *Low ACE* (LA) and consisted of 50.53 % ($n = 571$) of the available sample that had complete ACE data. It was characterized by lower prevalence of all ACEs measured except for emotional neglect, which had more than one third of the class members experiencing it (34.85 %). The mean number of adversity types experienced by this class was 1.49 ($SD = 1.10$).

Class 2 ($n = 322$; 28.50 % of the sample; $M_{\text{adversities}} = 3.91$, $SD = 1.21$) was characterized by high prevalence of ACEs such as household member incarceration and substance abuse, as well as parental separation. We labeled this class *Indirect Victimization* (IV).

Class 3 ($n = 139$; 12.30 % of the sample; $M_{\text{adversities}} = 4.42$, $SD = 1.41$) was characterized by relatively high prevalence of ACEs that are abusive in nature such as Family Violence, Emotional Abuse, and Physical Abuse. We have termed this class *Abusive Environment*

Table 1
Fit indices for 2 to 5 latent classes based on ACEs.

Number of classes	LMR (*p* value)	AIC	BIC	SBIC	Entropy
2	–	13,304.93	13,430.68	13,351.28	0.65
3	3 vs 2 classes (<.001)	13,057.55	13,248.69	13,127.99	0.71
4	4 vs 3 classes (<.001)	12,973.41	**13,229.93**	**13,067.94**	0.70
5	5 vs 4 classes (<.001)	12,957.13	13,286.80	13,083.51	0.69

Note: Bold indicates preferred solution for that statistic. *LMR* Lo-Mendell-Rubin test, *AIC* Akaike's Information Criterion, *BIC* Bayesian Information Criterion, *SBIC* Sample adjusted Bayesian Information Criterion.

Table 2
Proportions of ACEs exposed by participants in the study.

ACE	Class 1 – Low ACE (LA)	Class 2 – Indirect Victimization (IV)	Class 3 – Abusive Environment (AE)	Class 4 – Polyvictimized (PV)	χ^2 (*p* value)
Household member substance abuse	1.40 %	57.76 %	0 %	93.88 %	642.91 (<.001)
Household member mental illness	5.43 %	12.73 %	9.35 %	47.96 %	147.73 (<.001)
Household member incarceration	5.25 %	90.06 %	17.99 %	73.47 %	714.06 (<.001)
One or no parents	40.11 %	76.09 %	47.48 %	79.59 %	135.95 (<.001)
Family violence	18.56 %	43.79 %	65.47 %	93.88 %	270.37 (<.001)
Emotional abuse	2.28 %	7.76 %	82.73 %	82.65 %	705.69 (<.001)
Physical abuse	2.10 %	2.17 %	73.38 %	69.39 %	652.10 (<.001)
Sexual abuse	10.16 %	14.60 %	17.99 %	23.47 %	16.49 (<.001)
Bullying	6.66 %	9.32 %	27.34 %	27.55 %	72.20 (<.001)
Emotional neglect	34.85 %	41.93 %	51.08 %	69.39 %	46.89 (<.001)
Physical neglect	5.95 %	7.14 %	19.10 %	16.85 %	14.23 (.003)
Community violence	16.29 %	27.64 %	37.41 %	18.47 %	79.01 (<.001)

(AE).

Class 4 ($n = 98$; 8.67 % of the sample; $M_{adversities} = 7.31$, $SD = 1.50$) was characterized by participants with a relatively high mix of all ACEs measured. This class most resembled Charak et al. (2019) *Polyvictimization* (PV) group and we termed it as such for consistency. The number of adversities was significantly higher for each class relative to the preceding classes (all *p*s < .001).

3.3. Relationship between ACE class and disruptive behavior disorders

For oppositional disorder severity, the ANCOVA for class was significant, $F(3, 1122) = 20.00$, $p < .0001$. LA and IV had the lowest levels of oppositional disorder. The difference between them was non-significant ($p = .17$). AE had higher levels of oppositional disorder compared to LA and IV (both *p*s < .009) but was no different than PV ($p = .18$). PV had significantly higher oppositional disorder levels than all other groups, except AE (see Table 3).

For conduct disorder, the class effect was also significant, $F(3, 1122) = 26.61$, $p < .0001$. LA youths had the lowest level of conduct disorder relative to all others (all *p*s < .001), while PV had the highest level (all *p*s < .006). The difference between AE and IV was not significant, however ($p = .25$).

3.4. Relationship between antisociality and class

The class effect in the ANCOVA model for MCAA total score was significant, $F(3, 1123) = 22.17$, $p < .0001$. LA had the lowest level of antisocial attitudes relative to all others (all *p*s < .001) while PV had significantly higher antisocial attitudes relative to all others (all *p*s < .03), except AE ($p = .21$). There was no difference in antisociality between AE and IV ($p = .92$).

Table 3
Differences in disruptive behaviors, antisocial attitudes, and aggression between latent classes.

Dependent variables	Class 1 – Low ACE (LA)	Class 2 – Indirect Victimization (IV)	Class 3 – Abusive Environment (AE)	Class 4 – Polyvictimized (PV)	Statistically significant class comparisons*
Oppositional disorder	59.12 (58.24–59.8)	60.30 (59.39–64.31)	62.94 (61.57–64.31)	65.15 (63.51–66.79)	PV > IV; PV > LA; AE > LA; AE > IV
Conduct disorder	62.38 (61.65–63.12)	64.80 (63.82–65.79)	66.48 (64.99–67.98)	65.15 (68.57–72.14)	PV > AE; PV > IV; PV > LA; AE > LA; IV > LA
MCAA total score	21.19 (20.52–21.86)	24.35 (23.45–25.25)	24.87 (23.51–26.23)	26.95 (25.32–28.58)	PV > IV; PV > LA; AE > LA; IV > LA
Reactive aggression	0.75 (0.71–0.79)	0.85 (0.8–0.9)	0.96 (0.89–1.04)	1.02 (0.94–1.11)	PV > IV; PV > LA; AE > LA; IV > LA
Proactive aggression	0.23 (0.21–0.26)	0.30 (0.27–0.34)	0.33 (0.28–0.38)	0.45 (0.39–0.51)	PV > AE; PV > IV; PV > LA; AE > LA; IV > LA

Note: Parentheses denote 95 % confidence intervals.
* Following Tukey contrasts at $p < .05$.

3.5. Relationship between ACE class and aggression

The class effects for proactive, $F(3, 1122) = 14.18$, $p < .0001$, and reactive aggression, $F(3, 1122) = 16.66$, $p < .0001$, were statistically significant. PV had the highest levels of proactive aggression (all $ps < .03$). On the other hand, while the difference between AE and LA was significant ($p = .01$), AE did not differ from IV ($p = .85$). IV had higher proactive aggression than LA in proactive aggression ($p = .01$).

For reactive aggression, PV had higher levels than IV and LA (both $ps < .004$) but was not different from the AE group ($p = .69$). AE scored higher in reactive aggression relative to LA ($p < .001$), but not the IV group ($p = .07$). The difference between IV and LA was significant ($p = .008$).

4. Discussion

In this study, we set out to achieve two goals. First, was to provide empirical evidence of differentiated ACE typologies with an Asian sample. A second objective was to explore variations in aggression, disruptive behavior disorder and antisocial attitudes between these typologies. Findings indicated a four-class solution with groups characterized by Low ACE (LA), Indirect Victimization (IV), Abusive Environment (AE) and a Polyvictimized (PV) group. Overall, there is a trend of decreasing levels of disruptive behavior severity, aggression and antisociality from PV to AE, IV and LA. We discuss the findings of each group below separately in greater detail.

4.1. Polyvictimization (PV)

Our finding of the PV group replicated many previous studies that have undertaken similar analytical approaches (Charak et al., 2019; Ford et al., 2010; Ford et al., 2013; Shin et al., 2018), showing the reliability of this approach. In our study, we hypothesized that due to the more severe and varied nature of adversity experiences, PV youths would exhibit higher levels of disruptive behavior disorders, aggression, and antisocial attitudes relative to all other groups. On disruptive behavior disorders, we showed that PV youths had relatively higher levels of conduct disorder relative to all other classes. With the exception to AE, PV also had higher levels of oppositional disorder than all other groups. PV also had higher levels of antisocial attitudes compared to LA and IV. For proactive aggression, PV was the most severe while in reactive aggression, PV also had higher levels compared to LA and IV. However, PV was not significantly different from AE for reactive aggression, and oppositional disorder.

Our findings that showed more deleterious effects of polyvictimization were generally in agreement with previous studies that showed PV youths having worse outcomes in emotional responding, engaging in goal-directed behavior, anger, depression, and PTSD symptoms (Charak et al., 2019; Ford et al., 2010; Ford et al., 2013). In addition, our study also added to the extant literature by showing elevated antisocial attitudes, aggression, and disruptive behaviors in PV youths. These are important aspects of an offender's risk profile for reoffending and delinquency (Eisenberg et al., 2019; Mordre et al., 2011; Murray & Farrington, 2010).

Despite potentially different conceptualizations of child maltreatment in Asia, our study of a racially-diverse sample concurred with those done in Western jurisdictions (Degli Esposti et al., 2020). It showed that Asian youths with multiple adversities have higher propensity for elevated antisocial attitudes and aggression. This is also consistent with Chinese samples that show higher likelihood of externalizing problems among boys exposed to multiple ACEs (Wang et al., 2022).

Youth offenders in general were known to have elevated levels of disruptive disorders, aggression, and antisocial attitudes (Burke et al., 2015; Eisenberg et al., 2019; Olashore et al., 2016; Walters, 2005). We showed here that substantial variations corresponded to the level and typologies of ACE. The elevated levels of disruptive behavior disorders, aggression and antisocial attitudes could point to generally elevated levels of psychopathy within the environment in which PV youths socialize in. Child disruptive behavioral disorders have strong genetic and intergenerational transmissibility but may also be mediated by the environment (D'Onofrio et al., 2007; Moffitt, 2005; Raudino et al., 2013; Rhee & Waldman, 2002). From a social learning perspective, it is plausible that PV youths might have a family history of conduct disorder and these family members were in turn at an elevated risk for relationship violence (Jaffee et al., 2006), child abuse (Verona & Sachs-Ericsson, 2005) as well as have poor parenting practices and maladaptive communication patterns (Raudino et al., 2013). These maladaptive behaviors might then be subsequently modeled by PV youths (Bandura, 1973; Raudino et al., 2013; Rhee & Waldman, 2002).

Compared to the other groups, two particular types of adversities stood out among the PV youths in our sample, namely family violence and household member substance abuse, both of which have prevalence of over 90 %. Youths with parents who use substances or witnessed family violence are at increased risk of behavioral and conduct disorder as well as seen as more aggressive (Bountress & Chassin, 2015; Clark et al., 2004; Connor et al., 2004). These other studies fit in with our current findings and could potentially explain why PV youths have overall more serious conduct disorder and proactive aggression compared to the others.

We note the lack of a difference between PV and AE on oppositional, reactive aggression and antisocial attitudes. We speculate that the lack of difference between the AE and PV groups might be due to the high prevalence of physical abuse and in particular, emotional abuse in both these groups. Physical and emotional abuse has been linked to the development of adolescent behavioral disorders and aggression (Auslander et al., 2016; Lin et al., 2019; Xie et al., 2020). Among Chinese offenders, those incarcerated for violent offences were also more likely to have physical abuse history compared to those incarcerated for other offences (Wang et al., 2012). It is possible that youths developed vindictive, angry, and irritable traits characteristic of oppositional disorders through learned behaviors from parental interactions with them, which often comprise of physical aggression, hostility, and emotionally abusive language.

Numerous studies have shown that emotional abuse may be as damaging on psychological health as other types of abuse (Dye,

2020), especially since emotional pain share overlapping neural substrates with physical pain (Eisenberger et al., 2003; Kross et al., 2011). The finding here that AE and PV with high prevalence in emotional and physical abuse having the highest levels of disruptive behavior problems is thus consistent with the overall child abuse literature. This also suggested that although ACEs often co-occur, it might be the presence of emotional abuse that is particularly damaging psychologically and should be given equal priority as physical and sexual abuses.

4.2. Abusive Environment (AE)

The AE group was characterized by high levels of violence perpetrated on family members as well as abuse on the youth. We found that AE also had significantly more severe disruptive behavior disorders, aggression, and antisocial attitudes than LA. As mentioned previously, experience with emotional and physical abuse is known to have deleterious effects on aggression, psychopathology and antisociality (Auslander et al., 2016; Lin et al., 2019; Xie et al., 2020). This may explain the deleterious effects on these measures.

Aside from emotional and physical abuse, the AE group was also characterized by high prevalence of family violence. Again, drawing from Social Learning Theory (Bandura, 1973), these youths might also model their parents in using aggression in conflict resolution. Over time, these aggressive acts at home might become normative socialization behavior, especially when they resulted in instrumental gains (Black et al., 2009). These may explain the higher levels of aggression in the AE group compared to the LA group.

4.3. Indirect Victimization (IV)

The IV group represented a group that had an intermediate level of ACE, as shown by the relatively greater number of cumulative ACE than LA but fewer than the AE and PV groups. Importantly, as discussed earlier, this group presented a pattern of ACE that is characterized by a high prevalence of indirect victimization types such as household member incarceration and substance use, parental separation, and family violence. We found that IV had greater levels of conduct disorder, antisocial attitudes, and aggression relative to LA. There was however no difference between IV and AE on conduct disorder, aggression, and antisocial attitudes. We theorized that one possibility for the non-significant difference between IV and AE in aggression may be the somewhat high prevalence of family violence in both groups that resulted in modeling of aggression.

The evidence base for intergenerational transmission of offending and criminality is overwhelming (Chng et al., 2016; Junger et al., 2013; Murray & Farrington, 2005; Ting et al., 2022; van de Weijer et al., 2014). A key contributor to the intergenerational transmission of criminality might be genetic transmissibility of disruptive behavior disorders and possibly even aggressive tendencies and antisociality (D'Onofrio et al., 2007; Moffitt, 2005; Raudino et al., 2013; Rhee & Waldman, 2002). This could partially explain the elevated levels of aggression, antisocial attitudes, and conduct disorder in IV relative to LA.

According to the Self Control Theory (Gottfredson & Hirschi, 1990), the failure to develop adaptive self-control early in life might also result in delinquency later. Lack of positive role models in behavioral control at home could also in our case result in impulsivity and antisocial means to obtain wants and conduct disorder problems in the IV youths. These findings therefore suggest that there are profound consequences, even when adversities are not directly perpetrated on the youth. Hence, special care needs to be given to these children and adolescents with these adversities, even though these cases might not be deemed as priority cases by child protection agencies.

Importantly, our analysis of potential effects of indirect victimization relative to other classes adds to the extant literature as other studies (Logan-Greene et al., 2016, 2020; Wolff et al., 2018) that have examined indirect victimization were from a Western perspective. Furthermore, as the Logan-Greene et al. studies only included probationers, our study also adds to these studies by having offenders with a wider variation of sentences.

4.4. Low ACE (LA)

The LA group had the lowest level of conduct disorders and was generally lower than AE and PV in oppositional disorder, aggression, and antisocial attitudes. This was not surprising as the LA group largely had lower prevalence on all the ACE types relative to others, except emotional neglect, which might not result in a substantial impact relative to other ACEs. However, the LA group, although having low prevalence generally compared to other classes, still had moderate prevalence of adversities in parental separation (40 %), and family violence (18 %). These ACEs were known to result in delinquency, conduct and aggression problems (Amato, 2001; Hemovich & Crano, 2009; Nadeau et al., 2013; Zephyr et al., 2021). From a practical standpoint, these youths should still therefore have access to interventions, especially those that are directed to improving family functioning, relationships, and communicative patterns (Gan et al., 2019).

4.5. Limitations

We were unable to demonstrate cause and effect from our findings. However, we note studies that show a temporal relationship of worse externalizing behaviors over time following childhood adversity (Kjellstrand et al., 2018). A second limitation is with a person-centered approach, data on the severity and chronicity of ACE are lost. This is a shortcoming of not only the current approach, but also the cumulative risk approach (Evans et al., 2013). Future studies would thus add significantly to the literature by considering severity of adversities.

As is the case in many other studies in criminology (Bennet et al., 2015; Smith, 2014), our study sample is overrepresented by male

offenders, which could limit generalizability to female offenders. Specific ACEs might impact males and females differently (Jones et al., 2022; Leban & Gibson, 2020) and that males and females may have different exposures to ACEs (Baglivio & Epps, 2014). While we have mitigated this disparity by including sex as a covariate in all our analyses, future studies could nonetheless conduct separate analyses for males and females to validate the current findings.

Finally, as ACEs were self-reported, response bias could have potentially affected the findings. However, the ACE-IQ questionnaire is an extensively used and well-validated instrument (Christoforou & Ferreira, 2020; Kidman et al., 2019; Meinck et al., 2017). Nonetheless, we acknowledge that there is an inherent possibility of underreporting due to the reluctance of youths in self-disclosing some ACEs such as sexual abuse (Halvorsen et al., 2020; Lev-Wiesel & First, 2018). Future studies may look to augment self-reports with official child protection administrative data if these are available.

4.6. Theoretical and practical implications

Our findings highlight the importance of incorporating trauma-informed assessment for childhood adversities in youth rehabilitation settings to establish ACE history and interventional needs for youth offenders (see also Penn & Thomas, 2005). Trauma-informed assessments would help in directing intervention towards the specific needs corresponding to the ACE history. For example, youths from AE and PV, with high prevalence in direct victimization, might need to be continually monitored for abuse upon discharge from the youth justice system. This is especially so when adult perpetrators might still be part of their social circle when these youths are discharged.

Understanding adversity profiles in young persons would allow for upstream intervention to prevent antisocial and delinquent behaviors especially those in the PV, AE and IV groups. Early identification might be challenging for children and youth subjected to indirect victimizations as they may not present with overt signs of distress or injuries unlike direct victims. This calls for greater coordination between different services. One example is the “Hague protocol” (Diderich, 2012) implemented in hospitals in the Netherlands, where children of adults presenting at emergency departments due to spousal abuse, substance abuse and suicide are referred to Child Protective Services. In Singapore, the Government is also piloting a *Localised Community Network* for children in challenging home circumstances to identify needs early and coordinate support accordingly (Ministry of Social and Family Development, 2019). These upstream efforts are crucial to prevent youths in these challenging home environments from offending.

One of our aims for the current study was also to extend ACE typologies to a culturally diverse Asian sample of youth offenders. This was motivated by past research indicating cultural variations in conceptualizations of child maltreatment. Our findings were in general agreement with studies done in Western jurisdictions and with predominantly Chinese samples regarding the deleterious effects of childhood adversities on offending behaviors. Furthermore, it had the added benefit of the inclusion of a racially diverse sample of Asian youth offenders, thus improving the generalizability of findings. These generally consistent findings across different samples taken together, suggest that there might be greater convergence of Western and Asian conceptualizations and effects of childhood adversities since the publication of the earlier reports. It is thus important to update previous findings to examine whether such cultural variations still exist. Nevertheless, it is important to be careful in not obscuring within-culture differences when making between-culture comparisons (Ellonen et al., 2015; Kucuk Bicer et al., 2015).

4.7. Conclusions

Our unique contribution in this study was to show differential ACE typologies as well as indirect victimization having varying effects on antisocial attitudes, aggression, and disruptive behavior disorders. Although we have had significant advance in this field since the landmark Felitti et al. (1998) study, the significant gaps noted above means that there is still much more work to be done. Given the negative effects of ACE in youths, these undertakings are surely worthwhile, especially if they can result in targeted trauma-informed interventions and policies.

Funding information

The study is funded by the Ministry of Finance, Singapore.

Declaration of competing interest

The authors declare no conflict of interests with respect to the study, authorship, and publication of this manuscript.

Data availability

The authors do not have permission to share data.

Acknowledgement

We would like to express our gratitude for the fieldwork officers and project officers from the Social Service Research Centre, National University of Singapore involved in the data collection, management and overall support of the EPYC research programme.

References

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms and profiles*. ASEBA.

Aebi, M., Linhart, S., Thun-Hohenstein, L., Bessler, C., Steinhausen, H.-C., & Plattner, B. (2015). Detained male adolescent offender's emotional, physical and sexual maltreatment profiles and their associations to psychiatric disorders and criminal behaviors. *Journal of Abnormal Child Psychology, 43*(5), 999–1009. https://doi.org/10.1007/s10802-014-9961-y

AlHemyari, A. H., Al-Zamil, N. A., Shaikh, A. Y., Al-Eidi, D. A., Al-Dahlan, H. W., & Al-Shamekh, S. S. (2022). Prevalence of adverse childhood experiences and their relationship to mental and physical illnesses in the Eastern Region of Saudi Arabia. *Brain and Behavior: A Cognitive Neuroscience Perspective, 12*(7), Article e2668. https://doi.org/10.1002/brb3.2668

Alhowaymel, F. M., & Alenezi, A. (2022). Adverse childhood experiences and health in rural areas of Riyadh province in Saudi Arabia: A cross-sectional study. *Healthcare, 10*(12), 2502. https://www.mdpi.com/2227-9032/10/12/2502 https://www.mdpi.com/2227-9032/10/12/2502.

Amato, P. R. (2001). Children of divorce in the 1990s: An update of the Amato and Keith (1991) meta-analysis. *Journal of Family Psychology, 15*(3), 355–370. https://doi.org/10.1037//0893-3200.15.3.355

Ang, R. P., & Huan, V. S. (2008). Predictors of recidivism for adolescent offenders in a Singapore sample. *Criminal Justice and Behavior, 35*(7), 895–905. https://doi.org/10.1177/0093854808317270

Auemaneekul, N. (2013). Parents' perceptions of child abuse and child discipline in Bangkok, Thailand. *Journal of the Medical Association of Thailand, 96*(Suppl. 5), S181–S189.

Auslander, W., Sterzing, P., Threlfall, J., Gerke, D., & Edmond, T. (2016). Childhood abuse and aggression in adolescent girls involved in child welfare: The role of depression and posttraumatic stress. *Journal of Child & Adolescent Trauma, 9*, 1–10. https://doi.org/10.1007/s40653-016-0090-3

Baglivio, M. T., & Epps, N. (2014). The prevalence of Adverse Childhood Experiences (ACE) in the lives of juvenile offenders. *Journal of Juvenile Justice, 3*(2), 1–23.

Baglivio, M. T., Wolff, K. T., DeLisi, M., & Jackowski, K. (2020). The role of Adverse Childhood Experiences (ACEs) features on juvenile offending criminal careers to age 18. *Youth Violence and Juvenile Justice*. , Article 154120402092707. https://doi.org/10.1177/1541204020927075

Baglivio, M. T., Wolff, K. T., Piquero, A. R., & Epps, N. (2015). The relationship between Adverse Childhood Experiences (ACE) and juvenile offending trajectories in a juvenile offender sample. *Journal of Criminal Justice, 43*(3), 229–241. https://doi.org/10.1016/j.jcrimjus.2015.04.012

Bandura, A. (1973). *Aggression: A social learning analysis*. Prentice-Hall.

Basto-Pereira, M., Gouveia-Pereira, M., Pereira, C. R., Barrett, E. L., Lawler, S., Newton, N., Stapinski, L., Prior, K., Costa, M. S. A., Ximenes, J. M., Rocha, A. S., Michel, G., Garcia, M., Rouchy, E., Shawi, A. A., Sarhan, Y., Fulano, C., Magaia, A. J., El-Astal, S., & Sakulku, J. (2022). The global impact of adverse childhood experiences on criminal behavior: A cross-continental study. *Child Abuse & Neglect, 124*, Article 105459. https://doi.org/10.1016/j.chiabu.2021.105459

Bellis, M. A., Lowey, H., Leckenby, N., Hughes, K., & Harrison, D. (2014). Adverse Childhood Experiences: Retrospective study to determine their impact on adult health behaviours and health outcomes in a UK population. *Journal of Public Health, 36*(1), 81–91. https://doi.org/10.1093/pubmed/fdt038

Bennet, S., Farrington, D. P., & Huesmann, L. R. (2015). Explaining gender differences in crime and violence: The importance of social cognitive skills. *Aggression and Violent Behavior, 10*, 263–288. https://doi.org/10.1016/j.avb.2004.07.001

Black, D. S., Sussman, S., & Unger, J. B. (2009). A further look at the intergenerational transmission of violence: Witnessing interparental violence in emerging adulthood. *Journal of Interpersonal Violence, 25*(6), 1022–1042. https://doi.org/10.1177/0886260509340539

Bonta, J. L., & Andrews, D. A. (2017). *The psychology of criminal conduct* (6th ed.). Routledge.

Bountress, K., & Chassin, L. (2015). Risk for behavior problems in children of parents with substance use disorders. *The American Journal of Orthopsychiatry, 85*(3), 275–286. https://doi.org/10.1037/ort0000063

Burke, J. D., Mulvey, E. P., & Schubert, C. A. (2015). Prevalence of mental health problems and service use among first-time juvenile offenders. *Journal of Child and Family Studies, 24*(12), 3774–3781. https://doi.org/10.1007/s10826-015-0185-8

Celeux, G., & Soromenho, G. (1996). An entropy criterion for assessing the number of clusters in a mixture model. *Journal of Classification, 13*(2), 195–212. https://doi.org/10.1007/BF01246098

Charak, R., Ford, J. D., Modrowski, C. A., & Kerig, P. K. (2019). Polyvictimization, emotion dysregulation, symptoms of posttraumatic stress disorder, and behavioral health problems among justice-involved youth: A latent class analysis. *Journal of Abnormal Child Psychology, 47*(2), 287–298. https://doi.org/10.1007/s10802-018-0431-9

Chng, G. S., Chu, C. M., Zeng, G., Li, D., & Ting, M. H. (2016). A latent class analysis of family characteristics linked to youth offending outcomes. *Journal of Research in Crime and Delinquency, 53*(6), 765–787. https://doi.org/10.1177/0022427816644947

Christoforou, R., & Ferreira, N. (2020). Psychometric assessment of Adverse Childhood Experiences International Questionnaire (ACE-IQ) with adults engaging in non-suicidal self-injury. *Mediterranean Journal of Clinical Psychology, 8*(3), 1–23. https://doi.org/10.6092/2282-1619/mjcp-2601

Chu, C. M., Yu, H., Lee, Y., & Zeng, G. (2014). The utility of the YLS/CMI-SV for assessing youth offenders in Singapore. *Criminal Justice and Behavior, 41*(12), 1437–1457. https://doi.org/10.1177/0093854814537626

Clark, D. B., Cornelius, J., Wood, D. S., & Vanyukov, M. (2004). Psychopathology risk transmission in children of parents with substance use disorders. *American Journal of Psychiatry, 161*(4), 685–691. https://doi.org/10.1176/appi.ajp.161.4.685

Connor, D. F., Steingard, R. J., Cunningham, J. A., Anderson, J. J., & Melloni, R. H., Jr. (2004). Proactive and reactive aggression in referred children and adolescents. *American Journal of Orthopsychiatry, 74*(2), 129–136. https://doi.org/10.1037/0002-9432.74.2.129

D'Onofrio, B. M., Slutske, W. S., Turkheimer, E., Emery, R. E., Harden, K. P., Heath, A. C., Madden, P. A. F., & Martin, N. G. (2007). Intergenerational transmission of childhood conduct problems: A children of twins study. *Archives of General Psychiatry, 64*(7), 820–829. https://doi.org/10.1001/archpsyc.64.7.820

Deater-Deckard, K., & Dodge, K. A. (1997). Externalizing behavior problems and discipline revisited: Nonlinear effects and variation by culture, context, and gender. *Psychological Inquiry, 8*(3), 161–175. https://doi.org/10.1207/s15327965pli0803_1

Degli Esposti, M., Pinto Pereira, S. M., Humphreys, D. K., Sale, R. D., & Bowes, L. (2020). Child maltreatment and the risk of antisocial behaviour: A population-based cohort study spanning 50 years. *Child Abuse & Neglect, 99*, Article 104281. https://doi.org/10.1016/j.chiabu.2019.104281

DeLisi, M., Kosloski, A. E., Vaughn, M. G., Caudill, J. W., & Trulson, C. R. (2014). Does childhood sexual abuse victimization translate into juvenile sexual offending? New evidence. *Violence and Victims, 29*(4), 620–635. https://doi.org/10.1891/0886-6708.vv-d-13-00003

Diderich, H. (2012). Child abuse detection at the emergency department using a new protocol based on parental characteristics. *Archives of Disease in Childhood, 97*(Suppl. 2), A420. https://doi.org/10.1136/archdischild-2012-302724.1480

Dong, M., Giles, W. H., Felitti, V. J., Dube, S. R., Williams, J. E., Chapman, D. P., & Anda, R. F. (2004). Insights into causal pathways for ischemic heart disease: Adverse Childhood Experiences study. *Circulation, 110*(13), 1761–1766. https://doi.org/10.1161/01.Cir.0000143074.54995.7f

Dube, S. R., Felitti, V. J., Dong, M., Chapman, D. P., Giles, W. H., & Anda, R. F. (2003). Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: The adverse childhood experiences study. *Pediatrics, 111*(3), 564. https://doi.org/10.1542/peds.111.3.564

Dye, H. L. (2020). Is emotional abuse as harmful as physical and/or sexual abuse? *Journal of Child & Adolescent Trauma, 13*(4), 399–407. https://doi.org/10.1007/s40653-019-00292-y

Eisenberg, M. J., van Horn, J. E., Dekker, J. M., Assink, M., van der Put, C. E., Hendriks, J., & Stams, G. J. J. M. (2019). Static and dynamic predictors of general and violent criminal offense recidivism in the forensic outpatient population: A meta-analysis. *Criminal Justice and Behavior, 46*(5), 732–750. https://doi.org/10.1177/0093854819826109

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does rejection hurt? An fMRI study of social exclusion. *Science, 302*(5643), 290. https://doi.org/10.1126/science.1089134

Elliott, J. M., Tong, C. K., & Tan, P. M. E. H. (1997). Attitudes of the Singapore public to actions suggesting child abuse. *Child Abuse & Neglect, 21*(5), 445–464. https://doi.org/10.1016/S0145-2134(97)00005-7

Ellonen, N., Jernbro, C., Janson, S., Tindberg, Y., & Lucas, S. (2015). Current parental attitudes towards upbringing practices in Finland and Sweden 30 years after the ban on corporal punishment. *Child Abuse Review, 24*(6), 409–417. https://doi.org/10.1002/car.2356

Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin, 139*(6), 1342–1396. https://doi.org/10.1037/a0031808
Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults the Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245–258. https://doi.org/10.1016/s0749-3797(98)00017-8
Finkelhor, D., Turner, H. A., Shattuck, A., & Hamby, S. L. (2013). Violence, crime, and abuse exposure in a national sample of children and youth: An update. *JAMA Pediatrics, 167*(7), 614–621. https://doi.org/10.1001/jamapediatrics.2013.42
Ford, J. D., Elhai, J. D., Connor, D. F., & Frueh, B. C. (2010). Poly-victimization and risk of posttraumatic, depressive, and substance use disorders and involvement in delinquency in a national sample of adolescents. *Journal of Adolescent Health, 46*(6), 545–552. https://doi.org/10.1016/j.jadohealth.2009.11.212
Ford, J. D., Grasso, D. J., Hawke, J., & Chapman, J. F. (2013). Poly-victimization among juvenile justice-involved youths. *Child Abuse & Neglect, 37*(10), 788–800. https://doi.org/10.1016/j.chiabu.2013.01.005
Fox, B. H., Perez, N., Cass, E., Baglivio, M. T., & Epps, N. (2015). Trauma changes everything: Examining the relationship between Adverse Childhood Experiences and serious, violent and chronic juvenile offenders. *Child Abuse & Neglect, 46*, 163–173. https://doi.org/10.1016/j.chiabu.2015.01.011
Gan, D. Z. Q., Zhou, Y., Hoo, E., Chong, D., & Chu, C. M. (2019). The implementation of Functional Family Therapy (FFT) as an intervention for youth probationers in Singapore. *Journal of Marital and Family Therapy, 45*(4), 684–698. https://doi.org/10.1111/jmft.12353
Gershoff, E. T. (2002). Corporal punishment by parents and associated child behaviors and experiences: A meta-analytic and theoretical review. *Psychological Bulletin, 128*, 539–579.
Gottfredson, M., & Hirschi, T. (1990). *A general theory of crime*. Stanford University Press.
Grasso, D. J., Dierkhising, C. B., Branson, C. E., Ford, J. D., & Lee, R. (2016). Developmental patterns of Adverse Childhood Experiences and current symptoms and impairment in youth referred for trauma-specific services. *Journal of Abnormal Child Psychology, 44*(5), 871–886. https://doi.org/10.1007/s10802-015-0086-8
Halvorsen, J. E., Tvedt Solberg, E., & Hjelen Stige, S. (2020). "To say it out loud is to kill your own childhood". – An exploration of the first person perspective of barriers to disclosing child sexual abuse. *Children and Youth Services Review, 113*, Article 104999. https://doi.org/10.1016/j.childyouth.2020.104999
Hemovich, V., & Crano, W. D. (2009). Family structure and adolescent drug use: An exploration of single-parent families. *Substance Use & Misuse, 44*(14), 2099–2113. https://doi.org/10.3109/10826080902858375
Jaffee, S. R., Belsky, J., Harrington, H., Caspi, A., & Moffitt, T. E. (2006). When parents have a history of conduct disorder: How is the caregiving environment affected? *Journal of Abnormal Psychology, 115*(2), 309–319. https://doi.org/10.1037/0021-843x.115.2.309
Jones, M. S., Pierce, H., & Shafer, K. (2022). Gender differences in early adverse childhood experiences and youth psychological distress. *Journal of Criminal Justice, 83*, Article 101925. https://doi.org/10.1016/j.jcrimjus.2022.101925
Juarez, T., & Howard, M. V. A. (2021). Self-reported change in antisocial attitudes and reoffending among a sample of 2,337 males convicted of violent offenses. *Criminal Justice and Behavior, 49*(1), 3–19. https://doi.org/10.1177/00938548211013576
Juby, H., & Farrington, D. P. (2001). Disentangling the link between disrupted families and delinquency: Sociodemography, ethnicity and risk behaviours. *The British Journal of Criminology, 41*(1), 22–40. https://doi.org/10.1093/bjc/41.1.22
Junger, M., Greene, J., Schipper, R., Hesper, F., & Estourgie, V. (2013). Parental criminality, family violence and intergenerational transmission of crime within a birth cohort. *European Journal on Criminal Policy and Research, 19*(2), 117–133. https://doi.org/10.1007/s10610-012-9193-z
Kidman, R., Smith, D., Piccolo, L. R., & Kohler, H.-P. (2019). Psychometric evaluation of the Adverse Childhood Experience International Questionnaire (ACE-IQ) in Malawian adolescents. *Child Abuse & Neglect, 92*, 139–145. https://doi.org/10.1016/j.chiabu.2019.03.015
Kjellstrand, J. M., Reinke, W. M., & Eddy, J. M. (2018). Children of incarcerated parents: Development of externalizing behaviors across adolescence. *Children and Youth Services Review, 94*, 628–635. https://doi.org/10.1016/j.childyouth.2018.09.003
Kross, E., Berman, M. G., Mischel, W., Smith, E. E., & Wager, T. D. (2011). Social rejection shares somatosensory representations with physical pain. *Proceedings of the National Academy of Sciences, 108*(15), 6270. https://doi.org/10.1073/pnas.1102693108
Kucuk Bicer, B., Ozcebe, H., Kose, E., Ahmad, F., & Kose, O. (2015). Corporal punishment: Similarities and differences from Eastern cultured countries. *European Journal of Public Health, 25*(suppl_3), ckv176.292. https://doi.org/10.1093/eurpub/ckv176.292
Lantos, H., Wilkinson, A., Winslow, H., & McDaniel, T. (2019). Describing associations between child maltreatment frequency and the frequency and timing of subsequent delinquent or criminal behaviors across development: Variation by sex, sexual orientation, and race. *BMC Public Health, 19*(1), 1306. https://doi.org/10.1186/s12889-019-7655-7
Lau, J. T. F., Liu, J. L. Y., Yu, A., & Wong, C. K. (1999). Conceptualization, reporting and underreporting of child abuse in Hong Kong. *Child Abuse & Neglect, 23*(11), 1159–1174. https://doi.org/10.1016/S0145-2134(99)00075-7
Leban, L., & Gibson, C. L. (2020). The role of gender in the relationship between adverse childhood experiences and delinquency and substance use in adolescence. *Journal of Criminal Justice, 66*, Article 101637. https://doi.org/10.1016/j.jcrimjus.2019.101637
Lee, H. Y., Kim, I., Nam, S., & Jeong, J. (2020). Adverse Childhood Experiences and the associations with depression and anxiety in adolescents. *Children and Youth Services Review, 111*. https://doi.org/10.1016/j.childyouth.2020.104850
Lev-Wiesel, R., & First, M. (2018). Willingness to disclose child maltreatment: CSA vs other forms of child abuse in relation to gender. *Child Abuse & Neglect, 79*, 183–191. https://doi.org/10.1016/j.chiabu.2018.02.010
Li, D., Chu, C. M., Goh, J. T. L., Ng, I. Y. H., & Zeng, G. (2015). Impact of childhood maltreatment on recidivism in youth offenders: A matched-control study. *Criminal Justice and Behavior, 42*(10), 990–1007. https://doi.org/10.1177/0093854815598598
Li, D., Chu, C. M., Ng, W. C., & Leong, W. (2014). Predictors of re-entry into the child protection system in Singapore: A cumulative ecological–transactional risk model. *Child Abuse & Neglect, 38*(11), 1801–1812. https://doi.org/10.1016/j.chiabu.2014.08.017
Li, S., Wang, S., Gao, X., Jiang, Z., Xu, H., Zhang, S., Sun, Y., Tao, F., Chen, R., & Wan, Y. (2021). Patterns of adverse childhood experiences and suicidal behaviors in adolescents: A four-province study in China. *Journal of Affective Disorders, 285*, 69–76. https://doi.org/10.1016/j.jad.2021.02.045
Li, X., Zheng, H., Tucker, W., Xu, W., Wen, X., Lin, Y., Jia, Z., Yuan, Z., & Yang, W. (2019). Research on relationships between sexual identity, adverse childhood experiences and non-suicidal self-injury among rural high school students in less developed areas of China. *International Journal of Environmental Research and Public Health, 16*(17). https://doi.org/10.3390/ijerph16173158
Lian, J., Kiely, K. M., & Anstey, K. J. (2022). Cumulative risk, factor analysis, and latent class analysis of childhood adversity data in a nationally representative sample. *Child Abuse & Neglect, 125*, Article 105486. https://doi.org/10.1016/j.chiabu.2022.105486
Lin, X., Li, Y., Xu, S., Ding, W., Zhou, Q., Du, H., & Chi, P. (2019). Family risk factors associated with oppositional defiant disorder symptoms, depressive symptoms, and aggressive behaviors among Chinese children with oppositional defiant disorder. *Frontiers in Psychology, 10*. https://doi.org/10.3389/fpsyg.2019.02062, 2062-2062.
Linzer, D. A., & Lewis, J. B. (2011). poLCA: An R package for polytomous variable Latent Class Analysis. *Journal of Statistical Software, 42*(10). https://doi.org/10.18637/jss.v042.i10
Logan-Greene, P., Kim, B. K. E., & Nurius, P. S. (2016). Childhood adversity among court-involved youth: Heterogeneous needs for prevention and treatment. *Journal of Juvenile Justice, 5*(2), 68–84.
Logan-Greene, P., Kim, B. K. E., & Nurius, P. S. (2020). Adversity profiles among court-involved youth: Translating system data into trauma-responsive programming. *Child Abuse & Neglect, 104*, Article 104465. https://doi.org/10.1016/j.chiabu.2020.104465
McLachlan, G., & Peel, D. (2000). *Finite mixture models*. John Wiley & Sons, Inc.. https://doi.org/10.1002/0471721182
Meinck, F., Cosma, A. P., Mikton, C., & Baban, A. (2017). Psychometric properties of the Adverse Childhood Experiences Abuse Short Form (ACE-ASF) among Romanian high school students. *Child Abuse & Neglect, 72*, 326–337. https://doi.org/10.1016/j.chiabu.2017.08.016
Méndez-López, C., Pereda, N., & Guilera, G. (2021). Lifetime poly-victimization and psychopathological symptoms in Mexican adolescents. *Child Abuse & Neglect, 112*, Article 104883. https://doi.org/10.1016/j.chiabu.2020.104883
Miley, L. N., Fox, B., Muniz, C. N., Perkins, R., & DeLisi, M. (2020). Does childhood victimization predict specific adolescent offending? An analysis of generality versus specificity in the victim-offender overlap. *Child Abuse & Neglect, 101*, Article 104328. https://doi.org/10.1016/j.chiabu.2019.104328

Mills, J. F., Kroner, D. G., & Forth, A. E. (2002). Measures of Criminal Attitudes and Associates (MCAA): Development, factor structure, reliability, and validity. *Assessment, 9*(3), 240–253. https://doi.org/10.1177/1073191102009003003
Ministry of Social and Family Development. (2019). Enhancing support for at-risk children and youth. Retrieved 23 March 2022 from https://www.msf.gov.sg/media-room/Pages/Enhancing-Support-for-At-Risk-Children-and-Youth.aspx.
Ministry of Social and Family Development. (2022). Services/programmes under the Integrated Service Providers (ISPs). Retrieved 3 Feb 2023 from https://www.msf.gov.sg/policies/Rehabilitation-of-Offenders/Community-based-Rehabilitation/Pages/Services-Programmes-under-the-Integrated-Service-Providers.aspx.
Moffitt, T. E. (2005). The new look of behavioral genetics in developmental psychopathology: Gene-environment interplay in antisocial behaviors. *Psychological Bulletin, 131*(4), 533–554. https://doi.org/10.1037/0033-2909.131.4.533
Mordre, M., Groholt, B., Kjelsberg, E., Sandstad, B., & Myhre, A. M. (2011). The impact of ADHD and conduct disorder in childhood on adult delinquency: A 30 years follow-up study using official crime records. *BMC Psychiatry, 11*(1), 57. https://doi.org/10.1186/1471-244X-11-57
Murray, J., & Farrington, D. P. (2005). Parental imprisonment: Effects on boys' antisocial behaviour and delinquency through the life-course. *Journal of Child Psychology and Psychiatry, 46*(12), 1269–1278. https://doi.org/10.1111/j.1469-7610.2005.01433.x
Murray, J., & Farrington, D. P. (2010). Risk factors for conduct disorder and delinquency: Key findings from longitudinal studies. *The Canadian Journal of Psychiatry, 55*(10), 633–642. https://doi.org/10.1177/070674371005501003
Nadeau, M., Nolin, P., & Chartrand, C. (2013). Behavioral and emotional profiles of neglected children. *Journal of Child & Adolescent Trauma, 6*, 11–24. https://doi.org/10.1080/19361521.2013.732202
Ngiam, X. Y., & Tung, S. S. W. (2016). The acceptability of caning children in Singapore. *Journal of Developmental & Behavioral Pediatrics, 37*(2), 158–163. https://doi.org/10.1097/dbp.0000000000000247
Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(4), 535–569. https://doi.org/10.1080/10705510701575396
Oei, A., Chu, C. M., Li, D., Ng, N., Yeo, C., & Ruby, K. (2021). Relationship between Adverse Childhood Experiences and substance use in youth offenders in Singapore. *Child Abuse & Neglect, 117*, Article 105072. https://doi.org/10.1016/j.chiabu.2021.105072
Olashore, A. A., Ogunwale, A., & Adebowale, T. O. (2016). Correlates of conduct disorder among inmates of a Nigerian Borstal Institution. *Child and Adolescent Psychiatry and Mental Health, 10*(1), 13. https://doi.org/10.1186/s13034-016-0100-0
Penn, J. V., & Thomas, C. (2005). Practice parameter for the assessment and treatment of youth in juvenile detention and correctional facilities. *Journal of the American Academy of Child Adolescent Psychiatry, 44*(10), 1085–1098. https://doi.org/10.1097/01.chi.0000175325.14481.21
R Core Team. (2019). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. http://www.R-project.org/.
Raine, A., Dodge, K., Loeber, R., Gatzke-Kopp, L., Lynam, D., Reynolds, C., Stouthamer-Loeber, M., & Liu, J. (2006). The Reactive-Proactive Aggression Questionnaire: Differential correlates of reactive and proactive aggression in adolescent boys. *Aggressive Behavior, 32*(2), 159–171. https://doi.org/10.1002/ab.20115
Raudino, A., Fergusson, D. M., Woodward, L. J., & Horwood, L. J. (2013). The intergenerational transmission of conduct problems. *Social Psychiatry and Psychiatric Epidemiology, 48*(3), 465–476. https://doi.org/10.1007/s00127-012-0547-0
Rhee, S. H., & Waldman, I. D. (2002). Genetic and environmental influences on antisocial behavior: A meta-analysis of twin and adoption studies. *Psychological Bulletin, 128*(3), 490–529. https://doi.org/10.1037/0033-2909.128.3.490
Saunders, B. E., & Adams, Z. W. (2014). Epidemiology of traumatic experiences in childhood. *Child and Adolescent Psychiatric Clinics of North America, 23*(2), 167–184. https://doi.org/10.1016/j.chc.2013.12.003
Shin, S. H., McDonald, S. E., & Conley, D. (2018). Patterns of adverse childhood experiences and substance use among young adults: A latent class analysis. *Addictive Behaviors, 78*, 187–192. https://doi.org/10.1016/j.addbeh.2017.11.020
Smith, G. (2014). Long-term trends in female and male involvement in crime. In R. G.a. B. McCarthy (Ed.), *The Oxford handbook of gender, sex, and crime* (pp. 139–157). Oxford University Press.
Sölva, K., Haselgruber, A., & Lueger-Schuster, B. (2020). Latent classes of childhood maltreatment in children and adolescents in foster care: Associations with ICD-11 PTSD and complex PTSD. *European Journal of Psychotraumatology, 11*(1), 1832757. https://doi.org/10.1080/20008198.2020.1832757
Tang, J., Li, G., Chen, B., Huang, Z., Zhang, Y., Chang, H., Wu, C., Ma, X., Wang, J., & Yu, Y. (2018). Prevalence of and risk factors for non-suicidal self-injury in rural China: Results from a nationwide survey in China. *Journal of Affective Disorders, 226*, 188–195. https://doi.org/10.1016/j.jad.2017.09.051
Ting, M. H., Xu, X., Chu, C. M., Lai, P., & Li, D. (2022). Understanding the intergenerational transmission of criminal justice involvement: A multi-birth-cohort study in Singapore. *Asian Journal of Criminology, 17*(4), 449–473. https://doi.org/10.1007/s11417-022-09371-w
Turner, D., Wolf, A. J., Barra, S., Müller, M., Gregório Hertz, P., Huss, M., Tüscher, O., & Retz, W. (2021). The association between Adverse Childhood Experiences and mental health problems in young offenders. *European Child & Adolescent Psychiatry, 30*(8), 1195–1207. https://doi.org/10.1007/s00787-020-01608-2
van de Weijer, S. G. A., Bijleveld, C. C. J. H., & Blokland, A. A. J. (2014). The intergenerational transmission of violent offending. *Journal of Family Violence, 29*(2), 109–118. https://doi.org/10.1007/s10896-013-9565-2
van de Weijer, S. G. A., Thornberry, T. P., Bijleveld, C. C. J. H., & Blokland, A. A. J. (2015). The effects of parental divorce on the intergenerational transmission of crime. *Societies, 5*(1), 89–108. https://doi.org/10.3390/soc5010089
Verona, E., & Sachs-Ericsson, N. (2005). The intergenerational transmission of externalizing behaviors in adult participants: The mediating role of childhood abuse. *Journal of Consulting and Clinical Psychology, 73*(6), 1135–1145. https://doi.org/10.1037/0022-006X.73.6.1135
Vitopoulos, N. A., Peterson-Badali, M., Brown, S., & Skilling, T. A. (2019). The relationship between trauma, recidivism risk, and reoffending in male and female juvenile offenders. *Journal of Child & Adolescent Trauma, 12*(3), 351–364. https://doi.org/10.1007/s40653-018-0238-4
Walters, G. D. (2005). Proactive and reactive aggression: A lifestyle view. In *Psychology of aggression* (pp. 29–43). Nova Science Publishers.
Wang, Y., Ma, S., Jiang, L., Chen, Q., Guo, J., He, H., Li, P., Gao, T., & Wang, X. (2022). Adverse childhood experiences and deviant behaviors among Chinese rural emerging adults: The role of social support. *BMC Public Health, 22*(1), 2404. https://doi.org/10.1186/s12889-022-14691-8
Wang, Y., Xu, K., Cao, G., Qian, M., Shook, J., & Ai, A. L. (2012). Child maltreatment in an incarcerated sample in China: Prediction for crime types in adulthood. *Children and Youth Services Review, 34*(8), 1553–1559. https://doi.org/10.1016/j.childyouth.2012.04.015
Wolff, K. T., Cuevas, C., Intravia, J., Baglivio, M. T., & Epps, N. (2018). The effects of neighborhood context on exposure to Adverse Childhood Experiences (ACE) among adolescents involved in the juvenile justice system: Latent classes and contextual effects. *Journal of Youth and Adolescence, 47*(11), 2279–2300. https://doi.org/10.1007/s10964-018-0887-5
World Health Organization. (2012). Adverse Childhood Experiences (ACE-IQ). Retrieved 27 Apr 2020 from www.who.int.
Xiao, Q., Dong, M.-X., Yao, J., Li, W.-X., & Ye, D.-Q. (2008). Parental alcoholism, adverse childhood experiences, and later risk of personal alcohol abuse among Chinese medical students. *Biomedical and Environmental Sciences, 21*(5), 411–419. https://doi.org/10.1016/S0895-3988(08)60062-8
Xie, Q., Bi, T., Du, Y., Kou, H., & Yang, B. (2020). Childhood maltreatment is associated with aggression among male juvenile delinquents in China: The mediating effects of callous-unemotional traits and self-control. *Frontiers in Psychology, 11*. https://doi.org/10.3389/fpsyg.2020.01373
Yohros, A. (2022). Examining the relationship between adverse childhood experiences and juvenile recidivism: A systematic review and meta-analysis. *Trauma, Violence, & Abuse*. , Article 152483802110738. https://doi.org/10.1177/15248380211073846
Zephyr, L., Cyr, C., Monette, S., Langlois, V., Cyr-Desautels, L., & Archambault, M. (2021). Disinhibited social engagement behaviors in young maltreated children: Dysfunctional behavior of biological parents and child attachment. *Child Abuse & Neglect, 111*, Article 104791. https://doi.org/10.1016/j.chiabu.2020.104791
Zhang, L., Fang, J., Wan, Y., Gong, C., Su, P., Tao, F., & Sun, Y. (2020). The patterns of adverse childhood experiences among Chinese children: Four-year longitudinal associations with psychopathological symptoms. *Journal of Psychiatric Research, 122*, 1–8. https://doi.org/10.1016/j.jpsychires.2019.12.009