What Came First, PTSD or the Prison System? A Review of Cumulative Trauma Exposure and PTSD Prevalence and Development While Incarcerated

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Abstract

While incarcerated, people can be exposed to events specific to a prison environment. Experiencing a traumatic event is not uncommon for men and women who are incarcerated as the events that occur tend to include physical assault, victimization, and coercion (Piper and Berle, 2019). Cumulative trauma exposure (CTE) is a concern as inmates have little control over the environment they inhabit and the experiences they are exposed to. This article sought to determine whether, and how, CTE and traumatic exposure during incarceration is associated with developing PTSD to identify whether incarceration functions as a moderator for PTSD outcomes. CTE increases the likelihood of developing posttraumatic stress disorder (PTSD) during and after incarceration (Baker et al., 2021). Three factors were observed: (a) interpersonal trauma exposures are connected to more severe, life-long problems than non-interpersonal, (b) cumulative trauma exposure, which is multiple, repeated, or chronic exposure to traumatic events before and during incarceration, results in an increased likelihood of developing PTSD, and (c) experiencing multiple types of exposures—especially physical and sexual abuse as a form of victimization—are positively associated with PTSD symptoms (Morrison et al., 2023). Understanding the type of traumatic events incarcerated individuals are exposed to (e.g. interpersonal and mixed trauma) while simultaneously considering their individual characteristics assisted with navigating ways incarceration moderated PTSD symptoms. Investigating the exposure to traumatic events while incarcerated can increase understanding, and treatment, of the PTSD-related consequences that may arise from incarceration.

Keywords: CTE, PTSD, interpersonal trauma exposure, mixed trauma exposure

There has been extensive research done on the prevalence of mental health problems within prison populations, especially when attempting to identify factors that influence recidivism rates. Prisoners tend to display a higher prevalence of mental health disorders compared to the general population, and PTSD is no exception (Liu et al., 2021). To understand how to remedy recidivism rates, researchers have investigated types of trauma exposure and the implications of when this exposure occurs, along with the consequences of being exposed to a traumatic occurrence such as substance abuse (Lortye et al., 2024). There have also been investigations on adult populations that observe treatment effectiveness for incarcerated individuals who previously experienced trauma (Crole-Rees et al., 2024; Pettus, 2022). This research has demonstrated a need for understanding how mental health contributes to recidivism rates, as well as who is at risk for being incarcerated with its focus on trauma that occurs pre-incarceration. Something equally important to consider that has not been as sufficiently explored is the idea of trauma exposure not only occurring prior to incarceration but also continuing throughout incarceration. The intention of the prison structure in the United States is to discipline those who have disobeyed the moral legislation enforced to deter them from breaking the law again. One could argue this purpose fosters an environment that is distressing to the individuals inhabiting it.

Identifying how cumulative trauma exposure (CTE) functions within incarcerated populations will better inform treatment options and practices within these facilities. There is evidence of a relationship between experiencing childhood adversity, incarceration, and the prevalence of PTSD symptoms during adulthood. Some argue that this extreme prevalence of PTSD

within incarcerated populations is due to the criminalization of this disorder. Rather than perceiving the increased prevalence of PTSD diagnoses within incarcerated populations as the criminalization of people with the disorder, the purpose of this review is to explicate whether incarceration exacerbates PTSD symptoms in those who are at risk for developing the disorder due to cumulative trauma exposure starting at childhood, continuing throughout incarceration and post-release. The aim is to identify how cumulative trauma exposure (CTE) may occur within incarcerated populations and ultimately influence recidivism rates because these individuals (1) experience trauma at higher rates than the general population, and (2) these individuals who have already experienced traumatic events may encounter additional traumatic events while incarcerated (Liu, Wai Li, Liang, and Kai Hou, 2021; Morrison, Pettus, Drake, Roth, Renn, 2023; Piper and Berle, 2019).

This review focuses on adverse childhood exposure (ACE) in addition to exposure to physical and sexual abuse, and victimization while incarcerated to encapsulate the role CTE has on incarcerated populations. To contextualize these forms of trauma exposure, the life course perspective detailed by Liu et al. (2021) will be the primary theoretical framework utilized. The life course perspective emphasizes the complex features of, and consequences of, CTE as it prioritizes acknowledging both (1) what type of event occurred, and (2) when that event occurred developmentally. When discussing CTE, it has been identified that exposure to greater numbers of different types of—or mixed—traumatic events increases the likelihood of developing PTSD (Piper & Berle, 2019). Piper and Berle (2019) conducted a qualitative synthesis of six studies investigating the interrelatedness of experiencing potentially traumatic events (PTEs) while incarcerated and eventually developing symptoms of PTSD. Across all 2153 participants generated from the studies, there was a demonstration of PTE exposure while incarcerated being, "significantly positively associated with PTSD symptoms" regardless of how long an individual has been incarcerated or their pre-existing mental states, as neither was significantly associated with PTSD, suggesting the exposure to the traumatic events themselves was the reason (Piper & Berle, 2019, p. 865; Pettus, 2022, p. 430). Exposure to PTEs while incarcerated has illustrated a significant role in developing PTSD symptoms and expanding on how this may occur will hopefully more effectively inform how we treat victims of trauma before and after incarceration, and positively influence the environment cultivated within prisons.

Defining Trauma and Posttraumatic Stress Disorder (PTSD)

Trauma is defined by the American Psychological Association (APA; 2018) as "any disturbing experience that results in significant fear, helplessness, dissociation, confusion or other disruptive feelings intense enough to have a long-lasting negative effect on a person's attitudes, behavior, and other aspects of functioning. Traumatic events include those caused by human behavior (e.g. rape, war, industrial accidents) as well as by nature (e.g. earthquakes) and often challenge an individual's view of the world as a just, safe, and predictable place." The APA (2018) notes a few key aspects of trauma: (1) the events considered traumatic must be physically experienced (e.g, being physically affected by the actions of another or by experiencing a natural disaster), and (2) the existence of an inhibiting negative mood state (e.g., experiencing in extreme levels of fear, helplessness, dissociation, and/or other disruptive feelings).

Diagnostic requirements for posttraumatic stress disorder (PTSD) in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5-TR) includes three new criteria: continuous adverse emotional standing, consistent misrepresented thoughts on the origin or result of the extremely strenuous event giving rise to holding themself or others liable, and incautious or unhealthy actionsDSM-5-TR, 2022)). The symptom groups encompass invasiveness, aversion, pessimistic adjustments to thoughts and feelings, and adjustments in emotional agitation and responsiveness (Pai et al., 2017). From a neuroscientific perspective, the shift in mood state and behavior can be attributed to "the limbic system," (Pettus, 2022, p. 431). The hippocampus, amygdala, and prefrontal cortex are fundamental for responses to stress and fear, emotional regulation (e.g, irritability and hostility), recollection, knowledge acquisition, differentiating between former and current tense, attentiveness, emotional reasoning, and the processing of information (Pettus, 2022). These regions and brain processes are affected and altered by traumatic stressors. Evidence of the physical effects of traumatic stressors includes PTSD research identifying interferences within the orbitofrontal cortex resulting in aggressive and uninhibited action, as well as support demonstrating a disturbance in terror management, awareness of danger, and interpreting stimuli attributed to positive outcomes when PTSD is evident (Pettus, 2022).

The DSM-5-TR describes PTSD as including exposure to a traumatic event. In this diagnostic manual, trauma is defined as, "actual or threatened death, serious injury, or sexual violence" (Pai et al., 2017, p. 2). Trauma can be conceptualized as an experience igniting an extreme stress response physiologically due to the inclusion of experiencing an extreme compromise to your safety. When observing the environment within prisons in America there is an increased prevalence of violence with violent acts occurring between 13 to 27 times more frequently when compared to mainstream citizens (Piper & Berle, 2019). A feature exclusive to incarceration includes eliminating all options except dependency with virtually no opportunity to escape their immediate circumstances, and this extreme enforcement of dependency and helplessness fosters an environment prevalent

with intense interpersonal traumas—coercion, abuse/assault, and victimization. (Piper & Berle, 2019, p. 856; Morrison et al., 2023, p.169).

Exposure is categorized by three types: firsthand exposure, viewing trauma happen to someone else, and secondhand exposure through the trauma experienced by family or intimate associates (Pai et al., 2017). There is a fourth type of exposure added to the DSM-5-TR, explained as reoccurring or intense exposure to taxing events (Pai et al., 2017). This fourth type of exposure is relevant when considering employees coming into contact with the results of traumatic events as an aspect of their job requirements, but when considering reoccurring or intense exposure to taxing events in the context of being incarcerated, one begins to contemplate the connection between exposure to conditions exclusive to prison and the development—or exacerbation—of PTSD.

Continuing the discussion of exposure to traumatic events, there is a relationship between the likelihood of being incarcerated and exposure to traumatic events. According to Pettus (2022), "research on the prevalence of traumatic experiences among those with incarceration histories largely falls into two categories: the prevalence of adverse childhood experiences and prevalence of lifetime traumatic experiences, which can include current experiences" (p. 425). Specifically, exposure to adverse childhood events (ACEs) is higher in incarcerated individuals in comparison to the general population (Morrison et al., 2023). In addition to exposure to ACEs, lifetime traumatic experiences—which is the culmination of all extremely distressing events experienced throughout a person's life from birth to the present day, and the impact of experiencing those events—are important to consider, especially for incarcerated populations. Studies have found that "lifetime traumatic experiences are significantly and positively correlated with both engaging in criminal behavior and factors that predict engagement in criminal behavior (e.g., poor emotional regulation, aggression, hostility, impulsivity, risk-taking, and substance misuse)" (Pettus, 2022, p. 424). As previously mentioned, traumatic stressors disrupt the cognitive processes that regulate emotions, aggression, hostility, impulsivity, and information processing. The disruptions to these cognitive processes result in trauma exposure not only increasing the likelihood of being incarcerated but also related to the increased possibility of experiencing PTSD symptoms and decreasing the likelihood of successful reintegration upon release.

Cumulative Trauma Exposure and the Life Course Perspective

The first category of traumatic experiences present among incarcerated individuals is the prevalence of lifetime traumatic experiences. Acknowledging the lifetime traumatic experiences an individual encounters requires considering the culmination of trauma experienced from birth to the present day. The lifetime traumatic experiences of an individual are conceptualized within the context of CTE and the theoretical perspective known as the life course perspective (Liu et al., 2021). CTE is repeated and/or prolonged experiences of traumatic events. The life course perspective observes factors such as, "chronological age, significant life events, and social changes" and their influence on a person's life trajectory from beginning to end (Liu et al., 2021, p.2). Reviewing CTE and the life course perspective is conducted within criminology settings to distinguish the role trauma plays in engaging in criminal behavior. Identifying this relationship between experiencing trauma throughout your lifetime and engaging in criminal behavior begins with the prevalence rates of adverse childhood experiences (ACEs) within incarcerated populations. The aim is to inform our understanding of the impact ACEs have on incarcerated populations.

The life course perspective defines a life event as a situation "that incurs a relatively abrupt change in life and may have [a] significant and long-lasting impact" (Liu et al., 2021, p. 2). Traumatic experiences can be considered distressing life events that cause physiological and psychological changes in behavior, and they can have prolonged impacts on quality of life. Because the life course perspective observes factors such as the chronological age of the individual when the events occurred, and the impact of these life events from the beginning to the end of an individual's lifetime, CTE becomes an instrumental facet of this theoretical perspective.

The life course perspective acknowledges life events that can have long-term effects on the individual experience in addition to identifying transition periods that occur throughout life. A transition is defined as, "a change in roles and statuses that represents a distinct departure from prior ones" (Liu et al., 2021, p. 2). An example of a transition is going from childhood to adolescence and into adulthood based on chronological age. These developmental stages differ in skills and abilities acquired that move the individual from one role to another. In the context of imprisoned populations, three transitions are prevalent within the life course perspective: (1) physiological and psychological changes that occur during childhood into adulthood; "(2) role and status transitions from pre-imprisonment to imprisonment; and (3) other role and status transitions from imprisonment to post-imprisonment" (Liu et al., 2021, p. 2). The physiological and psychological transitions occurring during childhood, adolescence, and into to adulthood associate the period in which the event occurred with the cognitive and physical capabilities during that stage, providing insight into the developmental impacts traumatic events have on later development. Transitions that occur pre-imprisonment from childhood to adulthood, and changes or events that occur during and after imprisonment are also considered in this framework. The culmination of three transitions for incarcerated individuals and the acknowledgment

of CTEs throughout these transitions provides a general timeline for lifetime trauma as it outlines the occurrence of trauma anytime across the lifespan.

When studying criminal behavior, the life course perspective is important as it attempts to "conceptualize important issues such as the development of offending behaviors, protective and risk factors of committing crime at different ages, and the role of life events across developmental stages" (Liu et al., 2021, p. 2). Generally speaking, a large percentage of inmates have encountered no less than one traumatic event and face high rates of exposure to childhood adversity prior to being incarcerated (Morisson et al., 2023; Konecky and Lynch, 2019). When observing poor men of color, and women, events such as sexual assault and physical abuse were very prevalent within the population prior to being incarcerated (Baker et al., 2021;Konecky & Lynch, 2019; Morrison et al., 2024 ; . Multiple traumatization, rather than a single trauma exposure, increases the risk of developing mental disorders, especially PTSD (Baker et al., 2021;Liu et al., 2021). It has been found that cumulative trauma exposure (CTE) from childhood and pre-imprisonment impacts the later development of PTSD symptoms after incarceration. Due to the disruptions in the limbic system caused by traumatic stressors, both exposure to multiple traumatic events and PTSD are linked to "lower distress tolerance which likely exacerbates the effects of post-traumatic stress and related outcomes," (Baker et al., 2021, p. 250). Traumatic events compromise regulatory and decision-making abilities which would inherently impact a person's ability to manage the impacts of traumatic events. Acknowledging the cognitive impacts attributed to trauma exposure is productive when considering ACE. Exposure to trauma at younger ages will only further impact that individuals development long-term; the disruptions in the limbic system will have more significant impact when it occurs sooner. Experiencing more than one traumatic stressor would only amplify the lack of distress tolerance and limbic system functioning, "women who experienced more cumulative trauma exposures had significantly worse emotion regulation and more severe PTSD symptoms," (Konecky & Lynch, 2019, p. 809). Understanding how traumatic events before, during, and after incarceration are associated with the development of PTSD symptoms is best observed using the life course perspective, and the trend of CTE that exists within this framework. The life course perspective and CTE establish the foundation of physiological and psychological consequences resulting from prolonged trauma exposure. Understanding *when* and *what* trauma impacts incarceration likelihood can explain why incarceration further exacerbates PTSD symptoms.

Cumulative Trauma Exposure: Distinguishing Types of Traumas

Throughout a person's lifetime, people can be exposed to more than one traumatic event, and these traumatic events can vary in the type of trauma experienced. Different types of traumatic interactions can include: indirect (the person is observing a traumatic event occur to someone else; generally, this type of trauma is a secondary experience), direct (the person is immediately impacted by, and is personally experiencing the traumatic event), interpersonal (the traumatic event is distressing and typically involves an interaction between two parties), or even mixed (experiencing multiple types of trauma, or repeated exposure to the same type of trauma). Morrison et al. (2023) state three patterns generally observed within existing trauma researcher literature. The first established trend within trauma research is that (a) interpersonal trauma exposures are connected to more critical life-long problems than non-interpersonal (Morrison et al., 2023). Distinguishing the form of exposure to the traumatic event is significant when identifying how PTSD develops to possibly observe if it develops differently depending on the how the person is involved in the experience. Firsthand and secondhand exposure to traumatic events are both distressing to the individual, and both types of exposure are prevalent within prisons. In a prison it can be difficult to obtain privacy so it can be even more difficult to physically avoid distressing events. The second established trend Morrison et al. (2023) mentions is that (b) complex trauma—multiple, repeated, or chronic exposure to traumatic events—results in more negative "mental health outcomes in both degree and type" in comparison to exposure to only one event (p. 169). This is important to acknowledge when observing incarcerated populations as there are distinct potentially traumatic events (PTEs) that occur while imprisoned, resulting in more frequent exposure to traumatic events (Piper and Berle, 2019). The third established trend proposed by Morrison et al. (2023) is that (c) experiencing multiple types of exposures—which is known as polyvictimization—("e.g. physical abuse and sexual abuse") plays a role in exhibiting more intense symptoms, along with distinct obstacles in how to approach care, in contrast to encounter one *type* of traumatic exposure regardless of whether it's repeated or chronic (p. 169). Not only is there an increased exposure to PTEs within a prison setting, but there are different forms of these events that exacerbate the expression and intensity of PTSD symptoms.

The significance of distinguishing the types of traumas imprisoned populations encounter is that it can impact the likelihood of developing PTSD symptoms later in life, as well as impacts the likelihood of re-incarceration post-release. The findings suggested by Morrison et al. (2023) support the idea that the impacts of CTE throughout the life course of an individual is most significant when considering (1) when life events and transitions occur, and (2) identifying what those transitions and life events (i.e. CTE) are. The findings suggest that when we consider these two factors, we have a better ability to truly grasp the impact of when, and what CTEs lead to the development of PTSD symptoms for incarcerated individuals.

Interpersonal Trauma Exposure

Interpersonal traumas are defined by Baker et al. (2021) as "experiences involving direct or vicarious emotional abuse, emotional neglect, physical abuse, physical neglect, and/or sexual abuse perpetrated by another person, often someone known to the victim. Interpersonal traumas often feel deeply personal, especially when the victim knows and trusts the perpetrator," (Baker et al., 2021, p.250). Interpersonal traumas can be extremely distressing as they are inherently considered an assault on one's perception of themself, ultimately leading to trauma-related cognitions regarding an individual's self-image and a discontinuity of their self-image (Anderson et al., 2019). Discontinuity of self is one of the criteria for a PTSD diagnosis so it is important to consider when discussing exposure to interpersonal traumas within incarcerated populations (Anderson et al., 2019). Incarcerated women with a history of sexual assault, whether as a child and/or adult, have illustrated more challenges with adapting to "the prison environment than incarcerated women with no prior sexual assault history" (Anderson et al., 2019, p.5). The discrepancy in women's ability—and others ability—to adjust to the prison environment could be explained by the interpersonal trauma exposure. It has been demonstrated that when the interpersonal trauma exposure occurred during the pre-imprisonment transition, "individuals entering incarceration could be destabilized from the trauma in addition to the distressing experience of conviction, sentencing, and removal from the community," (Pettus, 2022, p. 427). Interpersonal trauma exposure compromises cognitive abilities, and these cognitive vulnerabilities expose the individual to negative health issues that are exacerbated during incarceration. Interpersonal traumas are generally attributed to more intense life-long problems compared to non-interpersonal trauma exposures (Liu et al., 2021; Morrison et al., 2023, p.169). Liu et al. (2021) suggested that physical, sexual, and emotional abuse were attributed to increased risk of Axis I mental disorders—which includes "anxiety, depression, PTSD, ADHD, and psychosis"—and "Axis II mental disorders"—which includes personality disorders—among prisoners and ex-prisoners, implicating the life-long problems that can exist from exposure to interpersonal trauma (p. 2). There is a transparent trend in traumatic exposure for incarcerated individuals that resembles diagnostic criteria for PTSD and other mental health disorders.

Mixed Trauma Exposure

Mixed trauma exposure is defined as the experience of multiple types of trauma, or the repeated exposure to the same type of trauma. Mixed trauma and CTE are complementary to each other because CTE, "captures one's lifetime experience of abuse, whether repetition of the same type, differing types, or a combination of both," (Baker et al., 2021, p.250). Mixed trauma has been confirmed to be interrelated "with all mental disorders" according to Liu et al. (2021), with the attribution of trauma disorder being stronger with mixed trauma compared to physical trauma alone (p.8). Incarcerated people experience various types of traumatic events that occur at an earlier age and last for a longer period, causing a link between trauma and mental health issues and increased likelihood of engaging in criminal behavior (Liu et al., 2021). Building on this discovery, Anderson et al. (2019) found that, "the severity of psychological disorders increased by the amount and types of trauma experienced," (p.9). Mixed trauma exposure and CTE play important roles in mental disorder development as these concepts highlight that traumatic disruptions are more intense when experienced cumulatively.

Cumulative Trauma Exposure: Trauma During Childhood

The second form of traumatic experience investigated in incarcerated populations is the existence of adverse childhood experiences (ACEs). It has been reported by Morrison et al. (2023) that incarcerated populations "have high rates of exposure to childhood adversity" (p. 169). Cumulative trauma exposure starts with an individual's exposure to ACEs. ACEs occur at the beginning of an individual's lifespan and the type of ACE, and quantity of exposure to them, demonstrates increased risk for several poor health outcomes. Originating in the 1990s, the ACE project was a study formulated to highlight possible interactions between interpersonal traumas such as, "abuse, neglect, and family/household challenges (e.g., violence in the home, mental health and substance use disorders in the home)" occurring throughout youth and enduring consequences on well-being (Pettus, 2022, p. 425). Pettus (2022) reported that the individuals who experienced ACEs, especially four or more, are substantially more likely to experience multiple negative issues regarding their physical and behavioral health (Pettus, 2022). The existence of an increased risk of negative health issues being significantly associated with the number of ACEs an individual is exposed to demonstrates a cumulative effect of trauma when applying the life course perspective framework.

Considering the cognitive and physical disruptions trauma causes, one could argue that unless appropriately managed the ACE can impact mental health long-term. Liu et al. (2021) discovered that childhood trauma was positively correlated with all mental disorders. It is most productive to observe the prevalence of cumulative trauma from the three transition stages mentioned previously: (1) transitions from childhood and adolescence to adulthood, (2) role and status transitions from pre-imprisonment to imprisonment (3) other role and status transitions from imprisonment to post-imprisonment, and the

transitions' association to the risk of developing mental disorders. Liu et al. (2021) provide significant statistical results that break down the importance of when trauma exposure occurs. Liu et al. (2021) identify that, "the majority of effect size was reported on childhood trauma (55.05%), followed by lifetime trauma (32.83%), imprisonment trauma (6.06%), pre-imprisonment trauma (5.56%), and post-imprisonment trauma (0.51%)" (p. 7). It is important to consider that experiencing trauma during childhood accounted for over half of the effect found on the interaction between someone experiencing a traumatic event and the likelihood they'll develop mental disorder symptoms later in adulthood. Most prisoners report experiencing at least one ACE, and when the symptoms from the exposure to this event go untreated these individuals only build upon this maladaptive mental state when exposed to PTEs in prison. Pre-imprisonment trauma (PIT)—a traumatic event experienced during or closer to adulthood prior to imprisonment—has previously demonstrated that it contributed more to the prediction of trauma-related cognitions than what was considered when observing incarceration-based trauma (IBT), or trauma that occurs during incarceration, alone (Anderson et al., 2019). The more significant impact PIT has on predictive implications for demonstrating trauma-related cognitions speaks to the fact that incarcerated individuals have pre-existing negative cognitions from distressing events that are only exacerbated while imprisoned.

Exposure to ACEs is highly associated with developing mental disorder symptoms and the increased risk of incarceration. Comparing individuals that are not involved in the justice system but have experienced ACEs to a sample of individuals involved in the justice system, Pettus (2022) identified that, "those with juvenile justice involvement were four times more likely to report four or more ACEs (50% versus 13%)" (p.425). If you experience four or more ACEs, the likelihood of incarceration during adulthood increases significantly. Pettus (2022) reports the increased risk of criminal justice system involvement during adulthood would include, "arrest, incarceration, and being incarcerated more than once as a young adult (ages 24–32), or in middle adulthood (ages 33–43)" (p. 429). Pettus (2022) continues to state that all types of mistreatment during youth—except for "caregiver maladjustment"—increased imprisonment probability during adulthood with better predictability for women than men (p. 429). Interpersonal trauma seems to be the most prevalent form of trauma amongst incarcerated individuals. Pettus (2022) discusses the findings that most, "incarcerated women (58%) and more than one-third of men (37%) fall into the highest ACEs risk category for poor outcomes in adulthood (i.e., 4 or more ACEs)." After combining the imprisoned men and women reports of ACEs, the following childhood adversities were identified: "64% reported emotional abuse, 60% reported physical abuse, 43% reported sexual abuse, 71% had divorced parents, 40% witnessed domestic violence, 64% had alcohol/drug use disorders in their home, 34% had mental health disorders in their home, and 42% had an incarcerated parent" (p. 426).

The typology of the ACE—specifically the higher prevalence of interpersonal trauma—and the amount of exposure to them cumulatively are considered to accurately predict incarceration likelihood, and the prevalence of mental disorder symptoms during and after imprisonment. Liu et al. (2021) mention that, "childhood emotional abuse alone was related to a four-time higher likelihood of clinically significant psychotic symptoms among a sample of male prisoners with substance abuse" (p. 2). Emotional abuse is a form of interpersonal trauma and the fact that trauma in youth, regardless of whether it is experienced firsthand or secondhand, happens in a "developmentally formative period" insinuates permanent consequences on "individuals' functioning" (Liu et al., 2021, p. 2). Interpersonal ACEs are formative events that shape the trajectory of individuals' lives, and whether than trajectory is heading toward or away from incarceration and subsequent PTSD symptom development.

Cumulative Trauma Exposure: Trauma During Incarceration

The culmination of traumatic experiences is, "significantly and positively correlated with both engaging in criminal behavior, and factors that predict engagement in criminal behavior (e.g., poor emotional regulation, aggression, hostility, impulsivity, risk taking, and substance misuse)" (Pettus, 2022, p. 424). As previously discussed, ACEs and CTE results in an increased risk of incarceration when untreated and this is due to the trauma-related cognitions and disruptions, such as the discontinuity of self and relapse in emotional regulation, that cause behaviors such as aggression, impulsivity, and risk-taking. This interaction between trauma and PTSD, and the association with criminal behavior, can be known as the "trauma-to-prison pathway" (Baker et al., 2021, p.250).

Traumatic Exposure Exclusive to Imprisonment

If someone along the trauma-to-prison pathway ends up incarcerated, they can be exposed to specific events including PTEs. Consistent exposure to PTEs may result in the development of mental disorders. Potentially traumatic events are defined by Piper and Berle (2019) as, "any form of actual, attempted, or threatened physical, sexual, emotional or environmental abuse or neglect, resulting in significant psychological distress" (p. 855). This definition reflects traumatic experiences that occur while incarcerated, and resembling criterion mentioned for PTSD diagnosis within the DSM-5. Events that occur within the prison environment tend to include "interpersonal traumas such as physical and sexual assault, victimization, and coercion," (Piper

and Berle, 2019, p.5). Anderson et al. (2019) mentions a previous study reported that the ordinary contextual circumstances inmates typically encounter include the threat of "physical and sexual assault, theft, robbery, and property damage"—which are all interpersonal traumatic events—"with one out of every 10 inmates being victims of physical assault within a six-month period," (p.5). The concept of traumatic events exclusive to being incarcerated—meaning the exposure to these events is more likely to occur due to being incarcerated—is also known as 'prison-induced stressors' according to Anderson et al. (2019). The model that identifies prison-induced stressors proposes that institutional stressors may be attributed to a negative impact on inmate behavior. It has been found that 13-40% of incarcerated individuals report experiencing at least one form of trauma during imprisonment (Pettus, 2022, p.427). The prison environment is evident to expose incarcerated individuals—most of which have most likely experienced at least one form of ACE—to potentially traumatic events that only heighten the already increased likelihood of developing symptoms of PTSD.

Traumatic Exposure Exclusive to Imprisonment-Victimization

Victimization and physical and sexual abuse are related to each other in that victimization can operate as a form of trauma. Victimization can also present as a result of traumatic experiences such as physical abuse. The exposure to adverse life experiences during "crucial and formative developmental stages," such as childhood, is associated with harmful mental health outcomes and behaviors that compromise physical well-being (Liu et al., 2021, p.3). This suggests that trauma is a sustained experience as previous trauma is, "positively related to subsequent victimization" (Liu et al., 2021, p.3). In fact, among incarcerated men and women, women report a 78% prevalence of personal victimization where men report a 15% prevalence of victimization (Anderson et al., 2019, p. 3).

Continuing the discussion of Piper and Berle's (2019) findings, 3/6 studies observed the prevalence of victimization and abuse while incarcerated in addition to developing PTSD symptoms post-release. All studies analyzed concluded that experiencing victimization and abuse while incarcerated is positively associated with PTSD. Piper and Berle (2019) mention that even individuals without mental health concerns prior to incarceration demonstrated a significant positive relationship between victimization and PTSD symptoms. Interestingly, there was no relationship between victimization and PTSD symptoms for people with mental health problems prior to incarceration. It is important to acknowledge that this interaction between victimization and PTSD development was more significant in populations without mental health concerns prior to incarceration, illustrating the intense impact prison-induced stressors has on an individual and supporting the idea that incarceration functions as a moderator for PTSD development. 1/6 studies were interested in the association between perceiving a threat and coercion while incarcerated on PTSD outcomes post-release (Piper and Berle, 2019). These studies found coercion having a negative effect on inmates' mental states (Piper & Berle, 2019). Victimization in the context of coercion demonstrates an increased likelihood of PTSD development regardless of the existence of previous mental health concerns, further supporting the idea that prison environments functioning as a moderator in aggravating PTSD symptoms through a compromised mental state.

Traumatic Exposure Exclusive to Imprisonment: Physical and Sexual Abuse

Observing the cumulative effects of physical and sexual abuse within incarcerated populations highlights a moderating effect of incarceration on PTSD development. Physical trauma is understood as physical abuse, neglect, or witnessing violence, and sexual abuse is understood as abuse or assault in a sexual context (Liu et al., 2021). Incarcerated women generally report more childhood abuse than men. Women are 7 times more likely to experience sexual abuse and 4 times more likely to experience physical abuse, with childhood sexual abuse being associated with "depression, suicidal ideation, stress, victimization and recidivism for them but not for men" (Anderson et al., 2019, p.10). The importance of acknowledging the occurrence of physical and sexual abuse prior to incarceration during childhood or adulthood is due to incarcerated women demonstrating that their experience with childhood sexual trauma was associated with increased levels of trauma-related cognitions (Anderson et al., 2019). This increase in trauma-related cognitions ultimately impact how they cope with prison-induced stressors.

Men and women are vulnerable to viewing or experiencing physical or sexual violence while incarcerated. 100 post-incarcerated men were interviewed and 89% reported they directly (~30%) or indirectly (~79%) experienced violence during incarceration (Pettus, 2022). More than half of incarcerated men (60%) who have been exposed to trauma indicate that violence was executed by correctional staff, while 26% of the incarcerated men say it was executed by another prisoner, and 15% being attacked by both (Pettus, 2022). The non-existent privacy in the prison environment stems from the extreme presence of correctional staff or inmates, and this might detract from an inmates' positive sense of self. This lack of privacy results in discontinuity of self in response to the absence of autonomy, and the lack of trust in other inmates and correctional staff. These conditions only instigate negative self-worth due to a fear of vulnerability causing an individual to isolate themselves. Although this has been found to impact female inmates more in the context of increased vulnerability to sexual abuse, it should be

acknowledged that the lack of privacy could very well be applicable to negative effect on male inmates as men can also experience anguish and distress regarding the loss of their "ability to make choices while incarcerated," (Anderson et al., 2019, p.5).

Traumatic Exposure: Gender Distinctions

This review includes several examples of types of traumatic exposure incarcerated men and women encounter.There are several similarities with trauma exposure and the development of PTSD symptoms across genders, but there are also distinctions that are important to acknowledge. It has been mentioned by Anderson et al. (2019) that there is a necessity for creating a framework centered on the traumatic experiences incarcerated women encounter. They proposed this framework due to most of the existing literature on trauma exposure and incarcerated populations focusing on youth, or men, meaning the frameworks and implications from these experiments are reflective of their experience more than a womens' experience. Liu et al. (2021) acknowledge that men and women are at an increased risk for developing PTSD due to different types of trauma exposure. Liu et al. (2021) mention increased probability of PTSD development in women is linked closest with sexual trauma, whereas for men the probability will increase the most with "non-sexual interpersonal trauma" (p.2). To support this assumption, Pettus (2022) report that a majority (80%) of convicted women encountered "one or more ACE" with half of these ACEs being sexual abuse (p.426).

Not only is there a significant distinction between the types of exposure that result in PTSD development between men and women, there is also a significant distinction between the prevalence of PTSD across genders. Compared to incarcerated men and the general population, PTSD prevalence is highest within incarcerated women (Anderson et al., 2019; Crole-Rees et al., 2024). This discrepancy in symptom expression across genders is significant when attempting to understand the role CTE plays in PTSD development within incarcerated individuals as it informs how to more effectively approach treatment options. Focusing on as many factors as possible—the type of traumatic exposure, gender, when the traumatic event occurred—will strengthen our understanding of the mechanisms operating on the development of PTSD and hopefully positively influence recidivism rates.

Discussion

The interaction between trauma and PTSD development is founded on the evidence that (1) the type of trauma (interpersonal, mixed, and ACE), (2) the amount of trauma, and (3) when the trauma exposure occurs determines not only the chance of being incarcerated but also predicts the development of PTSD during and after incarceration. The life course perspective is an effective framework demonstrating this interaction as it follows the occurrence of traumatic events throughout three transition stages of incarcerated populations: (1) physiological and psychological changes that occur during childhood into adulthood; "(2) role and status transitions from pre-imprisonment to imprisonment; and (3) other role and status transitions from imprisonment to post-imprisonment" (Liu et al., 2021, p. 2). Cumulative trauma exposure (CTE) across the lifespan of an incarcerated individual has proven to have significant implications on the development of PTSD symptoms and other mental disorders with interpersonal and mixed trauma having the strongest effect. Adverse childhood experiences (ACEs) are events that predict an increased likelihood of incarceration when exposed to four or more. The evidence of ACEs impact on incarceration risk can be attributed to cognitive disruptions that occur after traumatic exposure and alter the course of development, especially when these disruptions go untreated. ACEs are the foundation of the trauma-to-prison pathway as traumatic experiences are understood to cause disruptions on cognitive processes such as emotional regulation, information processing, and decision making which increases the probability of individuals engaging in criminal behavior. The existence of exposure to multiple traumatic events within incarcerated populations interact with prison-induced stressors—physical abuse, victimization, threat, coercion, and lack of autonomy—further exacerbating cognitive disruptions. Imprisonment-based trauma (IBT) could be viewed as a moderator of PTSD development using the life course framework as IBTs have demonstrated significant impact on the probability of developing PTSD in individuals with, and especially without, mental health concerns prior to incarceration, and incarcerated individuals have exposure to a variety of numerous traumatic events starting during childhood and continuing post-release.

The implication of this review includes understanding the role of trauma exposure and PTSD development within prison populations to formulate more effect interventions within prison facilities as well as within communities to reduce recidivism rates. Specially, implementing trauma-informed practices within correctional institutions could mitigate the negative effects of cumulative and incarceration-based trauma exposure because these practices involve staff and inmates acknowledging the preexistence of trauma experienced by the inmate in addition to the current trauma exclusive to imprisonment, allowing inmates to be vulnerable and express autonomy in voicing their emotions without fear of stigmatization.

When answering the question, "what came first, PTSD or the prison system," it is safe to assume that the higher prevalence rates of PTSD within incarcerated populations is not mainly attributed to the existence of a PTSD diagnosis (or other mental health concerns) but is the result of cumulative unresolved trauma that manifests into PTSD once an individual is thrown into the correctional facility environment. Socioeconomic and gender differences have been explored in the context of investigating trauma exposure, PTSD development and incarceration, but there is limited research on distinguishing apparent differences in trauma exposure between racial groups, as well as studies aimed at observing adult populations rather than juvenile samples. Understanding how cultural influences may or may not be attributed to the interpretation and impact of traumatic events, especially in the context of cumulative trauma exposure, would strengthen the fields understanding of individual factors and PTSD development. Observing more adult incarcerated populations would solidify the link between ACEs and trauma experienced during adulthood as their connection over time would become more transparent when identifying how the effects of ACEs manifest in adults.

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