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RISK FACTORS FOR VIOLENT BEHAVIOR AMONG INCARCERATED MALE PSYCHIATRIC PATIENTS: A MULTIMETHOD APPROACH

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A multimethod approach that included demographic, criminal offense, drug use, neuropsychological, Rorschach, psychiatric diagnosis, and psychopathy characteristics was used to evaluate 131 incarcerated male psychiatric inpatients. Each criminal offense was ranked from nonviolent to severely violent, and participants were classified as having lifetime histories of either high or low violent behavior. Univariate analyses revealed 12 characteristics which independently discriminated inmates with lifetime histories of high or low violent behavior (married, non-Caucasian race, Axis I psychotic diagnosis, drug other than alcohol or marijuana used most, positive for psychopathy on the Hare Psychopathy Checklist–Revised, scores indicating impairment on the Halstead Impairment Index and Category Test, and five Rorschach measures). Logistic regression revealed that eight of those characteristics (married, non-Caucasian race, Axis I psychotic diagnosis, positive for psychopathy on the Hare Psychopathy Checklist–Revised, scores indicating impairment on the Halstead Impairment Index, and Rorschach Coping Deficit Index, Personal Responses, and Raw Sum Special Scores) significantly contributed to identifying inmates with lifetime histories of highly violent behavior. Data are provided for sensitivity, specificity, positive and negative predictive power, and overall correct classification rate for neuropsychological and Rorschach measures. Because this sample represented only incarcerated male psychiatric inpatients, and not a general prison population, caution as to limits of generalization are discussed. Implications for use of this information in understanding violent behavior are also discussed.

Keywords: violence, risk for violence, psychopathy, Rorschach, Halstead Reitan Battery

Although the incidence of violent behavior has recently shown a decline, statistics indicate that violent crime continues to be a major problem in the United States. For example, statistics from Uniform Crime Reports—Crime in the United States (U.S. Department of Justice, 1996) indicate that, from 1994 to 1995, the number of violent crimes decreased 3.2%. Although this decrease is

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encouraging, the fact remains that in 1994 there were 1,857,670 violent crimes committed, and in 1995 there were still 1,798,785 violent crimes committed in the United States.

Investigators have provided various explanations to understand violent behavior. Demographic characteristics, drug abuse, neurological disorders, psychiatric disorders, environmental conditions, and combinations of these factors have all been proposed as possible precursors to violent behavior.

Monahan (1992) presented a profile of risk factors for violent behavior that included being young, unmarried or divorced, non-Caucasian, and of low socioeconomic status. Similar profiles have been presented by Helzer, Burnam, and McEvoy (1991) and by Keith, Reiger, and Rae (1991).

A frequent theme in understanding violent behavior has been the role of alcohol and drug use. Senay and Wettstein (1983) reviewed 24 homicide cases and concluded that high dosage use of psychoactive drugs with subsequent impaired reality testing and judgment was related to violent behavior. Kreutzer, Myers, Harris, and Zasler (1990) hypothesized a relationship between alcohol abuse and violent offenses. Edwards, Morgan, and Faulkner (1994) reviewed records of South Carolina inmates who had histories of psychiatric treatment prior to prison and reported that 63.5% had histories of alcohol and/or drug abuse. Chiles, Von Cleve, Jemelka, and Trupin (1992) found that histories of alcohol and/or drug abuse were reported by 92% of inmates diagnosed with Antisocial Personality Disorder and 82% of inmates diagnosed with an Axis I clinical disorder.

Neurological and Axis I clinical disorders other than drug use disorders have also been implicated in understanding violent behavior. Reporting on existing literature, Diaz (1995) reported positron emission tomography (PET) data in studies of violent offenders, indicating that in at least one study, 50% of the offenders had PET findings of frontal brain abnormality. Although details of their methodology were not described, Tancredi and Volknow (1988) reported neurological examination, PET, computed tomography (CT), and electroencephalographic (EEG) results for four violent offenders. They reported that although physical neurological examination was unremarkable, PET revealed disturbances in regional glucose metabolism and blood flow in the frontal and right temporal cortex; CT revealed generalized cortical atrophy; and EEG revealed abnormal electrophysiological activity in all four participants. Research by Adrian Raine provides further support for the impact of neurological differences on violent behavior (Raine, 1993; Raine, Venables, & Williams, 1990).

Although demographic characteristics, drug use patterns, neurological disorders, and psychiatric disorders have been independently implicated as playing roles in understanding violent behavior, most investigators emphasize the complex, multifaceted nature of violent behavior. In a retrospective review of records of 1,310 New York prison inmates, Toch and Adams (1994) emphasized the necessity of considering the type of offense, timing of the offense, prior offenses, social characteristics, substance abuse, and the development, nature, and treatment patterns of psychiatric disorder of the offender. In a retrospective review of treatment records of 292 Canadian inmates (146 inmates who received specialized treatment while in prison, and 146 inmates who did not receive specialized treatment while in prison) Harris, Rice, and Quinsey (1993) identified twelve predictors of violent recidivism: Hare Psychopathy Checklist–Revised score (PCL-R; Hare, 1990); elementary school maladjustment; age at time of offense for which they were incarcerated at the time of the study; diagnosis of personality disorder; separation from parents when the participant was under age 16 years; failure on prior conditional release; criminal history for property offenses; not married at the time of the study; diagnosis of Schizophrenia; history of alcohol abuse; and male victim in index offense. The impact of childhood abuse and maltreatment on the offender has been added as another dimension in understanding violent behavior (Lewis, 1992; Lewis et al., 1988). In her evaluations of both adolescents and adults, Lewis reported that death row inmates tended to have histories of abuse, neglect, maltreatment, and biological/psychiatric

vulnerability. She hypothesized that the combined impact of maltreatment and biological vulnerability accounted for the highly violent behavior in this group of individuals.

Although there are several studies which add to the understanding of violent behavior, to our knowledge there have been no studies which provide a comprehensive description of demographic characteristics, drug use histories, neurological and psychiatric histories, neuropsychological functioning, emotional functioning, and psychiatric functioning within a sample of incarcerated, male psychiatric inpatients with information about past history of violent behavior. In this study, a group of such inmates received a comprehensive evaluation and were also rated as to either high or low lifetime violent behavior based on a review of their criminal histories.

The purpose of this study was to employ a multimethod approach to discriminate between inmates with lifetime histories of high versus low violent behavior. Our goal was to identify risk factors for violent behavior. Prior research has implicated various demographic, drug use, brain functioning, and psychiatric factors with high violent behavior among forensic populations. To our knowledge, however, this is the first study which comprehensively evaluates all these characteristics within the same forensic psychiatric population. Although prior research has influenced this study, specific hypotheses were not established. This is, therefore, considered to be an exploratory evaluation of violent behavior within a forensic psychiatric population from which further research might develop.

Method

Participants

Participants were 131 males who were receiving treatment for acute psychiatric problems in a mental health facility located within a California state prison. Any inmate within the State of California prison system who was thought to be experiencing acute psychiatric problems was referred to this program for stabilization, evaluation, and treatment. In this study, 153 participants were invited to participate; 131 participants completed at least 85% of all procedures. Reasons for lack of completion included delusional thinking (10), manic episode (4), suicidal behavior (3), likely falsification of psychiatric symptoms (3), and unknown reasons/refused (2).

Demographics

Ages ranged from 19 to 65 years, with a mean age of 33.31 years (SD = 8.19 years). Education ranged from completion of 3rd grade to completion of 16 years (bachelors degree), with a mean education of 10.31 years (SD = 2.53 years).

Caucasians not of Hispanic origin (36%) and African Americans (36%) were the largest ethnic groups, followed by Latino (23%), and Other (Asian, Native American) (5%). Efforts to reduce potential confounding effects of language, cultural experience, and education were made by using language interpreters and those neuropsychological (Halstead-Reitan Neuropsychological Battery) and personality (Rorschach) tests which are considered to be the least impacted by these factors. Although significant differences among ethnic groups were not found for age, marital status, prior hospitalization, presence of Axis I or Axis II disorders, or scores for Rorschach measures, significant differences were found among ethnic groups for education, socioeconomic status (SES), ratings on the PCL-R, and scores on some neuropsychology measures. For purposes of statistical analysis, participants who were Caucasian and not of Hispanic origin were included in the group "non-Hispanic Caucasian." Participants who were African American, Latino, Asian, or Native American were included in the group "non-Caucasian." This grouping was necessary to meet statistical assumptions for data analyses. Participants in the non-Caucasian group were significantly more likely to have fewer years of education (p = .01), lower SES (p = .02), higher scores on the PCL-R (p = .01), and high scores indicating impairment on neuropsychological tests (Halstead Impairment Index, p = .05; Category Test, p = .001).

Using a two-factor (Education x Occupation) index of social position (Myers & Bean, 1968), most participants were in the two lowest classifications of social position (IV = 19% and V = 61%).

Most inmates were single (65%), with nearly equal numbers either married (17%) or separated/divorced (18%).

Psychiatric Diagnoses

In addition to demographic characteristics, information regarding psychiatric diagnosis, was obtained. The diagnosis used in this study was the diagnosis established by the inmate's Interdisciplinary Treatment Team at the time of his discharge from treatment. Psychotic disorders accounted for 47% of the sample, mood disorders accounted for 21%, and organic disorders accounted for 14%. Using *DSM-III-R* descriptors, organic disorders in this study included Dementia, Organic Delusional Disorder, Organic Mood Disorder, and Organic Disorder NOS. Inmates who received no diagnosis, diagnosis deferred, malingering, or an Adjustment Disorder diagnosis were considered in the "Other" classification, and accounted for 18% of the sample. Also as would be expected for this sample, many of the inmates had a *DSM-III-R* Axis II personality disorder diagnosis with 34% from Cluster B (Antisocial, Borderline, Narcissistic) and 19% from Cluster C (Dependent, Passive-Aggressive, Personality Disorder NOS). Only 6% had Axis II personality disorder diagnosis from Cluster A (Paranoid, Schizoid, Schizotypal).

Diagnosis was further explored using the Hare Psychopathy Checklist–Revised (PCL-R; Hare, 1990). As recommended by Hare (1980), a score of 30 or more identified 21% of this sample as meeting the criteria for psychopathy.

Neurological and Psychiatric History

Most participants had received psychiatric treatment prior to prison (62%) and most participants had a diagnosis for *Diagnostic and Statistical Manual of Mental Disorders*, third edition, revised (*DSM-III-R*; APA, 1987) Axis I clinical disorder. Neurological injury/disorder was defined as head trauma which resulted in loss of consciousness for more than 15 minutes, or seizure disorder, loss of consciousness for reasons other than seizure disorder (the latter being primarily from drug overdose), or medical disorder which resulted in documented central nervous system damage. Although these criteria reflect a broad definition of neurological injury/disorder, the salient descriptions of events that were described either in the medical record or by the inmate, convinced the investigators of the importance of including this characteristic as defined. Neurological examinations were not done for all inmates, but medical examinations were completed upon admission. The presence of a neurological injury/disorder was established either by documentation in the medical chart or by inmate description. When description by the inmate was relied upon, only those incidents for which there was agreement by two interviewers that the injury/disorder existed were included. Using these criteria, a remarkably high incidence of neurological injury/disorder was reported for this sample (84%), with the mean number of injuries/disorders being 2.17 (range from 0-10; SD = 1.69). One participant had a documented head injury as a toddler (1 year), the age of first injury ranged from 1 year to 59 years; and the mean age at injury was 14.48 years (SD = 10.64 years).

Drug Use History

Drug use was also particularly prevalent in this sample. Most participants (91%) reported drug use histories which met criteria for drug abuse/dependence, and of those reporting drug abuse, 83% reported polysubstance abuse. The mean age for first drug use was 13.0 years (SD = 2.93 years), with an age of first drug use ranging from as young as 6 years to as old as 21 years of age. The drug most used was alcohol (44%), followed by cannabis (20%), opioids (12%), and other (24%). A slightly more diverse group of drugs was reported as preferred (alcohol = 35%; cannabis = 19%, opioids = 16%; cocaine = 13%; other = 17%). Drugs most frequently used first were alcohol (47%), cannabis (30%), and other (23%). Considering the information known about the pervasive damaging effect of inhalants on the brain (Byrne, Kirby, Zibin, & Ensminger, 1991; Dinwiddle, 1994; Filley, Heaton, & Rosenberg, 1990; Hormes, Filley, & Rosenberg, 1986; Morrow, Ryan, Hodgson, & Robin, 1991; Rosenberg, Kleinschmidt-Demasters, Davis, Hormes, & Filley, 1988; Singer & Scott, 1987) inhalant use in this sample was of particular interest. Inhalants were

used most by 4%, preferred by 4%, and used first by 10% of this sample.

Violent Behavior History

History of violent behavior was obtained from a review of the inmate's central file. Reviews were completed by individuals who did not have knowledge of potential predictors of violent behavior. Only those offenses for which the inmate was convicted were recorded. Each offense was ranked on a 7-point scale, ranging from nonviolent (1) to extreme violent behavior (7). Appendix A provides further description of this rating system. Interrater reliability was established by having two raters independently rank each offense for 10% of the sample (n = 13). Using this method, 89% agreement in rating of violent behavior level for offenses was obtained.

Records indicated that 65% of this sample had a history of juvenile arrest, and 55% had a history of placement with youth authority. Although 2% of this sample had juvenile offenses which involved loss of life, the majority of juvenile offenses were nonviolent.

Although juvenile offenses were predominantly nonviolent, a pattern of increasing violent behavior over time was demonstrated. For most inmates the current offense was the offense with the highest violent behavior rating (97%). Whereas most juvenile offenses had a of low violent behavior rating, most adult offenses had a high violent behavior rating. Offenses which involved violent physical attack on a person (without loss of life) accounted for 42% of the highest violent offenses, and offenses which resulted in loss of life accounted for another 31% of the highest violent offenses.

A lifetime violent behavior characteristic was obtained by considering the inmate's highest rated violent behavior offenses. Inmates who had two or more offenses which involved physical attack on another, or who had one offense which involved loss of life, were considered "high" violent behavior. Inmates who had no more than one offense which involved a physical attack, with all other offenses involving threats, property crimes, or nuisance violations, were considered "low" violent behavior. Using this classification system, 63% of this sample had lifetime histories of "high" violent behavior and 37% had lifetime histories of "low" violent behavior.

Materials

Materials included a demographic data form, semi-structured clinical interviews, tests of neuropsychological functioning, and tests of psychological/personality functioning.

Structured and Semi-Structured Interviews

Demographic information was obtained through an interview with the inmate and a review of his criminal and medical records. Any differences between the inmate's self-report and his records were resolved by relying on documented information (unless an obvious documentation error had been made). A semi-structured interview, developed by the investigator (Young, 1994), was administered and included information such as criminal history, psychiatric history, drug use history, developmental, medical, social, school, and work histories.

Neuropsychological Evaluations

Neuropsychological evaluations included tests from the Halstead-Reitan Neuropsychological Battery for Adults (Reitan & Wolfson, 1993) which includes the Finger Tapping Test, Seashore Rhythm Test, Speech Sounds Perception Test, Trail Making Test Parts A and B, Tactual Performance Test, Aphasia Screening Test, and Category Test as well as the Wechsler Adult Intelligence Scale–Revised (WAIS-R; Wechsler, 1981) Vocabulary and Block Design subscales.

Rorschach Evaluations

Rorschach test was scored using Exner (1995) standards. Rorschach characteristics describing Personality Style (EB), Reality Testing ($X+\%$ and $X-\%$), Thinking (Sum Special Scores and Level 2 Special Scores), Interpersonal (Egocentricity Index, Reflection Responses, Cooperative, Aggression Responses) and Indexes (Schizophrenia, Depression, Coping Deficit, Suicide Potential, and Hypervigilence) were analyzed. Rorschach characteristics were selected based on information presented by Meloy (1992) and Gacono and Meloy (1994).

Psychiatric Evaluations

Psychiatric diagnosis was established by utilizing demographic information, clinical information, and the Rorschach Test. An estimate of psychopathy was established using the Hare Psychopathy Checklist–Revised.

Procedures

Participants were randomly selected from weekly admission lists. Within 2 weeks of admission the inmate was invited to participate in the study and provided with information that allowed informed consent. Assessment procedures were initiated when the Interdisciplinary Treatment Team determined that the participant had reached reasonable psychiatric stability.

A comprehensive review of medical and criminal records was completed, the inmate was interviewed, and all previously listed procedures were administered. The *DSM-III-R* Axis I clinical disorder diagnosis was the Interdisciplinary Treatment Team discharge diagnosis, and was based on all available information (chart review, interviews, testing, etc.). Interrater reliability for Axis I diagnosis was established by comparing Structured Clinical Interview for *DSM-III-R*-Patient Edition (SCID-P; Spitzer, Williams, Gibbon, & First, 1990) diagnosis with Interdisciplinary Treatment Team discharge diagnosis for 10% of the sample. SCID-P was administered by an investigator who was blind to diagnosis based on all other information. There was 79% agreement between SCID-P diagnosis and discharge diagnosis.

Two raters coded 10% of the Rorschach protocols to establish intercoder agreement. Agreement findings are based on Cohen's (1960) kappa, a chance-corrected agreement characteristic. Landis and Koch (1977) suggested the following guidelines for describing levels of agreement as characterized by kappa: 0 to .20, slight agreement; .21 to .40, fair agreement; .41 to .60, moderate agreement; .61 to .80, substantial agreement; and .81 to 1.00, nearly perfect agreement. Intercoder agreement for this sample ranged from .75 to 1.00. Those administering neuropsychological and Rorschach tests were generally aware of the inmate's criminal history, but were not aware of the inmate's lifetime violent behavior rating or violent behavior classification. Lifetime violent behavior ratings were established after all information had been collected, and were independent of all characteristics except criminal history.

Results

The purpose of this study was to describe demographic, psychiatric, neurological, drug use, neuropsychological, and emotional/personality functioning of a sample of 131 inmates who were receiving psychiatric treatment while in prison. The study was also designed to determine if any of these characteristics, either independently or in combination, discriminated inmates with lifetime histories of high versus low violent behavior.

Demographic Characteristics

To determine if there were significant differences in demographic characteristics between inmates who had histories of either high or low violent behavior, *t*-test or likelihood chi-square procedures were completed. There were no significant differences between high and low violent behavior groups on characteristics of age, $t(131) = 1.55$, $p = .13$, education, $t(129) = 0.52$, $p = .60$, or SES $t(99) = 0.38$, $p = .70$. There were, however, significant differences between high and low violent behavior participants for race and marital status. Non-Caucasian inmates, χ^2 $(1, N = 131) = 4.72$, $p = .03$, and inmates who reported that they were married, χ^2 $(1, N = 121) = 5.62$, $p = .02$, were significantly more likely to be in the high violent behavior group (Table 1).

Using only those demographic characteristics which were independently significant, a multivariate logistic regression analysis using marital status and race revealed overall significance, χ^2 $(2, N = 119) = 11.62$, $p = .003$. Both marital status $p = .03$ and race ($p = .01$) independently significantly contributed to the model (Table 3). Inmates who reported that they were married at the time of this evaluation were 4.13 times more likely to be in the high violent behavior group. Inmates in the non-Caucasian group were 2.78 times more likely to be in the high violent behavior group.

Table 1
Demographic Data for Inmates With Lifetime Histories of High or Low Violent Behavior

Characteristic	Lifetime violent behavior history		Probability	Odds ratio
	Low	High		
Sample size				
n	48	83		
%	37	63		
Age (years)			$t(131) = 1.55$, *ns*	
M	32	34		
SD	9.1	7.5		
Education (years)			$t(129) = 0.52$, *ns*	
M	10	10		
SD	2.6	2.5		
Race/Ethnicity			χ^2 (1,N = 131) = 4.72, p < .05	2.26
Non-Hispanic Caucasian	23	24		
Non-Caucasian	25	59		
African American	13	34		
Latino	10	20		
Other (Asian, Native American)	2	5		
Marital status			χ^2 (1,N = 121) = 5.62, p < .05	4.05
Single	33	44		
Married	3	16		
Separated/Divorced	11	14		
Socioeconomic status			$t(99) = 0.38$, *ns*	
I	1	0		
II	1	0		
III	1	7		
IV	13	16		
V	23	37		

Psychiatric Diagnoses Characteristics

The majority of this sample (82%) were diagnosed with an Axis I major mental disorder (Psychosis, Mood, Organic) and the data are summarized in Table 2. As would be expected, 86% of the sample were taking psychotropic medication at the time of evaluation. A greater proportion of the sample were diagnosed with Axis II Cluster B personality disorder characterized as Borderline, Narcissistic, and/or Antisocial (34%) than for any other Axis II cluster (Cluster A = 6%; Cluster C = 19%). Approximately one-fifth (21%) of the inmates in this sample were positive for psychopathic characteristics as defined by Hare (1980). Psychopathic characteristics included behaviors characterized by lying, manipulation, parasitic lifestyle, poor behavioral controls, promiscuous sexual behavior, early behavioral problems, impulsivity, irresponsibility, lack of realistic long-term goals, failure to accept responsibility for their own actions, many short-term marital relationships, juvenile delinquency, revocation of conditional release, and personality characteristics characterized by glibness, grandiosity, lack of remorse, callousness, and shallow affect.

Table 2
Psychiatric Diagnosis for Inmates With Lifetime Histories of High or Low Violent Behavior

Characteristic	Lifetime violent behavior history		Probability	Odds ratio
	Low	High		
Hare PCL-R			χ^2 (1,N = 86) = 8.23, p < .01	6.70
Score ≥ 30	2	16		
Score < 30	31	37		
***DSM-III-R* diagnosis**				
Axis I			χ^2 (1,N = 127) = 4.90, p < .05	2.33
Psychotic disorder	15	44		
Mood disorder	13	14		
Organic disorder	9	9		
Axis II			χ^2 (1,N = 126) = 2.31, *ns*	
Cluster A	1	6		
Cluster B	14	29		
Cluster C	8	16		
No diagnosis on Axis II	21	31		

Note. PCL-R = Psychopathy Checklist–Revised.

Table 3
Multivariate Logistic Regression Models for Demographic Data, Psychiatric Diagnosis, Neuropsychological, and Rorschach Measures

Characteristic	Chi-square	p	Chi-square	p	Odds ratio
Demographic data	11.62	.003			
Married			4.40	.03	4.13
Non-Caucasian			6.22	.01	2.78
Psychiatric diagnosis	12.67	.001			
Axis I Psychotic disorder			4.87	.03	3.03
Hare Psychopathy Checklist–Revised Score ≥ 30			6.57	.01	8.33
Neuropsychological measures	4.45	.03			
Halstead Impairment Index Impaired			4.26	.04	1.03
Rorschach measures	11.38	.003			
Coping Deficit Index			4.35	.03	0.44
Personal Responses			4.98	.02	1.64
Raw Sum Special Scores			6.85	.01	1.12

Chi-square analyses revealed that inmates who evidenced psychotic disorders, χ^2 (1,N = 127) = 4.90, p = .03, and who were positive for psychopathic characteristics, χ^2 (1,N = 86) = 8.23, p = .004, were significantly more likely to be in the high violent behavior group. The diagnosis of an Axis II disorder did not significantly discriminate between high/low violent behavior. Inmates who had an Axis I psychotic diagnosis were 2.33 times more likely to be in the high violent behavior group, and inmates who received a score of 30 or more on the Hare PCL-R were 6.70 times more likely to be in the high violent behavior group.

Using only those characteristics which were independently significant (Axis I psychotic diagnosis and Hare PCL-R rating ≥ 30), the multivariate logistic regression model was significant, χ^2 (2,N = 84) = 12.67, p = .001, with both Axis I diagnosis (p = .03) and Hare PCL-R rating ≥ 30 (p = .01) each significantly contributing to the overall model (Table 3).

Neurological and Psychiatric History Characteristics

Prevalence of neurological history, number of neurological conditions, age at first neurological insult, and history of psychiatric hospitalization prior to prison were evaluated. As previously indicated, there was a high prevalence of both neurological injury/disease history (84%) and of psychiatric hospitalization prior to prison (62%). Although—or perhaps because—the prevalence of neurological condition and psychiatric hospitalization was so high, these characteristics did not significantly discriminate the high and low violent behavior groups, neurological condition χ^2 (1,N = 101) = 1.02, p = .30; psychiatric hospitalization χ^2 (1,N = 124) = 0.36, p = .55. Number of neurological conditions and age at first neurological condition also did not significantly discriminate the high and low violent behavior groups, number of injuries t(101) = 1.33, p = .19; age t(52) = -1.00, p = .32. Absence of neurological and psychiatric hospitalization characteristics with independent significance precluded further multivariate logistic regression analysis for this cluster of information.

Drug Use History Characteristics

Univariate analyses revealed that the only characteristic that significantly discriminated the high and low violent behavior groups was drug most used. Inmates who used a drug other than alcohol or marijuana most χ^2 (1,N = 105) = 4.35, p = .04 were significantly more likely to be in the high violent behavior group (Table 4). Since only one of the drug use history characteristics was independently significant, multivariate logistic regression analysis was not conducted on this cluster of characteristics.

Neuropsychological Characteristics

Table 5 presents the score means and standard deviations for high and low violent behavior groups on neuropsychological tests. With the exception of language tasks, inmate performance across neuropsychological tests was markedly deficient.

Although performance across neuropsychological tests was impaired for most participants, only overall cognitive functioning (Halstead Impairment Index t(129) = -2.12, p = .03) and abstract reasoning (Category Test t(130) = -2.19, p = .03) significantly identified inmates with high versus low violent behavior. The univariate likelihood chi-square and odds ratios for these characteristics are presented in Table 6. Inmates with high violent behaviors were significantly more impaired on both these characteristics than were inmates with low violent behaviors. Specificity of .60 and .50, respectively, were found for these characteristics. Overall correct classification rate was .67 for the Halstead Impairment Index and .63 for Category Test (Table 7).

Logistic regression analysis was completed to determine which tests of the Halstead Impairment Index significantly contributed to the model. Halstead Impairment Index tests (Finger Tapping Dominant, Finger Tapping Nondominant, Seashore Rhythm, Speech Sounds Perception, Tactual Performance Total Time-Memory-Location, and Category Test) were entered into the equation in a stepwise manner. As was anticipated, this analysis revealed that, for tests within the Halstead Impairment Index, only the Category

Table 4
Drug Use History of Inmates With Lifetime Histories of High or Low Violent Behavior

Characteristic	Lifetime violent behavior history: Low	High	Probability	Odds ratio
Drug abuse positive	44	72	χ^2 (1,N = 138) = 0.007, *ns*	
Polydrug abuse positive	43	62	χ^2 (1,N = 126) = 2.31, *ns*	
Drug used first			χ^2 (1,N = 105) = 0.52, *ns*	
Alcohol/Marijuana	35	45		
Other	9	16		
Drug most used			χ^2 (1,N = 105) = 4.35, p <.05	2.36
Alcohol/Marijuana	23	44		
Other	21	17		
Drug preferred			χ^2 (1,N = 105) = 2.74, *ns*	
Alcohol/Marijuana	20	37		
Other	24	24		

Test significantly contributed to the Halstead Impairment Index χ^2 (3,N = 80) = 7.84, p = .04.

Previous analyses in this study had revealed a significant effect of race on violent behavior. Non-Caucasian inmates were significantly more likely to be in the high violent behavior group. In order to control for possible impact of race in predicting neuropsychological risk factors for high violent behavior, a hierarchical regression analysis was conducted entering race first, followed by simultaneously entering the Halstead Impairment Index and Category Test. This analysis revealed that–when controlled for the effect of race–Category Test performance significantly identified inmates with histories of high violent behavior (p = .03) but Halstead Impairment Index performance did not (p = .07).

Rorschach Characteristics

Rorschach characteristics which describe Personality Style, Reality Testing, Thinking, Interpersonal, and Diagnostic Indexes were selected for evaluation. Mann-Whitney U tests were used in order to accommodate for unequal distributions. This test identified five Rorschach characteristics which significantly identified inmates with high violent behavior histories (see Table 5). Inmates with high violent behavior histories were more likely to provide Rorschach responses which suggested more illogical thinking (Raw Sum Special Scores, p = .05) and tangential speech (Deviant Response Level 2, p = .04). High violent behavior inmates were also more likely to provide Rorschach responses which suggested greater interest in interpersonal interactions (Human Responses, p = .03) but also more likely to be interpersonally distant in those relationships (Personal Responses, p = .02). Additionally, inmates with histories of high violent behavior were less likely to provide Rorschach responses which suggest emotional immaturity (Coping Deficit Index, p = .01). The univariate likelihood chi-square and odds ratios for these characteristics are presented in Table 6.

Stepwise logistic regression procedures were applied to those Rorschach characteristics which were identified through univariate analyses as significantly discriminating high from low violent behavior inmates. These five characteristics were entered into the logistic regression equation. Ultimately, three of these characteristics significantly discriminated high from low violent behavior inmates (Coping Deficit Index (p = .03),

Table 5
Descriptive Statistics for Neuropsychological and Rorschach Test Scores

	Lifetime violent behavior history						
	High			Low			
Measure	*n*	*M*	*SD*	*n*	*M*	*SD*	*p*
Estimated Full Scale IQ	82	81.37	15.87	48	80.97	13.17	
Neuropsychological tests							
Halstead Impairment Index	81	26.27	13.39	48	31.72	15.28	.03
Motor							
Finger Tap-Dominant	80	32.90	12.73	47	34.49	12.20	
Finger Tap-Nondominant	80	35.34	12.63	46	38.22	13.46	
Attention							
Seashore Rhythm	82	39.00	15.33	48	37.19	11.86	
Speech Sounds	54	37.46	9.76	33	39.36	10.11	
Trails A	83	33.51	11.68	48	34.58	11.40	
Incidental memory							
TPT-Memory	75	36.78	10.87	41	40.24	11.78	
TPT-Localization	75	37.19	7.87	41	40.17	10.51	
Language							
Aphasia Screening Test	81	44.86	13.92	47	44.48	11.14	
WAIS-R Vocabulary	81	40.73	13.80	47	38.77	8.59	
Psychomotor							
WAIS-R Block Design	81	39.83	11.96	47	39.26	11.64	
TPT-Total Time	74	31.74	10.63	41	33.15	12.14	
Abstract reasoning							
Category Test	82	32.90	10.78	48	37.29	11.50	.03
Trails B	82	34.25	10.76	48	36.77	13.24	
Rorschach measures							
Coping Deficit Index	80	0.46	0.50	45	0.67	0.48	.01
Raw Sum Special Scores	80	4.31	3.41	45	3.24	2.35	.05
Deviant Responses 2	80	0.36	1.00	45	0.11	0.32	.04
Human Responses	80	2.60	2.11	45	1.89	1.99	.03
Personal Responses	80	0.90	1.33	45	0.39	0.61	.02

Note. Neuropsychological scores are demographically corrected *T* scores (Heaton, Grant, & Matthews, 1991). TPT = Tactual Performance Test; WAIS-R = Wechsler Adult Intelligence Scale–Revised.

Personal Responses ($p = .02$), and Raw Sum Special Scores ($p = .01$). These are presented in Table 3. Sensitivity was .74 for Coping Deficit Index and .85 for Personal Responses. Specificity was .54 for Coping Deficit Index and .40 for Personal Responses (see Table 7). Overall classification rates were .58 for Coping Deficit Index and .47 for Personal Responses. There were similar concerns for race effects on Rorschach characteristics as for neuropsychological characteristics. Independent *t*-test analyses, however, did not reveal significant race differences on any of the

Table 6
Univariate Likelihood Chi-Squares and Odds Ratios for Neuropsychological and Rorschach Measures

Measure	Likelihood chi-square	Odds ratio
Neuropsychological tests		
Halstead Impairment Index	6.68**	3.23
Category Test	3.31*	2.10
Rorschach measures		
Raw Sum Special Scores	3.85*	5.00
Deviant Responses 2	4.43*	3.57
Human Responses	6.31**	2.63
Coping Deficit Index	4.90*	2.32
Personal Responses	5.11*	3.78

*$p < .05$. **$p < .01$.

Table 7
Sensitivity, Specificity, Positive Predictive Power, Negative Predictive Power, and Overall Correct Classification Rates for Neuropsychological and Rorschach Measures

Measure	Sensitivity	Specificity	Positive predictive power	Negative predictive power	Overall correct classification
Neuropsychological tests					
Hare Psychopathy Checklist–Revised	.89	.46	.31	.94	.55
Halstead Impairment Index	.68	.60	.88	.31	.67
Category Test	.68	.50	.79	.35	.63
Rorschach measures					
Raw Sum Special Scores	.85	.37	.07	.98	.40
Deviant Responses 2	.84	.39	.20	.93	.46
Human Responses	.70	.65	.91	.29	.69
Coping Deficit Index	.74	.54	.54	.67	.58
Personal Responses	.85	.40	.21	.93	.47

Rorschach characteristics analyzed (Raw Sum Special Scores, $p = .64$; Deviant Responses Level 2, $p = .21$; Human Responses, $p = .08$; Coping Deficit Index, $p = .30$; Personal Responses, $p = .92$).

Discussion

In this study, 131 randomly selected inmates who were receiving psychiatric treatment while in prison were administered a series of procedures which included record reviews, interviews, neuropsychological tests, and other tests such as the Rorschach test and the Hare Psychopathy Checklist–Revised. Demographic characteristics, incidence of neurological injury/disease, psychiatric hospitalization prior to prison, drug use, violent behavior patterns, neuropsychological functioning, Rorschach responses, psychiatric

diagnosis, and psychopathy characteristics were analyzed. Participants were identified as demonstrating lifetime histories of either high or low violent behavior and differences between the groups on characteristics previously described were evaluated.

Prior research has identified several risk factors to high violent behavior. Monahan (1992) and Helzer, Burnam, and McEvoy (1991) identified young age, single, and non-Caucasian race. Senay and Wettstein (1983), Kreutzer et al. (1990), Edwards et al. (1994), and Chiles et al. (1992) identified drug use, and Diaz (1995) and Volknow (1988) implicated impaired frontal brain systems. Rice (1997) identified severe psychopathy as the characteristic most sensitive to recidivistic violent behavior.

Our findings, in most ways, are consistent with prior research. In this sample, non-Caucasian race, psychosis, overall neuropsychological impairment (Halstead Impairment Index), impaired neuropsychological performance on a test which evaluates the ability to reason and problem solve (Category Test), and severe psychopathy were all identified as risk factors to violent behavior.

Although our findings generally are consistent with these prior studies, two characteristics (age and married) differed in their association with violent behavior ratings. One possible explanation as to why young age was not identified as a risk factor in high violent behavior in this sample may be explained by the time of sampling. In prior research, "age" was typically identified as the age the violent offense occurred. In this study, "age" was identified as the inmate's age at the time of evaluation. Many participants in this sample had committed their offense years before this evaluation, and had been in prison for several years. This difference in time sampling might explain why age was not identified as a risk factor to high violent behavior in this sample.

Being married at the time of evaluation was also identified as a risk factor to high violent behavior in this sample. Prior research has not reported this finding. In fact, Monahan (1992) and Rice (1997) reported the opposite—being single, not married, was a risk factor to violent behavior. In this study, marital status did not correlate highly with age (r = .04), education (r = .07), or SES (r = .19), and marital status was not associated with race (χ^2 = 0.002, p = .96). These demographic characteristics, therefore, would not explain why participants who were married at the time of this evaluation were more likely to have histories of high violent behavior. Further exploration into this characteristic is needed. Questions such as how long the inmate had been married when he participated in the study; whether or not he was married prior to prison or while in prison; whether the rated violent behavior was against the inmate's spouse or former spouse; and possible relationships between marital status and *DSM-III-R* diagnosis of Axis I clinical disorders and Axis II personality disorders need to be explored. Additionally, marital status as recorded in the criminal justice file is often based on inmate report, rather than legal documentation. Marital status may suggest a quality of interpersonal relatedness, and further understanding of the relationship between marital status and violent behavior provides direction for future research.

There are several limitations to this study. One limitation is the participant sample, and consequent limits to generalization. Although we would assert that our participants are representative of a defined population, that population is restricted to male inmates who during incarceration had experienced a psychiatric decompensation such that they were removed from the general prison population and were placed in a psychiatric facility for stabilization and treatment. Although information reported here is representative of this particular sample of incarcerated men, it cannot be assumed that this sample is representative of the general prison population or any other group. If information regarding risk factor for violent behavior is to be generalized beyond this sample of men who are receiving psychiatric treatment while in prison, a follow-up study using a random sample of inmates who have not been referred for psychiatric treatment needs to be completed.

Another limitation to this study is that, importantly, this study used currently obtained information about the inmates to "predict" prior violent behavior. Following individuals in this sample

over time–and specifically once they are released from prison into the community–to determine if factors identified in this study predicted repeated violent behavior would add to our knowledge of violent behavior.

Additionally, there are some statistical concerns for this study. Although prior research guided selection of characteristics reported, this study represents a descriptive study, without benefit of specific a priori hypotheses. Consequently, the large number of characteristics analyzed raises concern for increased probability of Type I errors. It is felt that, in order to provide grounds for further research, this potential methodological weakness was justified.

Further research using a control group comprised of inmates who were not referred for psychiatric treatment, using an independent sample of psychiatrically hospitalized inmates for cross validation, and with specific a priori hypotheses provide directions for future investigations in this area.

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Appendix A

Violent Behavior Rating Scale for Criminal Offenses

Rating/Category	Offense
1-Nonviolent	Drug offenses, fraud, prostitution, curfew violation, disorderly conduct, trespassing, begging, failure to provide for spouse
2-Ambiguous Violence	Escape, driving offenses, theft, possession of weapon, possession of stolen property, violation of probation/parole
3-Property Crimes	Vandalism, burglary, grand theft auto, taking vehicles without owner consent, malicious mischief
4-Threats to Persons	Indecent exposure, robbery, lewd and lascivious, exhibiting a deadly weapon, intimidating a witness
5-Attacks on Persons	Car jacking, assault, rape, incest, child molest, forced oral copulation, kidnap, resisting arrest, arson, battery, false imprisonment, spousal abuse
6-Loss of Life	Murder
7-Loss of Life/Extreme Violence	Murder with special circumstances, serial murder, torture, serial rape, rape with torture