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Do behavioral disorders render gang status spurious? New insights

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ABSTRACT

In community and correctional settings, gang status is a robust predictor of offending, unfortunately relatively few studies have considered behavioral disorders of offenders and whether these disorders mediate the gang-offending relationship. Drawing on a near population of correctional clients on federal supervised release, negative binomial regression and ROC-AUC models found that gang variables were rendered insignificant or were generally weak classifiers of severe offending once behavioral disorders were specified. The only exception was security threat group status that was robustly associated with prison misconduct. Gang researchers should consider behavioral disorders and other psychopathology of gang members to inform theory and research.

1. Introduction

Gang membership, involvement, or activity is a fundamental risk factor for engagement in externalizing behaviors. The significant and often robust linkages between gang status and diverse forms of antisocial behavior (e.g., delinquency, crime, violence, victimization, substance use, and related social problems) are evident from a broad spectrum of data sources including the Denver Youth Survey (Esbensen & Huizinga, 1993), Gang Resistance Education and Training (GREAT) program (Peterson, Taylor, & Esbensen, 2004), Incarcerated Serious and Violent Young Offender Study (McCuish, Bouchard, & Corrado, 2015), Montreal Longitudinal Experimental Study (Gatti, Tremblay, Vitaro, & McDuff, 2005; Lacourse, Nagin, Tremblay, Vitaro, & Claes, 2003), National Longitudinal Study of Adolescent to Adult Health (Barnes, Beaver, & Miller, 2010; Watkins & Melde, 2018; Watkins & Taylor, 2016), National Longitudinal Survey of Youth 1997 (Pyrooz & Densley, 2016), Pittsburgh Youth Study (Gordon et al., 2004; Lahey, Gordon, Loeber, Stouthamer-Loeber, & Farrington, 1999; Loeber et al., 2005), Rochester Youth Development Study (Thornberry, Krohn, Lizotte, & Chard-Wierschem, 1993), and Seattle Social Development Project (Battin, Hill, Abbott, Catalano, & Hawkins, 1998; Gilman, Hill, & Hawkins, 2014) among others. Although gang status and membership have been operationalized in a variety of ways, gang variables have nevertheless been consistently linked with conduct problems. To illustrate, in a recent meta-analysis of 179 studies and 107 independent data sets producing 1649 effect sizes, Pyrooz, Turanovic, Decker, and Wu (2016) found a significant association between gang membership and criminal offending (Mz = 0.23) and this association was especially strong in studies of current gang-involved offenders.

It is important to note that the gang-offending association is not limited to street gang members in the community, but is also apparent in studies of gangs and security threat groups within correctional facilities. Penological research has shown that gang-involved offenders are significantly more likely to perpetrate murder (Drury & DeLisi, 2011; Reidy & Sorensen, 2017), assaults-on-staff and correctional officers (Sorensen, Cunningham, Vigen, & Woods, 2011), assaults-on-inmates (Tasca, Griffin, & Rodriguez, 2010; Worrall & Morris, 2012), drug trafficking (Skarbek, 2011), and engage in other serious forms of misconduct (Byrne & Hummer, 2007; DeLisi, 2003; DeLisi, Spruill, Peters, Caudill, & Trulson, 2013; Kuanliang, Sorensen, & Cunningham, 2008; Schenk & Fremouw, 2012; Skarbek, 2014; Trulson, 2007; Trulson, DeLisi, Caudill, Belshaw, & Marquart, 2010) during their time in custody. Large epidemiological studies of prisoners in the federal Bureau of Prisons have similarly demonstrated associations between prison gang/security threat group status and numerous types of noncompliance including violent misconduct, weapons misconduct, drug sales/use, and violations of institutional rules and regulations (Camp, Gaes, Langan, & Saylor, 2003; Gaes, Wallace, Gilman, Klein-Saffran, & Suppa, 2002).

Although sundry social risk factors have been identified for gang behavior including parent dysfunction, adverse childhood experiences, school problems, and deviant peers (Barnes et al., 2010; Caudill, 2010; Cohen, 1955; Farrington, Loeber, Stallings, & Homish, 2012; Gatti et al., 2005; Gilman et al., 2014; Merrin, Hong, & Espelage, 2015), it is surprising that gang researchers have mostly overlooked the potentially critical role of behavioral disorders, specifically ones that relate to conduct problems in understanding the linkages between gang

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measures and antisocial outcomes.[1] In their developmental model of gang involvement, for instance, Howell and Egley Jr (2005) suggested that aggressive and disruptive behaviors such as those consistent with behavioral disorders were an important developmental piece in the etiology of gang delinquency. Specifically, they theorized that behavioral disorders upon school entry contributed to conduct problems, school problems, peer rejection, antisocial peer selection, and delinquency on the way toward gang membership. Unfortunately, they did not present empirical data to illustrate how and to what degree behavioral disorders are implicated in gang activity. This research is examined next.

2. Behavioral disorders, gangs, and antisocial behavior

Although a paucity of studies have examined behavioral disorders among gang members vis-à-vis antisocial behavior, the balance of this research has shown that gang members are significantly more likely than non-gang individuals to display psychiatrically-defined conduct problems.[2] As Dupéré and colleagues elegantly stated (2007, p. 1036), "When facing the opportunity to join a gang, preexisting configurations of individual traits may greatly increase the likelihood that any given adolescent actually join the gang." In a seminal work, Lahey et al. (1999) examined predictors of gang entry among African American boys from the Pittsburgh Youth Survey. They found that Conduct Disorder behavior rating at baseline and in the year prior to gang entry were predictive of gang joining. Boys with Conduct Disorder behavior rating were nearly 30% more likely to join a delinquent gang suggesting that early evidence of behavioral disorders was an early stepping stone on the way to gang activity.

Similarly, based on data from 7615 youth from Harris County, Texas, Harris et al. (2013) reported significantly higher psychopathology among gang members compared to delinquents that were not involved in gangs. Specifically, gang members were 305% more likely to have been diagnosed with Conduct Disorders, 24% more likely to have been diagnosed with Oppositional Defiant Disorder, 158% more likely to have a substance abuse disorder, and 77% more likely to have been diagnosed with post-traumatic stress disorder.[3] In a sample of 73 male offenders, 44 of whom were involved in street gangs, Mallion and Wood (2018) found that Antisocial Personality Disorder significantly differentiated gang from non-gang offenders. Moreover, gang members had greater anger rumination, higher aggression, and reduced trait emotional intelligence relative to non-gang offenders.

Among a survey of nearly 5000 young adult men in the United Kingdom, Coid et al. (2013) examined the intersections of gang membership, violence, and psychiatric morbidity. Relative to violent offenders that were not involved in gangs, gang members exhibited significantly lower depression, but greater alcohol dependence, drug dependence, Antisocial Personality Disorder, and suicide attempt. Gang members also had the highest violent attitudes, greater violent rumination, more victimization, and greater involvement in various forms of violence. Regarding Antisocial Personality Disorder, gang members were 549% more likely than violent men to be diagnosed with Antisocial Personality Disorder. The profuse relation of Antisocial Personality Disorder among gang members was even more striking when compared to nonviolent men in the sample. Most dramatically, gang members were 5639% more likely than nonviolent men to receive an Antisocial Personality Disorder diagnosis!

Similarly, drawing on data from 152 prisoners in the United Kingdom, Egan and Beadman (2011) found that inmates with Antisocial Personality Disorder had more extensive criminal histories evidenced by more convictions and gang involvement. Additionally, they found that inmates with Antisocial Personality Disorder had greater adherence to and embeddedness within gangs suggesting that the violent and deviance inherent to gang life gelled with their similarly antisocial and deviant personality features.

To summarize, compared to their non-gang peers, gang members are more likely to have greater symptoms and diagnostic history for Oppositional Defiant Disorder, Conduct Disorder, and Antisocial Personality Disorder—conditions that have strong linkages to antisocial conduct (American Psychiatric Association, 2013; DeLisi, 2005; Moffitt, Caspi, Rutter, & Silva, 2001; Robins, 1993).[4] Despite linkages between gang status and behavioral disorders that are helpful for understanding selection into gangs, prior work has to our knowledge not yet examined a more specific and important scientific question, namely do behavioral disorders mediate or render spurious the association between gang status and antisocial conduct? Had more studies of gang activity and offending included controls for behavioral disorders in their models, would the same empirical picture remain? Prior researchers have raised the same question. For example, in their study of selection and socialization processes in the Pittsburgh Youth Survey, Gordon and colleagues concluded, (2004, p. 79), "The fixed-effects models we employ do not adjust for time varying covariates associated with both delinquency and gang membership. Thus, we cannot rule out the fact that a third variable predicts both gang participation and increased delinquency in a particularly time period, rather than there being a causal effect of gangs." We hypothesize that behavioral disorders constitute a third variable.

3. Current study

With this quotation in mind, the current study aim examined a simple research question: do behavioral disorders render the gang-crime relationship spurious? To answer this research question, the current authors 1) employed hierarchical multivariate models that first examined the association between gang status and offending and then

[1] There are notable exceptions. In the United Kingdom, Wood and her colleagues have published several studies that broadly examine the role of psychological factors (e.g., antisocial cognitions, antisocial traits, violence exposure and related psychiatric impairments) in the etiology of both street gang and prison gang formation (e.g., Alleyne & Wood, 2010, 2012; Mallion & Wood, 2018; Wood, Alleyene, Mozova, & James, 2014; Wood & Dennard, 2017). Their work is an important foundation to the current study albeit most of these studies did not specifically focus on behavioral disorders.

[2] Studies that did not examine behavioral disorders nevertheless found evidence that gang members evince far more antisocial symptoms than their non-gang peers (Alleyne & Wood, 2010; Craig, Vitaro, Gagnon, & Tremblay, 2002; Gilman et al., 2014). In the Seattle Social Development Project, gang members had more antisocial beliefs, greater hyperactivity, greater oppositional tendencies, and more externalizing behaviors (Gilman et al., 2014). These symptoms had longitudinal effects as well and were predictive of crime, socioeconomic disadvantage, substance disorders, and poor mental health by age 33. Similarly, analysis of data from the National Longitudinal Survey of Children and Youth found that youth with psychopathic features characterized by high hyperactivity, low anxiety, and low prosociality were susceptible to joining gangs during adolescence (Dupéré, Lacourse, Willms, Vitaro, & Tremblay, 2007).

[3] In their study using longitudinal data of youth from Montreal, Craig et al. (2002) reported robust evidence of rank-order stability from ages 10 to 14 involving stable gang members, unstable gang members, and non-gang members. A gradient of severity with stable gang members the most severe was seen for fighting, hyperactivity, inattention, oppositionality, and aggression and with stable gang members exhibiting the lowest scores for anxiety and prosociality.

[4] The social and behavioral science literature on the associations between Oppositional Defiant Disorder, Conduct Disorder, and Antisocial Personality Disorders and delinquent/criminal outcomes is far too voluminous to review here, but readers can consult several meta-analyses, systematic reviews, or monographs on the topic (e.g., Beauchaine & Hinshaw, 2016; Burke, Loeber, & Birmaher, 2004; Frick et al., 1993; Lahey, Moffitt, & Caspi, 2003; Loeber, Burke, Lahey, Winters, & Zera, 2000; Loeber & Hay, 1997; Ruiz, Pincus, & Schinka, 2008).

stepped in demographic controls and finally age-appropriate behavioral disorders, 2) examined offending outcomes using gang measures that were developmentally appropriate (e.g., street gang activity with juvenile police contacts, security threat group status with institutional misconduct, and a gang index with career arrest charges), and 3) evaluated the classification accuracy of a gang index and behavioral disorders relative to extreme criminal offending.

4. Method

4.1. Participants and procedures

Retrospective, archival data from the total population of 865 active correctional clients in a federal jurisdiction in the Midwestern United States were used. Two clients had incomplete data thus the analytical sample is 863. All clients were on supervised release after serving a confinement sentence under the supervision of the Bureau of Prisons. The sample was 84% male, 16% female, 79.4% white, 20.6% African American, 92% non-Hispanic, 8% Hispanic, and the mean age was 44 years. The clients were supervised for a range of offenses and the most prevalent instant conviction offenses were distribution of methamphetamine (35%), felon in possession of firearm (13%), bank fraud, money laundering, and/or identity theft (13%), distribution of cocaine base (12%), possession or manufacturing of child pornography (6.5%), distribution of marijuana (6%), use of firearm during a drug trafficking offense (4.5%), and distribution of cocaine (3.6%). The clients were diverse in terms of their criminal history, offending background, and criminal justice system involvement. The federal criminal history rank employs a 6-point system where I = lowest risk and VI = highest risk in terms of criminal history. In these data, 35.4% were Criminal History Rank I, 13.5% were Criminal History Rank II, 18.7% were Criminal History Rank III, 12.5% were Criminal History Rank IV, 6.7% were Criminal History Rank V, and 13.2% were Criminal History Rank VI.

Two forms of data collection were used. First, all data in the client's Probation/Pretrial Services Automated Case Tracking System (PACTS) file were electronically extracted and converted to an Excel spreadsheet. PACTS is the case management platform used in all 94 federal districts to track federal defendants. This electronic extraction contained information on numerous variables including demographics, case information, conditions, criminal history indices, and other documents relevant to the client's social and criminal history. Second, the senior author manually collected additional data from presentence reports (PSR), offender documents from the Bureau of Prisons, local, state, and national criminal histories, psychological and psychiatric reports, treatment reports, and other relevant documents located in PACTS.

During the PSR interview process, defendants self-reported their address and residency history and requests for criminal history were sent to all of those areas. In addition, defendants were questioned about juvenile placements and if the defendant lived in any other location than with their parents, such as foster care, group homes, juvenile homes, state facilities, and others. Based on this information, verification was sent by United States Probation to those facilities. Additional self-reported information on antisocial behavior was gleaned from official mental health and educational records. All variables were coded and entered into the Excel spreadsheet by the senior author and upon completion, the data were transferred into Stata/IC 14.2 for data analyses. Research approval for the study was provided by the Chief District Judge in this federal jurisdiction.

4.2. Measures

Gang measures. Three gang measures were used. An ordinal measure of gang activity during childhood and adolescence based on information in the client's PACTS file. This was scored as 0 = no evidence (91.9% of sample), 1 = some evidence (1.4% of sample), and 2 = definite evidence (6.7% of sample). An ordinal measure of security threat group status during the client's Bureau of Prisons confinement was scored as 0 = no evidence (93.5% of sample), 1 = some evidence (0.4% of sample), and 2 = definite evidence (6.1% of sample). A 5-point gang index was an additive measure of the client's juvenile/street gang and security threat group experiences where higher value indicated greater continuity in gang involvement. This was scored as 0 (91.1% of sample), 1 (0.6% of sample), 2 (2.9% of sample), 3 (0.7% of sample), or 4 (4.8% of sample). Forty-one correctional clients had definite evidence of gang involvement across the life-course.[5]

Covariates. Four demographic factors were used including sex (0 = female, 15.7%, 1 = male, 84.3%), race (0 = white, 79.4%, 1 = African American = 1, 20.6%), Hispanic (0 = no, 92%, 1 = yes, 8%), and age (M = 43.7, SD = 11.45, range = 21–81). Three behavioral disorders were used based on secondary data in the client's PACTS. Clients that had a documented lifetime DSM-IV diagnosis in their file were rated as definite evidence (= 2). Clients that had documented symptoms of a condition but not enough to warrant a full diagnosis were rated as some evidence (= 1). Clients that had no evidence of a condition in their file were rated as no evidence (= 0). The current authors did not render any diagnoses. The behavioral disorders were Oppositional Defiant Disorder (87.4% no evidence, 0.6% some evidence, 12.1% definite evidence), Conduct Disorder (78.6% no evidence, 1.5% some evidence, 19.9% definite evidence), and Antisocial Personality Disorder (70% no evidence, 5.6% some evidence, 24.4% definite evidence).

Dependent variables. Five dependent variables were used. Juvenile police contacts (M = 2.09, SD = 4.93, range = 0–59) is a count-measure of the total police contacts or arrests the client accumulated. BOP misconduct (M = 1.06, SD = 3.53, range = 0–31) is a count-measure of the total official acts of misconduct during federal confinement. Career arrest charges (M = 14.31, SD = 14.74, range = 1–97) is a count-measure of the total arrest charges accumulated during the client's criminal career. Two dichotomous measures were used to indicate offenders that were in the 90th percentile for total arrest charges (no = 0, yes = 1) and career assault-related arrest charges (no = 0, yes = 1) to capture chronicity and violence within the criminal career.

4.3. Analytical strategy

Two forms of data analysis were used. For the count-data dependent variables, preliminary Poisson regression models were executed and there was significant evidence of overdispersion (the conditional variance exceeds the conditional mean) due to the outlier effects of the most chronic offenders. As such, the negative binomial regression model was used and the LR test of α (reported in the tables) confirmed it was the appropriate way to estimate the data (Coxe, West, & Aiken, 2009; Gardner, Mulvey, & Shaw, 1995). Bootstrapped standard errors with 50 replications were used to provide greater confidence in the estimates. In order to assess whether gang status was rendered spurious, hierarchical models were used with just the gang measure in model 1, the addition of demographic controls in model 2, and the specification

[5] The diverse ways to measure gang status is itself a large research area, and there are strengths and weaknesses associated with self-report and official measures of gang status (see Melde, 2016 for a recent overview). A potential problem in studies of the gang-offending relationship relates to mono-operational bias where participants self-report both their antisocial conduct and their gang involvement. In contrast, the current gang information in the client's PACTS includes self-reports, family reports of gang activity, evidence of gang activity from arrest narratives, security threat group data from the Bureau of Prisons, and others. The Federal Rule of Criminal Procedure 32(b)(4)(a) states that evidence of gang activity, involvement, and offending is required for inclusion in presentence and dispositional reports, in part because the Bureau of Prisons uses the information when classifying and placing inmates.

of the relevant behavioral disorder(s) in model 3 for the negative binomial regression models. Behavioral disorders were only specified in models where they were developmentally appropriate, thus ODD and CD were included for juvenile police contacts and ASPD was included for adult criminal outcomes.[6]

For the binary dependent variables, receiver operating characteristic (ROC) area under the curve (AUC) models were used which examine the classification accuracy of a variable on a binary outcome in terms of sensitivity (the proportion of positive cases that are correctly classified) and specificity (the proportion of negative cases that are correctly classified). In other words, sensitivity is the true-positive rate and specificity is the true-negative rate (Pepe, 2003). The greater the AUC, the better classification accuracy of the variable.

5. Findings

5.1. Hierarchical negative binomial regression model for juvenile police contacts

Table 1 contains output for the hierarchical negative binomial regression models for juvenile police contacts. In model 1, gang activity had a strong positive association with police contacts (IRR = 2.14, z = 8.21, p < 0.001). In model 2, race, Hispanic, sex, and age were introduced as covariates and all were significant. Blacks, males, and younger clients totaled more juvenile police contacts. The effect for gang activity remained significant (IRR = 1.78, z = 4.69, p < 0.001). In model 3, Oppositional Defiant Disorder and Conduct Disorder were introduced and both were significantly associated with police contacts (IRR = 1.20, z = 2.34, p < 0.05 for Oppositional Defiant Disorder and IRR = 2.95, z = 13.62, p < .001 for Conduct Disorder). Race and age effects remained significant; however the effects for sex, Hispanic, and gang activity were no longer significant.

5.2. Hierarchical negative binomial regression model for BOP misconduct

Table 2 contains output for the hierarchical negative binomial regression models for BOP misconduct. In model 1, security threat group had a strong positive association with misconduct (IRR = 2.12, z = 5.87, p < 0.001). In model 2, race, sex, Hispanic, and age were introduced as covariates with only sex having a significant effect. Moreover, the effect for security threat group declined somewhat but remained significant (IRR = 1.99, z = 4.59, p < .001). In model 3, Antisocial Personality Disorder was introduced and it had a strong positive association (IRR = 2.06, z = 4.70, p < .001) and the demographic controls were not significantly associated with misconduct. However, even with the inclusion of the behavioral disorder, security threat group remained positively associated with misconduct (IRR = 1.66, z = 3.43, p < .001).

5.3. Hierarchical negative binomial regression model for career arrest charges

Table 3 contains output for the hierarchical negative binomial regression models for career arrest charges. In model 1, the gang index had a strong positive association with career arrest charges (IRR = 1.21, z = 8.03, p < .001). In model 2, race, sex, Hispanic, and age were introduced as covariates and both race (African Americans) and sex (males) exhibited more arrest charges, and Hispanics had fewer arrest charges. The gang index also remained significantly associated with career arrest charges (IRR = 1.15, z = 6.08, p < .001). In model 3, Antisocial Personality Disorder was specified and it had a robust positive association with career arrest charges (IRR = 1.83, z = 26.11, p < .001). The race effect remained significant with African Americans accruing more arrest charges, however, the gang index fell from significance (IRR = 1.01, z = 0.95, ns).

5.4. ROC-AUC model for career arrest charges at the 90th percentile

Fig. 1 displays area under the curve estimates for career arrest charges at the 90th percentile. The gang index had poor classification accuracy (ROC-AUC = 0.58, SE = 0.02) relative to Oppositional Defiant Disorder (ROC-AUC = 0.69, SE = 0.03), Conduct Disorder (ROC-AUC = 0.78, SE = 0.03), and Antisocial Personality Disorder (ROC-AUC = 0.84, SE = 0.02). The overall model fit was significant $\chi^2 = 110.08$, p < 0.001.

5.5. ROC-AUC model for career assault-related arrest charges at the 90th percentile

Fig. 2 displays area under the curve estimates for career assault-related arrest charges at the 90th percentile. The gang index had poor classification accuracy (ROC-AUC = 0.62, SE = 0.04) relative to Oppositional Defiant Disorder (ROC-AUC = 0.70, SE = 0.03), Conduct Disorder (ROC-AUC = 0.78, SE = 0.02), and Antisocial Personality Disorder (ROC-AUC = 0.84, SE = 0.02). the overall model fit was significant $\chi^2 = 72.6$, p < 0.001.

6. Discussion

Using data from a near-population of offenders on federal supervised release, the current study inquired whether behavioral disorders rendered gang status spurious in terms of their relation to offending. Across three specification of gang status occurring in the community, in federal confinement, and cumulatively over the life-course, the short answer is yes: the addition of behavioral disorders mostly reduces the association between gang status and antisocial conduct to non-significance. Moreover, gang measures were the weakest predictors of chronic antisocial conduct and chronic assaultive offending with classification accuracy that was weak and not much better than chance. The following discussion points integrate the findings within the criminological literature and hopefully serve as directions for future research.

First, whereas gang activity was not significantly associated with juvenile police contacts or career arrest charges, it was significantly associated with misconduct during BOP confinement even when controlling for Antisocial Personality Disorder. Unlike street gangs which serve a variety of purposes for youth of which involvement in antisocial activity is only one (Cohen, 1955; Decker & Kempf-Leonard, 1991; Goldstein, 1991, 1994), documented security threat group involvement is a status where the *raison d'être* is antisocial behavior. Indeed, security threat group members were significantly involved in diverse forms of misconduct including drug violations, weapons violations, and violent assaults. Although not a focus of the current study, several of the security threat group members in these data were members of the Aryan Brotherhood, Gangster Disciples, or Rollin' 90s Crips, and served large segments of their confinement sentence in the federal system's most secure facilities, such as the United States Penitentiary at Terre Haute where the federal death row is located. Our finding that security threat group was the only gang status that was significantly related to offending is supportive of Decker and Pyrooz's (2015) recent assessment that the "real" gangbanging—that is, the form of gang activity most intimately connected to offending—is that which occurs inside prison.

Second, greater inclusion of behavioral disorders can illuminate why some gang members become deeply immersed or embedded within gang life notwithstanding all of its negative consequences, for instance, prior research has shown that Antisocial Personality Disorder (Egan &

[6] Regression diagnostics were conducted to check for multicollinearity given the large z-scores for Antisocial Personality Disorder in some of the models. The mean variance inflation factor ranged between 1.11 and 1.14, well below thresholds of ~10 that indicate multicollinearity (O'Brien, 2007).

Table 1
Hierarchical negative binomial regression models for Juvenile Police contacts.

Variable	IRR (BSE)	z	IRR (BSE)	z	IRR (BSE)	z
Gang Activity	2.14 (.20)**	8.21***	1.78 (.22)	4.69***	1.12 (.11)	1.13
Race			2.93 (.57)	5.53***	1.84 (.27)	4.18***
Sex			2.03 (.59)	2.43*	.93 (.22)	-0.32
Age			.96 (.01)	-5.01***	.96 (.01)	-5.24***
Hispanic			1.19 (.40)	0.53	1.43 (.39)	1.31
ODD					1.20 (.10)	2.34*
CD					2.95 (.23)	13.62***
Wald $\chi 2$	67.33***				629.12***	
LR test of α	2887.99***				774.64***	

*** p < 0.001.
** p < 0.01.
* p < 0.05.

Table 2
Hierarchical negative binomial regression models for Bureau of Prisons misconduct.

Variable	IRR (BSE)	z	IRR (BSE)	z	IRR (BSE)	z
Security Threat Group	2.12 (.27)**	5.87***	1.99 (.30)	4.59***	1.66 (.25)*	
Race	3.43***		1.23 (.32)	0.80	1.06 (.26)	0.23
Sex			2.62 (.74)	3.43***	1.67 (.57)	1.50
Age			.99 (.01)	-0.37	.98 (.01)	-1.24
Hispanic			1.09 (.49)	0.20	1.59 (.68)	1.08
ASPD					2.06 (.32)	4.70***
Wald $\chi 2$	34.48***		64.62***		67.15***	
LR test of α	2307.79***		2224.53***		1953.26***	

*** p < 0.001.
** p < 0.01.
* p < 0.05.

Table 3
Hierarchical negative binomial regression models for career arrest charges.

Variable	IRR (BSE)	z	IRR (BSE)	z	IRR (BSE)	z
Gang index	1.21 (.03)**	7.90***	1.15 (.03)*	6.08***	1.01 (.02)	0.95
Race	3.43***		1.52 (.12)	5.27***	1.23 (.08)	3.16**
Sex			1.56 (.15)	4.53***	1.07 (.09)	0.89
Age			1.00 (.01)	0.01	1.00 (.01)	0.53
Hispanic			68 (.09)	-2.77**	.84 (.10)	-1.44
ASPD					1.83 (.04)	26.11***
Wald $\chi 2$	62.42***		162.05***		1182.86***	
LR test of α	7417.55***		6577.82***		3408.72***	

*** p < 0.001.
** p < 0.01.
* p < 0.05.

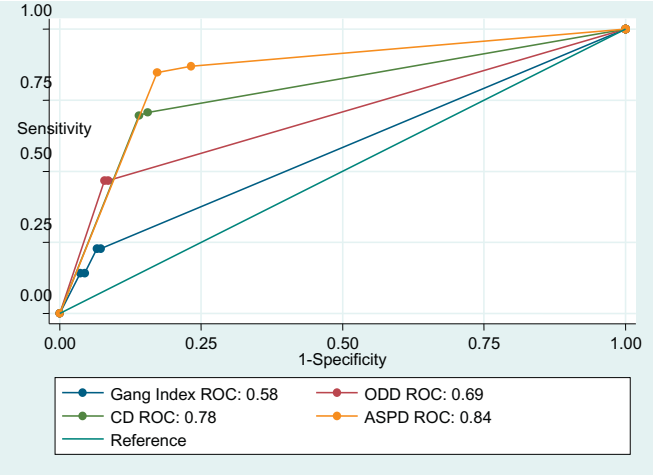

Fig. 1. ROC-AUC Model for Career Arrest Charges at 90th Percentile.

Beadman, 2011) and other person-specific psychopathology, such as low self-control (Pyrooz, Sweeten, & Piquero, 2013) are associated with greater gang embeddedness. To an individual whose personality functioning is entrenched with oppositional and antisocial features, gang involvement is not only attractive, but also an endeavor that one will want to perpetuate. Behavioral disorders could also be helpful for understanding gang leadership. In their classic study, Short Jr. and Strodtbeck (1963), p. 578) found that "Among conflict gangs the leaders are known to have the capacity to function aggressively against other members when necessary to maintain their dominance." It is likely that more recalcitrantly antisocial youth will gravitate toward these type of leadership roles. In contrast, gang members that have fewer CD or ASPD symptoms are likely more prone to walk away from gang activity and involvement. Indeed, the historically weak organizational structure of street gangs could reflect the general attrition of less antisocial members.[7]

[7] For example, Decker and Curry (2002, p. 346) concluded, "Taken together, these studies suggested that gangs were not well organized and had weak

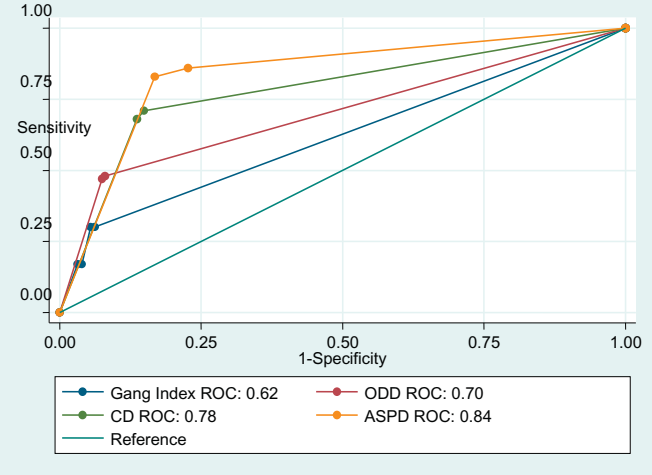

Fig. 2. ROC-AUC Model for Career Assault-Oriented Arrest Charges at 90th Percentile.

Third, within criminology, the study of gangs has overwhelmingly assumed and originated from a sociological perspective (e.g., Cohen, 1955; Decker, 1996; Miller, 1958; Venkatesh, 1997), thus it is not surprising that prior studies often failed to include behavioral disorder measures in models that estimated the effects of gang status on various specifications of antisocial behavior. But the current models make clear that psychiatric constructs such as Oppositional Defiant Disorder, Conduct Disorder, and Antisocial Personality Disorder have considerable predictive validity relative to gang measures suggesting that gang studies that fail to control for these disorders likely have omitted variable bias and specification error. Harkening back to Gordon et al.'s (2004) quotation, behavioral disorders are strong candidates for the "other" variables that gang studies usually fail to specify.

Fourth, the current findings are relevant to etiological explanations for gang effects, namely the selection model (Thornberry et al., 1993). To youth that meet diagnostic criteria for Oppositional Defiant and Conduct Disorders, the notion of joining a gang and participating in diverse forms of antisocial conduct is rather attractive and a perfect illustration of niche picking or what biosocial scholars refer to as an active gene-environment correlation (Ten Eyck & Barnes, 2015; Vitaro et al., 2016). By including behavioral disorders, gang researchers can more clearly understand the selection processes that occur when an antisocial individual elects to become a gang member. Indeed, when considering the symptoms of Conduct Disorder (e.g., aggressive toward others and animals, use of weapon, physically cruelty to people and animals, forced sex, arson, mugging, and assorted status violations), gang delinquency seems like a logical next step.

Fifth, the overall effects for gang measures were primarily non-significant and weak. It is also revealing that the prevalence of gang involvement in these data was rather low approximately 92% to 94% of clients had no evidence of gang activity across measures. By comparison, the no evidence endorsement for Oppositional Defiant Disorder (87%), Conduct Disorder (79%), and Antisocial Personality Disorder (70%) were appreciably lower. These prevalence estimates suggest that among adult offenders in the federal system, gang status is less salient than behavioral disorders in terms of understanding their psychopathology. Gang status is also less valuable for understanding offending at the highest levels in terms of career arrest charges and career assault-related arrest charges compared to behavioral disorders. This is likely because gang status, especially during adolescence, is transitory and even ephemeral compared to behavioral disorders which instantiate the antisocial traits that drive antisocial conduct. The high AUC values for behavioral disorders in classifying offending at the 90th percentile or above are also consistent with conceptual models (e.g., DeLisi, 2005; Moffitt, 1993, 2018; Vaughn et al., 2011; Vaughn, Salas-Wright, DeLisi, & Maynard, 2014) that stress the importance of the most severe 5–10% of the offending population.

Although the current study offered many strengths including data from a near population of correctional clients, multiple measures of gang status and behavioral disorders to span different life stages, and rigorous multivariate models, there are also limitations to consider. The data are retrospective and cross-sectional, thus we were not able to specify additional ways that gang status and behavioral disorders interact. For instance, Wu and Pyrooz (2016) analyzed longitudinal data from a school sample and found joining a street gang resulted in increases in self-centeredness, risk-taking, aggression, temper/poor emotional regulation and decreases in empathy. In other words, psychopathology worsened and became more antisocial after gang entry suggesting that gang status can also moderate the symptoms of behavioral disorders. Similarly, the offenders in this population are middle-aged adults, which is significantly older than the adolescents that comprise samples in most gang research. Longitudinal data collection would have permitted us to model social dynamics, peer relationships, and school variables to test the notion that behavioral disorders mediate the gang-offending relationship. Given the wealth of data on juvenile populations, we encourage other criminologists to attempt to replicate the current study on younger samples of offenders.

7. Conclusion

Gang status is a pillar of the criminological canon and has been repeatedly linked to a slew of negative behaviors in the community and within correctional facilities. A recurrent theoretical question has centered on gang formation specifically the role of selection where more antisocial individuals gravitate to gangs given their association with deviance. But most studies have not even considered behavioral disorders, and among those that have, none have examined whether behavioral disorders mediate the effect of gang status on antisocial outcomes. In the case of institutional misconduct, gang status—specifically security threat group—maintained a significant association even while controlling for demographics and Antisocial Personality Disorder. In the remaining models, gang status fared poorly and was characterized by null findings and weak classification accuracy. Our results hopefully will motivate gang scholars to consider behavioral disorders when specifying models of antisocial conduct.

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control over their members, and that rivalries could lead to violence within and between gangs. In addition, these studies pointed to the transitory nature of gang membership, reinforcing the notion that gangs might not be organizations capable of controlling the behavior of their members."

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