

The Effects of Traumatic Brain Injury and Post-Traumatic Stress Disorder on Prison Adjustment and Recidivism Among Military Veterans: Evidence from Minnesota

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Research Summary

The prevalence of, and link between, mental health disorders—such as traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD)—and antisocial behavior is well-documented among the military veteran population. Studies also show that TBI and PTSD account for variation in prison-based and re-entry outcomes. Despite this body of research, comparatively fewer studies have explicitly focused on how these factors affect prison adjustment for inmates with prior military experience. We used administrative data provided by the Minnesota Department of Corrections (MnDOC) and employed a series of survival analyses to examine how prior diagnoses of TBI and PTSD (among other risk factors) influence metrics of institutional adjustment and recidivism among a sample of military veterans. Our results indicate that the effects of TBI, PTSD, and other indicators of criminogenic risk are relevant when examining the experiences of justice-involved military veterans—especially with respect to recidivism-based outcomes. The implications of our results are discussed and directions for future research are given.

Introduction

An extensive body of scholarship spanning several decades and multiple disciplines suggests that certain experiences in the military can negatively affect returning servicemembers and increase the likelihood of mental health disorder and subsequent maladaptive behaviors [3-5, 18-20, 22-23, 25-26, 39]. Data from the Iraq War show that 1 in 8 returning soldiers met the clinical/diagnostic criteria for post-traumatic stress disorder (PTSD) [1], many of whom also experienced other related problems including traumatic brain injury (TBI) [25-26, 42]. A spate of research also indicates that PTSD and TBI—vis-à-vis neuropsychological deficits and impairments in judgment—are robust predictors of incarceration and subsequent difficulties in adapting to prison [12, 13, 16, 32-33, 41].

Although the pervasiveness of these disorders is comparatively higher among veteran samples, few empirical studies have explicitly examined the degree to which these factors influence how those with prior military experience adjust to prison and beyond. Recent research shows that veterans enter prison with more mental health problems—including PTSD and TBI—than other inmates and that these baseline differences correspond with variation in prison-based outcomes such as an increased reliance on medical and mental health services, decreased program participation, and an increased likelihood of violent institutional misconduct [12, 34]. Understanding the experience of incarcerated military veterans is therefore important for at least two reasons. First, there is a sizeable number of them across the United States, who total more than 180,000 and account for nearly 1 out of every 10 inmates housed in the state system [6, 18]. Second, mental health disorders among inmates in general are largely under-diagnosed or unreported [17]—the likes of which may present veteran inmates with unique challenges with respect to institutional adjustment and re-entry.

The goal of this study is to examine the degree to which TBI and PTSD (among other

important risk factors) impact metrics of institutional adjustment and recidivism among a subsample of military veterans under the supervision of the Minnesota Department of Corrections (MnDOC). A secondary objective of this study is to attempt to replicate and extend the findings of past studies. Heretofore, studies of incarcerated veterans have been unable to statistically account for the effects that both PTSD and TBI exert in the prison context; a limitation that is potentially problematic, given that the two disorders often occur in the presence of one another. For instance, some authors have examined the effects of TBI on metrics of adjustment but not the effects of PTSD [13] while others have assessed the influence exerted by PTSD, but not TBI [36]. By the same token, no studies (to our knowledge) have examined prison-based outcomes in conjunction with recidivism-based outcomes among veteran subsamples.

Methods

Sample and procedure

Our analyses are based on a sample of adults released from Minnesota state prisons between January 18, 2014¹ and December 31, 2017. We removed individuals from the sample if they were recorded as deceased, fugitives, released on conditional medical release, released with a hold from another agency, or released to a different state. Although some individuals may have been released from prison multiple times during that period, only the first release for each person is included in the dataset. During that timeframe, a total of 673 veterans were released from prison.² Those who did not receive scores on the Level of Service Inventory-Revised (LSI-R) before release (N = 92) were removed from the sample, resulting in a final sample size of 581. We

¹ This start date was based on the introduction of the newest version of the Correctional Operations Management System (COMS) used by MnDOC.

² Veteran status is based on self-reported military history. Of the 673 who reported having a military history, 51% reported serving in the Army, 14% in the Navy, 12% in the Marines, 6% in the Air Force, <1% in the Coast Guard, and 17% reported another type of military service.

dropped these cases from our analyses because past research has shown that the LSI-R is a robust predictor of individual risk, especially with respect to institutional adjustment and recidivism [37, 45]. Indeed, it is a “third-generation” risk/needs assessment instrument comprised of 54 questions across 10 domains³ that assesses “criminogenic needs” which might be targeted for treatment in the process of correctional intervention. The process of correctional intervention includes, among others, identifying treatment targets and monitoring offender risk while under supervision and/or treatment services, making probation/supervision decisions, making decisions regarding placement into halfway houses, deciding appropriate security-level classifications within institutions, and assessing the likelihood of recidivism [37, 45]—decisions which may be unique with respect to incarcerated military veterans. To date, the scale has been used across hundreds of empirical studies to evaluate criminogenic risk factors for over 135,000 offenders throughout the world [37, 45].

Table 1 provides a demographic breakdown of our sample. As can be seen, the sample was comprised almost entirely of males (99%). The sample was also predominantly white (70%), while 21% were Black, 6% were Native American, 2% were Hispanic, and 1% were Asian or Pacific Islander. They ranged in age from 20-83 years, with an average age of 48.3 years. Nearly half (48%) of the sample had been incarcerated for a person (i.e., violent) offense, 16% for drug offenses, 14% for DWI, 9% for property offenses, 1% for weapons offenses, and 10% for other offenses.⁴ The average sentence length was 28 months, and ranged from less than 1 month to 390 months.

³ These domains include Criminal History (10 items), Education/Employment (10 items), Financial (2 items), Family/Marital (4 items), Accommodation (3 items), Leisure/Recreation (2 items), Companions (5 items), Alcohol/Drug Problems (9 items), Emotional/Personal (5 items), and Attitudes/Orientation (4 items).

⁴ The demographic breakdown of incarcerated veterans in our sample closely mirrors samples analyzed by other scholars, which includes predominately older (~49 years) white (79%) males (98%), the majority of whom are serving time for violent offenses (40.1%) [13].

Table 1: Descriptive Statistics (N=581)

	Mean	SD	Range
Follow-up period (months)	49.75	13.19	20-67
Dependent Variables			
Recidivism			
<i>Rearrest</i>	0.52	0.50	0-1
<i>Reconviction</i>	0.40	0.49	0-1
<i>Reincarceration</i>	0.21	0.41	0-1
<i>Supervised release revocation</i>	0.35	0.48	0-1
Institutional adjustment			
<i>Misconduct</i>	0.45	0.50	0-1
<i>Segregation</i>	0.31	0.46	0-1
<i>Visitation</i>	0.48	0.50	0-1
<i>Participated in treatment</i>	0.77	0.42	0-1
Independent Variables			
TBI	0.10	0.31	0-1
PTSD	0.17	0.37	0-1
Control Variables			
Other mental illness	0.24	0.43	0-1
Level of Service Inventory-Revised score	28.27	8.70	4-51
Age in years (admission)	45.63	12.02	19-83
Age in years (release)	48.02	12.15	22-83
Female	0.01	0.12	0-1
Minority	0.30	0.46	0-1
Married	0.18	0.39	0-1
High school or GED (admission)	0.88	0.32	0-1
High school or GED (release)	0.94	0.24	0-1
Length of stay in months	28.04	41.07	<1-390
Sentence length	61.00	65.51	12.03-451
New commitment	0.68	0.47	0-1
Metro commitment	0.40	0.49	0-1
Prior prison admissions	2.16	2.64	0-18
Person offense	0.48	0.50	0-1
Supervision type			
<i>Standard (ref. group)</i>	0.59	0.49	0-1
<i>ISR</i>	0.23	0.42	0-1
<i>Discharge</i>	0.05	0.21	0-1
<i>Program release</i>	0.14	0.34	0-1

*p < .05

Measures

Outcomes. Recidivism was measured in four ways: (1) re-arrest for a new offense, (2) re-conviction for a new offense, (3) re-incarceration for a new felony offense, and (4) revocation of supervised release. The first three of these measures represent new criminal activity; the fourth variable includes a more general rule involving legal behavior not allowed among parolees (e.g., alcohol use, failing to meet with supervision agent). Recidivism data were collected through

August 30, 2019, resulting in a follow-up period between 20 and 67 months, with an average follow-up period of 49 months. These outcomes include both “status” and “time” variables. Status variables indicate whether an individual recidivated; time variables measure the number of months between release and the first recidivism event (or August 30, 2019, for those who did not recidivate).

We obtained arrest and conviction data electronically from the Minnesota Bureau of Criminal Apprehension (BCA). Re-incarceration and revocation data came from the Correctional Operations Management Systems (COMS) maintained by the Minnesota Department of Corrections (MnDOC). It is important to note that the dependent variables only measure arrest, conviction, and re-incarceration that took place in Minnesota. Because these variables did not include re-offending that occurred in other states or that went undetected by the criminal justice system, these variables may underestimate the true rates of re-offending.

We also examined four indicators of institutional adjustment. First, prison misconduct is operationalized as a conviction for any rule violation, which includes behavior that ranges from disobeying orders from correctional staff to assaults against other inmates or staff. Second, we examined placement in disciplinary segregation, which is the result of misconduct. The third institutional outcome is prison visitation, which included visits with friends or family members as well as volunteers. Finally, we examined participation in sex offender treatment, chemical dependency treatment, or educational programming. As with recidivism, these outcomes include both status and time variables. Status variables indicate whether an individual committed an infraction, was sent to disciplinary segregation, received a visit, or entered a treatment program between their admission date and release date; time variables measure the number of months between prison admission and the date of the first misconduct, segregation placement, visit, or

entry to a treatment program (or, if the event did not occur, the release date).

Covariates. Our measures of TBI and PTSD are binary variables that indicate whether the individual was diagnosed with either (or both) condition(s) by MnDOC staff, or the pre-sentence investigation (PSI) report noted a prior diagnosis of or treatment for the condition.⁵ We analyzed these variables separately from other mental health disorders, given the established link between military service and the prevalence of each. To account for broader mental health issues, we created a binary variable indicating whether individuals' records noted they had a diagnosis for any of the following: intellectual impairments, a major mental illness, and/or a significant mood disorder. We controlled for individual risk by including the most recent score on the Level of Service Inventory-Revisited (LSI-R) risk assessment before release from prison. Supervision type was measured with dummy variables that indicated whether the person was discharged with no supervision,⁶ released on standard supervision (reference group), released on intensive supervised release (ISR), or was released via an early release program (i.e., CIP or work release).

Four sociodemographic characteristics were measured as binary variables: gender (male), race (minority, compared to non-Hispanic White), marital status (married, compared to other marital statuses), and education level of at least a high school diploma or GED. Age is a continuous variable measured in years.⁷ Three binary variables measured whether the person entered prison on a new commitment (compared to those returned to prison for a release violation), whether the person was committed from the seven-county Minneapolis-St. Paul metropolitan area, and whether the current sentence was for a person offense (1) or another type of offense (0). The length of

⁵ We considered including a measure of comorbid TBI/PTSD; however, there were only 29 individuals (2% of the sample) with a history of both PTSD and TBI.

⁶ Those who were released with no supervision were removed from the analyses predicting supervised release revocation.

⁷ Age and education level were measured at two different time points: at admission for the analyses predicting institutional outcomes, and at release for the analyses predicting recidivism.

prison confinement is a continuous variable measured in months. This variable was only used in the analyses predicting recidivism; we substituted sentence length in months⁸ in the analyses predicting institutional outcomes. Finally, criminal history was measured as the number of prior prison admissions.

Analytic procedures

Because information on the timing of the outcomes was available, this study employed a series of survival analyses using Cox regression models. Survival analyses are preferable over logistic regression models because they allow for an examination of not only whether individuals engage in a particular behavior (i.e., status variables), but also how quickly they do so (i.e., time variables). To accurately measure the amount of time individuals were at risk to commit new offenses (i.e., their “street time”), we deducted the number of months spent in prison for a release violation from the at-risk period. This deduction was only made when the time spent in prison preceded the re-arrest, re-conviction, or re-incarceration for a new offense, or if the individual did not recidivate before August 30, 2019. Collinearity checks were conducted, and no problems were found; tolerance values were all above 0.4 and variance inflation factors (VIFs) were all below 2.5.

Results

The results of our models predicting institutional outcomes among veterans are presented in Table 2. Interestingly, and contrary to the findings of past research [13], neither TBI nor PTSD were significantly related to any of the four measures of institutional adjustment. However, several of the covariates such as the veteran’s LSI-R score, age, education level, and commitment status were related to various forms of institutional adjustment.

⁸ The longest sentence was 450 months; those serving a life sentence were coded as having a sentence length of 451 months.

Table 2: Models Predicting Institutional Outcomes Among Veterans

	<i>Misconduct</i>	<i>Segregation</i>	<i>Visitation</i>	<i>Treatment</i>
TBI	1.25 (0.20)	1.15 (0.24)	1.02 (0.22)	1.15 (0.16)
PTSD	1.09 (0.17)	1.24 (0.20)	0.99 (0.18)	0.93 (0.13)
Other mental illness	1.12 (0.14)	1.24 (0.17)	0.74 (0.15)†	1.08 (0.11)
Level of Service Inventory-Revised score	1.04 (0.01)***	1.05 (0.01)***	0.96 (0.01)***	1.00 (0.01)
Age in years	0.99 (0.01)**	0.98 (0.01)**	0.98 (0.01)***	1.00 (0.004)
Female	0.63 (0.73)	1.28 (0.74)	0.38 (0.72)	1.58 (0.37)
Minority	1.18 (0.15)	1.10 (0.18)	0.84 (0.15)	1.05 (0.11)
Married	0.85 (0.18)	0.79 (0.23)	1.63 (0.15)**	0.96 (0.13)
High school diploma	0.71 (0.19)†	0.64 (0.23)*	1.32 (0.20)	0.72 (0.15)*
Sentence length	0.99 (0.001)†	0.99 (0.001)†	1.00 (0.001)	0.99 (0.001)***
New commitment	0.83 (0.15)	0.69 (0.18)*	1.48 (0.15)*	1.25 (0.11)*
Metro commitment	0.97 (0.14)	1.08 (0.17)	0.93 (0.13)	1.10 (0.10)
Person offense	1.23 (0.13)	1.09 (0.16)	0.99 (0.13)	1.07 (0.10)
Prior admissions	0.99 (0.03)	0.98 (0.03)	0.95 (0.03)†	0.99 (0.02)

Hazard ratios are presented with standard errors in parentheses

*** p < .001, ** p < .01, * p < .05, † p < .10

Next, Table 3 displays the results of the analyses predicting recidivism among veterans. Unlike institutional adjustment, TBI and PTSD were related to some forms of recidivism among veterans. The presence of TBI increased the risk of re-arrest by 49%, the risk of supervised release revocation by 85%, and marginally increased the risk of reconviction by 44%. Similarly, PTSD increased the risk of supervised release revocation by 64%. Measures of institutional adjustment were largely unrelated to recidivism, with two exceptions: veteran offenders who were sentenced to segregation at least once during their sentence had a 148% higher risk of reincarceration, and those who participated in treatment while incarcerated had a 32% lower risk of supervised release revocation. Table 3 also shows that LSI-R scores, age, length of stay, and commitment status were associated with various forms of recidivism.

Table 3: Cox Regression Models Predicting Recidivism Among Veterans

	Rearrest	Reconviction	Reincarceration	Revocation
TBI	1.49 (0.17)*	1.44 (0.20)†	1.33 (0.27)	1.85 (0.20)**
PTSD	1.13 (0.16)	1.03 (0.18)	1.20 (0.23)	1.64 (0.18)**
Institutional misconduct	0.97 (0.19)	1.32 (0.21)	0.81 (0.36)	1.18 (0.23)
Segregation	1.31 (0.20)	1.11 (0.21)	2.48 (0.36)*	1.22 (0.23)
Visitation	1.13 (0.15)	1.09 (0.17)	0.76 (0.22)	1.28 (0.19)
Treatment	0.84 (0.14)	0.93 (0.16)	0.84 (0.22)	0.68 (0.17)*
Other mental illness	1.14 (0.14)	1.09 (0.16)	0.72 (0.23)	0.86 (0.18)
Level of Service Inventory-Revised score	1.04 (0.01)***	1.04 (0.01)***	1.04 (0.01)**	1.02 (0.01)
Age in years	0.98 (0.01)***	0.98 (0.01)***	0.97 (0.01)***	0.99 (0.01)**
Female	0.98 (0.47)	1.05 (0.60)	0.62 (1.03)	1.11 (0.60)
Minority	1.24 (0.14)	1.31 (0.15)†	1.14 (0.21)	1.06 (0.16)
Married	0.96 (0.18)	1.11 (0.20)	1.21 (0.28)	0.88 (0.22)
High school diploma	0.64 (0.24)	1.23 (0.32)	0.93 (0.41)	1.16 (0.34)
Length of stay	0.99 (0.004)**	0.99 (0.01)**	0.99 (0.01)*	1.00 (0.002)
New commitment	1.02 (0.14)*	0.67 (0.16)**	0.73 (0.21)	0.42 (0.16)***
Metro commitment	0.71 (0.13)	0.98 (0.15)	1.11 (0.20)	1.30 (0.16)†
Person offense	0.70 (0.13)**	0.80 (0.16)	0.69 (0.21)†	1.18 (0.17)
Prior admissions	1.06 (0.02)**	1.10 (0.02)***	1.11 (0.03)**	1.03 (0.03)
<i>Supervision type</i>				
Discharge	0.58 (0.31)†	0.52 (0.34)†	0.64 (0.42)	---
ISR	0.55 (0.17)**	0.63 (0.19)*	0.70 (0.27)	1.07 (0.18)
Program release	0.75 (0.19)	0.88 (0.22)	0.97 (0.31)	1.17 (0.22)

Hazard ratios are presented with standard errors in parentheses

*** p < .001, ** p < .01, * p < .05, † p < .10

Supplemental analyses

We also conducted supplemental analyses (available upon request) to assess the effects of more specific measures of PTSD, institutional misconduct, and segregation. First, we recreated our analyses using a measure of combat-related PTSD. As with the general PTSD measure, veterans with combat-related PTSD had an 82% higher risk of supervised release revocation. Unlike the general PTSD measure, however, veterans with combat-related PTSD had a 68% higher probability of receiving visits. Second, we examined violent misconduct (e.g., assault of inmates, staff, or others) and serious non-violent misconduct⁹ (e.g., drug use, smuggling contraband, escape, etc.). Like our general measure, neither TBI nor PTSD were significantly related to the risk of either type of misconduct. Third, we examined whether veterans were sentenced to extended

⁹ These misconduct types were chosen to represent serious non-violent misconduct because MnDOC policy identifies them as risk code violations (RCVs), or violations that create a serious safety and security risk.

segregation sentences (over 30 days). Again, neither TBI nor PTSD were significantly related to the risk of being sentenced to extended segregation.

Discussion

The purpose of our study was to examine a set of established risk factors among a group of offenders which remains understudied in the context of prison research: military veterans. The implicit assumption of this limited research is that past experiences make military veterans especially susceptible to adverse, criminogenic outcomes. Our results comport with this literature to the extent that they suggest TBI and PTSD are relevant predictors of criminal justice outcomes among military veterans. Indeed, we found that both disorders were predictive of recidivism, including re-arrest, revocation, and re-conviction. In explaining these results, it could be, as past research has shown, that although the prevalence of each disorder is higher among veterans than civilians, veterans are particularly avoidant of services and resources that may aid with rehabilitation out of fear of being stigmatized as “weak” [44]. Instead, they may be more likely to “self-medicate” with a host of substances that may increase their chances of having their parole revoked.

Conversely, and in contrast to past research, neither PTSD nor TBI were predictive of any form of institutional adjustment that we examined, with the exception of our supplementary analyses which documented a positive relationship between combat-related PTSD and prison visitations. The null relationships between each disorder and metrics of institutional adjustment could also be explained, in part, by the extent to which PTSD and TBI are screened during the intake process. Assuming that veterans are appropriately screened [14-15] and these problems are identified in assessments prior to admission, then the negative manifestations that accompany each disorder could be targeted and subsequently nullified or curbed. For instance, it could be that

proper screening among veterans might produce significantly different outcomes with respect to institutional adjustment whereby at-risk inmates receive mental health referrals in lieu of misconduct tickets or disciplinary segregation. In fact, between 2010 and 2014, MnDOC worked with the Minnesota Department of Human Services to create processes to better identify TBI, provide TBI training and resources for staff, and provide specialized release planning for offenders whose TBI causes functional impairment. Further, since 2011, MnDOC has had Crisis Intervention Teams (CIT) made up of correctional officers educated on mental health issues and de-escalation. This may reduce the effects of mental health issues on institutional adjustment, as officers trained in CIT are more likely to make mental health referrals for those experiencing symptoms [34].

Age and level of education also corresponded with better prison adjustment among veterans; a pattern which comports with past research within the general inmate population [38, 46]. Age and education are generally associated with higher levels of human capital—including a litany of social and mental skills, such as higher levels of self-control—that might serve as assets in the prison environment and account for variation across outcomes of interest [31]. This observation is particularly noteworthy in the study of incarcerated veterans who, according to recent estimates from the Bureau of Justice Statistics (BJS), tend to score higher on both metrics, relative to nonveteran inmates [6]. Furthermore, we found that veterans who were placed in disciplinary segregation were more likely to recidivate, but only with respect to one outcome: re-incarceration. This is a curious finding given that our general measure of misconduct was unrelated to any form of recidivism. It could be, however, that being placed in segregation for rule violations is a proxy for more serious (i.e., violent) behavior which may extend beyond prison and into the community. Recent research on the predictors of solitary confinement shows that

assaultive infractions toward staff and inmates alike are robust predictors [30]. To this end, studies also suggest that violent misconduct in prison correlates with various forms of recidivism, including felony reconviction [10, 24, 43].

The potential drawbacks of our study offer several opportunities for future research. First, the sample upon which our study is based is only generalizable within the state of Minnesota. Future research endeavors should therefore attempt to replicate our analyses with data collected in other states to account for discrepancies that may be an artifact of geographic location. Second, we chose not to disaggregate our sample by military branch because our statistical models were affected by smaller cell counts across different branches of the armed forces [31]. Yet past research has failed establish a link between military service branch and institutional adjustment [7]. Third and relatedly, we could not account for combat experience among veteran inmates. However, we maintain that our measure combat-related PTSD serves as a relevant proxy measure. We further submit that combat exposure is relevant only to the extent that it captures those veterans who have witnessed or experienced trauma during their respective tours of duty. Based on this logic, its effects should be subsumed under our measures of TBI, PTSD, and LSI-R scores. Where possible, researchers should control for service type and combat exposure to assess the effects of potential variation across categories.

Fourth, our measures of PTSD and TBI (and other mental disorders) are based on data collected at different points in time (e.g., at intake, later while incarcerated). As such, we were unable to isolate their causal effects on our outcomes. It could be, by virtue of program participation or exposure to further trauma/violence in prison or upon re-entry, that the negative manifestations of these disorders either increase or decrease precipitously over time. Future research should therefore rely on multiple data points based on chronological ordering with respect

to each disorder to establish temporality across metrics of institutional adjustment and recidivism. Fifth, we did not have information for the period during which veteran inmates served. It could be, for example, that the experiences of those who served during the Vietnam era are affected by TBI and PTSD in ways that differ from those who served in the Gulf War, or Iraq and Afghanistan. Thus, accounting for service era may be desirable when examining variation in outcomes among incarcerated military veterans. Finally, our results suggest that metrics of visitation and treatment might be relevant in the context of incarceration and re-entry among military veterans. Future research would therefore benefit from an examination of the causal mechanisms of each measure and their potential impact on veteran-specific initiatives and policy, such as the recent advent of veteran prison wings as a means of facilitating successful reintegration into society upon release from custody [8].

Conclusion

Although the linkage between prior military service and antisocial behavior is well-documented, our study is among only a few to explicitly focus on the effects that PTSD and TBI have not only on metrics of prison adjustment, but also on recidivism. To the extent that military veterans remain classified as an at-risk, vulnerable population with respect to the aforementioned disorders, the need to examine their experience at multiple points of the criminal justice system will also remain. We submit that this is especially relevant for the veteran inmate population, whose raw numbers in state and federal correctional facilities have increased over the past three decades and may present distinct or unique challenges in the way of service delivery, risk assessment, and other rehabilitative efforts from criminal justice practitioners.

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