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ORIGINAL PAPER

Juvenile Offending and Crime in Early Adulthood: A Large Sample Analysis

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Abstract Using large sample archival data from the state of South Carolina's juvenile justice agency and other state agencies, we examined the background, early experiential and delinquency-related variables predicting young adult (ages 17–30 years) offending among juvenile offenders. We also examined characteristics of juvenile offenders who committed only a single misdemeanor offense, compared to non-juvenile offenders. Finally, we examined the variables that accounted for group differences in persistence of juvenile offending. Early adverse experiences including family-related adversities, mental health problems, identification as having school-related disabilities and juvenile recidivism accounted for more than 20 % of the variance in adult offending. Cox proportional hazards analysis revealed several time-dependent covariates including gender, age at first offense and repeat versus one time offending. Contrary to the view that the one time, misdemeanor level juvenile offending represents only minor departure from normative adolescent behavior, we found that this group of offenders differed significantly from non-delinquents on every category of risk for adult offending and also were more likely than non-delinquents to commit felonies as adults. Finally, in comparing adolescence-limited offenders with life-course persistent offenders, we accounted for more than 50 % of the variance in criminal outcomes on the basis of measures of background, early adversity, psychological characteristics and age of first juvenile arrest or referral.

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Introduction

While national rates for most categories of crime have declined significantly since the early 1990s, the social and economic consequences of criminal behavior have not changed and in some respects have worsened. In a 2014 policy memo, the Hamilton Project, an initiative of the Brookings Institute, described the effects of adult and juvenile crime on government expenditures, family life and individual well-being (Kearney et al. 2014). Recent studies show the direct costs of crime at over $250 billion, including costs associated with police and legal services as well as correctional spending (Kyckelhahn and Martin 2013). In 2007, over 1.75 million children under the age of 18 had a parent in a state or federal prison with about 53 % of incarcerated men and 61 % of females being parents; Black children were almost eight times more likely than white children and nearly three times more likely than Hispanic children to have a parent in prison (Maruschak et al. 2010).

It is well known that juvenile criminal activity is a significant predictor of adult criminal behavior but less is known about what percentage of juvenile offenders continue to engage in criminal behavior as adults, what factors differentiate those that do and do not engage in adult criminal behavior, and whether the same factors predict adult offending for youth who were not juvenile offenders (National Institute of Justice 2014). Utilizing a meta-analytic technique examining predictors of adult offender recidivism across 131 studies, Gendreau et al. (1996) found that criminogenic needs, criminal history/history of

antisocial behavior, social achievement, age/gender/race, and family factors were the strongest correlates of adult offending. Offending at an early age, juvenile delinquency recidivism, and being a violent juvenile offender have also been shown to predict adult offending (Loeber and Farrington 2011; see also, Hawkins et al. 2000; Loeber and Farrington 1998). Similarly, a few large sample studies have examined demographic and early experiential factors that differentiate delinquents and non-delinquents and that distinguish recidivist delinquents from non-recidivists (Barrett et al. 2010, 2014, 2015). These studies have demonstrated strong relationships between early adverse experiences in the family and mental health disorders and both juvenile delinquency (versus non-delinquency) and juvenile recidivism (versus one time offending).

In addition, there is a need for a closer examination of the characteristics of early onset and later onset delinquent offenders. In 1993, Moffitt introduced the construct of "adolescence-limited" offending (Moffitt 1993). According to Moffitt, the adolescence-limited offender was an individual whose juvenile delinquent activity began and ended during the period of adolescence; that is, there was no previous childhood criminal activity and criminal behavior generally did not continue into adulthood. The distinction between "adolescence-limited" and "life-course persistent" offending has been an appealing one to psychologists and sociologists (see White et al. 2001). Steinberg (2014) emphasizes that while adolescence-limited offenders may "have more problems" during adolescence than non-delinquent youth, they do not show the same patterns of family pathology and mental health problems manifested by earlier starting delinquents. Further, according to Steinberg, it is widely accepted that the "causes and consequences of delinquent behavior that begins during childhood or pre-adolescence are quite different from those of delinquency that begins—and typically ends—during adolescence or young adulthood …" (p. 437). One implication of this position, however, is that one time offending among adolescents is normative and not indicative of more serious psychological problems; a closer examination of this issue is warranted.

It is important, finally, to better understand the role of mental health problems and early adverse experience in accounting for very serious delinquency. Prevalence rates for mental health problems among juvenile delinquents are disproportionally higher than for non-delinquent youth and have been estimated to range from 40 to 70 % (Fazel et al. 2008; Katsiyannis et al. 2004; Mallett et al. 2009; Wolpaw and Ford 2004). The most common diagnoses include depression, attention deficit disorders, and bipolar disorder (see Mallett 2008; Teplin et al. 2002; Weiss and Garber 2003). Parental maltreatment has also been shown to be predictive of both juvenile delinquency (Barrett et al. 2014) and criminal behavior among young adults (Administration for Children and families 2008). Nonetheless, a persistent concern has been the magnitude of the impact of these factors on juvenile delinquency; in fact, few studies examining predictors associated with delinquency have accounted for more than 20 % of the variance in delinquent outcomes (see Archwamety and Katsiyannis 1998; Barrett et al. 2014; Cottle et al. 2001; Katsiyannis et al. 2004; Klein and Caggiano 1986).

Using large sample archival data from the state of South Carolina's juvenile justice agency and other state agencies, we examined the background, early experiential and delinquency-related variables predicting young adult (ages 17–30 years) offending among juvenile offenders. Further, we examined the childhood histories and adult criminal behaviors of large samples of individuals who would be classified as later-onset delinquents. We compared the later-onset delinquents both with individuals who were never arrested as juveniles and with juveniles whose first offense occurred prior to adolescence. Finally, we examined the importance of mental health problems and early adverse experience in accounting for very serious delinquency. Because of the size of our available sample we were able to identify a large group of delinquents that could be classified as serious, life course delinquents. Individuals in this group had committed more than one offense while a youth, had been arrested as a juvenile for at least one felony level offense, and had been arrested as an adult. We compared this group to a large sample of youth who had only been arrested once as juveniles, had never been arrested for a felony, and were not arrested as adults. We examined the relative contributions of family, mental health and school related disabilities to the prediction of membership in these two groups.

Method

Source of Data

Data for this study were obtained from two sources, the South Carolina Department of Juvenile Justice (DJJ) and the South Carolina Budget and Control Board's Office of Research and Statistics (ORS). DJJ data comprised information on approximately 100,000 youth who had been born in the period of 1981–1988 and who had been involved in delinquent activity. We linked the DJJ data with data obtained from the ORS. The ORS houses data from all of the state agencies in South Carolina, including, but not limited to, the South Carolina Department of Education (SDE), the South Carolina Department of Social Services (DSS), the South Carolina Department of Mental Health (DMH), and the South Carolina Law Enforcement

Division (SLED) as well as the South Carolina Department of Juvenile Justice (DJJ). These linkages enabled us to examine environmental influences on both juvenile delinquency and adult criminal behavior.

DJJ Data

Data were drawn from the South Carolina Department of Juvenile Justice Management Information System. The DJJ sample consists of all juveniles born between 1981 and 1988 whose cases were referred to the South Carolina Juvenile Justice System (DJJ) on at least one occasion ("referral"). The sample was part of a multi-cohort, matched control study conducted in conjunction with the South Carolina Budget and Control Board (Barrett et al. 2014), a study which also included non-delinquent youth. The 1981–1988 cohorts include 99,602 individuals, 65,502 (65 %) males and 35,100 (35 %) females. The racial composition is 50,496 (51 %) Black, 47,537 (48 %) White and 1569 (2 %) other (Asian and Hispanic). The average age of the juveniles when they were first referred to the system was 14.47 years ($SD = 1.94$) and the mean total number of referrals per juvenile was 2.21 ($SD = 2.00$); see Barrett et al. (2010) for more details.

Data on offense severity were also collected. The determination of the seriousness of a crime was based on the coding scheme employed by South Carolina. DJJ rates crimes on an ordinal scale, with lower ratings representing less serious offenses. For purposes of this analysis we categorized offenses as status offenses and misdemeanors (DJJ severity levels of 3 or lower) and felonies (rating levels of 5 and above).

ORS Data

For all individuals in the DJJ sample and also for the matched control group (described below), data from other state agencies (housed in the ORS) were made available. (Files on each child in the DJJ file were linked with files of the other state agencies using a probabilistic matching algorithm; information about the key linkage system is available on request.) For the present analyses, individual data in the DJJ files were linked with data for the same individuals from the Department of Social Services (DSS), the Department of Mental Health (DMH), the Department of Education (SDE) and the South Carolina Division of Law Enforcement (SLED). Data obtained from the Department of Social Services included information about foster care placements and whether or not an individual had ever been placed in the custody of Child Protective Services (CPS). Data obtained from the Department of Mental Health included information about age at first, second and most recent referrals and primary DSM-IV (American Psychiatric Association 2000) diagnosis at each referral. Primary diagnoses were further categorized into 7 major categories (described in "Analyses" section). Data from the Department of Education included information about the ages at which the student was eligible for free and/or reduced lunch and eligibility for special education services due to learning disabilities (LD) or emotional/behavioral disorders (EBD). SLED data included information about adult arrests, including age at time of arrests and severity of arrest offense. After separate files were constructed for each agency (DJJ, DMH, DSS, DOE, SLED), files were merged to create a new master file for the DJJ sample. All files were constructed and analyses conducted using IBM SPSS Statistics 22.

Analyses

There were three levels of analyses. Significance levels were set at .001 for all statistical tests due to the large sample size and large number of statistical tests carried out. First, we examined the variables associated with adult criminal offending using data obtained from the different state agencies. Cross tabulations were computed between adult offending status (non-offender, misdemeanor level arrest only, felony level arrest) and each of the variables constructed from the ORS data file (described earlier). Multivariable logistic regression analyses allowed us to examine the contributions of each of these potential predictor variables to adult offending. The dependent variable in these logistic regression analyses was presence of an arrest as an adult (maximum age 30). Analyses were conducted separately for individuals with and without histories of juvenile offending. In the logistic regression analysis for those with juvenile delinquency histories, we included six blocks of predictors. We first examined the role of demographic variables. Included in this block were the variables "eligible for free or reduced lunch" (coded Yes or No), race (Black, White only) and gender. The second block of predictors included two measures of family background/dysfunction, placement in foster care (Yes or No) and placement in Child Protective Services (Yes or No). The third set of predictors focused on childhood psychopathology. In constructing these variables, all DSM-IV diagnoses conferred by the Department of Mental Health were assigned to one of two major categories. Category assignments were made by the first author, a licensed psychologist, in consultation with colleagues. Subjects were first scored for presence or absence (at any time in development) of a primary diagnosis involving aggression and/or conduct problems. The DSM-IV classifications which were used to define an aggressive behavior problem included Antisocial personality disorder (DSM-IV classification 301.7); Impulse control disorder (312.30); Conduct

disorders (312.81, 312.82, 312.89), Disruptive behavior disorder (312.9); Oppositional defiant disorder (313.81) and Child or adolescent antisocial behavior (V71.02).They were then scored for presence or absence of a primary disorder involving any other type of disorder recognized in the DSM-IV. These two variables constituted the third block of predictor variables. The fourth set of variables included two indicators of eligibility for special education. Subjects were first scored for presence or absence of a school-based identification as eligible for special education services due to a learning disability (LD). They were also scored for presence or absence of a school-based identification as eligible for services due to an emotional/behavioral disorder (EBD). The fifth block of predictors included the variables age at first offense (continuous variable), recidivism (two or more arrests versus single offense), most severe offense (felony versus misdemeanor or status offense) and incarcerated for any offense (Yes or No). Analyses for non-offenders followed the same steps with the exception of the fifth block of predictors (representing juvenile delinquency history). In addition, for those who had been arrested as juveniles, we conducted survival analyses to examine the timing of first arrest as an adult and Cox regression analyses to examine influences of different risk factors on the hazard function.

Second, we examined background characteristics and selected adult outcomes for later starting delinquents. Of interest was the extent to which this group differed from non-delinquent controls in their early life histories, including mental health histories, special education history, and placements in Child Protective Services and foster care. Individuals were included in the later starting group if, according to DJJ files, their first offense occurred after 14 years of age. We restricted this sample to those who were arrested only once while a juvenile and had not been arrested for a felony as a juvenile. We also compared this group to early starting delinquents whose first offense occurred before age 13, who were arrested more than once as a juvenile, and who were arrested at least once for a felony as a juvenile. Cross tabulations of delinquency status (control, later starting, and early starting) and each of the early experiential and demographic variables were conducted. Two degree of freedom contrasts were followed by one degree of freedom orthogonal contrasts comparing, first, later onset delinquents versus controls and, second, early onset delinquents with the two comparison groups.

Finally, we examined the role of early adverse experiences and mental health history in accounting for serious life course delinquency. Individuals were included in the life course delinquency group if they had been arrested and/or referred to DJJ more than once, if they had been arrested for a felony level offense as a juvenile, and if they had been arrested as an adult. Individuals were included in the adolescence limited group if they had been arrested only once as an adolescent, and this for a misdemeanor level offense, and were never arrested as an adult. We used logistic regression analysis to examine the role of background and early experiential factors in accounting for group membership (life course delinquent versus adolescent only criminal activity). Variables were included in the analysis in the same order as described for the level one analyses; however the fifth block of predictors (which related to delinquency history) included only the variable age at first offense.

Results

Characteristics of individuals in the sample that were not adult offenders, were arrested at least once as an adult (but before age 30) for a misdemeanor but not a felony, and were arrested at least once as an adult for a felony are shown in Table 1. As shown in Table 1, individuals arrested as adults were significantly more likely than non-offenders to be male, African American, and to have been eligible for free or reduced lunch when in school. They were more likely to have been in foster care and more likely to have been placed in Child Protective Services and were more likely to have been identified as having a learning disorder or emotional/behavioral disorder while attending school. They were more likely to have received a diagnosis by the SC Department of Mental Health of having a disorder of aggression or impulse control while juveniles and were also more likely to have been diagnosed with a mental or emotional disorder not specifically aggressive in nature. As juveniles, they were more likely to have been referred to the Department of Juvenile Justice, more likely to have been referred for a felony level offense, and more likely to have been referred on at least two occasions. Proportions of individuals showing each of the above indicators were significantly higher for individuals who were arrested by SLED for a felony than they were for those arrested for misdemeanor level offenses.

Predicting Adult Arrests

Table 2 shows results of the multivariable logistic regression analysis for the prediction of felony level adult offending for individuals with a history of juvenile criminal offending. The multivariable analysis showed significant effects for race and gender with Black youth and males more likely than White youth and females to be arrested as adults; χ^2 $(1,\ N = 97{,}776) = 523.29,\ p < .001$ and $\chi^2 = 2979.55,\ p < .001$, respectively. There was also an effect for free lunch with individuals qualifying for free lunch more likely to commit an adult offense;

Table 1 Descriptive statistics for young adult comparison groups

Variables	Non-offenders (N = 122,123[a]) (%)	Misdemeanor (N = 56,779[a]) (%)	Felony (N = 17,164[a])
Demographic			
Gender male	58.68	71.15	86.12
African American	47.04	56.27	67.60
Receives free lunch	48.20	67.37	76.28
Parenting			
Foster care	1.83	4.45	7.24
CPS	4.89	10.89	15.43
Mental health diagnoses			
DSM-IV aggression	3.78	12.67	21.79
DSM-IV other	10.35	24.39	32.28
Disabilities			
LD	10.88	17.26	22.23
EBD	2.04	4.86	10.00
Juvenile arrests			
Any	36.39	69.10	83.61
Felony[b]	22.88	34.95	52.64
Repeat arrests[b]	30.66	52.69	69.43

Two degree of freedom Chi-square analyses for differences between groups were conducted for all categorical variables. Significant differences at $p < .001$ were detected for all three group comparisons. One degree of freedom orthogonal contrasts compared (a) adult offending groups with controls and (b) misdemeanor level offenders with felony level offenders; all contrasts were significant at $p < .001$

[a] Due to small samples sizes in other categories, only Black and White youth included in analyses

[b] For these categories, percentages reflect proportions of juvenile offenders

Table 2 Prediction of adult arrest (N = 97,776)

Block	Variable	R^2 block	B	Wald (X_1^2)	AOR_E	AOR_F
Block 1	Race (black)		.34	523.29**	1.62**	1.40**
	Gender (male)		.84	2979.55**	2.27**	2.32**
	Free lunch	.12**	.69	2045.09**	2.45**	1.99**
Block 2	Foster care		−.08	4.00	1.72**	.93
	CPS	.12**	.18	48.65**	1.64**	1.19**
Block 3	DSM-IV AGG)		.32	212.64**	2.42**	1.38**
	DSM-IV other	.15**	.43	582.54**	1.88**	1.53**
Block 4	EBD		.14	16.46**	2.35**	1.15**
	LD	.16**	.11	29.70**	1.62**	1.11**
Block 5	Age 1st offense		.09	580.49**	.95**	1.10**
	Severity		.23	195.02**	2.22**	1.26**
	Juvenile recidivism	.21**	.80	2496.17**	3.01**	2.23**
	Juvenile incarceration		.46	274.04**	3.51**	1.59**

R^2 block refers to Nagelkerke R^2 following this step in the equation and including the constant. Significance level for R^2 block is based on the change in the log-likelihood of the outcome. Significance level for the Wald Statistic is based on the final logistic regression equation. B refers to the logistic regression coefficient in the final equation. AOR_F refers to the adjusted odds ratio in the final equation. AOR_E refers to the adjusted odds ratio if entered alone in the equation

** $p < .001$

$\chi^2 = 2045.09$, $p < .001$. While the effect for foster care was not significant, there was a significant effect for Child Protective Services; $\chi^2 = 48.65$, $p < .001$. Individuals who had been in Child Protective Services were approximately 20 % more likely than those who had not been in Child Protective Services to be arrested as an adult. Mental health

diagnosis was significantly related to the likelihood of an adult offense, with youth with either a diagnosis relating to aggressive behavior or any other diagnosis more likely to be arrested as adults; $\chi^2 = 212.64$, $p < .001$ and $\chi^2 = 582.54$, $p < .001$, respectively. Individuals identified as eligible for special education services due to an emotional/behavioral disorder or a learning disability were more likely to commit an adult offense than youth without these special education classifications; $\chi^2 = 16.46.54$, $p < .001$ and $\chi^2 = 29.70$, $p < .001$, respectively.

Four variables related to delinquency history were predictive of adult offending. There was a significant relationship between age of first offense and adult crime ($\chi^2 = 580.49$, $p < .001$), with a tendency for later age of first arrest to be associated with adult offending. In addition, youth who had been referred for a felony level offense and youth who committed more than one offense were more likely to be arrested as an adult ($\chi^2 = 195.02$, $p < .001$ and $\chi^2 = 2496.17$, $p < .001$, respectively). Juvenile recidivism was a particular strong predictor of adult felony level offending (AOR = 2.23). Finally, individuals who has been incarcerated for a crime were more than 50 % more likely to be arrested as an adult than those who had not been incarcerated. The total adjusted R^2 was .21; model χ^2 (13, $N = 97{,}776$) = 16,334.92, $p < .001$. Also as shown in Table 2, simple logistic regression analyses showed that each independent variable when considered alone was a significant predictor of recidivism (AOR_E shows values of adjusted odds ratios with only one variable in the equation). Notably, when considered alone, foster care was significantly associated with an increased likelihood of adult arrest (AOR = 1.72). Also, age of first offense, when considered alone, was inversely related to adult offending (AOR = .95).

All but two of the measures of early adversity that were related to adult offending among juvenile offenders were also significantly associated with adult offending for those who had not been arrested as juveniles. For those who had never been arrested as juveniles, gender ($\chi^2 = 2179.60$, $p < .001$), race ($\chi^2 = 630.59$, $p < .001$), free lunch ($\chi^2 = 678.02$, $p < .001$), CPS ($\chi^2 = 88.81$, $p < .001$), DSM-IV aggression ($\chi^2 = 209.49$ $p < .001$), DSM-IV other ($\chi^2 = 1136.85$, $p < .001$) and LD ($\chi^2 = 82.14$, $p < .001$) were all significantly related to adult offending in the multivariable analyses. In all, this set of predictors accounted for approximately 10 % of the variance in adult offending for those without a juvenile criminal history.

Figure 1 shows the density function for adult arrests; 0 indicates that the arrest occurred in the individual's 17th year, 2 in the 19th year, etc. A density function shows the probability that a random variable (in this case age) takes on a value in a particular interval. The density function is highest at 17 years with 32 % of those arrested

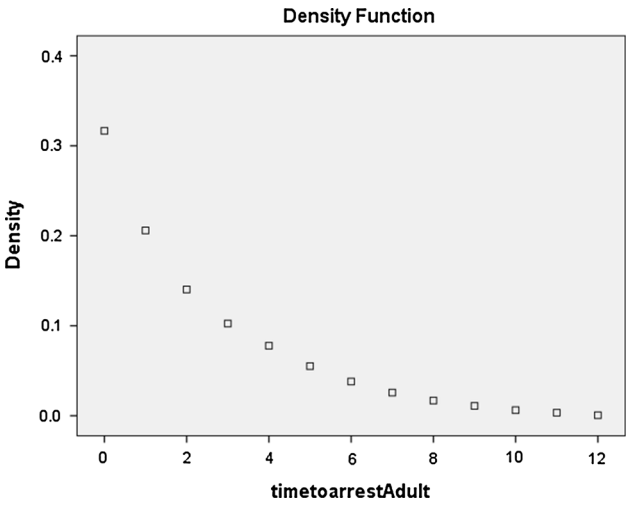

Fig. 1 Density plot for time to first adult arrest after 17th birthday

before age 30 first arrested before the 18th year. 20 % are arrested in the 18th year, 14 % in the 19th and 86 % by age 21. Cox regression analyses allowed us to examine the variables influencing the hazard function for an event, which estimates the likelihood that an individual will experience an event (in this case adult arrest) given that they have not yet experienced the event. We included all of the variables which we used in the logistic regression analyses in the hazards analysis. We also included several time dependent covariates. Preliminary analyses indicated that the effects of gender, race, age of first juvenile offense, recidivism (yes/no) and maximum severity of juvenile offending were time dependent. Therefore time x covariate interaction terms were constructed for each of these five variables. Results showed significant effects for all independent variables with the exception of foster care and LD. There were significant time x covariate interaction effects for gender, age at first juvenile arrest and recidivism. The effects of male gender on hazard decreased over time, χ^2 (1, $N = 53{,}515$) = 123.79, $p < .001$, as did the effects of age at first referral ($\chi^2 = 21.65$, $p < .001$), and recidivism ($\chi^2 = 156.14$, $p < .001$).

Characteristics of Later Starting Delinquents

Table 3 shows the proportions of later starting delinquents with various background and risk factors. They are compared with non-delinquent controls and early starting delinquents (those committing their first offense before the age of 13). Chi-square analyses compared the proportions of individuals showing a specific background/risk factor across the three groups. One degree of freedom Chi-square contrasts compared (1) later starting delinquents with controls and (2) later starting delinquents and non-delinquents with early starting delinquents. All Chi-square

contrasts were significant at $p < .001$. As can be seen in the table, later starting delinquents—defined as delinquents who did not commit a crime until after age 14, were only arrested once and never committed a felony—differed significantly from controls on every risk indicator. They were approximately three times more likely to have been in foster care, to have been referred to CPS, and to have been diagnosed with a DSM-IV disorder. They were also significantly more likely to have been eligible for free or reduced school lunch, and to have been identified as having a learning disability or emotional/behavioral disorder. As adults, later starting delinquents were approximately twice as likely as non-delinquents to be arrested before the age of 30 and three times more likely to be arrested for a felony. As expected, early starting delinquents were significantly more likely than later starting delinquents and controls to be represented on each individual risk indicator. They were also significantly more likely to be arrested as adults.

Predicting Life Course Delinquency

Table 4 shows the results of the multivariable logistic regression analysis for predicting serious life course delinquency (versus less serious juvenile delinquency). Over 30 percent of the variance in offending was explained by gender, race and poverty status; χ^2 (1, $N = 41{,}627$) = 3671.92, $p < .001$ for gender, $\chi^2 = 486.32$, $p < .001$ for race, and $\chi^2 = 1290.56$, $p < .001$ for free lunch. Referral to CPS ($\chi^2 = 156.59$, $p < .001$) was also associated with more serious delinquent activity in the final equation. The strongest predictor of more serious criminal activity was a referral to the Department of Mental Health for a disorder of aggression or impulse control ($\chi^2 = 2216.59$, $p < .001$); individuals with such a referral in their history were more than seven times more likely to be in the life-course offending group than those without a diagnosis, even with other variables controlled. Presence of any other DSM-IV disorder ($\chi^2 = 1322.36$, $p < .001$), identification as EBD ($\chi^2 = 138.59$, $p < .001$) and identification as LD ($\chi^2 = 39.48$, $p < .001$) were also associated with more serious offending. Age of offense was inversely related to serious criminal offending ($\chi^2 = 1290.56$, $p < .001$) with each year of earlier offending associated with a 25 % increase in likelihood of life course offending. In sum, the entire set of predictor variables accounted for 51 % of the variance in life-course offending. Simple logistic regression analyses showed similar results with one exception; being in foster care, non-significant in the multivariable analysis, was associated with almost a four-fold increase in the likelihood of life-course offending when considered separately.

Table 3 Descriptive statistics for juvenile comparison groups

Variables	Non-offenders (N = 98,033) (%)	Later starting (N = 33,438) (%)	Early starting (N = 7323) (%)
Demographic			
Gender male	64.69[a]	56.47	86.36
African American	51.51[a]	44.94	70.33
Receives free lunch	50.72	52.75	77.66
Parenting			
Foster care	.82	2.75	11.73
CPS	2.78	7.39	23.26
Mental health diagnoses			
DSM-IV aggression	1.27	5.50	36.52
DSM-IV other	6.95	17.57	38.37
Disabilities			
LD	10.65	13.00	25.36
EBD	1.42	2.47	17.79
Adult arrests			
Any	20.76	43.22	78.92
Felony	2.89	7.84	35.11

Chi-square analyses for differences between racial groups were conducted for all categorical variables. Significant differences at $p < .001$ were detected for all three group comparisons. One degree of freedom orthogonal contrasts compared (a) later starting delinquents with controls and (b) early starting delinquents with later starting delinquents and controls; all one degree of freedom contrasts were significant at $p < .001$

[a] Percentages for race and gender for non-delinquents were the same as for the entire delinquent sample due to the matching design of the study

Table 4 Prediction of life course offending (N = 41,627)

Block	Variable	R^2 block	B	Wald (X_1^2)	AOR_E	AOR_F
Block 1	Race (black)		1.99	486.32**	2.36**	1.85**
	Gender (male)		.61	3671.92**	6.17**	7.28**
	Free lunch	.31**	1.03	1290.56**	3.87**	2.79**
Block 2	Foster care		.05	.40	3.94**	1.04
	CPS	.35**	.60	156.59**	3.33**	1.83**
Block 3	DSM-IV AGG)		2.00	2216.59**	11.60**	7.41**
	DSM-IV other	.47**	1.20	1322.36**	3.89**	3.34**
Block 4	EBD		.74	138.59**	7.71**	2.09**
	LD	.48**	.22	39.48**	2.58**	1.24**
Block 5	Age 1st offense	.51**	-.27	2180.28**	.68**	.77**

R^2 block refers to Nagelkerke R^2 following this step in the equation and including the constant. Significance level for R^2 block is based on the change in the log-likelihood of the outcome. Significance level for the Wald Statistic is based on the final logistic regression equation. B refers to the logistic regression coefficient in the final equation. AOR_F refers to the adjusted odds ratio in the final equation. AOR_E refers to the adjusted odds ratio if entered alone in the equation

** $p < .001$

Summary of Results

Among juvenile offenders, independent variables relating to background, adverse parenting, mental health, school related disabilities and features of first offenses contributed just over 20 % of the variance in adult arrests. Male gender, eligibility for free or reduced school lunch, placement in CPS, identification as qualifying for special education services due to EBD or LD, and a mental health diagnosis relating to aggression or any other disorder were all predictive of adult arrests when all other variables were controlled. Having been arrested for a felony, being a repeat offender, and having been incarcerated as a juvenile were also significant predictors. Considered alone, age of first arrest was inversely related to likelihood of adult crime; however, with other variables in the equation, age of arrest was positively associated with adult arrests, suggesting that it functioned as a suppressor variable in the multivariable analyses. Foster care was positively associated with adult arrests in the univariate analyses only. For individuals without a history of juvenile offending, measures of early interpersonal adversity and psychological problems—along with demographic variables—accounted for about 10 % of the variance in likelihood of adult offending.

Survival analyses showed that for those with a juvenile criminal history, the modal age period for initial offense as an adult was between 17 and 18 years of age. Over 30 % of those committing an adult offense before age 30 were first arrested before age 18. The density curve for offending followed a monotonic non-linear trend, with proportions of first offenses decreasing as the individual progressed toward age 30. Cox hazards analyses showed that the hazard function (showing the likelihood of an arrest given that an arrest had not yet occurred), showed significant effects for all independent variables with the exception of foster care and LD. There were significant time x covariate interaction effects; the effects of gender, age at first juvenile arrest and recidivism on the hazard function were significantly attenuated over time.

Results relating to characteristics of later starting delinquents did show that later starting delinquents were less likely to experience early adversities than early starting delinquents; in particular, they were far less likely to have been referred to DMH for a disorder relating to aggression or impulse control and were much less likely to have been identified as EBD. In addition, as adults they were far less likely than early starting delinquents to be arrested for a felony. However, the profile of the later starting delinquent, even the one time offender who was not arrested for a felony, was very different from that of the non-juvenile offender. This group of delinquents was more likely to show every indicator of environmental or psychological risk than non-delinquent controls. The greatest differences in percentages (with respect to ratios) were in the area of aggressive behavior and referral to child protective services. Those committing a single (non-violent) delinquent act were more than four times more likely than controls to have received a DSM-IV diagnosis of a disorder of aggression or impulse control, and were more than three times more likely to have been referred to CPS.

Finally, in discriminating between two groups of delinquents (a) those who committed only one juvenile offense, did not commit a felony and did not commit an adult offense before age 30 and (b) those who committed more than one juvenile offense, were arrested at least once for a felony, and were arrested at least once as an adult,

logistic regression analyses accounted for more than 50 % of the variance in distinguishing between these two groups of offenders. All of the variables included in previous logistic regression analyses played a significant role in accounting for individual differences. Male gender and DSM-IV aggression were the strongest predictors. In contrast to earlier analyses, age of first juvenile offending was inversely related to life course offending both in univariate and multivariable logistic regression analyses.

Discussion

Findings from this study underscore the importance of early adverse experiences in shaping juvenile delinquency and adult offending trajectories (see Hawkins et al. 2000; Loeber and Farrington 1998; Nellis 2012). Among juvenile offenders, we can predict adult offending from information about early adversities—including mental health problems, school related disabilities, problems in parenting—as well as characteristics of juvenile offenses. Further, the same set of factors (not including those related to juvenile delinquency) are predictive of adult arrests for those without a history of juvenile offending. For youth who have been in the juvenile justice system, likelihood of adult offending is highest at the end of the high school years and diminishes as the individual leaves his or her 20 s. The hazard function (showing likelihood of an arrest if an arrest has not yet occurred) is sensitive to the same factors as is the logistic function (which shows likelihood of an adult arrest). Interestingly, the impact of certain factors including gender, age of first referral, repeat juvenile offending and severity of juvenile offenses is greatest in the late teen years and diminishes as the individual moves through early adulthood. In attempting to distinguish less serious adolescent offending from more serious adolescent/adult offending, we can account for more than 50 % of the variance on the basis of the variables we have included in our analysis (predictive models for re offending typically account for much less of the variance-see Cottle et al. 2001; Katsiyannis et al. 2004; Klein and Caggiano 1986).

Several theoretical/clinical issues are raised by the present analysis. The first involves the highly significant impact of childhood variables in predicting adult referrals, even when delinquency itself is controlled. For youth who had a history of juvenile offending, and with offense characteristics controlled, variables such as being referred to child protective services or being diagnosed with a mental disorder relating to impulse control and aggression, continued to play a role in predicting adult offending. Our interpretation is that these relationships show that the impact of family dysfunction and antisocial tendencies is likely a lifelong one, with both types of conditions indelibly affecting the individual's orientation to and role in society. Lacking both a trust in adults and a respect for others' well-being, the individual is prone to violating social and legal boundaries that others might view as inviolable. The implication is that the most powerful preventive measures may be those that can normalize the early home environment and provide consistent rewards for positive, social behavior (see Welsh and Farrington 2007).

A second concern involves the results of comparisons of one time only, misdemeanor level juvenile offenders with non-juvenile delinquent controls. Moffitt (1993) presented a view on delinquency that distinguished adolescence-limited offenders versus life course persistent (adolescent and adult) offenders, a view which emphasized differences in the etiology and consequences of the disorders (1993). Cited in textbooks on adolescence (Berger 2012; Steinberg 2014), Moffitt's distinction has received support from empirical studies (See Piquero and Moffitt 2005. But one of the dangers of such a dichotomy is the failure to recognize the significance of a single act of law breaking. While scholars recognize that a history of lawful behavior is a powerful predictor of positive health and development in adulthood (Moffitt 2003), the clinical significance of one-time juvenile lawbreaking may be underappreciated. In our study, background and family profiles of one time, misdemeanor level offenders differed significantly from non-juvenile offenders on every indicator of emotional or behavioral health, and these offenders were also more likely than controls to be arrested as adults. The biggest differences were on frequencies of referrals for mental health disorders and on family dysfunction (CPS, foster care). These results indicate the importance of recognizing that any law breaking offense has implications for assessment of personality development and emotional well-being. Studies on the development of prosocial behavior have shown the importance of parental warmth (Zhou et al. 2002), responsiveness and shared positive affect (Kochanska 2002), and the child's capacity for empathic distress and guilt (Aksan and Kochanska 2005) in the development of prosocial versus antisocial tendencies. It is clear that an important aspect of delinquency prevention is the encouragement of the young child's emotional understanding of the effects of his or her actions on others and that this must begin in the first years of life.

A third issue is the reduced impact of offense characteristics (age of first referral, recidivism) as well as gender on the hazard function as age of adult offending increases from 17 to 30. One explanation for the reduced role of these factors could be related to developmental changes in relative proportions of variance in behavior due to genetic versus shared environmental factors. In general, heritability estimates for externalizing behaviors increase over time (Bergen et al. 2007). To the extent that offense

characteristics such as recidivism are better predicted by situational variables (as contrasted with temperamental or trait-related variables) we might expect a reduced role for these covariates as the individual matures. On the other hand, if that were the case we might have expected a significant covariate x time interaction for DSM-IV Aggression (with an increased effect for this variable over time), and this was not found. Further review of these questions is warranted.

Policy Implications

Consistent with research cited earlier on the role of effective parenting, early intervention/prevention programs have produced promising results in preventing delinquency (Piquero et al. 2009; see also Piquero et al. 2010). For example, the Seattle Social Development Project combined parent training, teacher training and skills training for children beginning at age 6. At age 27, the intervention group scored significantly better on educational and economic attainment, mental health, and sexual health. However, the intervention did not reduce substance abuse or offending (Hawkins et al. 2008). In contrast, interventions with older juvenile delinquents (e.g., Multi-systemic Therapy) have been effective in reducing recidivism rates in general and re-arrest rates for violent offenses in particular (Schaeffer and Borduin 2005).

School success and engagement are critical protective factors against juvenile and adult delinquency. System-wide initiatives such as Response to Intervention (RTI), a multi-tier approach to the early identification and support of students with learning and behavior needs (RTI, 2015) and Positive Behavior and Intervention Supports (PBIS), a school-wide system of tiered preventative interventions focusing on providing a positive school environment (PBIS, 2015) are increasingly being implemented to improve school engagement and academic success. In addition, school based mental health services have been shown to be highly effective in promoting school success and overall well-being (Atkins et al. 2010; Maag and Katsiyannis 2010).

Multiple factors related to social-economic standing are associated with depressed academic performance; these include parenting practices that impede children's intellectual and behavioral development, single parenthood, parents' irregular work schedules, inadequate access to primary and preventive health care, and exposure to and absorption of lead in the blood (Morsy and Rothstein 2015). Family and community engagement, therefore, is critical in addressing these concerns. Community-based care systems such as Intensive Aftercare Program, Juvenile Justice Wraparound program and Restorative Justice Programs bringing together law enforcement, school support, and family involvement, have proven effective in reducing juvenile delinquency (Pullmann et al. 2006; Rodriguez 2007). Wraparound services, for example, are intensive, individualized community-based services that focus on the strengths and needs of the child and family. In these programs, an individualized plan is developed collaboratively by family members, service providers, teachers, and agency representatives to allow for problem-solving skills, coping skills, and self-efficacy for youth and family members (National Wraparound Initiative 2015). It is important to note, also, that the economic benefits of intervention programs outweigh the costs. In fact, it has been estimated that, multidimensional treatment foster care (MTFC) saves $8 per $1 expended, functional family therapy $10 per $1 expended, and MST $3 per $1 expended (Welsh et al. 2012).

Limitations and Conclusions

The present analysis represents one of the more comprehensive studies on family and individual influences on juvenile and adult offending. But there are several limitations to the analysis which must be acknowledged. First, only general measures of adult offending were available for this analysis. Specifically, information on type of offense was dichotomized into "any" and "felony." Also, information about adult offenses was not available beyond age 30; thus, patterns of offending beyond age 30 could not be examined. Second, while information about family related problems proved invaluable in identifying sources of variability in offending, detailed information about parent–child interaction was not available. Such information is critical if we are to better understand the role of within-family influences on behavioral development, particularly with regard to the development of empathy and the internalization of societal norms. Finally, because of the nature of the original study design, which involved the construction of a control group of non-juvenile offenders proportionately matched to the original DJJ sample on race and gender, estimates of the role of gender and race in accounting for variability in the dependent variables will differ in magnitude from those that would be obtained on a sample where the variables were completely free to vary.

Notwithstanding these considerations, the present study demonstrates, first, the significant role of early adversity and mental health problems in accounting for early adult offending, even when juvenile offending is controlled. In a large sample of juvenile offenders, even controlling for offense characteristics such as age of first offense, recidivism, and most serious ever offense, adversities relating to family dysfunction, mental health problems and school related disabilities were significant predictors of both the likelihood of adult arrests and the timing of first adult

arrests. In addition, our study has shown that in a lower risk sample of non-juvenile offenders, the same environmental and personal variables are predictive of adult offending.

The present study also addresses two other issues which have been of interest to researchers. The first concerns the amount of variability in juvenile offending which can be attributed to background, psychological and social-environmental factors. While the general assumption is that it is difficult to account for more than 20 % of the variance in juvenile offending on the basis of such factors (and that more detailed information is necessary about day to day experiences and interactions), we were able to account for more than 50 % of the variance in juvenile offending when we compared individuals who committed repeated crimes as juveniles, were arrested for a felony as a juvenile, and were arrested as young adults to a group of one time, misdemeanor level juvenile offenders. This finding demonstrates the pervasive influence of early social-environmental adversities, and reminds us that early aberrations from optimal development are difficult to overcome.

Finally, in our study we examined the characteristics of individuals who were arrested only once as a juvenile and this for a misdemeanor level crime. Contrary to the view that such behavior is normative and does not represent a major departure from typical functioning, we found that such individuals were more likely to show every single risk factor for juvenile and adult offending than non-offending controls, and that they were far more likely to engage in criminal behavior as adults. We interpret this finding as suggesting a qualitative differences between individuals who do and do not violate social norms and suggest that, as we work with young children and families, greater attention be given to the importance of the child's capacity for empathy, guilt and the internalization of social norms.

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