NIJ UPDATE

Emerging relevance of neuroscience in corrections

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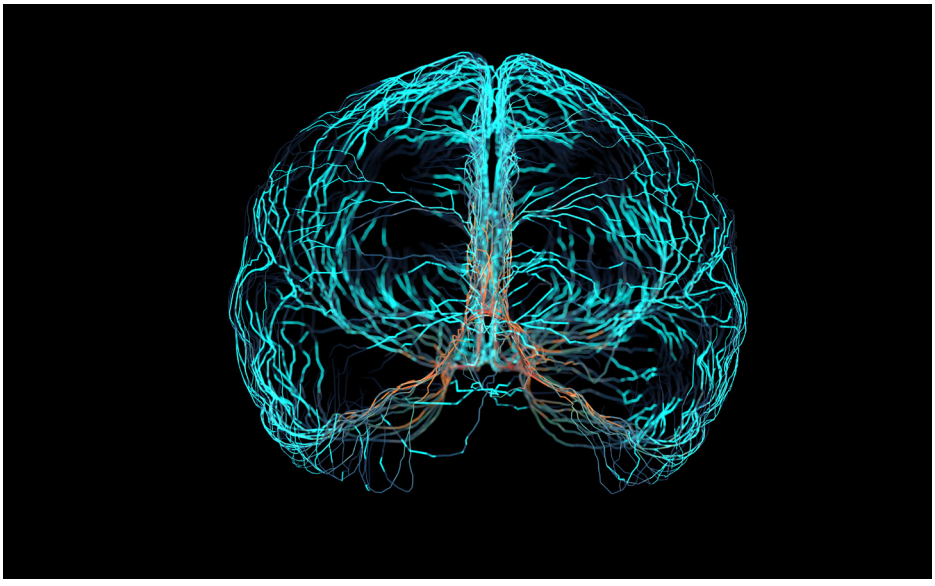
Neuroscience, the study of the structure and function of the brain and nervous system, is changing our thinking on the subject-matter boundaries of corrections research.

Recently the neuroscience field has yielded two significant contributions to NIJ-supported studies on correctional officer wellness, and reentry.

First, neuroscience data and biological and physiological markers have emerged as an invaluable source of data augmenting what correctional officers themselves are reporting about their stress levels.

Second, it is becoming increasingly clear that many justice-involved individuals may suffer from a past traumatic brain injury (TBI) and that the lingering effects of that trauma may contribute to their criminal justice involvement and act as a barrier to their successful reentry. Understanding the prevalence and consequences of past brain trauma among that population, particularly in terms of criminogenic risk and needs, will facilitate effective reentry programing.

This article details how neuroscience inquiries are making important inroads in the field of correctional research, traditionally the domain of the social sciences.



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Measuring correctional officer stress

In 2016, NIJ created an interdisciplinary working group on the safety and wellness of all individuals employed by, associated with, or involved with the criminal justice system. The working group called for the incorporation of neuroscience, biological, or physiological measures of wellness into NIJ research. Since then, NIJ has funded four projects that examined correctional officer wellness and responses to stress that have used psychological or biological health markers to augment conventional self-reported assessments of officer stress.

Much of the funded research focused on more of the day-to-day, work-related stress associated with corrections work. That type of stress can be as debilitating as exposure to trauma for police officers.[1] NIJ's goal was to observe whether correctional officers had similar experiences with organizational stress.

MRI imaging to gauge impact of stress on day-to-day activities

A major step forward for the inclusion of biomarkers in NIJ wellness research came from the Oregon Health and Science University (OHSU). The study included a robust measure of the impact of stress on daily function with the use of brain scans with MRI imaging. It investigated long-term exposure to work-related stress among Oregon correctional officers in medium and high-security facilities. The research team administered surveys to correctional officers from six correctional facilities and conducted MRI imagining and collected biomarkers of stress hormones and cardio-metabolic risk on a subsample of 60 officers.

Survey results from 329 correctional officers showed that work overload and other organizational stressors (e.g., insufficient resources, lack of supervisor support) were significant sources of perceived stress. The threat of COVID-19 exposure was also a major source of stress, but it did not contribute as much as the everyday, work-related stress. Additionally, extra money earned from working long hours did not seem to adequately compensate for the added stress placed by the overtime.[2]

The addition of the biological and neuro-imaging data enhanced the policy and practice relevance of the project because it allowed the research team to observe the impact of heightened stress levels in an operational setting. Using a subset of high-stress and low-stress correctional officers identified from the surveys, OHSU researchers were able to see, through MRI imaging, that stress levels impacted mental processing during the performance of mundane tasks. Officers under higher perceived stress levels (when compared to low-stress officers) had to activate the parts of their brain that dealt with focusing on relevant information and discarding irrelevant or conflicting information. The researchers attributed the response to the high-stress group having to activate more cognitive attention to the simple tasks in the lab.[3] In an operational setting, that may mean that correctional officers under higher levels of chronic occupational stress may have more difficulty, or take more time, identifying relevant information in a confusing or evolving situation. The OHSU research team is conducting additional analyses to see if these findings hold.[4]

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If the additional analysis does confirm them, these findings have major operational relevance. The slightest difficulty in quickly sifting through conflicting information would put correctional officers at a disadvantage in a critical incident in a jail or prison setting. As the OHSU team conducts additional analyses on the extent of that impact on cognitive processing and function, further research is also needed to understand how these findings translate from a controlled lab setting to the officers' response to an evolving and possibly chaotic operational incident.

The impact of latent brain trauma on incarcerated individuals

From 2018 to 2021, NIJ sought to generate rigorous program evaluations of emerging reentry initiatives. The effort resulted in 16 separate evaluations, three of which examined individuals with latent brain trauma reentering the community from incarceration.[5]

Prevalence and impact of traumatic brain injury

There is growing recognition that many incarcerated individuals are dealing with the lingering effects of a past TBI. Though estimates vary widely, one half to two-thirds of

the incarcerated population suffer from the effects of one or multiple past TBI.[6] That is roughly five times higher than the incidence within the general population.[7] Comparisons of different classifications of TBI reveal that the estimates are only slightly lower under a strict definition where the past trauma resulted in loss of consciousness. That outcome suggests that most of those instances were severe traumatic episodes.[8] The CDC lists falls, gun violence, car crashes, and assaults as the most common causes of TBI.[9]

For those that suffer from TBI, the already daunting prospect of a successful reentry from incarceration can be even more difficult. Past TBI can inhibit executive functioning. That effect may make filling out forms or navigating bureaucratic processes all the more difficult.[10] Research has also found that TBI may contribute to substance abuse and anger issues.[11] That adds to, and likely compounds, the criminogenic needs these individuals may have to overcome in order to be successful during the reentry process. For example, having a substance addiction puts an individual at risk for TBI, and the resulting injury may then put them at greater risk for substance abuse and dependency.[12]

Reentry interventions for those suffering from traumatic brain injuries

In 2019, and then again in 2020, NIJ funded evaluations of a promising reentry program for individuals suffering from a past TBI. The studies will evaluate variations of the same intervention, called resource facilitation, or NeuroResource Facilitation, which consists of a cognitive behavioral therapy program tailored to individuals with TBI, education on the impact of TBI, and a case management component to identify resources for the client. The cognitive behavioral therapy program addresses mental health issues and aggression often associated with TBI and is paired with a case management component that focuses on overcoming difficulties in problem solving, executive functioning, and organizational skills.[13]

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The Icahn School of Medicine at Mount Sinai, in New York City will study the implementation of a standard NeuroResource Facilitation intervention. The evaluation will randomly assign over 1,500 individuals from two Pennsylvania correctional facilities to either NeuroResource Facilitation or the conventional standard of care. NeuroResource Facilitation relies on training case management facilitators to work specifically with individuals with a history of TBI to identify services (especially services designed for those suffering from past TBI) and craft a reentry plan. The tailored case management is a core component of the program, along with the tailored cognitive behavioral therapy and education regarding the lingering effects of a past TBI. NeuroResource Facilitation participants will continue to receive case management and service referral upon release as well. The Icahn School of Medicine research team will collect data on recidivism, participation in reentry programming and TBI services, and employment outcomes. The evaluation is expected to be completed by the end of 2025.[14]

RHI Foundation of Indianapolis is conducting a TBI-focused evaluation in partnership with the Indiana Department of Corrections. Over 100 incarcerated individuals housed in one facility who were known to have a history of a past TBI were randomly selected to receive the Reentry Continuum for Brain Injury

intervention. The intervention combines the standard NeuroResource Facilitation intervention with programming to enhance resiliency to the effects of past brain injury and identify and decrease aggressive thoughts and impulses. The research team will assess recidivism outcomes up to three years post-release, as well as any positive gains in terms of employment outcomes and reduction in aggressive ideation. Gaining and maintaining successful employment is a major reentry focus of the project, as TBI's effects pose multiple risks to successful employment due to the difficulties with executive function and aggressive ideation. Findings are expected by the end of 2024.[15]

Conclusion

NIJ is taking a critical step to incorporate neurological science into criminal justice research, corrections operations, and reentry programming. First, the exposure to long-term stress can inhibit problem solving by correctional officers. Existing research is being expanded into evaluation of a program aimed at minimizing the impact of that chronic organizational stress. Second, NIJ is evaluating promising interventions to help incarcerated individuals overcome difficulties related to a past traumatic brain injury that may inhibit a successful reentry.

Those initial investments are part of a larger program incorporating neuroscience applications across all components of the criminal justice field. NIJ has initiated a Neuroscience, Law, and Criminal Justice portfolio within the agency. With this new portfolio, NIJ hopes to gain a better understanding of how best to integrate relevant neuroscience research findings into the laws and programming that affect criminal justice operations and outcomes system-wide. It is also working to integrate the work of government agencies, non-profits, and other relevant organizations in ways that maximize and harmonize research efforts and system outcomes. Through those combined efforts, NIJ strives to provide criminal justice practitioners and policy makers with the tools and knowledge needed to meet the needs of both their staff and those individuals affected by the system.

ENDNOTES

[1] See Liberman, A., et al. (2002). Routine Occupational Stress and Psychological Distress in Police, *Policing: An Internal Journal of Police Strategies & Management*, 25: 421-439; Gershon, J. (2009). National Institute of Justice Final Report 'Project Shields,' in Criminal Justice and Behavior 36(3): 275-289; Maguen, S., et al. (2009), Routine Environment Stress and PTSD Symptoms in Police Officers. *Journal of Nervous and Mental Diseases* 197(10): 754-760.

[2] Kuehl, K. (2021). *Defining the Impact of Stress and Traumatic Events on Corrections Officers: Final Research Report*. Washington, DC: National Institute of Justice.

[3] Ibid.

[4] OHSU received additional NIJ funding in 2020 to evaluate approaches to mitigate the common stressors identified in the 2017 study. See Corrections Work's Adverse Effects and a Total Worker Health Program to Enhance Well-being (Topic 2).

[5] Martin, E. & Garcia, M. (2022). "Reentry Research at NIJ: Providing Robust Evidence for High-Stakes Decision-Making." *NIJ Journal* 284.

[6] See CDC (n.d.). *Traumatic Brain Injury in Prisons and Jails: An Unrecognized Problem*. Atlanta, GA: Centers for Disease Control and Prevention; Shiroma, E. et al. (2012). "Prevalence of Traumatic Brain Injury in an Offender Population: A Meta-Analysis. *The Journal of Head Trauma Rehabilitation* 27(3): E1-E10; Durand, L. et al. (2017). "History of Traumatic Brain Injury in Prison Populations: A Systematic Review." *Annals of Physical and Rehabilitation Medicine* 60: 95-101.

[7] See CDC (n.d.). *Traumatic Brain Injury in Prisons and Jails.*

[8] In their meta-analysis, the authors found that studies report any instance of TBI at around 60% of the incarcerated population and the estimate of TBI that resulted in unconsciousness at 50%. Shiroma et al. (2012). "Prevalence of Traumatic Brain Injury," pg. 156.

[9] CDC (2022). *Traumatic Brain Injury and Concussion*. Atlanta, GA: Centers for Disease Control and Prevention.

[10] Nagele, D. et al. (2019). "Brain Injury in an Offender Population: Implications for Reentry and Community Transition." *Journal of Offender Rehabilitation* 57(1): 1-24.

[11] See Adams, R. (2020). "Opioid Use among Individuals with Traumatic Brain Injury: A Perfect Storm?" *Journal of Neurotrauma* 37: 211-216; CDC (n.d.). *Traumatic Brain Injury in Prisons and Jails*.

[12] Adams. "Opioid Use among Individuals with Traumatic Brain Injury."

[13] See Trexler, L. et al. (2010). "Prospective Randomized Controlled Trial of Resource Facilitation on Community Participation and Vocational Outcome Following Brain Injury." *Journal of Head Trauma Rehabilitation* 25: 440-446, and the award descriptions posted to: Resource Facilitation: A promising initiative shown to decrease recidivism in exiting offenders with traumatic brain injury | National Institute of Justice (ojp.gov) and NeuroResource Facilitation for Improved Re-Entry Outcomes for Offenders with Brain Injury: A Multi-Site Randomized Controlled Trial | National Institute of Justice (ojp.gov).

[14] See NeuroResource Facilitation for Improved Re-Entry Outcomes for Offenders with Brain Injury: A Multi-Site Randomized Controlled Trial | National Institute of Justice (ojp.gov).

[15] See Resource Facilitation: A promising initiative shown to decrease recidivism in exiting offenders with traumatic brain injury | National Institute of Justice (ojp.gov)

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