The homicide circumplex: a new conceptual model and empirical examination

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Abstract

Purpose – *Homicide is the most severe form of crime and one that imposes the greatest societal costs. The purpose of this paper is to introduce the homicide circumplex, a set of traits, behaviors, psychological and psychiatric features that are associated with greater homicidal ideation, homicidal social cognitive biases, homicide offending and victimization, and psychopathology that is facilitative of homicide.*

Design/methodology/approach – *Using the data from a near population of federal supervised release offenders from the Midwestern USA, ANOVA, multinomial logistic, Poisson and negative binomial regression models were developed.*

Findings – *Greater homicidal ideation is associated with homicide offending, attempted homicide offending and attempted homicide victimization and predicted by gang activity, alias usage, antisocial personality disorder and intermittent explosive disorder. These behavioral disorders, more extensive criminal careers, African American status and gang activity also exhibited significant associations with dimensions of the homicide circumplex.*

Originality/value – *Developing behavioral profiles of offenders that exhibit homicidal ideation and behaviors are critical for identifying clients at greatest risk for lethal violence. The homicide circumplex is an innovation toward the goal that requires additional empirical validation.*

Keywords *Offending, Homicide, Criminal psychology, Homicide circumplex, Murder, Psychological profile*

Paper type *Research paper*

Introduction

Homicide is the apex of criminal offending, the only form of antisocial behavior that produces the death of the victim, and the form of crime that imposes the greatest societal costs (DeLisi *et al.*, 2010; Hartley *et al.*, 2005; Wickramasekera *et al.*, 2015). Although the homicide literature is protean, several broad statements can be made about individuals that attempt or complete homicidal acts. First, homicidal conduct is strongly correlated with a versatile, generalized involvement in antisocial acts, such that a murder can be seen as a byproduct of other risky, dangerous behaviors including street gang involvement, security threat group involvement, violent offending, drug selling and weapons offending (Adams and Pizarro, 2014; Cale *et al.*, 2010; Cunningham *et al.*, 2010; Decker and Pyrooz, 2010; DeLisi and Scherer, 2006; Farrington *et al.*, 2012; Pizarro *et al.*, 2011). To illustrate, Cook *et al.* (2005) performed a case-control study of a data set that contained all arrests and felony convictions in Illinois for 1990–2001. Overall, 884 persons were convicted of homicide and were compared to 7.9 m controls. Nearly 43 percent of the homicide offenders had at least one prior felony conviction whereas only 3.9 percent of controls had a felony conviction. In terms of arrest, nearly 72 percent of murderers had been arrested compared to 18.2 percent of controls. In terms of violent felony convictions, such as homicide, rape, armed robbery, aggravated assault and related crimes of violence, 9.3 percent of homicide offenders had prior convictions compared to 0.9 percent of controls. In short, homicide is often representative of a broader antisocial behavioral pattern.

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Second, homicide offenders often evince considerable psychopathology and personality disturbances relative to persons in the general population and even other serious offenders (Chan and Beauregard, 2016; Culhane *et al.*, 2016; Lysell *et al.*, 2014). In this way, persons who kill or are killed by others (e.g. by law enforcement, by other offenders or by potential victims that use defensive violence) experience states and traits that exponentially increase opportunities for involvement in lethal violence. Several forms of psychopathology including psychosis (Large *et al.*, 2009; Nielssen and Large, 2008), disordered mood (Minero *et al.*, 2017), depression (Flynn *et al.*, 2016) and specific diagnostic conditions including Bipolar disorders (Fazel *et al.*, 2010) and Schizophrenia (Fazel *et al.*, 2009) have been shown to significantly increase circumstances by which an individual is at risk for homicide perpetration, victimization or both.

Third and relatedly, homicide offenders also commonly exhibit a variety of social risk factors relating to various adverse childhood experiences, victimizations, poverty, mortality and gang activity (DeLisi *et al.*, 2016; Farrington *et al.*, 2012, 2018; Loeber *et al.*, 2005; Pyrooz, 2012; Trulson *et al.*, 2012, 2016; Vaughn *et al.*, 2009) that increases their liability to homicide exposure. For example, in the Northwestern Juvenile Project, antisocial youth had significantly elevated mortality relative to persons in the general population. Among delinquent males, homicide was the cause of death in 91 percent of cases with the remaining sources of mortality relating to suicide, drug overdose, motor vehicle accident and other medical conditions (Teplin *et al.*, 2014). Based on data from 5,908 homicide offenders selected from the Florida Department of Juvenile Justice, Baglivio and Wolff (2017a) found that nearly two-thirds of homicidal youth had antisocial peer associations, 37 percent had history of witnessing serious violence, nearly 35 percent had a household member with incarceration history and nearly 12 percent had family violence history. In multivariate models, household mental illness increased the likelihood of homicide offending more than tenfold, greater dispositional anger more than doubled the risk of homicide offending, and history of self-mutilation increased the likelihood of homicide by a factor of 18.5! Thus, homicide can be understood as a downstream outcome of a behavioral history that is saturated with overlapping risk factors.

The current study introduces the homicide circumplex, which is defined as the set of behaviors, traits and psychological and psychiatric features that are associated with contemplation, attempts and completion of homicide, and homicide victimization. Across multiple dimensions, there is important variance relating to: the degree with which an individual contemplates homicide; the degree with which an individual's social cognitive style invokes homicide as a potential behavioral option; the degree that an individual is exposed to homicide offending and victimization usually due to their immersion in criminal activity; and the degree with which an individual's psychological and psychiatric traits and behaviors are associated with homicide. Evidence for these statements is provided below.

The homicide circumplex

Homicidal contemplation/ideation

There is sporadic but nevertheless meaningful evidence on the salience of homicidal ideation to the perpetration of serious criminal violence including murder. In Anderson's (2000) influential code of the street theory, criminal offenders live in a state of homicidal hypervigilance where lethal violence is a subcultural adaptation to environmental threats from other street code-adhering offenders. In urban centers characterized by concentrated disadvantage, there is a "kill-or-be-killed" ethos that results in exponentially higher homicide offending and victimization among African American males (Blumstein *et al.*, 2000; Braga, 2003; Fox and Zawitz, 1999; Hutson *et al.*, 1995) – the demographic group in the USA with the greatest risk for homicide involvement. Unfortunately, despite the visibility of Anderson's work, criminologists have not generally focused on homicidal ideation in studies of serious offenders. However, in their study based on the data from federal supervised release clients, DeLisi, Elbert, Caropreso, Tahja *et al.* (2017) and DeLisi, Tahja, Drury, Caropreso, Elbert and Heinrichs (2017) recently found that offenders with greater homicidal ideation had more extensive criminal careers including arrests for an assortment of violent crimes (e.g. murder, attempted murder, kidnaping, armed robbery and aggravated assault), were more likely to be chronic or career offenders, and had more severe and expansive psychiatric history. In this regard,

homicidal ideation was not exclusively associated with homicide, but instead appeared to be a broadband indicator of serious criminality.

In the forensic psychiatry, psychology and criminology literatures, a significant clinical feature in the background of numerous sexual homicide and/or serial homicide offenders (Burgess *et al.*, 1986; Johnson and Becker, 1997; Ressler and Burgess, 1985; Wright and Hensley, 2003) is animal abuse and cruelty to animals whereby the offender's killing of an animal is an early manifestation of the offender's desire to control and destroy life. In effect, the killing of animals is a rehearsal for the subsequent killing of human victims. Moreover, in the wake of highly publicized incidents of mass murder, it is commonly learned that the perpetrator had historically articulated an intense desire to murder specific victims, coherent categories of victims and/or indiscriminate victims, as seen in a variety of homicide offenders including Howard Unruh, Charles Whitman, Eric Harris and Dylan Klebold.

Homicidal ideation has complex etiological sources that span biological, psychological and sociological domains. Schizophrenia, which has a primarily heritable etiology, is a significant risk factor for homicide offending as supported by meta-analyses (Douglas *et al.*, 2009; Large *et al.*, 2009). In schizophrenia, homicidal ideation is seen in threat control override symptoms, which are positive symptoms (e.g. delusion and hallucinations) of the disorder in which the affected person perceives that others are a direct threat, experiences persecutory thought insertion or perceives that homicide is the only means to forestall a delusional outcome. The latter scenario characterizes the homicidal offending of Herbert Mullin, for example, who during a delusional state murdered 13 victims in 1972–1972 to (he believed) forestall a catastrophic earthquake.

Homicidal ideation also has social roots. A study of 574 adults (mostly male, primarily African American) in an outpatient substance abuse treatment facility found that a sense of thwarted belongingness, a sense of alienation and social isolation borne from social rejection, and alcohol abuse were associated with greater homicidal ideation (Waesche *et al.*, 2016). Homicidal ideation has also been shown to be a significant antecedent in cases of homicide-suicides involving child victims along with psychiatric disturbances, marital strife and other legal problems (Holland *et al.*, 2018). Due to neuropsychological factors, real and perceived social rejection, and various social stressors, persons with homicidal ideation experience a dysphoric mental life where homicide is frequently contemplated and even planned as a behavioral form of revenge, redemption and putative release from what the offender believes to be an unfair, persecution-based existence.

Homicidal social cognitive style

There is considerable evidence that a social cognitive style characterized by hostile attribution bias (e.g. perceiving neutral social information in a threatening, violent and malevolent manner) and dispositions toward anger, hostility and impulsive aggression is prevalent among violent offenders including homicide offenders (Anderson and Carnagey, 2004; Dodge *et al.*, 1990; Fontaine, 2008; Myers and Monaco, 2000; Novaco, 2011; Porter and Woodworth, 2007; Serin and Kuriychuk, 1994). Individuals with high dispositional anger and hostility and who interpret interpersonal exchanges with a threatening, negative, even paranoid valence are at elevated risk to engage in reactive violence. In the USA, reactive homicides are relatively common (Cooper and Smith, 2011; Smith and Cooper, 2013) as seen in incidents of intimate partner violence where a homicide immediately followed an argument, dispute or confrontation or stranger violence (e.g. bar fights) where violent assault potentially escalating to homicide is similarly the outcome of a dispute between usually intoxicated males.

Anderson's (2000) aforementioned code of the street is unique among criminological theories in that it invokes an antisocial social cognitive style as a fundamental causal force in the etiology of violent crime including homicide. According to Anderson's theory, among offenders that exhibit the street code, mundane social interactions, such as accidentally bumping into another person or making sustained eye contact with another person are interpreted as signs of disrespectful behavior that, consistent with the criminal subculture, necessitate a violent response to save face. That a passing glance is cause and justification for homicide is obviously absurd to those with pro-social social cognition, but to those who harbor hostile attribution bias or worse social cognitive styles, it is not. Indeed, qualitative criminologists (e.g. Hochstetler *et al.*, 2017)

have revealed that street offenders in high-violence, disadvantaged neighborhoods view their social environment as a "warzone" where preparedness for lethal violence is effectively a requisite condition for involvement in crime. Even in normative intimate relationships, the street code has been shown to be associated with greater relationship strife and discord and increased hostility (Barr *et al.*, 2013) conditions that lend themselves to interpersonal violence.

Homicidal social cognitive style is likely a distal factor in confinement facilities where inmates murder other inmates. Based on data from the Texas Department of Criminal Justice, Cunningham *et al.* (2010) found that various forms of interactional dysfunction were immediate contributors to prison murders. In more than 54 percent of murders, the murderer and murder victim had an altercation or argument. In nearly, 43 percent of cases, gang involvement precipitated the homicide and in more than 34 percent of cases, racial animosity was observed immediately prior to the killing. In our clinical experiences, former prison gang members reported that they were always prepared to kill rival gang members and had almost constant access to weapons in case an opportunity arose to attack a rival inmate or to use for self-defense. To corroborate this, former federal prisoners that were not involved in gangs complained that their prison unit was frequently locked down due to the frequency of violent attacks and retaliation between prison gangs. Thus, prison inmates particularly those who are involved in race-based security threat groups employ a social cognitive style that drives homicidal intent and action.

Homicide and criminal lifestyle

Diverse criminological studies have shown evidence that both homicide offending and victimization are often an outgrowth of a lifestyle that is reflective of a broader involvement in various antisocial acts (Behnken *et al.*, 2011; Drury and DeLisi, 2011; Loeber *et al.*, 2017; Trulson *et al.*, 2012). For instance, Scheyett *et al.* (2013) tracked mortality patterns of felons recently released from prison in the Eastern USA and found that 64 percent of the violent deaths of prison releasees were homicides. The homicides primarily occurred as the result of an altercation that was part of ongoing criminal activity. In total, 6 percent of the violent deaths were homicides as the result of legal intervention, or justified police killings. In total, 30 percent of the violent deaths were suicides. These were triggered by depression, relationship problems and other problems relating to continued involvement in the legal system.

Similarly, in a case-control study of 105 homicide victims and 105 non-victims, Dobrin and Brusk (2003) indicated that homicide victims are substantially more antisocial than non-victims. Ever having been arrested increased the likelihood of being murdered by a factor of 10. This produces an attributable risk of 90 percent which means that nine out of ten homicides among those who had been arrested was the result of the exposure of having been arrested. Any property arrest increased the likelihood of homicide victimization by a factor of 11.2. This equates to an attributable risk of 91 percent. Any drug arrest increased the likelihood of homicide victimization by 12.1, or an attributable risk of 92 percent. Any violent arrest increased the likelihood of homicide victimization nearly sixfold which produced an attributable risk of 83 percent. When age, race and sex are controlled, homicide victims are 5.3 times more likely to have ever been arrested than non-victims. Moreover, they are 5.9 times more likely to have a property arrest, 2.5 times more likely to have a violent arrest and four times more likely to have a drug arrest.

Moreover, numerous studies have shown that homicide offenders tend to have severe behavioral histories of overlapping adverse childhood experiences, lifelong emotional and behavioral regulation problems, recurrent involvement in the juvenile and criminal justice systems and extensive involvement in other forms of violent, property and drug offending (Baglivio and Wolff, 2017b; Caudill and Trulson, 2016; Farrell and Zimmerman, 2017; Farrington *et al.*, 2018; Pizarro *et al.*, 2011; Trulson and Caudill, 2017). In their study of 513 homicide events in Newark, New Jersey, Pizarro *et al*. (2011) found that among homicide offenders, nearly 30 percent were gang members, more than 39 percent were drug dealers, over 59 percent had violence and weapons arrest history and more than 65 percent had drug arrest history. Among homicide victims, 14 percent were gang members, nearly 28 percent were drug dealers, nearly 52 percent had violence and weapons arrest history and nearly

59 percent had drug arrest history. Indeed, gang-involved offenders have been shown to be nearly three times more likely to perpetrate single-victim homicides compared to offenders that were not enmeshed in gang activity (DeLisi *et al.*, 2014).

Braga (2003) observed that about 1 percent of juveniles in Boston during the late twentieth century accounted for 60 percent of the homicides within the population. Almost all of the homicide offenders were gang involved, chronic delinquents. The most chronic of these offenders had 54 prior criminal arraignments, 25 prior violent crime arraignments, 24 prior property crime arraignments and 14 prior drug crime arraignments. It is important to observe that such extensive involvement in crime necessarily excludes conventional involvement in family, school and work responsibilities, thus homicide offenders are disproportionately experience family dysfunction, school dropout or expulsion and chronic unemployment (Berthelot *et al.*, 2016; Farrington *et al.*, 2012, 2018; Hochstetler *et al.*, 2017). Thus, their lifestyle is entrenched with criminal activity and exposure to serious violence including homicide.

Homicidal psychopathology

Strong evidence from multiple nations exists that demonstrates that homicide offenders and victims evince greater and more varied psychopathology than those in the general population and in some cases, even compared to other serious offenders (Chan and Beauregard, 2016; Fazel and Grann, 2004; Flynn *et al.*, 2016; Meloy, 2000; Ogloff *et al.*, 2015; Putkonen *et al.*, 2004). For instance, Fazel and Grann's (2004) study of the entire population of 2,005 convicted homicide offenders in Sweden from 1988 to 2001 is illustrative. Fazel and Grann found that only 10 percent of the population did not have a formal psychiatric diagnosis or personality disorder. Of the 90 percent of convicted murderers that had formal diagnoses, 54 percent had a Cluster A, B, or C personality disorder and 20 percent had a psychotic disorder. Relatedly, a 25-year study of 1,087 Austrian homicide offenders found that major mental illness increased the likelihood of homicide offending twofold among males and sixfold among females (Schanda *et al.*, 2004). Côté and Hodgins (1992) studied nearly 400 serious offenders and reported that personality disorders, specifically antisocial personality disorder (ASPD), and depressive disorders, specifically major depressive disorder, were significantly more prevalence among convicted murderers compared to other serious felons.

Drawing on data from male convicted sexual offenders in Canada, Chan and Beauregard (2016) compared homicidal sexual offenders to non-homicidal sexual offenders. Compared to their counterparts, they found that homicidal sexual offenders exhibited greater paraphilic interests and engaged in more gratuitous violence during their offenses including mutilation of the victim. Homicidal offenders also had significantly greater paranoid, schizotypal, borderline, histrionic, narcissistic and obsessive-compulsive personality disorder symptoms. In their study of over 500 forensic outpatients, Asnis *et al.* (1994) found that approximately 4 percent of the sample had previously attempted homicide. Compared to non-homicide attempters, those with homicidal experience evinced greater homicidal ideation, heightened hostility, anger, and interpersonal sensitivity and history of assorted clinical diagnoses including substance use disorders, bipolar disorders and schizophrenia. Among juvenile sexual homicide offenders, Myers *et al.* (2010) found that the prevalence of personality disorders was exceptionally high where 43 percent had schizotypal personality disorder, 33 percent had schizoid personality disorder, 24 percent had paranoid personality disorder, 33 percent had sadistic personality disorder, 14 percent had borderline personality disorder and 14 percent had avoidant personality disorder. An additional offender also presented with narcissistic, obsessive-compulsive, and dependent personality disorders. The juvenile sexual homicide offenders averaged three personality disorders which is a staggering psychiatric burden.

Liability for homicidal experiences is dramatically higher for offenders that exhibit ASPD. Yu *et al.* (2012) conducted a systematic review and meta-regression and found that personality disorders increased the risk of violent criminal offending threefold, but ASPD specifically increased the risk of violent offending including homicide 13-fold. Similarly, Eronen *et al.* (1996) found that the increased likelihood of committing homicide among those with ASPD was tenfold among males and 50-fold among females. Yarvis (1990) examined 100 homicide offenders to assess their psychopathology and found that 38 percent of the sample had been diagnosed with ASPD.

Yarvis also disaggregated their crimes to see the relative influence of the condition on various criminal outcomes and found that ASPD accounted for 24 percent of the cases where the offender was only convicted of homicide. In cases of armed robbery and homicide, the prevalence of ASPD was 90 percent. In cases of rape and homicide, the prevalence was also 90 percent.

A similar theme is seen for homicide victimization. Individuals with ASPD pay a heavy price in terms of increased mortality. For example, a study of 250 criminal offenders from Finland compared them to men in the general population and found those with ASPD were five to ten times more likely to die by age 50. When non-natural causes of death such as homicide were considered, the risk of early death was increased by a factor of between 6 and 17 times (Repo-Tiihonen *et al.*, 2001). An examination of 500 outpatients from a psychiatric facility similarly found substantially higher mortality and early mortality among those with ASPD (Martin *et al.*, 1985). Taken together, a range of psychopathological conditions especially pernicious forms such as ASPD are powerful drivers of homicidal activity as supported by offending and victimization data.

To summarize, a diverse set of research findings in criminology, psychology, forensic science and related fields has shown that a set of cognitive, interpersonal, psychological and psychiatric traits and tendencies cohere to produce increased likelihood for involvement in homicide in a variety of ways – what we introduce as the homicide circumplex. Specifically, individuals that recurrently contemplate or ideate lethal violence, that view homicide as a viable behavioral option, that are exposed to homicide as a function of their involvement in generalized criminal activity, and whose individual-level traits are conducive to homicidal activity are more likely to kill and be killed.

Method

Participants and procedures

Retrospective archival data from the total population of 865 active clients in a federal probation jurisdiction in the Midwestern USA (two clients had incomplete data thus the analytical sample is 863) were used. All clients were on supervised release after a term of supervision in the Bureau of Prisons. The sample is 84 percent male and 16 percent female. The preponderance (79.4 percent) of clients are white and 20.6 percent are African American. In total, 92 percent are non-Hispanic and 8 percent are Hispanic and the mean age was 44 years. The most prevalent instant conviction offenses were distribution of methamphetamine (35 percent), felon in possession of firearm (13 percent), bank fraud, money laundering and/or identity theft (13 percent), distribution of cocaine base (12 percent), possession or manufacturing of child pornography (6.5 percent), distribution of marijuana (6 percent), use of firearm during a drug trafficking offense (4.5 percent) and distribution of cocaine (3.6 percent).

Data collection used two procedures. First, all data in the client's Probation/Pretrial Services Automated Case Tracking System or 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 and offenders. 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, information on many additional variables was manually collected by the senior author. These variables were extracted from presentence reports (PSR), offender dossiers from the Bureau of Prisons, local, state and national criminal histories, confidential psychological and psychiatric reports, treatment reports and other relevant documents located in PACTS. The additional variables included conviction offense, measures of juvenile and criminal history, substance abuse history, onset, and diagnoses, personality disorders, criminality, victimization and abuse history, adverse childhood experiences, socioeconomic indicators, and summary measures of activity and misconduct during Bureau of Prisons confinement. These variables were coded and entered into the Excel spreadsheet. Upon completion, the data were transferred into Stata 14.2 for data analyses.

Measures

Dependent variables. Homicidal ideation was measured based on information from psychological reports and the client's PSR where there was evidence that the offender

had experienced homicidal thoughts. Examples included the offender self-reporting to clinicians and/or criminal justice practitioners that he or she was experiencing homicidal thoughts, homicidal statements made to family members and/or victims and explicitly articulating homicidal statements during the perpetration of a crime. Homicidal ideation was coded on a three-point scale with no evidence = 0, some evidence = 1 and definite evidence = 2. Homicidal ideation was relatively rare with 88 percent exhibiting no evidence, 3 percent exhibiting some evidence and 9 percent exhibiting definite evidence. Examples of a client with some evidence of homicidal ideation include making threatening homicidal statements about killing a specific person (e.g. estranged spouse or significant other) or stating a desire to kill their victim during an assault or domestic violence case. Examples of a client with definite evidence of homicidal ideation include recurrent statements to psychologists that the offender often thinks about murdering other people, making a hit list of potential persons to murder, developing a murder plan (irrespective of whether the plan was executed) and making frequent statements to criminal justice practitioners about a desire and willingness to murder others (e.g. making statements about wanting to kill other inmates in custody).

Murder was measured based on official arrest charges in the client's criminal history ($\bar{x} = 0.02$, SD = 0.15, range = 0–2) for first-degree murder, second-degree murder, non-negligent manslaughter and related statutes. The prevalence of official arrest for murder was 1.86 percent. In total, 15 offenders were arrested for murder during their criminal career and 1 offender was arrested for two murders. Attempted murder was measured based on official arrest charges in the client's criminal history ($\bar{x} = 0.19$, SD = 0.69, range = 0–7) for attempted first-degree murder, attempted second-degree murder and related statutes. The prevalence of official arrest for attempted murder was 11.01 percent. In total, 56 offenders were arrested for one count of attempted murder, 20 offenders were arrested for two counts of attempted murder, 11 offenders were arrested for three counts of attempted murder, 5 offenders were arrested for four counts of attempted murder, 1 offender was arrested for five counts of attempted murder and 2 offenders were arrested for seven counts of attempted murder.

Gunshot wounds was used as a proxy for attempted murder victimization based on identifiers in the client's National Crime Information Center record ($\bar{x} = 0.10$, SD = 0.9, range = 0–6). Prior research has similarly used gunshot wounds as a proxy for homicide exposure or attempted victimization (Papachristos, Braga, Piza and Grossman, 2015; Papachristos, Wildeman, and Roberto, 2015). The prevalence of gunshot wounds was 6.26 percent. In total, 34 offenders had one gunshot wound, 13 offenders had two gunshot wounds, 3 offenders had three gunshot wounds, 2 offenders had four gunshot wounds and 2 offenders had six gunshot wounds.

Independent variables. Several independent variables relating to offender demographics, criminal career indicia and psychiatric diagnoses were used based on their associations with homicide offending (Adams and Pizarro, 2014; Ahonen *et al.*, 2016; Porter and Woodworth, 2007; Porter *et al.*, 2003; Trojan and Salfati, 2016; Wright *et al.*, 2008). These were age of arrest onset ($\bar{x} = 23.57$, SD = 12.46, range = 6–78), total arrest charges ($\bar{x} = 14.31$, SD = 14.75, range = 1–97), aliases ($\bar{x} = 1.23$, SD = 4.17, range = 0–46), current age ($\bar{x} = 43.71$, SD = 11.45, range = 21–81), sex (female = 0, male = 1) and race (white = 0, black = 1). Gang activity was coded on a three-point scale with no evidence = 0, some evidence = 1 and definite evidence = 2 based on records in the client's PACTS. Nearly, 92 percent had no evidence of gang activity, more than 1 percent had some evidence and nearly 7 percent had definite evidence of gang activity.

Four behavioral disorders were used including ADHD (83.8 percent no evidence, 0.2 percent symptoms, 16 percent diagnosis), conduct disorder (78.6 percent no evidence, 1.5 percent symptoms, 19.9 percent diagnosis), ASPD (70 percent no evidence, 5.6 percent symptoms, 24.4 percent diagnosis) and intermittent explosive disorder (IED) (96.4 percent no evidence, 1 percent symptoms and 2.6 percent diagnosis). Diagnoses were based on DSM-IV-TR criteria and based on official psychological and psychiatric reports in the client's PACTS. All disorders were scored on a three-point scale with no symptoms = 0, symptoms but not enough

for diagnosis = 1, met diagnostic criteria = 2. These forms of psychopathology were selected based on their association with offending and violence (Aebi *et al.*, 2015; Bartol and Bartol, 2014; DeLisi, Elbert, Caropreso, Tahja, Heinrichs and Drury, 2017; DeLisi, Tahja, Drury, Caropreso, Elbert and Heinrichs, 2017; Drury *et al.*, 2017; Kaszynski *et al.*, 2014; Liem, 2013; Malmquist, 2006).

Data analysis

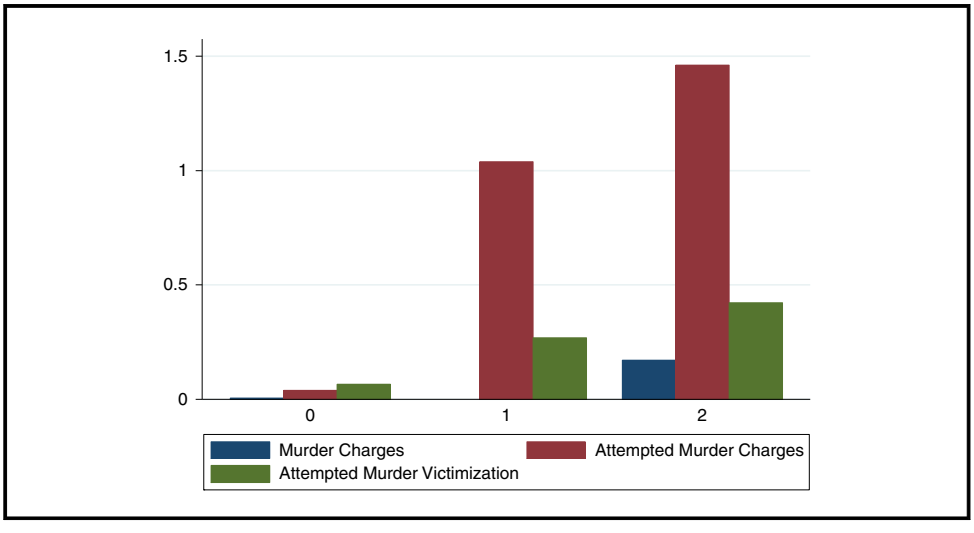
Four varieties of data analysis were employed. First, ANOVA models compared murder arrest charges, attempted murder arrest charges and attempted murder victimization by homicidal ideation status. Second, a multinomial logistic regression model examined predictors of some and definite evidence of homicidal ideation compared to the base outcome of no homicidal ideation with sex, race, current age, aliases, gang activity, ADHD, conduct disorder, ASPD, IED, arrest onset and total arrest charges as predictors. Third, a Poisson regression model for murder arrest charges was executed with the same independent variables since the dependent variable is count data (see, Coxe *et al.*, 2009; Gardner *et al.*, 1995). Regression diagnostics indicated no evidence of overdispersion, thus supporting the use of the Poisson estimator. Fourth, negative binomial regression models were used for attempted murder charges and attempted murder victimization (gunshot wounds) with the same independent variables. Regression diagnostics indicated evidence of overdispersion and, thus, the negative binomial as opposed to Poisson model was used. The LR test of α confirmed the negative binomial approach was appropriate for both attempted murder charges (LR test of $\alpha = 47.37$, $p < 0.001$) and attempted murder victimization (LR test of $\alpha = 31.65$, $p < 0.001$).

Findings

ANOVA for murder arrest charges, attempted murder arrest charges, and attempted murder victimization by homicidal ideation status

As displayed in Figure 1, there were significant differences in murder charges $F(2, 863) = 49.01$, $p < 0.001$, attempted murder charges $F(2, 863) = 276.55$, $p < 0.001$ and attempted murder victimization $F(2, 863) = 20.52$, $p < 0.001$. As homicidal ideation intensified, there were significant increases in murder arrests, attempted murder arrests and attempted murder victimization evidenced by gunshot wounds.

Figure 1 Murder charges, attempted murder charges and attempted murder victimization by homicidal ideation



Multinomial regression model for homicidal ideation

As shown in Table I, a multinomial logistic regression model was used to examine predictors of some evidence of homicidal ideation and definite evidence of homicidal ideation compared to the base outcome that was no evidence of homicidal ideation. Three significant effects emerged for some evidence of homicidal ideation compared to those with no evidence of homicidal ideation including gang activity (coefficient = 0.68, SE = 0.31, $z = 2.19$, $p < 0.05$), ASPD (coefficient = 1.22, SE = 0.37, $z = 3.28$, $p < 0.001$) and total arrest charges (coefficient = 0.03, SE = 0.01, $z = 2.51$, $p < 0.01$). Four significant effects were found for definite homicidal ideation compared to no homicidal ideation including number of aliases (coefficient = 0.10, SE = 0.02, $z = 3.84$, $p < 0.001$), gang activity (coefficient = 0.63, SE = 0.21, $z = 2.95$, $p < 0.01$), ASPD (coefficient = 1.47, SE = 0.30, $z = 4.88$, $p < 0.001$), and IED (coefficient = 0.90, SE = 0.28, $z = 3.17$, $p < 0.01$). Gang activity and ASPD were the only covariates that were significantly associated with moderate and definite homicidal ideation.

Poisson regression model for murder arrest charges

As shown in Table II, a Poisson regression model was used to examine murder arrest charges. Two significant effects were found. Current age (coefficient = 0.07, SE = 0.02, $z = 2.89$, $p < 0.01$) and aliases (coefficient = 0.06, SE = 0.02, $z = 2.69$, $p < 0.01$) were positively associated with murder arrest charges. None of the remaining covariates were significantly associated with murder arrest charges although race, conduct disorder and IED trended toward significance.

Negative binomial regression model for attempted murder arrest charges

As shown in Table III, a negative binomial regression model was used to examine attempted murder arrest charges. Four significant effects were found. African Americans (coefficient = 0.55,

Table I Multinomial logistic regression model for some evidence and definite evidence of homicidal ideation compared to base outcome of no evidence of homicidal ideation

Variable	*Coefficient*	SE	*z*	*95% CI*
Some homicidal ideation				
Sex	0.68	1.10	0.62	–1.48, 2.85
Race	0.52	0.49	1.05	–0.45, 1.48
Current age	0.02	0.02	0.65	–0.03, 0.06
Aliases	0.03	0.04	0.71	–0.06, 0.12
Gang activity	0.68	0.31	2.19*	0.07, 1.29
ADHD	–0.32	0.30	–1.07	–0.92, 0.27
Conduct disorder	–0.36	0.32	–1.12	–0.99, 0.27
Antisocial personality disorder	1.22	0.37	3.28***	0.49, 1.95
Intermittent explosive disorder	0.23	0.47	0.49	–0.70, 1.16
Arrest onset	–0.01	0.03	–0.05	–0.07, 0.07
Total arrest charges	0.03	0.01	2.51**	0.01, 0.06
Definite homicidal ideation				
Sex	14.61	826.53	0.02	–1,605.34, 1,634.58
Race	–0.07	0.35	–0.19	–0.76, 0.62
Current age	0.01	0.02	0.48	–0.02, 0.04
Aliases	0.10	0.02	3.84***	0.05, 0.14
Gang activity	0.63	0.21	2.95**	0.21, 1.05
ADHD	0.33	0.18	1.82	–0.002, 0.69
Conduct disorder	–0.36	0.26	–1.37	–0.86, 0.15
Antisocial personality disorder	1.47	0.30	4.88***	0.88, 2.06
Intermittent explosive disorder	0.90	0.28	3.17**	0.35, 1.46
Arrest onset	–0.05	0.04	–1.28	–0.13, 0.03
Total arrest charges	0.02	0.01	1.56	–0.01, 0.03
LR χ^2	288.6***			
Pseudo R^2	0.394			

Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table II Poisson regression model for murder arrest charges

Variable	*Coefficient*	SE	*z*	*95% CI*
Sex	–0.72	1.15	–0.62	–2.97, 1.54
Race	0.91	0.55	1.67	–0.16, 1.98
Current age	0.07	0.02	2.89**	0.02, 0.11
Aliases	0.06	0.02	2.69**	0.02, 0.10
Gang activity	–0.34	0.33	–1.02	–0.98, 0.31
ADHD	0.27	0.29	0.91	–0.31, 0.85
Conduct disorder	1.23	0.67	1.84	–0.08, 2.54
Antisocial personality disorder	–0.48	0.68	–0.71	–1.81, 0.86
Intermittent explosive disorder	0.59	0.36	1.65	–0.11, 1.29
Arrest onset	–0.08	0.06	–1.29	–0.21, 0.04
Total arrest charges	–0.01	0.02	–0.18	–0.04, 0.03
LR χ^2	49.39***			
Pseudo R^2	0.293			

Notes: $^{**}p < 0.01$; $^{***}p < 0.001$

Table III Negative binomial regression model for attempted murder arrest charges

Variable	*Coefficient*	SE	*z*	*95% CI*
Sex	0.66	0.63	1.05	–0.58, 1.91
Race	0.55	0.24	2.30*	0.08, 1.02
Current age	0.02	0.01	1.86	–0.01, 0.04
Aliases	0.03	0.02	1.63	–0.01, 0.07
Gang activity	0.56	0.15	3.77***	0.27, 0.85
ADHD	0.01	0.13	0.06	–0.25, 0.27
Conduct disorder	0.05	0.18	0.30	–0.30, 0.41
Antisocial personality disorder	0.84	0.21	4.08***	0.44, 1.25
Intermittent explosive disorder	0.46	0.20	2.35*	0.08, 0.85
Arrest onset	–0.04	0.02	–1.77	–0.08, 0.01
Total arrest charges	0.01	0.01	0.88	–0.01, 0.02
LR χ^2	197.94***			
Pseudo R^2	0.243			
LR Test of α	47.37***			

Notes: $^{*}p < 0.05$; $^{***}p < 0.001$

SE = 0.24, $z = 2.30$, $p < 0.05$), clients with gang activity (coefficient = 0.56, SE = 0.15, $z = 3.77$, $p < 0.001$), ASPD (coefficient = 0.84, SE = 0.21, $z = 4.08$, $p < 0.001$) and IED (coefficient = 0.46, SE = 0.20, $z = 2.35$, $p < 0.05$) accumulated more attempted murder arrest charges.

Negative binomial regression model for attempted murder victimization (gunshot wounds)

As shown in Table IV, a negative binomial regression model was used to examine gunshot wounds, which is a proxy for attempted murder victimization. Two significant effects were found. African Americans (coefficient = 1.35, SE = 0.32, $z = 4.24$, $p < 0.001$) and those with gang activity (coefficient = 0.61, SE = 0.20, $z = 3.10$, $p < 0.001$) were more likely to have been shot during the course of their lives. None of the other covariates were significantly associated with gunshot wounds although IED trended toward a positive association and arrest onset trended toward an inverse association.

Discussion

Between 15,000 and 20,000, victims are murdered annually in the USA and American culture is galvanized by incidents of serial and mass murder where the perpetrators of the lethal violence

Table IV Negative binomial regression model for attempted murder victimization (Gunshot wounds)

Variable	*Coefficient*	SE	*z*	*95% CI*
Sex	1.49	1.04	1.42	–0.56, 3.55
Race	1.35	0.32	4.24***	0.72, 1.97
Current age	0.01	0.02	0.71	–0.02, 0.04
Aliases	–0.02	0.03	–0.50	–0.08, 0.05
Gang activity	0.61	0.20	3.10***	0.22, 0.99
ADHD	0.06	0.18	0.30	–0.31, 0.42
Conduct disorder	0.23	0.29	0.80	–0.33, 0.79
Antisocial personality disorder	0.04	0.30	0.12	–0.55, 0.62
Intermittent explosive disorder	0.47	0.27	1.75	–0.06, 1.0
Arrest onset	–0.06	0.03	–1.81	–0.13, 0.01
Total arrest charges	0.01	0.01	0.76	–0.01, 0.03
LR χ^2	101.22***			
Pseudo R^2	0.201			
LR Test of α	31.65***			

Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

often have behavioral indicators, and at times, extraordinary histories of violent crime that should have been prognostic of their ultimate homicidal conduct. The current study introduced the homicide circumplex and articulated four dimensions upon which to understand the development of homicide spanning: the degree with which an individual contemplates homicide; the degree with which an individual's social cognitive style invokes homicide as a potential behavioral option; the degree that an individual is exposed to homicide offending and victimization via their criminal activity; and the degree with which an individual's psychological and psychiatric traits and behaviors are associated with homicide. Using data from a near population of federal offenders on supervised release from the Midwestern USA, multiple analytical techniques produced a variety of statistically and substantively significant findings.

There is compelling evidence that homicidal ideation is important when studying homicide offenders. Among clients with no evidence of homicidal ideation, there is relatively little involvement in murder, attempted murder or attempted murder victimization. As the evidence of homicidal ideation becomes more concrete and pervasive, involvement in homicide offending increases significantly along with the likelihood of nearly becoming a homicide victim evidenced by gunshot wounds. In a multivariate context, entrenched criminal activity evidenced by total arrests, antisocial behaviors toward police in terms of alias usage, and pernicious forms of psychopathology – ASPD and IED – were associated with more severe homicidal ideation. These findings support prior research that has linked these covariates to pathological offending and other violence (Adams and Pizarro, 2014; Braga, 2003; DeLisi *et al.*, 2013; Vaughn *et al.*, 2015; Yu *et al.*, 2012). In other words, there is tangible evidence that criminal offenders who routinely consider killing others, make statements about such, and even utter homicidal statements during the perpetration of violence are not merely in a contemplative state. Their ideation translates into behavior and it is driven by severe psychopathology and chronic criminal activity.

We suggest that homicidal ideation develops along three distinct but related conceptual streams. First, as offenders develop along a chronic and serious criminal career with multiple arrests and imprisonments, they also increase their exposure to other serious offenders and prisoners, and as such, have significant opportunities to be situations where murder is likely to ensue. Second and related to the first point, it is clear that gang activity is an important covariate for facilitating the development and maintenance of homicidal intent. In the case of street gangs, homicidal ideation, intent and perpetration are signal features of gang lifestyle and in the case of security threat groups, homicidal ideation, intent and perpetration are required for self-preservation, for enforcing the business mandates of the gang, and for manifesting a willing desire to kill someone that the offender views as an enemy or rival. Third, offenders with ASPD and IED have a personality style where violence, even lethal violence, is a preferred behavioral choice to resolve conflicts.

At times, homicidal ideation and attempts even reflect the offender's proclivity for antisociality and violence. For example, in our clinical and practitioner roles, some offenders in these data have described their involvement in completed and attempted murders both in the community and in prison with a glint of pride in their eyes and exuded heightened positive affect as they recounted the homicide events. It was clear that perpetrating lethal violence and surviving lethal attempts on their own life were internalized as criminal bona fides. Some offenders even reported that they had a "taste" for violence and liked to see if other antisocial persons in the community or in prison could be as violent as they could, and to see if others were willing to engage in potentially lethal violence.

While we did not include measures of social cognitive styles *per se* in the current models, the recurrent significance of ASPD and IED is instructive in terms of understanding the emotional life and relational tendencies of these offenders. In IED, aggressive behavior is spontaneous and lacks any premediated purpose and also is grossly disproportionate to the alleged underlying stressor (American Psychiatric Association, 2013). Quick explosions of temper, thus, occur without apparent provocation and are indicative of a behavioral system characterized by poor self-regulation and high negative emotionality that rapidly sparks into violence (DeLisi and Vaughn, 2014). In terms of ASPD, there is a tendency toward impulsive conduct and high levels of hostility, irritability and agitation. Against this backdrop of personality functioning, antisocial and hostile cognitions are likely. Future research can include social psychological measures to see empirically and more precisely how these negative personality features and aggressive psychopathology drive cognitive patterns in the homicide circumplex.

When studying homicide, it is important to separately model completed murders and attempted murders as they can have different covariates as the current models found. It is also important to analyze both murder and attempted murder because both criminal actions involve an intent to kill the victim, but differential circumstances, such as the location of gunshot wounds, the location of the attack and proximity to law enforcement and medical staff and the speed with which medical care is administered are what differentiate murder from attempted murder (Doerner, 1988; Harris *et al.*, 2002). Indeed, there is precedence in the literature suggesting that attempted murder offenders can be more severe. To illustrate, Ganpat *et al.* (2012) compared 2,049 homicide offenders to 3,387 violent offenders who had attempted homicide using data from the Dutch Homicide Monitor. Although both groups had extensive criminal histories, the attempted murderers had criminal careers that were slightly worse than the murderers. About 68 percent of completed homicide offenders had prior criminal history that averaged 6.7 arrests and spanned nearly eight years and 38 percent had prior crimes of violence. Comparatively, 76 percent of attempted homicide offenders had prior criminal history that averaged 7.1 arrests over a nearly nine-year span and 48 percent had prior crimes of violence. Nearly half of both samples had previously been imprisoned. Thus, it is important to consider attempted murder as part of the general disposition and tendency toward use of lethal violence.

African Americans and offenders with gang activity were significantly associated with attempted murder offending and attempted murder victimization which is consistent with prior research (Baglivio and Wolff, 2017a; Cunningham *et al.*, 2010; DeLisi *et al.*, 2014; Drury and DeLisi, 2011; Pizarro *et al.*, 2011; Trulson *et al.*, 2012). Indeed, at the bivariate level, there were significant race differences for all outcome measures as African American offenders had significantly more arrests for murder ($t = -3.16$, $p < 0.001$), more arrests for attempted murder ($t = -7.06$, $p < 0.001$), more gunshot wounds ($t = -7.66$, $p < 0.001$) and greater homicidal ideation (Wilcoxon t-test $= -2.30$, $p < 0.03$) than white offenders. These data are supportive of the disproportion salience of lethal violence among offenders that are black and/or involved in gang activity, a salience that has necessitated the creation of a stand-alone theory to address homicide in the African American community (e.g. Anderson, 2000).

Our findings have application for criminal justice practitioners. Although probation and parole officers have numerous work responsibilities, they would benefit from a careful reading of their client's presentence report and supplemental psychological and psychiatric files to see if there is evidence of homicidal behaviors and homicidal thoughts. Astute clinicians will document not only conditions for which the offender meets diagnostic criteria, but also conditions where the offender exhibits symptoms, or other relevant psychopathology that is germane to criminal offending, for instance, an offender's repeated statements about homicidal thoughts and intentions.

This information is vital for understanding the potential threats that an offender poses toward a specific individual (e.g. a prior victim in a case) or a specific group (e.g. criminal justice practitioners). The homicide circumplex also helps to contextualize an offender's criminal history and criminal tendencies. For example, if an offender has evidence of homicidal behaviors and ideation in their history, and has multiple prior arrests involving violence and disobedience toward the justice system (e.g. interference with official acts, resisting arrest with violence and certainly attempts to disarm a law enforcement officer), it is probable that client has a social cognitive and interpersonal style that is conducive for continued serious violence including homicide. Offenders that match this profile should be supervised with the utmost vigilance and security.

Limitations

There are limitations that should be considered to place the current findings into perspective as well as potentially guide future research. The theme of the current special issue is on biopsychosocial features of violent conduct. Although the current study included measures of psychological and social features, it excluded biological factors due to data limitations. It is important to note, for instance, that polymorphisms in neuronal and neurotransmission genes, including CDH13 and MAOA, have been linked to violent offending including homicide (Tiihonen *et al.*, 2015). The MAOA gene, known as the "warrior gene" provides a molecular foundation upon which the proneness for lethal violence in the homicide circumplex likely rests. For example, Buckholtz and Meyer-Lindenberg (2008) developed an explanatory model for how MAOA alters the neurogenetic architecture of serious aggression. They suggest that MAOA modifies an individual's "socioaffective scaffold" by altering serotonin and norepinephrine levels during development of the coritcolimbic circuit which results in impairments in social decision-making and affect regulation. This compromises the ability to interpret ambiguous social interactions and perceptions of potential threat. Unfortunately, the current data lack any genetic information, fortunately other studies (e.g. Armstrong *et al.*, 2014; Boisvert *et al.*, 2018; Caspi *et al.*, 2002) with offender data have included measures of MAOA and reported linkages to antisocial traits associated with serious violence.

Another important omitted variable in the current models was psychopathy which has been shown to be strongly associated with the most serious and violent offending trajectories (Boduszek *et al.*, 2016; Corrado, DeLisi, Hart and McCuish, 2015; Corrado, McCuish, Hart and DeLisi, 2015; McCuish, Bouchard, and Corrado, 2015; McCuish, Corrado, Hart and DeLisi, 2015; Vaughn and DeLisi, 2008) and has even been characterized as the essential construct in a unified theory of crime (DeLisi, 2009, 2016). Psychopathy is particularly important for its association with homicide. To illustrate, Jolliffe *et al.* (2011) compared youth who had been convicted of homicide to other violent offenders and found that homicidal youth were significantly more psychopathic than their peers. Homicide offenders scored nearly four times higher than controls on arrogance and deceitfulness, 26 times higher on deficient affective experience, 54 times higher on impulsive and irresponsible lifestyle and 38-fold higher on juvenile delinquency and criminal versatility. Although fewer than 15 percent of delinquent controls were clinically psychopathic, nearly 67 percent of the homicide offenders were clinical psychopaths, an odds ratio of 11.5! In addition, they found that the predominant emotional reaction during the commission of their homicide was to have no emotional reaction, 30 percent of homicide offenders reported feeling nothing. Moreover, 42 percent felt nothing or a general sense of numbness after their offense. It is likely that the aberrant affective reactions to self-reported homicidal activity among the current offenders were indicative of clinical psychopathy, but unfortunately we are currently lacking these measures.

Another important limitation relates to these cross-sectional data whereby we were unable to specify whether homicidal ideation developed before serious criminal activity including homicide, occurred contemporaneously with homicidal criminal conduct or was a potential consequence of homicidal activity. It could be argued that homicidal ideation is integral to homicide offending and, thus, their association is tautological. We caution against such an argument on two grounds. First, in these data, 64 offenders had definite homicidal ideation and 26 offenders had some homicidal ideation despite having zero arrests for homicide. Similarly, of the 16 offenders that had been arrested for one or two counts of murder, four had no evidence of homicidal ideation in their

clinical and psychological histories. Second, prior work (DeLisi, Elbert, Caropreso, Tahja, Heinrichs and Drury, 2017; DeLisi, Tahja, Drury, Caropreso, Elbert and Heinrichs, 2017) found that homicidal ideation was predictive of an array of crimes including murder, but also non-lethal crimes including kidnaping, armed robbery and aggravated assault. This suggests that homicidal ideation is a broader risk factor of serious violence and is not limited to homicide offending.

Conclusion

The current study introduced the homicide circumplex, a conceptual model that included homicidal ideation, homicidal social cognitive tendencies, lifestyle features that increased exposure to homicide, and psychopathology that is significantly associate with homicide. At the research level, future studies will determine the value of our conceptual model for understanding and profiling lethal violence in serious criminal offenders. At the practitioner level, it is imperative that criminal offenders who exhibit tangible evidence of homicide in their behavioral histories be managed with the most stringent, containment approach in the interests not only of officer safety, but also in maintaining the offender's compliance while under correctional supervision.

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