

# Adverse Childhood Experiences, Negative Emotionality, and Pathways to Juvenile Recidivism

Crime & Delinquency

1-27

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DOI: 10.1177/001128715627469

cad.sagepub.com



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## Abstract

Prior work has illustrated youth exposed to adverse parenting practices are more likely to offend and juvenile offenders with maltreatment histories more likely to re-offend. In addition, aggressive tendencies and a hostile interpretation of the actions of others and one's environment increase antisocial behavior. Unfortunately, the pathways by which those effects occur are not well understood. Using a sample of more than 25,000 juvenile offenders, we use structural equation modeling (SEM) to examine the pathways by which adverse childhood experiences (ACEs) affect juvenile delinquency. Results indicate ACEs have both a direct and indirect effect on recidivism, with nearly half of the total effect of ACEs on re-offending operating through negative emotionality. Policy implications are discussed.

## Keywords

adverse childhood experiences, negative emotionality, SEM, juvenile offenders, recidivism

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## Introduction

There were more than 78,000 juvenile arrests in Florida alone from July 1, 2013, to June 30, 2014. This represented an 8% reduction from the previous year, and a 36% reduction from the 121,734 arrests during July 1, 2009, to June 30, 2010 (Florida Department of Juvenile Justice [FDJJ], 2015b). Although these downward trends are slightly steeper than the decreasing national trends, and should be celebrated, the picture of juvenile recidivism is not as auspicious. According to available data, recidivism rates for youthful offenders completing probation supervision in Florida have held steady between 18% and 20% over the last 8 years (FDJJ, 2015a). Essentially, although fewer youth are being arrested each year, those who are arrested are re-offending at the same rate as prior years. These realities make the distinction between “what makes a *juvenile offend*” from “what makes a *juvenile offender re-offend*” paramount. Although a sizable body of research has examined a number of risk factors associated with juvenile recidivism, unfortunately, the pathways by which known risk factors affect delinquency, specifically continued offending, are not well understood.

An ever growing body of research has implicated childhood maltreatment in increasing the likelihood of delinquency and recidivism (Baglivio, Wolff, Piquero, & Epps, 2015; Barrett, Katsiyannis, Zhang, & Zhang, 2014a, 2014b; Maxfield & Widom, 1996; Teague, Mazerolle, Legosz, & Sanderson, 2008). Prior work has implicated childhood traumatic experiences, such as physical abuse, sexual abuse, emotional abuse, and growing up in poverty, with institutional misconduct of committed juvenile offenders (DeLisi, Trulson, Marquart, Drury, & Kosloski, 2011). Prominent criminological theories, such as Moffitt’s (1993) developmental taxonomy, childhood developmental work (such as that of Granic & Patterson, 2011), and recently DeLisi and Vaughn’s (2014) temperament-based theory of antisocial behavior, have suggested poor parenting and a child’s temperament are transactional where context and temperament act in a countercyclical manner over time in shaping development and adaptation (see also Lynch & Cicchetti, 1998). Undoubtedly, some youth present as more irritable, aggressive and hostile, easily frustrated, and/or with difficulty expressing themselves (for Moffitt due to neurological deficits), which further frustrate parents who may withdraw or engage in more sporadic, inconsistent, or harsh parenting practices. As vulnerable children are more likely born into maladaptive and dysfunctional environments (Baglivio, Wolff, Epps, & Nelson, 2015; Hertzog, 1983; Moffitt, 1993), the cycle is intensified. Stated eloquently, “early temperamental differences in emotionality and regulation contribute to the development of later personality differences and social adjustment by evoking responses from the

interpersonal environment that reinforce the child's initial tendencies" (Eisenberg, Fabes, Guthrie, & Reiser, 2000, p. 154). As such, the current study examines the processes that account for the complex relationships between adverse childhood experiences (ACE) and temperament with juvenile recidivism using structural equation modeling (SEM). We begin with a brief review of findings related to childhood maltreatment, specifically as captured in the ACE score, on delinquency, followed by findings related to the relationship between negative emotionality (NE) as a temperament construct and delinquency. Next, we describe the current study, data, and methodology. This is followed by results, conclusions, and implications for policy.

## ACE

The Centers for Disease Control and Prevention (CDC) has specified 10 unique maltreatment exposures occurring prior to 18 years of age as ACEs. The 10 exposures encompass three forms of abuse (emotional, physical, sexual), two types of neglect (emotional, physical), and five kinds of household dysfunction (domestic violence toward one's mother, household substance use, household mental illness, parental separation/divorce, and household member with a jail/prison history; CDC, 2015).<sup>1</sup> The 10 ACE indicators are each measured dichotomously as to whether an individual has had the exposure, then summed to arrive at an ACE score (ranging from 0 to 10). This simple additive ACE score has been subjected to a plethora of research, particularly in the medical field, and found predictive of a host of negative long-term outcomes such as ischemic heart disease, high blood pressure, chronic lung disease, skeletal fractures, liver disease, cancer, and even early death, for those with higher levels of neglect, adversity, or trauma in childhood (Anda, Butchart, Felitti, & Brown, 2010; Flaherty et al., 2013). Additional work has indicated ACEs are highly interrelated and operate as a dose-response cumulative stressor (Anda et al., 2010; Baglivio & Epps, 2015; Dong et al., 2004). 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., 2010, 2006).

Historically, criminologists have either examined individual (or only a few) forms of childhood maltreatment. However, the "cumulative stressor approach" based on the co-occurrence and cumulative impact of maltreatment 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. In

addition, relying on only official records such as child protective services or foster care placements may grossly underestimate maltreatment prevalence based on cultural differences in reporting and substantiating investigations, or contextual variance in access to services (for example, Ards, Myers, Malkis Erin, & Zhou, 2003; Drake, Lee, & Jonson-Reid, 2009). Furthermore, the interrelatedness of ACEs, and findings that exposures are not random in that exposure to one ACE type increases the likelihood of exposure to other ACEs, increases the importance of taking into account the collective composite of exposures (Scott, Burke, Weems, Hellman, & Carrión, 2013). Recently, ACE scores have been examined with respect to more proximal outcomes than long-term health. Higher ACE scores have been shown to increase the odds of smoking, heavy drinking, incarceration, and morbid obesity, along with increased risk of poor educational and employment outcomes, and recent involvement in violence (Bellis, Lowey, Leckenby, Hughes, & Harrison, 2014), as well as teenage pregnancy, sexually risky behaviors (Hillis et al., 2004; Hillis, Anda, Felitti, & Marchbanks, 2001), and even 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). Duke et al. found that each additional type of ACE exposure increased the risk of violence perpetration by 35% to 144% including both interpersonal violence (delinquency, weapon-carrying, fighting, bullying, and dating violence) and self-directed violence (attempted suicide, self-mutilation; Duke, Pettingell, McMorris, & Borowsky, 2010). Offenders have been found to have increased prevalence of maltreatment compared with non-offenders (Dierkhising et al., 2013; Evans-Chase, 2014). Research using the ACE score specifically has mirrored these findings examining juvenile offenders in comparison with the adults with private insurance examined in the original ACE studies, where juvenile offenders were found to have ACE prevalence rates 3 times higher, were 13 times less likely to have no ACE exposure, and 4 times more likely to have ACE scores of four or above (Baglivio et al., 2014; Grevstad, 2010). Juvenile offenders with higher ACE scores have been found more likely to have early-onset, chronic offending prevalence trajectories (Baglivio et al., 2015), and to be classified as serious, violent, and chronic offenders by age 18 (Fox, Perez, Cass, Baglivio, & Epps, 2015). In addition, juvenile offenders with higher ACE scores have been found more likely to re-offend, and to re-offend in less time from completing community-based juvenile services (Wolff, Baglivio, & Piquero, 2015). In light of consistency in findings regarding the relevance of ACE scores, the additive ACE index is used in the current study.

Although the findings reviewed confirm the importance of examining ACE exposures in the re-offending of juvenile offenders, the pathways by

which those childhood traumatic experiences affect recidivism have not been thoroughly explored. It is the examination of those pathways on which we now focus. Specifically, we argue the effects of ACE exposures on continued juvenile offending operate through the extent to which individuals with higher levels of traumatic exposure interpret situations and individuals as potentially hostile, and the ease to which emotional reactions to situations of those individuals are aroused; what is termed *negative emotionality*.

### *Negative Emotionality*

One of the primary components of temperament, emotionality refers to the ease at which emotions are aroused (Rothbart & Bates, 2006). NE is defined as individuals who interact with persons and experience their environment in a generally negative way (Clark, 2005; DeLisi & Vaughn, 2014). NE has been found to be a general risk factor and significant predictor of externalizing problem behavior (Clark, Watson, & Mineka, 1994; Eisenberg et al., 1996; Eisenberg, Fabes, et al., 2000; Lengua, West, & Sandler, 1998; Rothbart & Bates, 1998). More specifically, the “hot” variants of NE such as anger, irritability, frustration, and hostility have been implicated in antisocial externalizing behavior, whereas “cold” variants such as anxiety and depression linked more with internalizing behavior problems (Eisenberg et al., 2005; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Moffitt, 1993; Rothbart, 2007). Individuals with high levels and chronic displays of anger, aggression, and hostility are at increased likelihood of peer rejection, conflict with teachers and parents, and decreased social competence (Eisenberg et al., 2001; Eisenberg, Guthrie, et al., 2000).

Moffitt (1993) articulates life-course persistent offenders more likely to interpret the actions of others as hostile; a notion which has been demonstrated empirically using the Massachusetts Youth Screening Instrument, Version 2 (MAYSI-II) measure of angry-irritableness (Hoeve et al., 2015), case vignettes (Piquero, Langton, Gomez-Smith, 2004) and through an index measure combining tolerance for frustration and hostile interpretations of actions and intentions of others (Baglivio et al., 2015). Agnew (2001) postulates strains seen as unjust are more likely to lead to crime. Following that premise, one’s likelihood to perceive the intentions or actions of others as hostile would more likely lead to crime. This likelihood to attribute hostility to intentions/actions of others is enhanced when the individual believes an injustice was done voluntarily or intentionally (Jang & Rhodes, 2012), as would be the case with many ACE exposures.

Drawing from previous work, we argue that General Strain Theory represents a useful theoretical framework when examining the potential pathways

of ACEs to recidivism. Agnew's expanded role of strain includes the presentation of noxious stimuli as well as the removal of positive stimuli. We argue traumatic childhood experiences captured by the ACE score are relevant under the general umbrella of General Strain Theory. Many of the 10 ACE indicators capture the introduction of negative events and experiences, and one ACE, namely parental separation/divorce (including death of a parent), involves removal of positive stimuli. Agnew (2001) has articulated types of abuse and neglect as being consistent with different types of strain. Accordingly, we argue, as others have suggested, much of the effect on delinquency of childhood maltreatment exposure should operate through its effect on NE (Agnew, 2002; Aseltine, Gore, & Gordon, 2000; Jang, 2007; Jang & Rhodes, 2012; Mazerolle & Piquero, 1998; Moon, Hays, & Blurton, 2009; Piquero & Sealock, 2000). It is this assertion that we test in the current analysis, described in more detail in the following sections.

## Current Study

The current study examines the pathways by which ACE and NE affect delinquency as measured by official recidivism of juvenile offenders. Specifically, we examine whether the effect of ACEs can be explained by their association with NE. Although a sizable body of prior research has examined the impact of ACEs on a variety of life outcomes, research devoted to identifying the intervening mechanisms that explain this association is in its infancy. Thus, to fully understand how and why ACEs affect juvenile recidivism, it is imperative to consider the within-individual processes that may be associated with adverse childhood events and contribute to delinquent activity. To our knowledge, this is the first study to examine the individual-level processes linking ACEs to continued delinquent behavior among previous adjudicated youth and may have important implications for both theory and practice.

To explore the association between ACEs, NE, and juvenile recidivism, we use a sample of 27,720 juvenile offenders who have completed community-based sanctions/services within the state of Florida. In our analysis, we use SEM to examine the pathways by which ACEs and an index of NE lead to re-offending, while controlling for many established risk factors, the type of service the juvenile completed preceding a 1-year recidivism follow-up period, as well as pertinent demographic characteristics.

## Data

Data for this study were obtained from the FDJJ centralized database. The FDJJ database contains complete offense, placement, demographic, and

risk/needs assessment information for all youth arrested within Florida. The sample used consisted of all juveniles who completed an FDJJ community-based service between July 1, 2009, and June 30, 2012, that were administered the Full Community Positive Achievement Change Tool (C-PACT) risk/need assessment.<sup>2</sup> The risk/need assessment information was used to construct the independent and control measures (described in the following section). Subsequent juvenile arrests and data obtained annually by FDJJ on adult arrests were used to construct the dependent measure of official recidivism. The Full C-PACT administered just prior to the youths' completion of community-based services was used as it captures the youth's risks/needs closest to the 1-year recidivism follow-up.<sup>3</sup> Four hundred forty-nine youth (1.6%) were dropped from the sample due to missing data.<sup>4</sup> The final sample of 27,720 youth represents 21% of the 131,261 community-based completions of FDJJ services over the study period.

## Measures

### *Official Offending*

The outcome of interest in the current study is juvenile recidivism (official offending) and is measured as a subsequent juvenile or adult arrest within 365 days from the day a given juvenile completed a community-based FDJJ service. As some youth were, or turned, 18 years of age during the follow-up, both juvenile and adult records were used. Only new law violations were used; as all youth completed supervision preceding the follow-up period, technical/non-law violations were not a consideration. Any youth re-arrested within his or her 365-day window was counted as a recidivist (=1).

### *ACE Score*

The ACE score is the sum of the 10 types of childhood maltreatment considered in the original ACE studies (Felitti et al., 1998). Although designed to classify youth according to risk to re-offend, the Full C-PACT assessment contains requisite information to create measures of the 10 ACE exposures. The exact items, responses, and coding used to create ACE scores from C-PACT data have been reported elsewhere (Baglivio et al., 2014). Each ACE exposure was binary (yes/no), and exposures were summed for a cumulative ACE score ranging from 0 (unexposed) to 10 (exposed to all 10 ACE types). A brief description of each ACE and responses indicating exposure is as follows:

1. *Emotional abuse*: Parents/caretakers were hostile, berating, and/or belittling to youth.
2. *Physical abuse*: The youth reported being victimized or physically abused by a family member.
3. *Sexual abuse*: The youth reported being the victim of sexual abuse/rape.
4. *Emotional neglect*: The youth reported no support network, little or no willingness to support the youth by the family, or youth does not feel close to any family member.
5. *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).
6. *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.
7. *Household substance abuse*: Problem history of parents and/or siblings in the household includes alcohol or drug problems.
8. *Household mental illness*: Problem history of parents and/or siblings in the household includes mental health problems.
9. *Parental separation/divorce*: Youth does not live with both mother and father.
10. *Incarceration of household member*: There is a jail/prison history of family members.

### Negative Emotionality

A confirmatory factor analysis (CFA), results of which are discussed in the following sections, was used to derive a latent construct of NE. Ultimately, the NE index was created from four C-PACT items. The scale included both "hot" and "cold" NE variants and was composed of the following items<sup>5</sup>:

*Tolerance for frustration.* A youth's level of tolerance for frustration was assessed along a continuum from *rarely getting upset over small things or having temper tantrums, sometimes getting upset or having temper tantrums, and often getting upset over small things or having temper tantrums* (coded 1-3, respectively). Higher values indicate lower levels of tolerance for frustration.

*Hostile interpretation.* Hostile interpretations of the actions of others range from *primarily positive, primarily negative, and primarily hostile interpretations of*



*others' actions in a non-confrontational setting* (coded 1-3, respectively). Higher values indicate greater levels of hostility attributed to others' actions and intent.

*Dealing with emotions.* A youth's skill at knowing and expressing his feelings, understanding the feelings of others, and dealing with someone else's anger was assessed to gauge difficulty expressing and dealing with emotions as a "difficult temperament." The continuum ranged from *lacks skills in dealing with feelings/emotions, rarely uses skills in dealing with feelings/emotions, sometimes uses skills, and often uses skills in dealing with feelings/emotions* (coded 1-4). The measure was then reverse coded so that higher values indicate less ability to appropriately express and deal with feelings and emotions.

*Anxiety/depression.* The youth's degree of anxiety/depression was assessed ranging from *no history, occasional feelings of anxiety/depression, consistent feelings, to impairment in everyday tasks due to depression/anxiety* (coded 1-4, respectively). Higher values correspond to higher degrees of anxiety/depression.

## Independent Control Measures

*Demographics.* Age at completion of the community-based service, gender, and race/ethnicity were included as controls. *Age at completion* (therefore age at beginning of the follow-up) was measured continuously. Gender was measured as male (=1) or female (=0). Race/ethnicity was coded through a set of dichotomous variables of Black (=1), Hispanic (=1), and "Other" (=1), with White serving as the reference group.

### Risk factors

*Age at first offense.* The age at which the youth was first arrested was categorically captured (as per the measurement of the C-PACT risk/needs assessment). Categories included 12 and under, 13 to 14, 15, 16, and above 16. Higher values indicated an older age at first arrest.

*Worst prior offense.* The youth's most serious prior adjudicated offense was categorized as misdemeanor, "other" felony, property felony, or violent felony (coded 1-4, respectively). Higher values indicate a more serious worst prior adjudicated offense.

*Antisocial peers.* Antisocial peer association was assessed using a self-report measure of the youth's friendship network (=1 if youth reported having antisocial peers, or associating with gang members, else = 0).

*Special education need.* Whether the youth had a diagnosed special education need was dichotomized as yes (=1) or no (=0). Special education needs include learning disabilities, behavioral problems, or mental retardation. Special education needs must have been a formal diagnosis to be included.

*Substance abuse.* Prior substance use was categorized as those with no past use of alcohol or drugs (=0), those with past use (=1), and those whose past use of alcohol or drugs caused problems in life domains such as education, health, peer relationships, or contributed to criminal behavior (=2).

*Attention deficit hyperactivity disorder (ADHD) diagnosis.* ADHD diagnosis captures youth with a formal diagnosis of ADHD (=1), with all other youth coded 0.

*Mental health problems.* Youth with a history of mental health problems were coded 1, all others coded as 0. Mental health problems included formal diagnoses such as schizophrenia, bi-polar, mood, thought, personality, and adjustment disorders. Conduct disorder, oppositional defiant, substance use, and ADHD were not included. The diagnosis must have been formally made and not merely the opinion of a juvenile justice professional.

*Residential placement history.* This measures whether the youth had a history of residential commitment placement with FDJJ (*no history* = 1, *one placement* = 2, *two or more placements* = 3). In Florida, only a judge can commit a youth to a residential commitment program. Commitments are for indeterminate lengths of time with release dictated by completion of an individualized treatment plan and signed off on by the judge.

*Community-based placement type.* All youth in the sample are tracked post-completion of a community-based FDJJ service. To capture the type of community-based juvenile justice service the youth completed prior to the recidivism follow-up, a series of dichotomous variables were included in the analysis (coded 1 if the youth received a particular service and 0 if they did not).<sup>6</sup> In the final analyses, diversion serves as the reference group and was not included in the estimation.

Table 1 provides the descriptive statistics for the final sample of 27,720 youth. As shown, 41% of the juveniles were re-arrested within 1 year of completion of a FDJJ community-based service.<sup>7</sup> The average youth was exposed to three different types of childhood maltreatment (average ACE score = 2.6). The sample was 77% male, 46% Black, and 15% Hispanic, and the average age at beginning of the 1-year follow-up period was 17. In addition, 34% of the youth had a formal special education need, 25% were diagnosed with ADHD, and 14% had a history of mental health problems.

**Table 1.** Descriptive Statistics for Analysis of Adverse Childhood Experiences, Negative Emotionality, and Juvenile Recidivism ( $n = 27,720$ ).

Variable	Variable definition	M	SD
<b>Dependent variables</b>			
Recidivism	Re-arrested for a new law violation within 365 days of completing FDJJ service	.406	.491
<b>Independent variables</b>			
Sum of ACE score	Total of ACEs for each youth, range 0-10	2.645	1.777
<b>Mediating variables</b>			
Negative emotionality	Latent construct derived from a CFA of four measures of emotionality: anxiety, frustration, hostility, and coping	—	—
<b>Demographics</b>			
Gender	Coded 0 for females, 1 for males	.77	.421
Age	Age at time of release from FDJJ service	17.00	1.673
Black	Coded 1 for Black youth, 0 for all others	.462	.499
Hispanic	Coded 1 for Hispanic youth, 0 for all others	.152	.359
Other race	Coded 1 for Asian, Native American, or Pacific Islander, 0 for all others	.005	.071
<b>Individual risk factors</b>			
Age at first offense	Coded 5 for above 16 years old, 4 for 16, 3 for 15, 2 for 13-14, and 1 for 12 and under		
	Above 16 years old	.049	.216
	16 years old	.095	.294
	15 years old	.160	.367
	13-14 years old	.389	.488
Worst prior offense	12 and under	.307	.461
	Coded 1 for misdemeanor, 2 for other felony, 3 for property felony, and 4 for violent felony		
	Misdemeanor	.207	.405
	Other felony	.041	.199
	Property felony	.281	.450
	Violent felony	.470	.199

(continued)

**Table 1. (continued)**

Variable	Variable definition	M	SD
Residential placement history	Coded 1 for no prior residential treatment, 2 for one residential stay, and 3 for two or more		
	No prior residential stay	.691	.462
	One prior residential stay	.251	.434
Antisocial peers	Two or more residential stays	.579	.233
	Coded 1 if youth reported having exclusively antisocial peers, or gang members, 0 for all others	.473	.499
Special education	Coded 1 if youth has history of special education needs	.338	.473
Substance abuse	Coded 0 for no past use, 1 for past use, and 2 for past use that caused problems	.894	.748
ADHD	Coded 1 if youth has been diagnosed with ADHD	.250	.433
Mental health problems	Coded 1 if youth has been diagnosed with mental health problems	.137	.344
Diversion	Coded 1 for diversion, 0 for all others. Represents reference group in full models	.225	.418
Probation	Coded 1 for probation, 0 for all others	.374	.484
Redirection	Coded 1 for redirection, 0 for all others	.047	.213
Day treatment	Coded 1 for day treatment, 0 for all others	.094	.291
Aftercare	Coded 1 for aftercare, 0 for all others	.260	.439

Notes. FDJJ = Florida Department of Juvenile Justice; ACE = adverse childhood experiences; CFA = confirmatory factor analysis.

## Analytic Strategy

To answer our research questions, we use SEM to assess the relationship among ACE, NE constructs, and youth recidivism. The relationship of indicators to specific latent constructs (i.e., NE) is captured in the measurement model, and the relationship between NE and the other variables in the model is captured by the structural portion, with the measurement errors of observed

indicator variables taken into account (Kline, 2005). In addition, the use of SEM allows for the total effect of ACE on recidivism to be decomposed into the direct effect and indirect effect (Alwin & Hauser, 1975; Mackinnon & Dwyer, 1993). For example, the effect of ACEs on juvenile recidivism was hypothesized to have two distinct parts: a direct effect (ACEs → recidivism) and an indirect effect mediated by NE (ACEs → NE → recidivism). For the current analysis, Mplus software, Version 7.3, was used (Muthén & Muthén, 1998-2015).

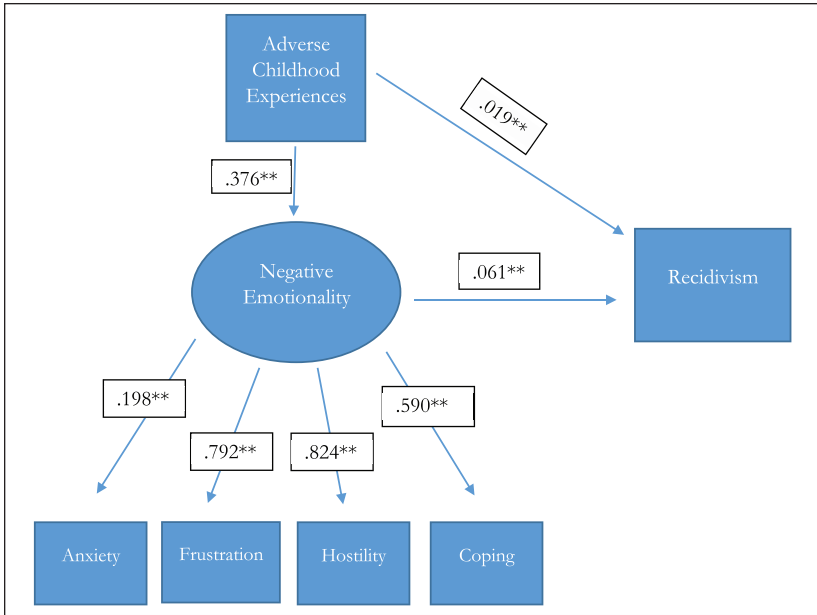
## Results

### *Measurement Models*

The results of a series of CFA models indicate that a latent variable composed of four observed ordinal measures of emotionality provided the best fit to the data. Mplus provides three different indices to assess the goodness of fit: comparative fit index (CFI), Tucker–Lewis index (TLI), and the root mean square error of approximation (RMSEA). It has been suggested that a cutoff value close to .95 for TLI and CFI and around .06 for RMSEA generally provides statistical support for a good fit between the hypothesized model and the observed data (Hu & Bentler, 1999). In the current analysis, our four observed measures of NE appear to fit the data very well (TLI = .978, CFI = .993, RMSEA = .051 with a 90% confidence interval of [.046, .057]). Results from this preliminary analysis generated a single latent construct, which we have labeled as *negative emotionality*, which is believed to mediate the relationship between ACEs and juvenile recidivism, with results discussed in the following sections.

### *Structural Models*

After assessing the adequacy of the factor structure, we now turn our focus to the hypothesized relationship among ACEs, NE, and juvenile recidivism. To test the hypothesized effects, the current study used robust weighted least squared (WLSMV) estimators with bias-corrected bootstrap confidence intervals. WLSMV was used because the traditional maximum likelihood (ML) estimators assume multivariate normality, and as our outcome variables are dichotomous, ML would not provide accurate estimates. WLSMV, on the other hand, is recommended when researchers use categorical data (Brown, 2006). The estimated path coefficients and factor loadings of the final model are displayed in Figure 1; results of the full model, including the computed direct and indirect effects of ACEs on juvenile recidivism, are presented in Table 2.



**Figure 1.** SEM of hypothesized mediation, with standardized coefficients.

Note. Circles represent latent construct (negative emotionality) and squares represent measured indicators. All parameters are standardized and statistically significant ( $p < .05$ ). Chi-square = 24,513.93,  $p < .001$ ; CFI = .958; TLI = .952; RMSEA = .053. SEM = structural equation model; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation.

Consistent with prior research, many of the control variables were significantly related to our outcome of interest, juvenile recidivism. Males were more likely than females to re-offend post-release from DJJ programming (.391, [352, .443]). Black and Hispanic youth were more likely than their White counterparts to recidivate (.284 and .136, respectively). In addition, those youth who committed more serious offenses previously (.021, [.006, .041]), reported having antisocial peers (.062, [.031, .104]), or reported using substances (.154, [.130, .182]) were more likely to re-offend. Youth who had a history of a greater number of residential placements (.123, [.078, .179]), as well as those who received deeper-end placements more generally (probation, redirection, day treatment, and aftercare), were more likely to recidivate (.228, .424, .410, and .326, respectively). Finally, youth with special education needs (.044, [.007, .092]) or a history of ADHD (.067, [.025, .121]) were more likely to recidivate than those without the same risk factors.

**Table 2.** Direct, Indirect, and Total Effect of ACE on Recidivism ( $n = 27,720$ ).

Independent variables	Coefficient / (95% CI)
Direct effect of ACE	.014** [.006, .024]
Indirect effect of ACE through NE	.014** [.010, .019]
Total effect of ACE	.028** [.016, .035]
<b>Demographics</b>	
Gender	.391** [.352, .443]
Age	-.014 [-.026, .001]
Black	.284** [.246, .328]
Hispanic	.136** [.086, .195]
Other race	-.031 [-.266, .267]
<b>Individual risk factors</b>	
Age at first offense	-.084** [-.101, -.062]
Worst prior offense	.021** [.006, .041]
Antisocial peers	.062** [.031, .104]
Special education	.044** [.007, .092]
Substance abuse	.154** [.130, .182]
ADHD	.067** [.025, .121]
Mental health problems	-.024 [-.070, .039]
Residential placement history	.123** [.078, .179]
Probation	.228** [.177, .292]
Redirection	.424** [.344, .526]
Day treatment	.410** [.384, .495]
Aftercare	.326** [.256, .420]

Note. ACE = adverse childhood experiences; CI = confidence interval; NE = negative emotionality; ADHD = attention deficit hyperactivity disorder.

Returning to our primary question of interest, how ACEs directly or indirectly contribute to youths' continued involvement in the criminal justice system, Table 2 summarizes the computed total, direct, and indirect effects of ACEs while controlling for all other individual-level risk factors discussed in the previous sections. Based on the fit indices, the final model of juvenile recidivism fit the data satisfactorily (CFI = .958, TLI = .952, RMSEA = .053).

The results provide evidence of an indirect effect of ACEs on recidivism via NE. As suggested in the introduction, ACEs had a significant direct effect on recidivism (.019,  $p < .05$ ) and also directly and positively predicted the latent construct, which we have labeled as *negative emotionality* (.376,  $p < .01$ ). The results also suggest that NE significantly increased the likelihood of being re-arrested (.061,  $p < .01$ ). Using the results of the full model, the direct and indirect effects were calculated, using bootstrap confidence intervals to

assess their statistical significance (MacKinnon & Dwyer, 1993; Preacher & Hayes, 2008). Overall, results indicate that ACEs have both a modest yet significant direct effect on juvenile recidivism (.014, [.006, .024]), as well as indirect effect through NE (.014, [.010, .019]) with a total effect of .028 [.016, .035]. Stated alternatively, approximately 50% of the effect of ACEs on recidivism is indirect through NE (.014 is 50% of .028).

## Conclusion, Limitations, and Policy Implications

As reviewed in the previous sections, a large body of research indicates childhood maltreatment, either official or self-report, increases the likelihood of delinquency. However, the mechanisms by which ACEs affect delinquency are not well understood. The current study highlights that NE may provide one explanation. Our review of the research on temperament, personality, and development suggests those with a more negative perception of others and their environment, and those whose (negative) emotions are more easily aroused (i.e., those with higher NE) are more likely to engage in antisocial behavior. We hypothesized those youth who have suffered a number of ACEs may be more likely to suffer from issues of frustration, hostility, and difficulty expressing/dealing with emotions, which in turn leads to higher levels of recidivism.

Prior work, also using SEM, has examined the interplay of official child protective services/foster care placements special education diagnoses, and socioeconomic status with delinquency (Barrett et al., 2014b). Results of the current study indicated direct effects of child maltreatment and developmental problems, but also that developmental problems mediated the relationship between ACEs and delinquency. Our results were similar, examining a comprehensive self-report measure of childhood maltreatment, the ACE score, finding both a direct and indirect effect of adverse experiences during childhood on official recidivism. Importantly, the current study illustrates that approximately half (50%) of the observed effect of ACEs on recidivism is indirect, operating through NE. The current measure of NE was captured as an inclusive index of both “cold” (anxiety and depression) and “hot” (hostile interpretation of others’ actions, tolerance for frustration) variants as well as one’s ability to navigate emotionally charged situations and deal with emotions. These results are robust to models that accounted for a host of criminal history and individual risk factors using a diverse sample (39% female, 29% Black, 14% Hispanic) of high-risk juvenile offenders across an entire state.

In addition to the significance of ACEs and NE, findings confirm much prior work in that early age of onset, antisocial peer associations, and substance use increase the likelihood of recidivism. Prior cross-sectional



(Trulson, DeLisi, & Marquart, 2011; Trulson, Haerle, DeLisi, & Marquart, 2011) and longitudinal work, such as the Pathways to Desistance study (Mulvey, 2011), examining recidivism of serious juvenile offenders has also highlighted the significance of substance use in the persistence of criminal careers. In addition, the current study found a diagnosed learning disability or emotional/behavioral disorder was predictive of re-offending, mirroring prior findings in official delinquent samples (Barrett et al., 2014a). Results of the current study did not find a significant effect for mental health diagnoses on delinquency, in contrast to Barrett et al. (2014a, 2014b), although our measure excludes conduct disorder and oppositional defiant disorder. We did find a diagnosis of ADHD significant, in keeping with previous studies that more chronic, persistent offenders would evidence such status (DeLisi, Neppel, Lohman, Vaughn, & Shook, 2013; Hoeve et al., 2015; Moffitt, 1993). These findings point toward the need to examine specific diagnoses' relationship to recidivism, rather than simply presence of any diagnosis. Unfortunately, data limitations prohibited that approach to a greater extent in the current analysis.

The current study is not without limitation. Only official offending was captured, which is surely an underrepresentation of actual delinquency. Unique to this study, however, was the inclusion of self-reported childhood maltreatment, which is missed when only child protective services official placements are examined. Official placements may arguably be culturally or socioeconomically biased in reporting or substantiation (Ards et al., 2003; Drake et al., 2009), although admittedly so may be self-reported maltreatment. Future work should examine the discrepancies between self-reported and official maltreatment, much like that conducted with measures of offending. Although temporal order was correct in that the self-reported abuse occurred prior to the recidivism measure used, we were unable to examine differences in the effect of ACEs on delinquency based on when the ACEs occurred. Similar to limitations of prior work (Barrett et al., 2014a, 2014b), we could not determine whether maltreatment during infancy or early childhood is more toxic than that occurring in later adolescence. Additional limitations include the necessity to include only youth assessed with the Full C-PACT assessment, excluding those assessed with only the Pre-Screen. However, we argue that this results in a higher risk sample, which is precisely the group most appropriate for targeting of scarce resources.

We acknowledge the current study uses a relatively short recidivism follow-up period of 12 months for each youth and includes only official offending. The recidivism parameters are identical to those used by the FDJJ, so they should be most useful for guiding policy decisions, however. A large proportion of those who will re-offend do so rather quickly, with prior FDJJ

work indicating 27% of high-risk recidivists (those re-offending within 12 months) re-offending within the first month, and more than 50% doing so within the first 150 days (Baglivio, 2014). Although we acknowledge additional youth will re-offend after the 12-month follow-up, there are diminishing returns which arguably would not substantively change the results of the current study examining the pathways of ACEs to recidivism. Future research, however, should examine the pathways of ACEs' effect on recidivism across gender and race/ethnicity subgroups. The current study finding significant recidivism differences for males mirrors longer 5-year follow-up studies of statewide cohorts of serious juvenile offenders, where male juveniles were significantly more likely to re-offend (Trulson, Marquart, Mullings, & Caeti, 2005). Calls for examining relationships to re-offending across race/ethnicity to gain a more nuanced understanding of race/ethnic differences across the life course have recently been levied to the field as well (Piquero, 2015).

An additional limitation is the selectivity of the sample, which is all juvenile offenders in the state of Florida. Without a non-offender comparison group, we cannot assert the pathways from ACEs to *offending* are similar to those found here, only that, among offenders, those who *re-offend* are more likely to do so in the presence of more ACEs, which operate both directly on recidivism and indirectly through NE. In addition, although several studies have now been published examining ACE exposure and FDJJ youth, no prior work has examined the pathways by which traumatic childhood experiences as captured by the ACE score lead to subsequent re-offending (of FDJJ youth or otherwise). Additional future work should explore whether specific interventions/services can mitigate the influence of NE and ACE score interactions, as prior prospective work has also indicated personality characteristics are predictive of both positive substance use indication and recidivism in follow-up studies of serious institutional samples (Wilson, Rojas, Haapanen, Duxbury, & Steiner, 2001).

Finally, we acknowledge that the measurement of NE within the current study is relatively imprecise. The use of dichotomous variables in capturing relatively complex emotional states is not ideal; however, as our goal was to explore the relationship between ACEs, NE, and recidivism among a large sample of youth from across an entire state, we were limited to the measures available from the C-PACT assessment.

Policy implications stemming from the current research highlight the importance of adverse childhood contexts on juvenile delinquency and recidivism. Prior work has indicated juvenile offenders have higher rates of maltreatment than non-delinquent samples (Barrett et al., 2014a, 2014b; Maxfield & Widom, 1996; Teague et al., 2008); however, there is limited understanding of the pathways by which that effect occurs. Although policies for

universal screening and prevention of maltreatment are certainly relevant to the current study, targeted intervention for youth exposed to multiple trauma types is equally relevant. Multisystemic interventions, such as Functional Family Therapy (FFT; Alexander & Sexton, 2002) or Multisystemic Therapy (MST; Henggeler & Borduin, 1990), seem appropriate as they address issues at the individual, family, and systems (such as school and community) levels. Both MST and FFT have proven cost-effective when implemented with fidelity (Barnoski, 2009; Lee et al., 2012). Parent and youth skills training has been suggested by others as perhaps the most effective approach to improve outcomes (Barrett et al., 2014a). Based on our finding that the majority of the effect of ACEs on recidivism operates through NE, it is possible that anger management treatment and interventions, such as Aggression Replacement Training (Goldstein & Glick, 1994; Goldstein, Glick, & Gibbs, 1998) may be promising strategies for aggressive youth with comorbid maltreatment histories. Future work should examine the efficacy of such an approach with youth presenting with aggressive tendencies and concomitant childhood maltreatment.

In addition to a number of policy implications, the current study highlights the need for additional research devoted to the mechanisms that underlie the maltreatment–delinquency relationship. To date, the individual mechanisms and dynamic processes accounting for the impact of childhood maltreatment on delinquent behavior have remained largely a black box. Recent research has recently begun to unpack this relationship (cf. Gao, Wong, & Yu, 2016), although much remains to be explained. Although the results of the current study suggest that much of the impact of ACEs can be explained by their effect on a youth's degree of emotionality, around half of ACEs' effect on recidivism remains unaccounted for. Future work in this area should be devoted to uncovering the mechanisms that underlie this relationship. It is the identification of these mechanisms that will add to our understanding of how childhood maltreatment contributes to juvenile delinquency and yield insights into what can be done to disrupt that cycle among youth with a history of traumatic event exposures.

The purpose of the current study was to examine the little-understood pathways by which childhood maltreatment affects delinquency. Using SEM, we found higher ACEs (a comprehensive measure of self-reported traumatic childhood experiences) have both a direct and indirect effect on delinquency as measured by official recidivism. Exposure to more types of trauma significantly increases the likelihood of recidivism. In addition, our results suggest that 50% of the effect ACEs have on recidivism is indirect, operating through NE. Essentially, more than half of the effect of ACEs on recidivism is due to their impact on one's tendency to perceive his or her environment and others

as having hostile intent. Knowing a characteristic is a risk factor for delinquency provides a basic understanding, but it is only with knowledge of the pathways by which those effects operate that we can begin to optimize prevention and intervention efforts.

### **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.

### **Notes**

1. We must mention that limitations to the Adverse Childhood Experiences (ACE) scale have been levied. Notably, Finkelhor, Shattuck, Turner, and Hamby (2013) question the retrospective recall of childhood maltreatment exposures by older adults, and the limitations to the ACE score through the omission of peer rejection, community violence exposure, low socioeconomic status, and poor academic performance. Nevertheless, the consistency in the relationships between higher ACE scores and negative outcomes found across disciplines lends support to its use. Furthermore, the recall problems of juveniles of childhood maltreatment are far less germane than that of adults.
2. All youth arrested within Florida are administered the pre-screen Full Community Positive Achievement Change Tool (C-PACT). Youth scoring moderate-high or high risk to re-offend are administered the Full C-PACT (used in the current study). Youth who are placed in day treatment, redirections, or being considered for residential placement are also administered the Full C-PACT, regardless of overall risk to re-offend on the pre-screen. Limiting the sample to only youth assessed using the Full C-PACT was necessary as the pre-screen does not contain needed items to assess all ACEs or negative emotionality. Although this biases the sample toward higher risk youth, it is still the case the 39% of the final sample was low risk to re-offend, 16% moderate risk, 30% moderate-high risk, and 14% high risk.
3. It is worth mentioning that the current study used the address entered into the Juvenile Justice Information System (JJIS) closest to 7 days post-completion of Florida Department of Juvenile Justice (FDJJ) services. This ensures that we have the best information regarding the youth at the beginning of the follow-up period.
4. Difference-of-means tests were completed between the 449 youth who were excluded from the final sample on all measures for which data were available. Results of these ancillary analyses suggest that the 449 youth who were excluded do not vary significantly in terms of their demographic characteristics

or criminal history measures. However, small yet significant differences existed between the analysis sample and those who were not included in terms of their substance abuse, mental health, and impulsivity. Specifically, the 449 excluded youth were less likely to report mental health issues or substance abuse and were more likely to report impulse control problems and higher levels of impulsivity more generally. Given the small number of youth excluded in comparison with the analysis sample, and the limited evidence that these youth differed dramatically from those included, we suspect that their removal had little impact on the results obtained.

5. Initially, we assessed the inclusion of an anger/irritability item as a component of negative emotionality. That item was removed as it did not load well on the latent variable as per comparative fit index (CFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA) statistics.
6. Diversion services are non-judicial alternatives (such as teen court) used in lieu of formal processing for less serious youth offenders. Probation supervision involves an assigned juvenile probation officer who monitors compliance with court restrictions and sanctions, conducts C-PACT risk/needs assessments, and makes appropriate referrals for services. Day treatment (day reporting) programs are facility-based treatment programs that provide interventions, and vocational, and educational training in the afternoons and evenings and often on weekends. The Florida Redirection program includes community-based intensive family therapy programs (predominately Multisystemic Therapy and Functional Family Therapy), as an “overlay” addition to probation supervision. Aftercare youth are those youth released from residential placement and subsequently supervised in the community under probation supervision. As such, all aftercare services youth have a history of residential placement.
7. To provide context as to how the necessity to use only Full C-PACT assessments leads to a higher risk sample, the average recidivism rate for all 2011–2012 FDJJ community-based services ranged from a low of 12% for intensive diversion services to a high of 39% for aftercare supervision, the vast majority of which were diversion (41% of the sample; 13% recidivism rate) and probation supervision (32% of the sample; 18% recidivism rate), as per the latest report from FDJJ (2015b). This is in comparison with the higher 41% average for the sample in the current study.

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