Anxiety, depression, and offending in the Columbia County longitudinal study: A prospective analysis from late adolescence to middle adulthood☆

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ABSTRACT

Purpose: We use data from a community sample, the Columbia County Longitudinal Study, which followed participants from childhood through adulthood, to examine the longitudinal relations between mental health (serious anxiety and serious depression) and offending across three waves of data collection (ages 19, 30, and 48).

Method: Participants were from the Columbia County Longitudinal Study (436 males and 420 females). The youth, their parents, and peers were first interviewed when the youth were age 8; the youth were later interviewed at ages 19, 30, and 48.

Results: We found significant longitudinal relations from offending to experiencing subsequent severe anxiety and weaker longitudinal relations from experiencing severe anxiety to subsequent offending. For the relation between offending and severe depression, we found similar but somewhat weaker longitudinal associations. Cross-lagged longitudinal structural modeling analyses controlling for the continuity of offending, anxiety, and depression and for family socio-economic status and education were conducted to test the plausibility of alternative causal effects.

Conclusions: The analyses suggest that it is more plausible to conclude that offending is stimulating serious anxiety and depression than to conclude that anxiety and depression are stimulating offending. These results mirror what has been found previously about general aggressive behaviour.

1. Introduction

Scholars studying crime have long been interested in relations over time between criminal offending and mental health (El-Sayed et al., 2016), and particularly in attempting to disentangle causal pathways between the onset of mental disorders and the onset of criminal behaviour. On the one hand, mental disorders might represent the manifestation of a life-course long struggle with a variety of personal and contextual risk factors that also lead to offending (Jolliffe, Farrington, Piquero, Loeber, & Hill, 2017). On the other hand, the aversive experiences associated with criminal offending including arrest, court processing, and incarceration might increase the likelihood of subsequent mental disorders (Blevins, Listwan, Cullen, & Jonson, 2010). Further, for some scholars, criminal behaviour has simply been viewed

as a mental disorder in its own right. For others, the prime interest has been in how certain serious mental disorders (e.g., schizophrenia, bipolar disorder) engender criminal and violent behaviour in the afflicted (Bonta, Law, & Hanson, 1998). Although prospective longitudinal studies have been utilized extensively to examine separately the prediction of criminal offending or mental disorders from early developmental risk factors (e.g., Dubow, Huesmann, Boxer, & Smith, 2014; also see Jolliffe et al., 2017), very little research has taken up the "chicken and egg" question of how offending and mental health difficulties interrelate over time.

In this paper, we consider a slightly different question about the relation between criminal offending and mental health: what is the relation between two of the more common psychopathologies – serious depression and serious anxiety – and offending over the life course?

Recent epidemiological scans conducted by the US Substance Use and Mental Health Services Administration examining the 12-month point-prevalence of mental disorders indicate that about 7% of U.S. adults experience clinically significant depression and about 4% of U.S. adults experience clinically significant anxiety (Center for Behavioral Health Statistics and Quality, 2016). We examine how serious anxiety and depression correlate over time with offending, and explore whether offending is more likely to lead to mental disorder or vice-versa. Our analyses rely on data from a 40-year prospective, longitudinal study (spanning age 8 to 48) of a representative sample of Americans.

We know from previous empirical research that there can be reasonably robust links over time between criminal offending and either serious depression or serious anxiety (as well as other indicators of psychopathology; Defoe, Farrington, & Loeber, 2013; El-Sayed et al., 2016). Various theoretical frameworks offer a basis for why we might observe these links across development.

From a neurophysiological perspective, certain abnormalities have been shown to be related both to aggressive behaviour and depressive or anxious reactions. For example, Sussman and Ponirakis (1997) reported multiple studies that showed that elevated cortisol reactivity is a characteristic of anxiety reactions, depression, and conduct disorder. Caspi et al. (2002, 2003) have shown that genetic abnormalities related to monoamine-oxidase or serotonin seem to predispose individuals to antisocial behaviour or depression when the individuals are exposed to stressful environments.

Learning theories of the development of aggression and antisocial behaviour also provide reasons why criminal offending might be associated with depression or anxiety either positively or negatively. Research and theory linking anxiety reactions with antisocial, aggressive, or criminal behaviour suggests alternative directions and reasons for an association. For example, fear and anxiety about being attacked can be a motivating factor for both reactive and proactive criminal behaviour, including weapon carrying. Repeated exposures to violent or antisocial behaviours by others engender in developing youth a generalized hostile attributional bias, fear or anxiety about being attacked, and need for self-protection, which can predispose them to subsequent aggressive, antisocial, and criminal behaviours (Crick, Grotpeter, & Bigbee, 2002; Dodge & Frame, 1982; Dodge & Somberg, 1987; Valdebenito, Ttofi, Eisner, & Gaffney, 2017). Studies have also shown that emotional distress in itself can be a mediator of the relation between exposure to antisocial behaviour and subsequent engagement in antisocial behaviour (Huesmann et al., 2017).

Although the common presentation of depression does not necessarily suggest depression as a situational precursor to antisocial behaviour, depression and aggression share similar neurobiological substrates (Coccaro et al., 1989). Further, it should be noted that anxiety and depression are thought to have overlapping etiologies given some of the overlap in their manifest symptoms and frequent diagnostic comorbity. Clark and Watson's (1991) conception of a "tripartite" model for understanding the link between anxiety and depression highlights the overlap in those two syndromes in terms of negative affectivity, the key factor shared by both anxiety and depression.

Of course, there are also theoretical reasons to expect that individuals high on anxiety or depression should be less aggressive, antisocial, and prone to criminal offending. While fear may motivate some to attack, it is likely to motivate others to avoid (Berkowitz, 1993), and the learned helplessness and related cognitive-attributional models of depression suggest that depressed individuals should have little motivation or incentive to commit crimes (Seligman, 1975). For example, from a social cognitive standpoint, Huesmann has argued (Huesmann, Dubow, Boxer, & Shikaki, 2016; Huesmann & Kirwil, 2007) that feeling anxious when one considers antisocial or criminal behaviour tends to inhibit such behaviour; so those high on trait anxiety should engage is less offending. The weight of theorizing and past empirical research do not provide clear overall predictions about the relations between criminal offending and serious anxiety or depression.

Thus far we have considered whether anxiety or depression should predict criminal offending. Going further, there also are theoretical reasons to expect that a relation between offending and anxiety might emerge through effects in the opposite direction – that is due to offending promoting anxiety or depression. It is certainly plausible that engaging in aggressive, antisocial, and criminal behaviours might lead to subsequent heightened fear or anxiety in anticipation or retaliation or legal sanctions and their consequences, or elevated depression through the loss of freedom or damage to social relationships. Principally we would expect mental health problems to result from the experience of court processing and subsequent incarceration; a substantial literature base exists to support the notion that individuals who experience incarceration and the "collateral consequences" of felony convictions are subsequently at greater risk of mental disorders and related social-economic challenges (Blevins et al., 2010; Middlemass, 2017).

In the present study we examined the potential causal ordering of criminal offending with serious anxiety and depression over the lifespan in a sample of American adults first assessed at age 8 and followed up at ages 19, 30, and 48. We rely on a combination of self reports and official records to draw inferences about the likely direction of effects between mental disorder and criminal offending.

2. Method

2.1. Participants and procedures

The CCLS began in 1960 with a sample of all 856 third graders (average 8 years of age; 436 boys, 420 girls; 95% Caucasian) in Columbia County, a semi-rural area of New York State (the county's population was approximately 47,000).The sample was 95% Caucasian, but in in terms of social and economic characteristics, population density, urban-rural characteristics, and the system of school administration, it was representative of 40% of the counties across the United States (Eron, Walder, & Lefkowitz, 1971; Eron, Walder, Toigo, & Lefkowitz, 1963; Toigo, 1965). The occupational backgrounds of the fathers averaged the equivalent of jobs such as craftsmen, foremen, and skilled tradesmen, and the youth displayed a wide range of intelligence, with an average IQ of 104.

In the first wave of data collection, in 1960 (see Eron et al., 1971), 85% of the children's mothers and 71% of their fathers also were interviewed. Youth were interviewed in their classrooms (through peer nomination procedures) and parents were interviewed in person. In 1970, ten years later, we obtained complete in-person interviews in a field office from 427 of the children (198 males, 211 females), who were then 19 years old (Eron, Huesmann, Lefkowitz, & Walder, 1972). In 1981–82, we conducted a third wave of data collection with the original sample (modal age = 30); we interviewed 295 in person in a field office and 114 by mail and telephone for a total of 409 subjects (198 males, 211 females). We also obtained archival data from the New York State Divisions of Criminal Justice and Motor Vehicles (Huesmann, Eron, Lefkowitz, & Walder, 1984). Finally, between 2000 and 2002, we completed a fourth wave of data collection (Dubow, Boxer, & Huesmann, 2008; Dubow, Huesmann, Boxer, Pulkkinen, & Kokko, 2006; Huesmann et al., 2016; Huesmann, Dubow, & Boxer, 2009). We re-interviewed 523 (61%) of the original participants (268 males, 255 females; 284 in person and 239 by mail and telephone) and again obtained data from criminal and traffic archives.

2.1.1. Attrition

For the 523 of the 856 participants re-interviewed during the 2000–2002 phase, the mean age was 48.85 years old (SD = 0.81); the average education level was between "some college" and a college degree; the average occupational attainment reflected a middle-class status (i.e., mean occupational prestige code using Stevens & Hoisington's, 1987 occupational prestige ratings indicated jobs such as

salespeople, bookkeepers, and secretaries). Sixty-nine percent of original participants were living with their spouses. Most of the re-interviewed subjects (63%) were living in New York State; many of those were living in, or in close proximity to, Columbia County.

At age 48, we collected some type of data (archival, interview, or other report) on 683 (80%) of the original sample of 856. Of the non-interviewed participants, 37 had died, 112 had disappeared and could not be found despite intense efforts, 40 could not be interviewed because of distance and scheduling difficulties, and 144 refused. The number who refused to be interviewed (despite substantial financial incentives) was higher than expected, but the completed re-interview rate of 61% and data collection rate of 80% over 40 years still provided us with a sizeable sample for analysis. Dubow et al. (2006) showed that a comparison of means on age 8 scores revealed that compared to participants who were re-interviewed at age 48, participants who were not re-interviewed had higher levels of aggression, lower levels of popularity, lower peer compliance, and lower IQ at age 8. These effect sizes ranged from $r = 0.14$ to $r = 0.19$. However, the plots of the distributions for these age 8 variables revealed that many of the high aggressive and low competent participants were re-sampled and there was no substantial restriction of range that might have made it hard to detect relations between these age 8 variables and adult outcomes. Dubow, Huesmann, Boxer, Smith, and Sedlar (2018) reported that 17% of those re-interviewed had been arrested at least once in their lifetimes compared to 23% of those not re-interviewed ($\chi2(1) = 3.78$, p < 0.10, Cramer's $V = 0.074$, small effect); 24% of those re-interviewed self-reported having been in trouble with the law at least once across waves compared to 39% of those not re-interviewed ($\chi2(1) = 10.55$, p < 0.001, Cramer's $V = 0.129$, small effect). There was no significant difference in age 8 father's occupational status between re-sampled participants and drop-outs.

2.2. Measures

2.2.1. Offending

As described elsewhere (Dubow et al., 2014; Dubow et al., 2018), we used two variables to create an index of offending. First, we examined official criminal arrest records. As noted, during the 1981–82 and 2000–02 data collections, criminal history data were obtained from the New York State Criminal Justice Archive. The criminal records include all arrests reported to the state agency since the participants were age 18. We coded arrests in three time periods corresponding to periods from the beginning of adulthood to the second wave of measurements (1970 thru 1972, modal ages 18 to 20, late adolescence); from just after the second wave of measurements to the start of the third wave (1973–1982, modal ages 21 to 30, early adulthood); and from the end of the third wave of measurements to the start of the fourth wave (1983–2000, modal ages 31 to 48, middle adulthood). The New York State Criminal Justice Archive only contains records for persons who had been arrested in New York State; we do not have data on arrests that may have occurred in other states. We assessed whether each of the participants was a New York State resident during each of the crime reporting periods. We counted them as a resident: a) if they had a criminal record during the period; b) if they had a New York drivers license during the period or a subsequent period; or c) if we found that they had a home address in NY State during the period. We found that 368 males and 323 females were residents during adolescence and 34 males (9.2%) and 4 females (1.2%) were "official offenders" during that period; 319 males and 264 females were residents during early adulthood and 82 males (25.7%) and 16 females (6.1%) were official offenders; and 308 males and 257 females were residents during middle adulthood and 48 males (15.6%) and 10 females (3.9%) were official offenders.[1]

In addition to arrest records, we used a self-report item from the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1940) to classify participants as offenders/non-offenders. At modal ages 19 (1970), 30 (1981), and 48 (2000), participants were asked to respond to the MMPI item, "I have never been in trouble with the law"[2] (False, True), and at age 48, they also were asked if they had ever been arrested in their lifetime and ever arrested in the past 5 years for anything other than a minor traffic offense (Elliott, Huizinga, & Ageton, 1985). At age 19, 32% of males and 8% of females reported that "yes, they had been in trouble with the law;" at age 30, 36% of males and 9% of females said "yes"; and at age 48, 42% of males and 17% of females said "yes." At age 48, 4% of males and 0% of females reported they had been arrested in the past 5 years.

Based on official arrest records and self-report of being in trouble with the law, we created an offender status variable for each of the three waves of measurement. A participant is classified as an offender for a wave if he or she had an official arrest record in the period between the prior wave and the current wave or, when interviewed in the current wave, indicated that he or she had been in trouble with the law. If the self-report variable was missing (i.e., the participant was not interviewed) but the participant still had an arrest record, he or she was still classified as an offender. At age 19, 40% of males and 10% of females were classified as offenders; at age 30, 56% of males and 16% of females were so classified; and at age 48, 50% of males and 22% of females were so classified.

2.2.2. Anxiety and depressive symptoms

At ages 19 and 30, participants were administered the Minnesota Multiphasic Personality Inventory (Hathaway & McKinley, 1940), which consists of 567 statements that respondents indicate are True or False for them. For this report, we examined scores on the depression scale (Scale 2; 60 items) and the psychasthenia (anxiety, worry) scale (Scale 7; 48 items). According to Hunsley, Hanson, and Parker's (1988) meta-analysis of multiple studies with college, psychiatric, and prison populations, the best estimates of the internal consistency reliabilities of the two scales are $\alpha = 0.61$ for Scale 2 and $\alpha = 0.88$ for Scale 7; our coefficient alphas were quite similar: $\alpha = 0.62$ for Scale 2 and $\alpha = 0.86$ for Scale 7. At age 30, participants completed two additional depression measures: the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; 13 depressive symptoms, rated from 0 to 3 in

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(footnote continued)

do not discriminate types of offenses in terms of "being in trouble with the law." Indeed, concordance between official records and self-report of being in trouble with the law decreased when driving while intoxicated offenses were not included: concordance decreased during adolescence 0.3%, during early adulthood 2.2%, and during middle adulthood 4.3%. The pattern of results for childhood and adolescent predictors of offending, and relations between offending and age 48 outcomes, remained largely the same with or without driving while intoxicated offenses. Results that do not include driving while intoxicated offenses can be obtained by contacting the first author.

[2] There is an important limitation to the self-report item: "I have never been in trouble with the law." If a participant responded "yes" at age 19 and also responded "yes" in adulthood (age 30 or 48), the "yes" in adulthood could refer back to being in trouble with the law before age 19, and not subsequently. However, we conducted analyses that lend to confidence that participants' responses to the item in adulthood reflect more recent behavior. First, we found that of the total sample (males and females) of participants who reported having been in trouble with the law at age 19, 55% reported that they were never in trouble with the law at age 30 and 61% reported that they had never been in trouble with the law at age 48. Also, we computed regressions predicting official reports of arrest at age 30 and at age 48 from the current self-report item ("I have never been in trouble with the law") as well as the same item the participant responded to in previous waves. In both regressions, the self-report item at the same time point significantly predicted arrests at that time point, even after controlling for the self-report item at previous time points.

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[1] We included driving while intoxicated offenses because the self-report items

level of severity; e.g., 0 = I do not feel sad to 3 = I am so sad or unhappy that I can't stand it; α = 0.82); and the Center for Epidemiological Studies Depression Scale (CES-D: Radloff, 1977; 20 items, rated as how often the respondent experienced each symptom in the past week from 0 = rarely or not at all to 3 = most or all of the time; e.g., I felt that everything I did was an effort; α = 0.91). In the analyses reported below, the anxiety scores at ages 19 and 30 are from the MMPI. The depression score for age 19 is from the MMPI, and the depression score for age 30 is a mean of the standardized scores of the MMPI depression scale, the Beck, and the CES-D scales.

At age 48, participants completed the Brief Symptom Index (Derogatis, 1992), which includes 53 items describing various problems that have "distressed or bothered you during the past seven days, including today," along a 4-point scale ranging from 0 = not at all to 4 = extremely. For this report, we examined the depression scale (6 items; e.g., "feeling lonely," "feeling blue"; α = 0.89) and the anxiety scale (6 items; e.g., nervousness or shakiness inside," "feeling fearful"; α = 0.86) (Boulet & Boss, 1991, p. 434).

2.2.3. Serious anxiety and depression

We classified individuals as experiencing "serious" anxiety or "serious" depression if their scores on the relevant symptom scale placed them in the upper quartile of the population. While this is a somewhat arbitrary, delimiting line, other researchers have used the upper quartile for determining a high level of risk especially when examining relatively rarer events (e.g., Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Farrington & Loeber, 2000; Gutman, Sameroff, & Cole, 2003; Huesmann, Moise-Titus, Podolski, & Eron, 2003); in our case, its use means that we are most likely including all participants who are displaying "clinically" significant levels of depression or anxiety plus individuals at the borderline of clinical significance. These categorizations then allow us to examine in the results below whether offending is associated significantly with more serious mental health problems.

2.2.4. Covariates

We included several covariates. First, we computed a score for family of origin socioeconomic status, assessed at age 8 (Dubow et al., 2008). This is a composite of three measures: (a) *Father's occupational level*. We used an occupational coding scale (Warner, Meeker, & Eells, 1960) adapted by Eron et al. (1971). Occupations were coded on a 10-point scale (*0* = laborers to *9* = professionals); (b) *Parents' educational level* reflects the parents' levels of educational attainment, ranging from 1 = under 7 years to 7 = graduate/professional training; (c) *Value of family housing* ranges from 1 = inexpensive rental to 4 = expensive owned. The composite score was derived through latent variable measurement modeling. Individual scores were standardized, multiplied by factor weights observed in the measurement model, and summed to create the family background composite. At ages 30 and 48, we included the participant's level of educational attainment (0 = didn't finish high school, 1 = some high school, 2 = HS graduate, 3 = some college or tech school, 4 = bachelors or RN degree, 5 = some graduate school, 6 = masters degree, 7 = doctorate or law degree).

3. Results

3.1. Associations between offending and mental health

Table 1 displays the associations between offending during a particular age range and mental health concurrently and at an earlier age and at a later age.

3.1.1. Offending and serious anxiety

One can see from Table 1 that experiencing serious anxiety at age 48 is significantly associated with having offended in an earlier period–between ages 18 and 20, between ages 21 and 30, or between ages 31 and 48. Similarly, experiencing serious anxiety at age 30 is significantly

Table 1
The association between offender status and serious anxiety across waves.

	Percent of non-offenders and offenders with "Serious" levels of anxiety[a]		
	In Wave 2 (Age 19)	In Wave 3 (Age 30)	In Wave 4 (Age 48)
Wave 2 offender status[b] (Age 18–20)			
Non-offender	24%	25%	25%
Offender	29%	41%	39%
Chi-square	$\chi2(1) = 0.73$	$\chi2(1) = 0.5.72_*$	$\chi2(1) = 5.74_*$
Wave 3 offender status[b] (Age 21–30)			
Non-offender	24%	21%	22%
Offender	38%	39%	41%
Chi-square	$\chi2(1) = 4.07_*$	$\chi2(1) = 9.42_{**}$	$\chi2(1) = 9.87_{**}$
Wave 4 offender status[b] (Age 31–48)			
Non-offender	26%	22%	23%
Offender	33%	33%	42%
Chi-square	$\chi2(1) = 1.32$	$\chi2(1) = 3.42+$	$\chi2(1) = 15.09_{**}$

Notes. Significant chi-square results are bolded.
[a] Those categorized as having "Serious Anxiety" in a particular wave scored in the upper quartile on anxiety symptoms.
[b] A participant is classified as an offender for a wave if he or she has an official arrest record in the period between the prior wave and the current wave or, when interviewed in the current wave, indicated that he or she had been in trouble with the law in response to an MMPI item
[+] p < 0.10.
[*] p < 0.05.
[**] p < 0.01.

associated with prior offending in an earlier period – between ages 18 and 20 or between ages 21 and 30. However, it can also be seen from Table 1 that experiencing serious anxiety at age 19 is significantly associated with immediately subsequent offending between age 21 and 30, and experiencing serious anxiety at age 30 is marginally significantly associated with immediately subsequent offending between age 31 and 48.

3.1.2. Offending and depression

Table 2 reveals somewhat shorter-term relations between offending and subsequent serious depression than found between offending and subsequent serious anxiety. While experiencing depression at age 48 is significantly associated with prior offending between ages 21 to 30 and with prior offending between ages 31 to 48, it is not associated with prior offending between ages 18 and 20. Serious depression at ages 30 and 19 are not significantly associated with any prior offending. As with the relation between serious anxiety and offending, it can also be seen from Table 2 that experiencing serious depression at age 30 is significantly associated with immediately subsequent offending between age 31 and 48.

3.2. Longitudinal path models

To better understand the reciprocal longitudinal relations between offending and mental health (serious anxiety and depression), we next constructed longitudinal structural equation models with paths from offending to mental health in the next age period as well as paths from mental health to offending in the next age period. First, we tested the model shown in Fig. 1 with gender as a grouping variable (F = 185, M = 181). Because we have categorical endogenous variables, we estimated the parameters of this model (and all subsequent models) using Mplus' weighted least squares estimation with missing values handled as pairwise present. The model that was constrained to have the same parameters for males and females did not fit significantly worse than the model that was not constrained (Mplus difference test: χ2 = 21.5, df = 18, N = 366). In other words, the model in Fig. 1 was invariant for gender. When we estimated the parameters of the model as a one-group

Table 2
The association between offender status and serious depression across waves.

	Percent of non-offenders and offenders with "Serious" levels of depression[a]		
	In Wave 2 (Age 19)	In Wave 3 (Age 30)	In Wave 4 (Age 48)
Wave 2 Offender status[b] (Age 18–20)			
Non-offender	23%	21%	25%
Offender	25%	32%	26%
Chi-square	$\chi2(1) = 0.16$	$\chi2(1) = 3.21$ +	$\chi2(1) = 0.07$
Wave 3 Offender status[b] (Age 21–30)			
Non-offender	24%	24%	21%
Offender	27%	32%	33%
Chi-square	$\chi2(1) = 0.23$	$\chi2(1) = 1.80$	$\chi2(1) = 4.28$ *
Wave 4 Offender status[b] (Age 31–48)			
Non-offender	22%	21%	20%
Offender	30%	36%	39%
Chi-square	$\chi2(1) = 1.85$	$\chi2(1) = 6.50$ *	$\chi2(1) = 14.13$ **

Notes: Significant chi-square results are bolded.

[a] Those categorized as having "Serious Depression" in a particular wave scored in the upper quartile on depression symptoms.

[b] A participant is classified as an offender for a wave if he or she has an official arrest record in the period between the prior wave and the current wave or, when interviewed in the current wave, indicated that he or she had been in trouble with the law in response to an MMPI item.

+ p < 0.10.
* p < 0.05.
** p < 0.01.
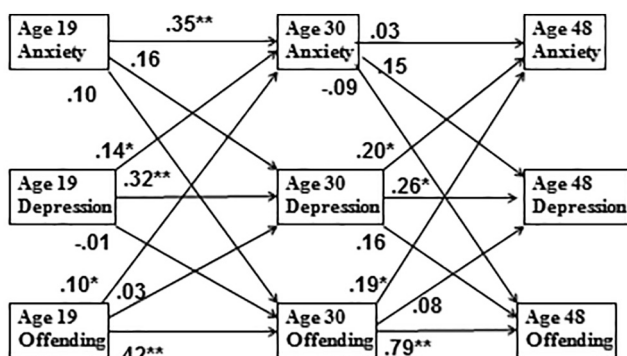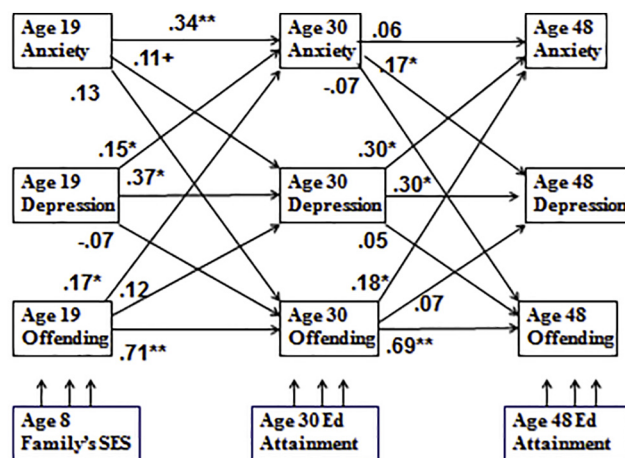

Invariant by Sex
$\chi2 (9) = 14.3, p = .11$; RMSEA = .04; CFI = .985

Fig. 1. Reciprocal longitudinal relations of offending with serious anxiety and depression from age 19 to age 30 to age 48 (N = 366).

model, we found that it fit the data well ($\chi2 = 14.3$, df = 9, p = 0.11; N = 366; RMSEA = 0.04; CFI = 0.985).

The standardized path coefficients for the model in Fig. 1 indicate that offending leads to significant subsequent serious anxiety for the offender that is detectable both 10 and 20 years later. However, there is no significant detectable effect of offending on later depression. There is also no evidence in this model that either anxiety or depression significantly predicts offending later in life.

Finally, we re-estimated the parameters of this model after adding early family socioeconomic status and the participant's age 30 and 48 educational achievement as covariates. The resulting model, shown in Fig. 2, also fit the data well ($\chi2 = 34.6$, df = 27, p = 0.149; N = 274; RMSEA = 0.032; CFI = 0.983). As the parameters in the figure show, the significant longitudinal effects of offending on later serious anxiety remain even after socioeconomic status of the family and educational attainment of the participant are controlled. Also, as with the previous model, there is no evidence that either anxiety or depression have an

$\chi2 (27) = 34.6, p = .15$; RMSEA = .032; CFI = .983

Fig. 2. Reciprocal longitudinal relations of offending with serious anxiety and depression from age 19 to age 30 to age 48 controlling for early family socio-economic status and adult educational attainment (N = 366).

effect on subsequent offending.

It should be noted that both of these path models show the strong continuity of offending and depression over the period from age 18 to age 48. The continuity of offending mirrors the continuity we have found in aggressive behaviour previously (Huesmann et al., 1984; Huesmann et al., 2009). Interestingly, characteristic levels of anxiety show continuity from age 18 to 30, but little continuity from age 30 to 48.

4. Discussion

Limitations of our methodology should be noted in the context of interpreting our results. As with most long-term, longitudinal studies, a key methodological limitation is the loss of participants over time. Attrition is typically related to higher risk participants not being available for follow up, and we found this to be the case with our study as well. Still, we found only a small effect of attrition on likelihood of official arrests. Related to missing data, we also note that we only had official arrest records from New York State, so if a participant was no longer a resident, the participant still needed to be interviewed and provide a self report of whether he or she had been in trouble with the law to be able to be categorized as an offender or non-offender. Future projects require resources to access official records across all states. A second methodological limitation is that, because of our choice of mental health symptom measures, we were not able to categorize participants as having diagnosable major depression or anxiety disorders, so we used an arbitrary determination (upper quartile of the symptom distributions) which we argue captured those with clinical and subclinical levels of anxiety and depression. We also note that the measures of anxiety and depression varied across time points, so it is possible that this attenuated relations found across waves. Future follow ups with the sample should include the same comprehensive measures of mental disorders that can yield clinical diagnostic assessments of current or lifetime disorders if the goal is to link offending with diagnosable mental disorders. Finally, although longitudinal interview studies can address issues of temporal ordering of variables across time, experimental studies—in this case, perhaps mental health intervention/treatment randomized controlled studies with offenders–are needed to address definitively the causal direction between mental health and offending.

Despite these methodological limitations, our project is unique in utilizing data from a 40-year prospective, developmental study to examine the causal ordering over time of criminal offending in relation to

serious anxiety and depression. Generally and not surprisingly we observed significant relations between criminal offending and our two indicators of serious mental health difficulties. However, we found more compelling support for the effect over time of criminal offending on mental disorders, as compared to the effect over time of mental disorders on criminal offending. Our findings are thus consistent with the notion that involvement in criminal offending leads to adverse consequences for the offender, and also underscore the possibility that the impact of criminal offending can be felt well into middle adulthood. At the same time, we also observed some modest but inconsistent predictive effects, primarily from bivariate modeling, of mental disorders on subsequent criminal offending. It may well be that mental health problems and criminal offending share cyclical, "downward spiral" effects over time, and future research using finer-grained assessment tools and narrower sampling intervals might serve to disentangle these relations.

Probably the most important conclusion to be drawn from our analysis is that offending is linked to a subsequent increased likelihood of mental disorder. This is consistent with research that has documented the various life consequences of criminal behavior and suggests that involvement in criminal behavior, even beyond the early adulthood years (or peak years for offending; Loeber & Farrington, 2014), can serve as a trajectory-altering experience or "turning point" in development (Rönkä, Oravala, & Pulkkinen, 2003). That is, offending increased the likelihood of mental disorder even when controlling for continuity in mental disorder. Certainly being caught, arrested, and prosecuted for a crime can be a stressful experience, and incarceration potentially traumatic (Boxer, Middlemass, & DeLorenzo, 2009). Further, the "collateral consequences" of incarceration and particularly as the result of serious crimes (felonies) can pose significant challenges across a number of life domains including housing, employment, and social relationships (Middlemass, 2017). Still, our data do not permit examination of what precisely might have occurred as the result of the criminal offending that exacerbated mental health difficulties. Future studies should consider the immediate experience and aftermath of criminal offending when exploring how offending can increase mental disorder.

Interestingly, although anxiety and depression are conceptually related and often co-morbid, we observed more consistent effects of offending on anxiety as compared to depression. This might be because of known relations among criminal offending, criminal victimization, and anxiety. Antisocial, aggressive individuals likely to engage in criminal offending tend to exhibit social-cognitive styles dominated by hostile attribution biases and views of the world as an unsafe, violent place (Huesmann, 1998), and these relations can be amplified by the common covariation of offending with victimization (Berg, Stewart, Schreck, & Simons, 2012. The hypervigilance engendered by this can lead to anxiety and related emotional reactions including traumatic stress symptoms.

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