

The Interrelatedness of Adverse Childhood Experiences Among High-Risk Juvenile Offenders

Youth Violence and Juvenile Justice
1-20

© The Author(s) 2015

Reprints and permission:

sagepub.com/journalsPermissions.nav

DOI: 10.1177/1541204014566286

yvj.sagepub.com



Michael T. Baglivio¹ and Nathan Epps¹

Abstract

The interrelatedness of adverse childhood experiences (ACEs) in 64,329 juvenile offenders was examined. ACEs include childhood abuse (physical, emotional, and sexual), neglect (physical and emotional), and household dysfunction (family violence, family substance use, family mental illness, separation/divorce, and family incarceration). Prevalence ranged from 12% to 82% for each ACE. Of youth experiencing one ACE 67.5% reported four or more additional exposures and 24.5% exposure to six or more additional ACEs. Females have higher prevalence and multiple exposures. ACEs are interrelated, necessitating assessment of multiple ACEs rather than one or a few. ACE exposure differs by gender and race/ethnicity.

Keywords

adverse childhood experiences, ACE, trauma, abuse, juvenile offenders

Introduction

Adverse childhood experiences (ACEs) as a composite score were first described in 1998 in the seminal study “Relationship of childhood abuse and dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study” (Felitti et al., 1998). The ACE concept acknowledges the complex and cumulative nature of risk factors through the process of summing risk factors and associating the composite score with relevant outcomes developed by Rutter (1983). Through a prospective study including 17,421 insured, well-educated, adult patients, Felitti and colleagues identified 10 negative childhood events that positively correlate with chronic disease in adulthood. The 10 adverse experiences are emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, violent treatment toward mother, household substance abuse, household mental illness, parental separation or divorce, and having an incarcerated household

¹ Florida Department of Juvenile Justice, Bureau of Research and Planning, Tallahassee, FL, USA

Corresponding Author:

Michael T. Baglivio, Florida Department of Juvenile Justice, Bureau of Research and Planning, 2737 Centerview Drive, Tallahassee, FL 32399, USA.

Email: Michael.Baglivio@djj.state.fl.us

member. Additional work has shown even higher prevalence of ACEs in special populations, such as children of alcoholics (Dube, Anda, Felitti, Croft, et al., 2001) and juveniles with justice system involvement (Baglivio, Epps, Swartz, Huq, & Hardt, 2014), than those found for the mostly middle-class original ACE Study population.

A person's cumulative ACE score is expressed as the total number of the reported 10 ACEs. Each ACE is measured in a binary yes–no fashion such that an affirmative response to each ACE “counts” as 1 point. For example, a positive response for sexual abuse would score 1 point whether there were 1 or 100 incidents and regardless of the duration or severity of the abuse. The ACE score ranges from 0 (not having been exposed to any of the traumas/abuses) to 10 (having been exposed to all of them). Prior ACE studies have indicated a dose–response relationship between ACE scores and negative outcomes, with higher ACE scores correlating most strongly with negative outcomes (Brown et al., 2009; Felitti et al., 1998).

The concept of a composite ACE score is central to the understanding of the effect of ACEs, as it is now clearly evident from empirical evaluation that ACEs are common, highly interrelated, and exert a powerful cumulative impact on human development (Anda, Butchart, Felitti, & Brown, 2010; Dong et al., 2004). This “cumulative stressor approach” based on the co-occurrence and cumulative impact of these exposures necessitates the examination of them as a collective composite. The customary approach of examining one or only a few adverse exposures misses the broader interrelated context in which they occur. The use of the ACE score as a measure of the cumulative traumatic stress exposure during childhood is consistent with the latest understanding of the effects of traumatic stress on neurodevelopment (Anda et al., 2006, 2010).

Life Course Perspective

Sampson and Laub (1990) describe trajectories and transitions as two central concepts of the life course perspective. Trajectories are defined as pathways or lines of development over the life span, referring to long-term patterns of behavior. These trajectories are marked by the sequencing of meaningful life events and transitions, with transitions being specific life events that develop over shorter time spans (such as single to married or getting arrested). Transitions may typically result in a change in status or social identity. How an individual adapts to and copes with life events is crucial to the ultimate outcome where different adaptations and coping styles may lead to different life trajectories. Sampson and Laub (1990, p. 610) note the life course perspective “implies both a strong connection between childhood events and experiences in young adulthood, and that transitions or turning points can modify life trajectories – they can “redirect paths.” Life course criminology, then, is principally concerned with pathways, and how transitions affect trajectories with respect to offending, and/or in the lives of offending populations. Prevalence studies, briefly reviewed below, showing at-risk and offending youth having more abuse/neglect exposure, place ACE in the risk factor prevention paradigm of developmental and life course criminology (Farrington, 2003). As such, risk factor research's primary focus is not on establishing causality and explanations but on finding correlations (Farrington, 2000).

From a life course perspective, implications of high ACE scores on both proximal and distal negative outcomes are well documented in the medical literature (Anda et al, 2006, 2010). Higher ACE scores are associated with significantly increased odds of developing some of the leading causes of death in adulthood, such as heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease. Prior studies have shown the odds of having one of those above-mentioned negative health outcomes in adulthood are up to 12 times higher for children who have experienced four or more ACEs, in comparison to children without such exposure (Felitti et al., 1998).

Examining more proximal outcomes, higher cumulative ACE scores have been shown to increase the odds of smoking, heavy drinking, intravenous drug use, incarceration, and morbid obesity, with

greater risk also for poor educational and employment outcomes and recent involvement in violence (Bellis, Lowey, Leckenby, Hughes, & Harrison, 2014). ACEs account for a 20–70% increased likelihood of mid-adolescence alcohol use initiation (Dube et al., 2006), and a dose–response relationship has been found between ACE score and a history of suicide attempts (Dube, Anda, Felitti, Chapman, et al., 2001). High ACE scores have been linked to a number of sexual risk behaviors such as having 50 or more sexual partners, intercourse before age 15 (Hillis, Anda, Felitti, & Marchbanks, 2001), and becoming pregnant as a teenager (Hillis et al., 2004). ACE scores have more recently been identified with immediate negative consequences such as chromosome damage (Shalev et al., 2013) and functional changes to the developing brain (Anda et al., 2010; Cicchetti, 2013; Danese & McEwen, 2012; Teicher et al., 2003).

However, there is a gap in the literature with regard to the prevalence and interrelatedness of ACEs in offending populations, specifically a juvenile offending population. The prior work reviewed earlier illustrates the ACE cumulative stressor composite score concept has implications over a person's entire life course. Maltreated children are vulnerable to a range of complications over the life course, including social, health-related, and behavioral problems, including criminal offending. Furthermore, studies reporting gender and racial differences in ACEs for special populations, such as juvenile offenders, are also scarce. We attempt to address that gap by examining the interrelatedness of ACEs in a diverse sample of over 60,000 of the highest risk juvenile offenders across an entire diverse state. To that end, this study is structured as follows: first, we very briefly describe the prior work on individual ACEs and justice-involved youth and the limited examination of cumulative ACE scores with that population. Next, we examine the prevalence of ACEs in the current sample of juveniles as well as the prevalence of additional ACEs, given the presence of any specific ACE. Third, we present the odds of having each additional ACE, given the presence of any specific ACE. Finally, we examine the prevalence of ACEs by gender and race/ethnicity, followed by a discussion of the findings, policy implications, and directions for future work.

Adverse Childhood Experiences and Adolescents

Recent studies have begun to examine the impact of childhood abuse/maltreatment (in a cumulative ACE score context) on behaviors in adolescent samples as opposed to retrospective recall of childhood abuse in adult samples. Examining the effects of maltreatment on early alcohol use in seventh through twelfth graders, Hamburger and colleagues found students witnessing domestic violence, having a history of physical abuse, and sexual abuse were up to 3 times more likely to have early alcohol use initiation (Hamburger, Leeb, & Swahn, 2008). Examining six types of ACEs on over 130,000 students, Duke and colleagues found each additional type of reported ACE increased the risk of violence perpetration by 35–144% (Duke, Pettingell, McMorris, & Borowsky, 2010). Interestingly, these results included interpersonal violence (including delinquency, weapon-carrying, fighting, bullying, and dating violence) as well as self-directed violence (attempted suicide, self-mutilation). A dose–response relationship was found between ACE score and both learning/behavior problems and obesity in a retrospective chart review of high-risk urban pediatric patients (Burke, Hellman, Scott, Weems, & Carrion, 2011).

Childhood Abuse, Neglect, Household Dysfunction, and Justice-Involved Youth

Higher prevalence rates of adversity and trauma for justice system-involved youth in comparison to the general population have been revealed in prior work (Dierkhising et al., 2013). Youth with juvenile justice system histories have been found more likely to have experienced multiple forms of trauma (Abram et al., 2004), with one third reporting exposure to multiple types of trauma each year (Dierkhising et al., 2013). Among offenders, experiencing childhood physical abuse and other forms

of maltreatment leads to higher rates of self-reported total offending, violent offending, and property offending, even after controlling for prior delinquent behavior. (Teague, Mazerolle, Legosz, & Sanderson, 2008). In a comparison of over 90,000 officially delinquent youth with an equal number of comparison youth, placement in Child Protective Services due to parental maltreatment, as well as foster care placement, has been shown to make unique contributions to the risk for delinquency (Barrett, Katsiyannis, Zhang, & Zhang, 2014).

A prior meta-analysis has documented parental divorce to have a strong association with delinquency, showing moderate effect sizes (Amato, 2001). The differences in delinquency between youth exposed to parental divorce and those from intact families have not decreased, despite increased social acceptability and prevalence of divorce in recent decades (Amato, 2001; D'Onofrio et al., 2005). Examining adoptive and biological families, Burt, Barnes, McGue, and Iacono (2008) demonstrated the association with delinquency was driven by the parental divorce experience, rather than being mediated by common genes.

Exposure to parental incarceration has also demonstrated association to delinquency and maladaptive behaviors (Geller, Garfinkel, Cooper, & Mincy, 2009; Murray & Farrington, 2005; Parke & Clarke-Stewart, 2002). In a longitudinal study following over 400 males, Murray and Farrington (2005) show parental imprisonment predicted antisocial and delinquent outcomes (beyond that of other types of parental separation) up to age 32, even after controlling for other childhood risk factors. Herrera and McCloskey (2001) found witnessing marital violence in childhood uniquely contributes to later behavioral problems and/or delinquency and predicted referral to juvenile court. These findings support prior research, including meta-analytic work, indicating that exposure to domestic violence leads to a range of internalizing and externalizing behavior problems (Evans, Davies, & DiLillo, 2008; Moylan et al., 2010).

In perhaps the first investigation of ACE with a juvenile offender sample, Tacoma Urban Network and Pierce County Juvenile Court used risk assessment instrument data to measure ACE prevalence among juvenile offenders (Grevstad, 2010). Grevstad (2010) found prevalence rates of ACEs 3 times higher than those reported by Felitti and Anda. Furthermore, youth with higher ACE scores had more substance abuse, self-harm behaviors, and school-related problems such as disruptive behaviors, substandard performance, and truancy. By deriving ACE scores from the standardized risk assessment tool used within the Florida Department of Juvenile Justice (FDJJ), prior work has demonstrated increased ACE scores correlate with increased risk to reoffend (Baglivio, Epps, et al., 2014). Juvenile offenders were 13 times less likely to report zero ACEs and 4 times more likely to report ACE scores of 4 or more compared to Felitti and Anda's private-insured population of mostly college-educated adults (Baglivio, Epps, et al., 2014). This study attempts to extrapolate from the Baglivio, Epps, and colleagues (2014) findings to examine the interrelatedness of each individual ACE with one another and the likelihood of having multiple other ACEs', given the presence of any specific ACE.

Gender and Adverse Childhood Experiences

Justice system-involved females report higher levels of exposure to sexual assault and interpersonal victimization, while males report higher rates of witnessing violence (Cauffman, Feldman, Waterman, & Steiner, 1998; Ford, Chapman, Hawker, & Albert, 2007; Wood, Foy, Layne, Pynoos, & James, 2002). Similar rates of exposure to each of 19 different trauma types were found in other studies of juveniles in the juvenile justice system, although females have higher rates of sexual abuse and sexual assault (Dierkhising et al., 2013). Males experiencing maltreatment have been shown to be prone to violent behavior and delinquency (Chen, Propp, deLara, & Corvo, 2011; Mass, Herrenkohl, & Sousa, 2008; Yu-Ling Chiu, Ryan, & Herz, 2011). Additionally, others have found significantly more maltreated females (including all forms of abuse) committed violent offenses as

juveniles or adults than nonmaltreated females, while by contrast, there were no significant differences in prevalence rates of violent offending for maltreated versus nonmaltreated males (Herrera & McCloskey, 2001; Widom & Maxfield, 2001). Others have found no sex differences for heightened risk of violent offending when examining an offending population and physical abuse in particular (Teague et al., 2008).

The first study to assess gender differences in ACE composite scores with juvenile justice youth found the ACE rank order by prevalence across gender is similar, except for sexual abuse (Baglivio, Epps, et al., 2014). However, females had a higher prevalence on every single ACE indicator, although effect sizes revealed that the majority of the differences are small (Cohen's d less than .5 with the exception of sexual abuse at .92 and the ACE composite score the second largest at a moderate .59). These results are consistent with prior findings that the main gender difference in this population is in experiencing sexual abuse (Cauffman et al., 1998; Dierkhising et al., 2013).

Interrelatedness of ACEs

The seminal work on the interrelatedness of ACEs was conducted by Dong and colleagues (2004) with over 8500 men and women from the original ACE study (Wave II). They found individual ACE indicator prevalence rates between 6% to just over 28%. Additionally, if an individual had experienced one ACE, 86.5% reported exposure to at least one additional ACE and 38.5% exposure to four or more ACEs on average (Dong et al., 2004). Comparing individuals with and without exposure to each individual ACE, they found the odds of having at least one other of the nine remaining ACEs were 2 to 17.7 times higher for those who had experienced any given ACE (Dong et al., 2004). Mirroring previous ACE findings, Dong and colleagues concluded ACEs should not be assumed to be isolated events and that both the negative short- and long-term influences of ACEs on health and behaviors is a cumulative, dose-response relationship (2004; see also Anda et al., 1999; Dietz et al., 1999; Dong, Dube, Felitti, Giles, & Anda, 2003; Dube, Anda, Felitti, Chapman, et al., 2001).

Community Positive Achievement Change Tool

The FDJJ implemented statewide in 2006 the Community Positive Achievement Change Tool (C-PACT), a fourth-generation risk/needs assessment. A primary purpose of the C-PACT is to classify youth according to their risk to reoffend. There are two versions of the C-PACT, namely, the Pre-Screen, with 46 items, and the Full Assessment, consisting of 126 items. Both versions produce identical overall risk to reoffend classifications (low, moderate, moderate-high, and high). The overall risk score is based on a matrix of the criminal history and social history subscores (see Baglivio, 2009, for further explanation of C-PACT scoring). The criminal history component is a scale of the extent of prior offending and prior justice system placements. The social history score is a combined scale of school, peer, family/home circumstances, substance use, and trauma/abuse and mental health history. The C-PACT assesses both static and dynamic risk and protective factors, rank orders criminogenic needs, which are automated into a case plan, and requires reassessments to gauge rehabilitative progress.

The Pre-Screen and Full Assessment both produce a criminal history subscore (extent and seriousness of prior offending/justice system placements) and a social history subscore (individual, family, and environmental risk factors). The overall risk score and the criminal and social history subscores for an individual youth are always identical for the Pre-Screen and the Full Assessment, as only the questions in the Pre-Screen used for scoring are used in the Full Assessment for scoring (e.g., if the same youth was administered a Pre-Screen and a Full Assessment, the overall risk score, criminal history score, and social history score would be identical). Each of the Full Assessment domains produces a risk score, and most have a protective score. The C-PACT domains are

reflective of the “Central Eight” risk factors espoused by Andrews and Bonta (2003). Full Assessment domains include Criminal history, school, leisure/free time, employment, relationships, family/living situation, alcohol/drugs, mental health, attitudes/behaviors, aggression, and social skills.

The current policy of the FDJJ is to assess each youth entering the system using the PACT Pre-Screen. Youth scoring at moderate–high or high risk to reoffend on the Pre-Screen are then administered the Full Assessment. The PACT Full Assessment is then repeated every 90 days for youth under FDJJ supervision who initially scored at moderate–high or high risk to reoffend. Youth on probation supervision who score at low or moderate risk to reoffend are reassessed every 180 days using the Pre-Screen. Any time a youth’s score indicates moderate–high or high risk, reassessment is performed using the Full Assessment. Any youth placed in a residential commitment facility, a day treatment program, or the FDJJ’s Redirection Program (intensive community-based family therapy, predominately Multisystemic Therapy, Functional Family Therapy, or Brief Strategic Family Therapy) is also assessed using the Full Assessment. This practice results in thousands of low and moderate risk youth being assessed using the Full Assessment as well.

Multiple evaluations have examined the predictive validity and reliability of the C-PACT for all juvenile offenders in Florida, including across gender, race/ethnicity, and dispositions/placements (such as diversion, probation supervision, and day treatment centers), with a cumulative “*N*” in excess of 130,000 youth. These evaluations include two peer-reviewed publications (Baglivio, 2009; Baglivio and Jackowski, 2013), one National Council on Crime and Delinquency (NCCD) multiassessment comparison report (Baird et al., 2013), and one independent research agency report (Winokur-Early, Hand, & Blankenship, 2012). Integral for this study, data collected by the C-PACT assessment for the purpose of predicting the likelihood of reoffense and the identification of intervention alternatives for the screened population includes information reflecting each domain examined in the original ACE study.

Current Focus

The purpose of this study was to replicate the Dong and colleagues (2004) interrelatedness of ACEs study using a high-risk juvenile offending population. Additionally, we examined differences in ACE prevalence across gender and race/ethnicity. As males and minority groups (Black youth in particular) are disproportionately represented in the juvenile justice system (Office of Juvenile Justice and Delinquency Prevention [OJJDP], 2012), including in Florida (FDJJ, 2011), differences in cumulative ACE scores are integral to examining those phenomena. To that aim, we addressed the following research questions: (1) what are the prevalence rates of each of the ten ACE indicators, and what is the proportion of youth who have each maltreatment that has additional ACE indicators?; (2) do the odds of having each additional ACE maltreatment increase for youth with exposure to any given ACE versus youth without exposure to that indicator?; and (3) does the cumulative ACE score differ between males and females, or by race/ethnicity?

Methods

The data for this study are inclusive of all youth within Florida with a history of an arrest who turned 18 between January 1, 2007, and December 31, 2012, and who were assessed using the Full C-PACT risk/needs assessment. Using only Full Assessment data biases the sample toward higher risk youth, which is the intent of this study. Only youth who had “aged out” of the juvenile justice system (turned 18, the age of majority in Florida) were included so as to capture the full range of ACEs and delinquency referrals (arrests) for each individual. This resulted in a final sample of 64,329 unduplicated youth who were assessed with the PACT Full Assessment and had turned 18 between January 1, 2007, and December 31, 2012.

This sampling strategy does not specifically isolate only youth for whom interventions targeted to trauma history may be most appropriate; those being youth who present with multiple ACEs in early adolescence. The strategy does, however, allow for examining the complete range of ACEs juvenile offenders in Florida will present with prior to young adulthood, allowing for the aim of this study of examining interrelatedness of those ACEs. Allowing youth who have not “aged out” in the sample would set up the scenarios by which perhaps not all of the ACEs a given youth will experience prior to age 18 would be captured, and certainly not all of that youth’s offending history. However, it should be noted that any youth who first presented with multiple ACEs at an early age has been included (provided that youth has since “aged out”); however, those youth have not been isolated for the purposes of this study.

C-PACT and ACE Score

C-PACT data were used to create ACE scores for each youth. In contrast to ACE studies with adults, this study suffered less from the challenges of retrospective recall of childhood events, as these events were much more recent for the current sample. In keeping with prior ACE studies, we ascertained the following 10 ACEs: emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, family violence, household substance abuse, household mental illness, parental separation or divorce, and household member incarceration. The exact items, responses, and coding used to create ACE scores from C-PACT data have been reported elsewhere (Baglivio, Epps, et al., 2014). Each exposure was binary (yes/no) and exposures were summed for a cumulative ACE score ranging from 0 (*unexposed*) to 10 (*exposed to all categories*). C-PACT reassessments every 90 days are part of FDJJ protocol for all youth who receive the Full Assessment. Therefore, the vast majority of the youth in the sample had multiple assessments. A positive indication of an ACE on any of the C-PACT assessments for a given youth was coded as a “yes” for that exposure, even if previous or future assessments did not indicate that exposure (in essence any “yes” response was carried forward). A brief description of each ACE and responses indicating being exposed are:

Emotional abuse: Parents/caretakers were hostile, berating, and/or belittling to youth.

Physical abuse: The youth reported being a victim of physical abuse was victimized or physically abused by a family member.

Sexual abuse: The youth reported being the victim of sexual abuse/rape.

Emotional neglect: The youth reported no support network, little or no willingness to support the youth by the family, youth does not feel close to any family member.

Physical neglect: The youth has a history of being a victim of neglect (includes a negligent or dangerous act or omission that constitutes a clear and present danger to the child’s health, welfare, or safety, such as: failure to provide food, shelter, clothing, nurturing, or health care).

Family violence: The level of conflict between parents included verbal intimidation, yelling, heated arguments, threats of physical abuse, domestic violence, or the youth has witnessed violence at home or in a foster/group home.

Household substance abuse: Problem history of parents and/or siblings in the household includes alcohol or drug problems.

Household mental illness: Problem history of parents and/or siblings in the household includes mental health problems.

Parental separation/divorce: Youth does not live with both mother and father.

Incarceration of household member: There is a jail/prison history of family members.

Participants

This sample represents the entire population of juveniles who were arrested since the 2006 implementation of the C-PACT in Florida, who have since reached the age of at least 18, and who had been assessed with the C-PACT Full Assessment. However, because the C-PACT Full Assessment is the only tool ascertaining all 10 ACEs (the Pre-Screen does not assess all 10), there is a bias toward oversampling more serious delinquents. The final sample of 64,329 youth was 21.7% female, 15.4% Hispanic, and 42.9% Black. Of these 64,329 youth, 18,835 were low risk (29.3%), 10,043 moderate risk (15.6%), 13,931 moderate–high risk (21.7%), and 21,520 high risk to reoffend (33.5%).

Analysis

First, the prevalence rates of each ACE exposure were examined as well as the proportion of the study group that had each exposure that also had additional ACEs. For example, the prevalence of youth with emotional abuse was examined, as well as the proportion that had 0, 1, etc. additional ACEs. That analysis yields an initial examination of the interrelatedness of ACE exposures. Next, youth who had a given exposure were compared to youth without that exposure on the likelihood of having each additional ACE. Multivariate logistic regressions were conducted to investigate whether exposure to each category of ACE was significantly associated with the risk of having other types of ACE exposures, after controlling for gender and race/ethnicity. This provided adjusted odds ratios (ORs) indicating whether the odds of having each ACE were increased or decreased by the presence of each other ACE.

To assess whether youth exposed to one type of ACE have elevated adjusted mean ACE scores (here the adjusted ACE score is the sum of the additional nine ACEs), multiple linear regressions were conducted. In each of these regressions, the ACE score (the sum of the nine additional ACEs) was the dependent variable, and the yes–no response to a given ACE was the independent. Gender and race/ethnicity were entered as controls. This resulted in 10 multiple linear regressions conducted (one for each of the ten ACE exposures, with the 0–9 adjusted ACE score being the dependent variable). Finally, the prevalence of ACE exposure was examined for males and females with chi-square tests indicating if those prevalence rates were significantly different. The same prevalence and chi-square testing was conducted across race/ethnicity as well.

Results

The prevalence rates of each ACE are listed in Table 1. Also included are the percentage with each ACE exposure that have additional ACE exposures. As indicated, prevalence rates ranged from a low of 9% for family mental illness to a high of 82% for family violence. The percentage of youth who had an exposure to any ACE that did not have exposure to any other ACE ranged from 0% to 8%, depending on the given ACE. Depending on the given ACE, the percentage of youth with exposure to at least one additional ACE ranged from 93% to 100%. Using the median value, Table 1 shows if a respondent had experienced one category of ACE, 100% of the youth reported having been exposed to at least one additional ACE, 67.5% reported four or more additional exposures, and 24.5% exposure to six or more additional ACEs.

Interrelatedness of ACEs

Tables 2 and 3 present the probability that youth exposed to a given ACE were also exposed to another ACE (based on logistic regressions). Youth exposed to one type of ACE were compared to youth not exposed to that ACE on the odds of having each additional ACE, controlling for gender

Table 1. Prevalence of Each Adverse Childhood Experience and Occurrence of Additional ACEs.

ACE Category	N	Prevalence (%)	Additional ACEs (%)						
			0	≥1	≥2	≥3	≥4	≥5	≥6
Abuse									
Emotional	20,928	32.5	0	100	97	83	58	34	18
Physical	18,969	29.5	0	100	99	90	70	45	24
Sexual	7,665	11.9	0	100	98	93	80	59	36
Neglect									
Emotional	11,610	18.0	1	99	93	84	65	43	25
Physical	8,542	13.3	0	100	99	95	84	65	41
Household dysfunction									
Family violence	52,715	81.9	3	97	84	61	38	21	10
Family substance abuse	16,102	25.0	0	100	97	89	70	46	25
Family mental illness	5,678	8.8	0	100	98	93	82	62	39
Separation/divorce	50,828	79.0	8	93	78	56	36	20	10
Family incarceration	42,370	65.9	2	98	88	66	43	24	12
Median			0	100	97.0	86.5	67.5	44.0	24.5
Range			0–3	93–100	78–99	56–95	36–84	20–65	10–41

Note. ACE = adverse childhood experience. Percentages in additional ACEs columns rounded to the nearest whole percentage.

and race/ethnicity. When these youth were compared, the adjusted OR of having at least one of the other nine types of ACE ranged from 1.0 (having the same odds as youth without that ACE) to 1286.2 (having over 1000 times higher odds than youth without that ACE). The median OR was 2.3 indicating youth who have a given ACE are 2.3 times more likely to have any other given exposure than youth who did not have that ACE.

Having a given ACE exposure significantly predicted each other ACE exposure for all relationships between categories of ACEs ($p < .001$), with the exception of the relationship between sexual abuse and emotional abuse (and emotional abuse and sexual abuse) which was not significant (OR of 1.0). To provide an example, the prevalence of physical abuse was 36% among youth who were exposed to emotional abuse, compared to 26% for youth not exposed to emotional abuse (with an adjusted OR of 1.5%; see Table 2). As an additional example, youth having been exposed to family incarceration have 6.8 times the odds of being exposed to family substance abuse as youth without family incarceration exposure, as 7.7% of youth without family incarceration exposure have family substance abuse exposure, compared to 34% of those with family incarceration exposure (see Table 3).

The ORs based on the relationship between abuse (emotional and physical) and family violence were by far the largest (see Appendix A for the correlation matrix among each ACE indicator and the ACE composite score). Bivariate correlations lend further support of the strength between the abuse and the family violence measures, as they are the strongest relationships between any ACE indicators, with the exception of sexual abuse with physical abuse. The Pearson correlation between physical abuse and family violence and emotional abuse and family violence are .325 and .301, respectively ($p < .001$).

Specific ACE Exposure and Adjusted Cumulative ACE Score

Next, 10 multiple linear regressions were conducted to examine whether youth exposed to a given ACE have higher adjusted cumulative ACE scores (here the adjusted ACE score is the sum of the

Table 2. Prevalence (%) and Adjusted Odds of Abuse and Neglect by Presence or Absence of Each ACE.

Outcome (ACE Category)	N	Abuse						Neglect				
		Emotional		Physical		Sexual		Emotional		Physical		
		%	OR ^a	%	OR ^a	%	OR ^a	%	OR ^a	%	OR ^a	
Abuse												
Emotional	No	43,401	—	—	26.4	1.0 ^b	11.3	1.0	13.2	1.0	10.8	1.0
	Yes	20,928	—	—	36.0	1.5**	13.2	1.0	28.1	2.5**	18.4	1.8**
Physical	No	45,360	29.5	1.0	—	—	3.4	1.0	14.8	1.0	6.9	1.0
	Yes	18,969	39.7	1.5**	—	—	32.3	12.8**	25.8	1.9**	28.6	5.3**
Sexual	No	56,664	32.1	1.0	22.7	1.0	—	—	16.6	1.0	10.9	1.0
	Yes	7,665	35.9	1.0	79.9	12.8**	—	—	28.5	1.8**	31.2	3.5**
Neglect												
Emotional	No	52,719	28.5	1.0	26.7	1.0	10.4	1.0	—	—	11.1	1.0
	Yes	11,610	50.7	2.5**	42.1	1.9**	18.8	1.8**	—	—	23.2	2.3**
Physical	No	55,787	30.6	1.0	24.3	1.0	9.5	1.0	16.0	1.0	—	—
	Yes	8,542	45.1	1.8**	63.4	5.3**	28.0	3.5**	31.5	2.3**	—	—
Household dysfunction												
Family violence	No	11,614	0.1	1.0	0.2	1.0	2.3	1.0	10.0	1.0	3.2	1.0
	Yes	52,715	39.7	1286.2**	35.9	237.3**	14.0	7.5**	19.8	2.2**	15.5	5.5**
Family substance abuse	No	48,227	28.1	1.0	24.4	1.0	9.7	1.0	16.3	1.0	9.0	1.0
	Yes	16,102	45.8	2.1**	44.8	2.4**	18.5	1.9**	23.1	1.5**	26.1	3.5**
Family mental illness	No	58,651	30.9	1.0	27.1	1.0	10.6	1.0	17.3	1.0	11.7	1.0
	Yes	5,678	49.1	2.1**	54.5	3.0**	25.1	2.5**	25.7	1.6**	29.5	3.0**
Separation/divorce	No	13,501	31.1	1.0	24.8	1.0	9.1	1.0	13.4	1.0	6.5	1.0
	Yes	50,828	32.9	1.1**	30.7	1.4**	12.7	1.4**	19.3	1.5**	15.1	2.6**
Family incarceration	No	21,959	24.6	1.0	18.5	1.0	8.3	1.0	15.3	1.0	5.3	1.0
	Yes	42,370	36.7	1.8**	35.2	2.5**	13.8	1.9**	19.5	1.3**	17.4	3.8**

Note. ACE = adverse childhood experience; OR = odds ratio.

^aOdds Ratio from a logistic model adjusting for gender and race. ^bThe referent group for all results are persons without the ACE.

* $p < .05$, ** $p < .001$.

remaining nine ACEs). Each binary ACE exposure was entered as an independent variable, along with gender and race/ethnicity, in a model predicting the adjusted ACE score of the other nine ACE exposures. For example, an indicator of physical abuse exposure (no or yes) was entered with gender and race/ethnicity to predict the adjusted ACE score of the other nine exposures. This was repeated for all 10 ACEs, resulting in 10 models. The unstandardized coefficients (B) from the 10 models ranged from a low of 2.961 for Separation or Divorce to a high of 5.073 for Physical Neglect (results not shown for brevity). Each ACE was a significant predictor of the adjusted ACE scores ($p < .001$ in all instances). Essentially, youth exposed to a given ACE have between three and five more exposures than youth not exposed to that given ACE.

ACE Prevalence Rates by Gender and Race/Ethnicity

Tables 4 and 5 provide the ACE exposure prevalence rates across gender and race/ethnicity (respectively). Table 4 indicates only 3% of the male youth, and only 2% of the female youth had no ACE exposures. At the opposite end of the ACE scale, 29% of female youth have six or more ACE exposures, more than twice the proportion of male youth (14%). The relationship between ACE and gender is significant ($\chi^2 = 2504.96$; $p < .001$) indicating females are more likely to have more ACE

Table 3. Prevalence (%) and Adjusted Odds of Growing Up in a Dysfunctional Household by Presence or Absence of Each ACE.

Outcome (ACE Category)	N	Household Dysfunction										
		Violence		Substance Abuse		Mental Illness		Separation/Divorce		Incarceration		
		%	OR ^a	%	OR ^a	%	OR ^a	%	OR ^a	%	OR ^a	
Abuse												
Emotional	No	43,401	73.3	1.0	20.1	1.0	6.7	1.0	78.6	1.0	61.8	1.0
	Yes	20,928	100	1284.5**	35.3	2.1**	13.3	2.1**	79.9	1.1**	74.2	1.8**
Physical	No	45,360	74.5	1.0	19.6	1.0	5.7	1.0	77.6	1.0	60.6	1.0
	Yes	18,969	99.8	236.1**	38.0	2.4**	16.3	3.0**	82.3	1.4**	78.5	2.5**
Sexual	No	56,664	80.0	1.0	23.2	1.0	7.5	1.0	78.3	1.0	64.5	1.0
	Yes	7,665	96.5	7.4**	38.8	1.9**	18.6	2.5**	84.0	1.4**	76.1	1.9**
Neglect												
Emotional	No	52,719	80.2	1.0	23.5	1.0	8.0	1.0	77.8	1.0	64.7	1.0
	Yes	11,610	89.9	2.2**	32.1	1.5**	12.5	1.6**	84.4	1.5**	71.1	1.3**
Physical	No	55,787	79.9	1.0	21.3	1.0	7.2	1.0	77.4	1.0	62.7	1.0
	Yes	8,542	95.6	5.5**	49.2	3.5**	19.6	3.0**	89.8	2.6**	86.4	3.8**
Household dysfunction												
Family violence	No	11,614	—	—	9.4	1.0	2.6	1.0	73.9	1.0	42.2	1.0
	Yes	52,715	—	—	28.5	4.0**	10.2	4.3**	80.1	1.4**	71.1	3.3**
Family substance abuse	No	48,227	78.2	1.0	—	—	5.1	1.0	79.0	1.0	58.0	1.0
	Yes	16,102	93.2	4.0**	—	—	19.9	4.4**	79.2	1.1**	89.5	6.8**
Family mental illness	No	58,651	80.7	1.0	22.0	1.0	—	—	78.9	1.0	63.9	1.0
	Yes	5,678	94.6	4.3**	56.4	4.4**	—	—	80.0	1.1**	85.8	3.6**
Separation/divorce	No	13,501	77.6	1.0	24.8	1.0	8.4	1.0	—	—	56.8	1.0
	Yes	50,828	83.1	1.4**	25.1	1.1**	8.9	1.1**	—	—	68.3	1.5**
Family incarceration	No	21,959	69.4	1.0	7.7	1.0	3.7	1.0	73.4	1.0	—	—
	Yes	42,370	88.4	3.3**	34.0	6.8**	11.5	3.6**	81.9	1.5**	—	—

Note. ACE = adverse childhood experience; OR = odds ratio.

^aOdds ratio from a logistic model adjusting for gender and race. ^bThe referent group for all results are persons without the ACE.

p* < .05, *p* < .001.

Table 4. ACE Score by Gender.

Gender	N	ACE Score (%)						
		0	≥1	≥2	≥3	≥4	≥5	≥6
Males	50,391	3	97	87	69	47	27	14
Females	13,938	2	98	91	79	62	45	29
χ^2	2504.96	<i>p</i> < .001						

Note. ACE = adverse childhood experience. Percentages in ACE score columns rounded to the nearest whole percentage.

exposures. ACE exposure by race/ethnicity is displayed in Table 5. As shown, only 1% of Black youth report no ACE exposure, compared to 4% of White youth, 5% of Hispanic youth, and 3% of youth classified as “Other.” Over 50% of White youth and 50% of Black youth report exposure to 4 or more ACEs, compared to 40% of Hispanic youth and 39% of youth classified as “Other.” At the extreme upper end, a higher proportion of White youth report 6 or more ACEs (22%) than any

Table 5. ACE Score by Race/Ethnicity.

Race	N	ACE Score (%)						
		0	≥1	≥2	≥3	≥4	≥5	≥6
White	24,595	4	96	86	72	55	38	22
Black	27,583	1	99	91	75	50	29	15
Hispanic	9,887	5	95	81	61	40	22	11
Other	2,264	3	97	83	64	39	21	9
χ^2	2424.19	$p < .001$						

Note. ACE = adverse childhood experience Percentages in ACE score columns rounded to the nearest whole percentage.

Table 6. Gender and Race/Ethnicity Predicting Cumulative ACE Score.

Measure	Unstandardized B	Standard Error	β	t
Female	.774	.018	.168	43.7**
White	.159	.016	.041	9.8**
Hispanic	-.491	.022	-.094	-22.6**
"Other"	-.500	.040	-.049	-12.4**
Constant	3.524	.012		299.5**

Note. ACE = adverse childhood experience.

* $p < .05$, ** $p < .001$.

other race/ethnicity classification. The differences in ACE exposure between race/ethnicity classifications are significant ($\chi^2 = 2424.19$; $p < .001$).

The final step in the gender and race/ethnicity analysis was to use linear regression to examine whether gender and race/ethnicity predict the ACE composite score (0–10). Being a female (*female* = 1), White (*White youth* = 1), Hispanic (*Hispanic youth* = 1), and "Other" (*youth classified as "Other"* = 1) were entered into a regression model with the ACE score as the dependent measure. Table 6 provides the results. As shown, being female increases the ACE composite score by .774 (substantively 1 ACE exposure). Being White increases the ACE score by .159, being Hispanic decreases the ACE score by .49, and being classified as "Other" is equated to a .500 decrease in the ACE score. All of the independent measures are significant predictors ($p < .001$).

Discussion

The primary purpose of this study was to examine the interrelatedness of ACE exposures in a high-risk population of juveniles with a history of arrest. This study attempted to replicate earlier work conducted using the original ACE study sample (Dong et al., 2004) on a high-risk sample. The prevalence rates of exposure ranged from a low of 9% for family mental illness to a high of 82% for family violence. If a youth had an exposure to one ACE, the likelihood of having another was as large as 1286 times higher than youth reporting no ACEs. Of those youth experiencing at least one ACE, 67.5% reported four or more additional exposures, and 24.5% exposure to six or more additional ACEs. These interrelatedness results echo those examining the original ACE study sample (Dong et al., 2004) in that exposure to multiple ACEs was extremely common. With regard to prevalence, only 3% of males and only 2% of females lacked exposure to any abuse/neglect type. Forty-seven percent of males, and 62% of females had ACE scores of 4 or more. These prevalence rates stand in stark contrast to the ACE score rates of the original ACE study, where 36% of the sample had ACE scores of 0 and only 13% had ACE scores of 4 or higher (Felitti et al., 1998). The higher risk juvenile offenders examined

in this study are 13 times less likely to have exposure to zero ACEs and 4 times more likely to have ACE scores of 4 or above. Again, this highlights the importance of examining abuse/neglect through a “cumulative stressor” approach, such as the ACE composite score, rather than the customary practice of examining them singularly, or only a few categories of abuse in a given population.

In regard to gender and race/ethnicity, female youth have higher prevalence rates of exposure as well as multiple exposures. Black youth are the least likely to report no exposure to any ACE category, although White youth are the most likely to report exposure to four or more ACE categories. These results mirror those of prior studies suggesting a “gender paradox” where certain risks for deviant outcomes, especially mental health-related risks/diagnoses, are found to be higher in girls than boys although male delinquency is more prevalent (Loeber & Keenan, 1994; Tiet, Wasserman, Loeber, McReynolds, & Miller, 2001). Similar circumstances have been suggested in multi-level models examining immigration and crime where immigrants, although possessing more risk factors and residing in areas of higher prevalence of economic disadvantage, are less likely to offend (referred to as the “immigrant paradox”) (Martinez, Stowell, & Lee, 2010; Ousey & Kubrin, 2009; Wright & Rodriguez, 2012). The results of ACE prevalence found in this study are, however, in contrast to a plethora of research showing males and minorities more likely to be serious, violent, and chronic (SVC) offenders (Baglivio, Jackowski, Greenwald, and Howell, 2014; Huizinga, Loeber, Thornberry, & Cothorn, 2000; Kempf-Leonard, Tracy, & Howell, 2001; Loeber & Farrington, 1998a, 1998b; Vaughn, Salas-Wright, DeLisis, & Maynard, 2014). Future research should attempt to replicate our findings by examining prevalence of ACE scores by gender and race/ethnicity.

It must be reiterated that we are examining a juvenile offending population and that perhaps these results highlight issues surrounding disproportionate minority contact (DMC) and reducing ethnic disparities (RED)—the system is less sensitive to white youths’ misbehavior, meaning that, on average, White youth are more likely to have higher ACE scores before they are noticed by the JJ system. Hispanic youth and youth classified as “Other” were less likely to experience higher ACE exposures. Over 50% of White and Black youth have ACE scores of 4 or more. We hypothesize the same logic may apply to the gender differences found in that females are more likely to have higher ACE scores before they are “noticed” by the juvenile justice system. Cycle of Violence research has indicated abuse and neglect are both related to increased risk of arrest for violent crime for males (in terms of frequency) and females (in terms of participation in violent crime), with more deleterious repercussions for Black youth (Widom & Maxfield, 2001). Many prior ACE studies either mention controlling for gender and race or just mention demographics of the sample. We chose to explicitly present prevalence rates separately for males and females and across race/ethnicity.

Family mental illness had the lowest reported prevalence (9%) of any ACE examined. However, youth with this ACE exposure evidenced 3.6–4.4 times the odds of exposure to household member incarceration, household substance abuse, and household violence than youth not presenting with family mental illness. The household dysfunction ACE indicators, with the exception of parental separation/divorce, were highly interrelated with one another such that exposure to one increased the odds of exposure to another 3.3–6.8 times. Being that ACEs are highly interrelated, as we have attempted to show in the current study, which mimics prior findings (Dong et al., 2004), having one exposure greatly increases the odds of having additional exposures. This is troubling from a public policy standpoint in that the number of different exposures (the ACE composite score) has been found predictive of a host of mental health and psychosocial behaviors and outcomes. As discussed earlier, higher ACE scores have been shown to increase the odds of smoking, drug use, incarceration, obesity, poor education and employment, risky sexual behavior, teenage pregnancy, and suicide attempts (Bellis et al., 2014; Dube, Anda, Felitti, Chapman, et al., 2001; Dube et al., 2006; Hillis et al., 2001, 2004).

Service providers, practitioners, and policy makers would be remiss to ignore the interrelatedness of childhood maltreatment types. These findings are particularly salient in light of the “Cycle of

Violence” research showing “If violence is begotten by not only violence, but also by neglect, far more attention needs to be devoted to families of children who are abandoned and severely malnourished” (Widom & Maxfield, 2001, p. 1). The results of this study would argue for more attention to include children who have any indication of household dysfunction.

ACE studies using retrospective recall of adults to report abuse/neglect during childhood may have questionable reliability. Dube and colleagues have discussed three reliability and validity concerns of such studies (Dube, Williamson, Thompson, Felitti, & Anda, 2004). Potential concerns include the time lapse between the events in question and the survey assessing those events and the difficulty recalling such experiences (Della Femina, Yeager, & Lewis, 1990). Additionally, the sensitive nature of reporting abuse/neglect could lead to variability in responding (Dube et al., 2004). Finally, recall impairments due to the stressful nature of the exposures may occur (Bremner, 1999; Williams, 1995). Examining test–retest reliability of the ACE sample specifically has found good/moderate to substantial agreement (Dube et al., 2004). However, they note that analysis compared agreement between responses at two different times during adulthood. They could not examine whether reported exposures changed over the decades between the abuse during childhood and adulthood. In contrast, examining ACE exposure more proximal to the event, such as the approach used in the current study, has less difficulty with such recall issues.

Limitations, Implications, and Future Directions

Perhaps the most constraining limitation of this study lies in generalizability and sampling bias. Only the C-PACT full assessment contained appropriate items to capture all 10 ACEs. Therefore, only youth who were administered the full assessment were included in this study. Youth whose scores indicate they are at low or moderate risk to reoffend may not receive the Full Assessment. Most youth who score at low or moderate risk to reoffend and who receive the Full Assessment are those whose treatment plan includes placement in resource-intensive services such as day treatment or residential commitment programs. While 64,329 youth who turned 18 during the study period were assessed with the PACT Full Assessment, an additional 136,691 youth who turned 18 during that time were only assessed with the PACT Pre-Screen, prohibiting the creation of ACE scores for those youth. While we captured ACE scores for all youth receiving a Full Assessment (approximately 32% of all juvenile offenders), caution should be used in generalizing the results to all juvenile offenders in Florida. This sample bias toward higher risk youth, limits generalizability to all juvenile offenders in Florida. However, it should be noted that 45% of the sample used were classified as low or moderate risk to reoffend.

Nonetheless, we argue a useful model to couch ACE work may be the Risk-Need-Responsivity (RNR) framework espoused by Andrews and Bonta (2003). Through the RNR paradigm, it is precisely the group of high risk youth (the risk principle) that have the most to gain from policies and procedures that address trauma exposure as a responsivity factor serving as a roadblock (responsivity principle) to providing effective intervention (needs principle). Along those lines, future endeavors should include examining whether youth with higher ACE scores evidence worse recidivism outcomes controlling for services provided and individual risk factors, and whether providing services to address traumatic exposure (addressing the responsivity factor) can mitigate any recidivism differences found between higher and lower ACE score youth. The question becomes whether trauma serves as a responsivity factor in being a roadblock to providing services targeted at more criminogenic needs, and whether trauma-informed services reduces that barrier allowing for effective interventions to be delivered to reduce future delinquency. In essence, can programming and intervention to reduce delinquency be delivered effectively without first addressing more immediate concerns such as safety, security, and stability and working with the youth to address the traumatic exposure? Such research would empirically validate childhood abuse/neglect as a responsivity

factor, and lead to additional policy implications in terms of providing trauma-informed care and treatment to optimize the effectiveness of other delinquency prevention/intervention services.

We would be remiss to not express that this matching of youth to appropriate services (the “Need Principle” in RNR) is precisely where the “evidence-based practices” movement has seemed to stall. We have seen the proliferation in research on risk factors of offending, and in the use of risk assessments over the last decade. Where we as a field have fell short is in empirical research showing the benefits of matching youth to services (for a notable exception see Luong & Wormith, 2011). Fortunately, FDJJ has begun to collect “dosage” data showing which interventions each youth receives, which can be matched to assessment data. This will permit future efforts to examine our proposition to investigate whether services aimed at addressing traumatic exposure mitigate recidivism differences across ACE scores.

Additional policy implications include the need for universal screening. The population of high-risk juvenile offenders clearly experiences ACEs at heightened rates from previously examined nonoffending populations. The types of exposure are clearly interrelated. Practitioners are doing a disservice to these youth if neglecting to screen for, and provide or refer for services to address, the multiple exposures experienced.

With respect to prevention, future research should examine whether risk or protective factors of ACE exposure differ by gender or race/ethnicity. Although this study adds to the literature on prevalence of ACE exposure, and examines a previously neglected high-risk population, few ACE studies have done much in the realm of examining what can be done to (a) mitigate the effects of ACE exposure once they have occurred, or (b) whether ACE exposures differ based on sociological contexts (such as living in a disadvantaged neighborhood or areas with heightened crime rates). More thorough examination of the risk factors for higher ACE exposure and the resiliency factors that can mitigate, or can be leveraged to mitigate those effects through intervention programs is clearly warranted.

Although the ACE concept argues for binary summation of exposure types, regardless of frequency or severity of exposure, additional child abuse/neglect research (such as Smith & Thornberry, 1995) argues those concepts essential. Future research should examine how timing, frequency, duration, and severity of exposure to all 10 ACEs replicate or add to study findings. Additionally, future work should examine the processes by which gender and race/ethnicity may mediate the relationship between maltreatment and offending. To the extent that ACE are risk factors for future delinquency, and Black youth have elevated exposure to specific ACEs, policies and prevention efforts surrounding RED and DMC are warranted.

If childhood maltreatment is a risk factor of delinquency as found in prior research (such as Smith & Thornberry, 1995; Teague et al., 2008), if abuse/neglect types co-occur and are interrelated, and if juvenile offenders have a high prevalence of maltreatment exposure, as has been shown in the current study, then ACE composite scores can make a significant contribution to life course perspectives. We argue that exposure to ACEs represents a significant transition in the developmental pathway. We argue that the higher the ACE composite score, the more substantial the transition and the increased likelihood of that exposure being a turning point which may negatively alter a youth’s current criminal trajectory. Future research should strive to test this theoretical framework examining the impact of ACE scores on trajectories. Perhaps more important, from a juvenile justice system policy perspective, is the provision of trauma-informed services to ACE-exposed juvenile offenders a meaningful life event/transition that can “redirect paths” on a more positive trajectory? Additional work could examine the implications of whether trauma-informed intervention can alter the course of trajectories for higher ACE scoring youth. Implications for developmental/life course criminology will surely avail themselves, as such frameworks are important for understanding and/or possibly preventing the onset and escalation of offending, and negative life outcomes associated with childhood maltreatment.

This study shows juveniles with histories of criminal offending are indeed an extremely high-risk population with respect to exposure to ACEs. The prevalence rates of ACE exposure surpass those reported for the original ACE study population. Given that the negative life and health outcomes found related to ACE exposure is now a massive body of research, the expected outcomes for these youth is an obvious concern. Considering there were over 1,642,600 arrests of juveniles during 2010 alone (Puzzanchera, 2013), this study serves as a warning sign about the high level of ACEs likely to exist in that arrested population. If this population carries into the future the same devastating health risks found in the original ACE study, the potential health crisis and financial strain in the decades to come is staggering to comprehend.

Appendix A.

Correlations of ACEs to One Another and the ACE Composite Score

	1	2	3	4	5	6	7	8	9	10
1 Emotional abuse										
2 Physical abuse	.099**									
3 Sexual abuse	.027**	.406**								
4 Emotional neglect	.182**	.130**	.100**							
5 Physical neglect	.105**	.291**	.194**	.137**						
6 Family violence	.325**	.301**	.139**	.098**	.139**					
7 Family substance abuse	.164**	.194**	.117**	.076**	.218**	.170**				
8 Family mental illness	.110**	.171**	.127**	.062**	.149**	.103**	.226**			
9 Separation/divorce	.015**	.053**	.045**	.062**	.103**	.058**	.002	.008*		
10 Family incarceration	.122**	.173**	.080**	.052**	.170**	.234**	.288**	.131**	.098**	
11 ACE composite score	.486**	.599**	.435**	.394**	.502**	.550**	.532**	.386**	.309**	.531*

Note. ACE = adverse childhood experience. Pearson correlations reported. $N = 64,329$.

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

Authors' Note

The views and opinions expressed in this manuscript are those of the authors and not necessarily those of the Florida Department of Juvenile Justice.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

- Abram, K. M., Teplin, L. A., Charles, D. R., Longworth, S. L., McClelland, G. M., & Dulcan, M. K. (2004). Posttraumatic stress disorder and trauma in youth in juvenile detention. *Archives of General Psychiatry*, *61*, 403–410.
- Amato, P. R. (2001). Children of divorce in the 1990's: An update of the Amato and Keith (1991) meta-analysis. *Journal of Family Psychology*, *15*, 355–370.

- Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of Adverse Childhood Experiences. *American Journal of Preventive Medicine, 39*, 93–98.
- Anda, R. F., Croft, J. B., Felitti, V. J., Nordenberg, D., Giles, W. H., Williamson, D. F., & Giovino, G. A. (1999). Adverse childhood experiences and smoking during adolescence and adulthood. *Journal of the American Medical Association, 282*, 1652–1658.
- Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., & Perry, B. D., . . . Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood: A convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neuroscience, 256*, 174–186.
- Andrews, D. A., & Bonta, J. (2003). *The psychology of criminal conduct* (3rd ed.). Cincinnati, OH: Anderson Publishing.
- Baglivio, M. T. (2009). The assessment of risk to recidivate among a juvenile offending population. *Journal of Criminal Justice, 37*, 596–607.
- Baglivio, M. T., Epps, N., Swartz, K., Huq, M. S., & Hardt, N. S. (2014). The prevalence of Adverse Childhood Experiences (ACE) in the lives of juvenile offenders. *Journal of Juvenile Justice, 3*, 1–23.
- Baglivio, M. T., & Jackowski, K. (2013). Examining the validity of a juvenile offending risk assessment instrument across gender and race/ethnicity. *Youth Violence and Juvenile Justice, 11*, 26–43.
- Baglivio, M. T., Jackowski, K., Greenwald, M. A., & Howell, J. C. (2014). Serious, violent, and chronic juvenile offenders: A statewide analysis of prevalence and prediction of subsequent recidivism using risk and protective factors. *Criminology & Public Policy, 13*, 83–116.
- Baird, C., Healy, T., Johnson, K., Bogie, A., Dankert, E. W., & Scharenbroch, C. (2013). *A comparison of risk assessment instruments in juvenile justice*. Madison, WI: National Council on Crime and Delinquency.
- Barrett, D. E., Katsiyannis, A., Zhang, D., & Zhang, D. (2014). Delinquency and recidivism, A multicohort, matched-control study of the role of early adverse experiences, mental health problems, and disabilities. *Journal of Emotional and Behavioral Disorders, 22*, 3–15. doi:10.1177/1063426612470514
- Bellis, M. A., Lowey, H., Leckenby, N., Hughes, K., & Harrison, D. (2014). Adverse childhood experiences: Retrospective study to determine their impact on adult health behaviors and health outcomes in a UK population. *Journal of Public Health, 36*, 81–91. doi:10.1093/pubmed/fdt038
- Bremner, J. D. (1999). Does stress damage the brain? *Biological Psychiatry, 45*, 797–805.
- Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., & Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine, 37*, 389–396.
- Burke, N. J., Hellman, J. L., Scott, B. G., Weems, C. F., & Carrion, V. G. (2011). The impact of adverse childhood experiences on an urban pediatric population. *Child Abuse and Neglect, 35*, 408–413.
- Burt, A. S., Barnes, A. R., McGue, M., & Iacono, W. G. (2008). Parental divorce and adolescent delinquency: Ruling out the impact of common genes. *Developmental Psychology, 44*, 1668–1677.
- Cauffman, E., Feldman, S., Waterman, J., & Steiner, H. (1998). Posttraumatic stress disorder among female juvenile offenders. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*, 1209–1216.
- Chen, W. Y., Propp, J., deLara, E., & Corvo, K. (2011). Child neglect and its association with subsequent juvenile drug and alcohol offense. *Child & Adolescent Social Work Journal, 28*, 273–290.
- Cicchetti, D. (2013). Annual research review: Resilient functioning in maltreated children- past, present, and future perspectives. *Journal of Child Psychology and Psychiatry, 54*, 402–422.
- Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology and Behavior, 106*, 29–39.
- Della Femina, D., Yeager, C. A., & Lewis, D. O. (1990). Child abuse: Adolescent records vs. adult recall. *Child Abuse and Neglect, 14*, 227–231.
- Dierkhising, C. B., Ko, S. J., Woods-Jaeger, B., Briggs, E. C., Lee, R., & Pynoos, R. S. (2013). Trauma histories among justice-involved youth: Findings from the National Child Traumatic Stress Network. *European Journal of Psychotraumatology, 4*, 20274. doi:10.3402/ejpt.v4i0.20274

- Dietz, P. M., Spitz, A. M., Anda, R. F., Williamson, D. F., McMahon, P. M., Santelli, J. S., . . . Kendrick, J. S. (1999). Unintended pregnancy among adult women exposed to abuse or household dysfunction during their childhood. *Journal of the American Medical Association*, *282*, 1359–1364.
- Dong, M., Anda, R. F., Felitti, V. J., Dube, S. R., Williamson, D. F., Thompson, T. J., Loo, C. M., & Giles, W. H. (2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse and Neglect*, *28*, 771–784.
- Dong, M., Dube, S. R., Felitti, V. J., Giles, W. H., & Anda, R. F. (2003). Adverse childhood experiences and self-reported liver disease: New insights into the causal pathway. *Archives of Internal Medicine*, *163*, 1949–1956.
- D’Onofrio, B. M., Turkheimer, E., Emery, R. E., Slutske, W. S., Heath, A. C., Madden, P. A., & Martin, N. G. (2005). A genetically informed study of marital instability and its association with offspring psychopathology. *Journal of Abnormal Psychology*, *114*, 570–586.
- Dube, S. R., Anda, R. F., Felitti, V. J., Chapman, D. P., Williamson, D. F., & Giles, W. H. (2001). Childhood abuse, household dysfunction and the risk of attempted suicide throughout the life span: Findings from the Adverse Childhood Experiences Study. *Journal of the American Medical Association*, *286*, 3089–3096.
- Dube, S. R., Anda, R. F., Felitti, V. J., Croft, J. B., Edwards, V. J., & Giles, W. H. (2001). Growing up with parental alcohol abuse: Exposure to childhood abuse, neglect, and household dysfunction. *Child Abuse and Neglect*, *12*, 1627–1640.
- Dube, S. R., Miller, J. W., Brown, D. W., Giles, W. H., Felitti, V. J., Dong, M., & Anda, R. F. (2006). Adverse childhood experiences and the association with ever using alcohol and initiating alcohol use during adolescence. *Journal of Adolescent Health*, *38*, 444.e1–444.e10.
- Dube, S. R., Williamson, D. F., Thompson, T., Felitti, V. J., & Anda, R. F. (2004). Assessing the reliability of retrospective reports of adverse childhood experiences among adult HMO members attending a primary care clinic. *Child Abuse and Neglect*, *28*, 729–737.
- Duke, N. N., Pettingell, S. L., McMorris, B. J., & Borowsky, I. W. (2010). Adolescent violence perpetration: Associations with multiple types of adverse childhood experiences. *Pediatrics*, *125*, 778–786.
- Evans, S. E., Davies, C., & DiLillo, D. (2008). Exposure to domestic violence: A meta-analysis of child and adolescent outcomes. *Aggression and Violent Behavior*, *13*, 131–140.
- Farrington, D. P. (2000). Explaining and preventing crime: The globalization of knowledge –The American Society of Criminology 1999 Presidential Address. *Criminology*, *38*, 1–24.
- Farrington, D. P. (2003). Developmental and life-course criminology: Key theoretical and empirical issues – The 2002 Sutherland Award Address. *Criminology*, *41*, 221–225.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine*, *14*, 245–258.
- Florida Department of Juvenile Justice. (2011). *Disproportionate minority contact: Racial and ethnic minority representation at various stages of the Florida juvenile justice system*. Tallahassee, FL. Retrieved from http://www.djj.state.fl.us/docs/research2/reportcard2011_final.pdf?sfvrsn=0
- Ford, J. D., Chapman, J. F., Hawker, J., & Albert, D. (2007). Trauma among youth in the juvenile justice system: Critical issues and new directions. *National Center for Mental Health and Juvenile Justice*. Retrieved September 9, 2013, from http://www.ncmhjj.com/pdfs/publications/trauma_and_youth.pdf
- Geller, A., Garfinkel, I., Cooper, C. E., & Mincy, R. B. (2009). Parental incarceration and child wellbeing: Implications for urban families. *Social Science Quarterly*, *90*, 1186–1202.
- Grevstad, J. A. (2010, June 8). *Adverse childhood experiences and juvenile justice*. PowerPoint delivered to Washington State Family Policy Council, Walla Walla, WA.
- Hamburger, M. E., Leeb, R. T., & Swahn, M. H. (2008). Childhood maltreatment and early alcohol use among high risk adolescents. *Journal of Studies on Alcohol and Drugs*, *69*, 291–295.
- Herrera, V. M., & McCloskey, L. A. (2001). Gender differences in the risk for delinquency among youth exposed to family violence. *Child Abuse and Neglect*, *25*, 1037–1051.

- Hillis, S. D., Anda, R. F., Dube, S. R., Felitti, V. J., Marchbanks, P. A., & Marks, J. S. (2004). The association between adverse childhood experiences and adolescent pregnancy, long-term psychosocial consequences, and fetal death. *Pediatrics*, *2*, 320–327.
- Hillis, S. D., Anda, R. F., Felitti, V. J., & Marchbanks, P. A. (2001). Adverse childhood experiences and sexual risk behaviors in women: A retrospective cohort study. *Family Planning Perspective*, *5*, 206–211.
- Huizinga, D., Loeber, R., Thornberry, T. P., & Cothorn, L. (2000). Co-occurrence of delinquency and other problem behaviors. *Juvenile Justice Bulletin*. Washington, DC: Office of Juvenile Justice and Delinquency Prevention.
- Kempf-Leonard, K., Tracy, P. E., & Howell, J. C. (2001). Serious, violent, and chronic juvenile offenders: The relationship of delinquency career types to adult criminality. *Justice Quarterly*, *18*, 449–478.
- Loeber, R., & Farrington, D. P. (1998a). *Serious & violent juvenile offenders: Risk factors and successful interventions*. Thousand Oaks, CA: Sage.
- Loeber, R., & Farrington, D. P. (1998b). Never too early, never too late: Risk factors and successful interventions for serious and violent juvenile offenders. *Studies on Crime and Crime Prevention*, *7*, 7–30.
- Loeber, R., & Keenan, K. (1994). Interaction between conduct disorder and its comorbid conditions: Effects of age and gender. *Clinical Psychology Review*, *14*, 497–523.
- Luong, D., & Wormith, J. S. (2011). Applying risk/need assessment to probation practice and its impact on the recidivism of young offenders. *Criminal Justice and Behavior*, *38*, 1177–1199.
- Martinez, R., Stowell, J. I., & Lee, M. T. (2010). Immigration and crime in an era of transformation: A longitudinal analysis of homicides in San Diego neighborhoods, 1980–2000. *Criminology*, *48*, 797–829.
- Mass, C., Herrenkohl, T. I., & Sousa, C. (2008). Review of research on child maltreatment and violence in youth. *Trauma, Violence, & Abuse*, *9*, 56–67.
- Moylan, C. A., Herrenkohl, T. I., Sousa, C., Tajima, E. A., Herrenkohl, R. C., & Russo, M. J. (2010). The effects of child abuse exposure to domestic violence on adolescent internalizing and externalizing behavior problems. *Journal of Family Violence*, *25*, 53–63.
- Murray, J., & Farrington, D. P. (2005). Parental imprisonment: Effects on boys' antisocial behavior and delinquency through the life-course. *Journal of Child Psychology and Psychiatry*, *46*, 1269–1278.
- Office of Juvenile Justice and Delinquency Prevention. (2012). *Disproportionate minority contact*. Office of Justice Programs, U.S. Department of Justice. Retrieved from <http://www.ojjdp.gov/pubs/239457.pdf>
- Ousey, G. C., & Kubrin, C. E. (2009). Exploring the connection between immigration and violent crime rates in US cities, 1980–2000. *Social Problems*, *56*, 447–473.
- Parke, R., & Clarke-Stewart, K. (2002). *Effects of parental incarceration on young children*. Washington, DC: US Department of Health and Human Services.
- Puzzanchera, C. (2013). *Juvenile arrests 2010*. Washington, DC: Office of Juvenile Justice and Delinquency Prevention.
- Rutter, M. (1983). Statistical and personal interactions: Facets and perspectives. In D. Magnusson & V. Allen (Eds.), *Human development: An interactional perspective* (pp. 295–320). New York, NY: Academic Press.
- Sampson, R. J., & Laub, J. H. (1990). Crime and deviance over the life course: The salience of adult social bonds. *American Sociological Review*, *55*, 609–627.
- Shalev, I., Moffitt, T., Sugden, K., Williams, B., Houts, R. M., Danese, A., . . . Caspi, A. (2013). Exposure to violence during childhood is associated with telomere erosion from 5 to 10 years of age: A longitudinal study. *Molecular Psychiatry*, *18*, 576–581.
- Smith, C., & Thornberry, T. P. (1995). The relationship between childhood maltreatment and adolescent involvement in delinquency. *Criminology*, *33*, 451–481.
- Teague, R., Mazerolle, P., Legosz, M., & Sanderson, J. (2008). Linking childhood exposure to physical abuse and adult offending: Examining mediating factors and gendered relationships. *Justice Quarterly*, *25*, 313–348.
- Teicher, M. H., Andersen, S. L., Polcari, A., Anderson, C. M., Navalta, C. P., & Kim, D. M. (2003). The neurobiological consequences of early stress and childhood maltreatment. *Neuroscience & Biobehavioral Reviews*, *27*, 33–44.

- Tiet, Q. Q., Wasserman, G. A., Loeber, R., McReynolds, L. S., & Miller, L. S. (2001). Developmental and sex differences in types of conduct problems. *Journal of Child and Family Studies, 10*, 181–197.
- Vaughn, M. G., Salas-Wright, C. P., DeLisi, M., & Maynard, B. R. (2014). Violence and externalizing behavior among youth in the United States: Is there a severe 5%? *Youth Violence and Juvenile Justice, 12*, 3–21.
- Widom, C. S., & Maxfield, M. G. (2001). *An update on the "Cycle of Violence."* Washington, DC: National Institute of Justice, US Department of Justice.
- Williams, L. M. (1995). Recovered memories of abuse in women with documented child sexual victimization histories. *Journal of Trauma and Stress, 8*, 649–673.
- Winokur-Early, K., Hand, G. A., & Blankenship, J. L. (2012). *Validity and reliability of the Florida Positive Achievement Change Tool (PACT) risk and needs assessment instrument: A three-phase evaluation (Validation Study, Factor Analysis, Inter-Rater Reliability)*. Tallahassee, FL: Justice Research Center.
- Wood, J., Foy, D. W., Layne, C., Pynoos, R., & James, C. B. (2002). An examination of the relationships between violence exposure, posttraumatic stress symptomatology, and delinquent activity: An "ecopathological" model of delinquent behavior among incarcerated adolescents. *Journal of Aggression, Maltreatment, Trauma, 6*, 127–147.
- Wright, K. A., & Rodriguez, N. (2012). A closer look at the paradox: Examining immigration and youth reoffending in Arizona. *Justice Quarterly, 31*, 882–904. doi:10.1080/07418825.2012.700057
- Yu-Ling Chiu, Y. L., Ryan, J. P., & Herz, D. C. (2011). Allegations of maltreatment and delinquency: Does risk of juvenile arrest vary substantiation status? *Children and Youth Services Review, 33*, 855–860.

Author Biographies

Michael T. Baglivio, PhD, currently works for the Bureau of Research and Planning at the Florida Department of Juvenile Justice (FDJJ). Michael serves as a member of FDJJ's Juvenile Justice System Improvement Project team, a grant initiative administered by Georgetown University's Center for Juvenile Justice Reform. His research interests include criminological theory, risk assessment, and life course criminology.

Nathan Epps, MS, completed his graduate studies in Criminology in May 1986 at the Florida State University, School of Criminology. He currently works for the Bureau of Research and Planning at the Florida Department of Juvenile Justice (FDJJ). His research interests include trauma-informed care, adverse childhood experiences, and the application of geographical information systems (GIS) software to juvenile justice data.