

Occupational and Environmental Hazards of Correctional Settings

A Scoping Literature Review From ACOEM's Presidential Task Force on Correctional Institutions

Andre Montoya-Barthelemy, MD, MPH, Brent R. Gibson, MD, MPH, CAE, FACPM, CCHP-P, Charles D. Lee, MD, JD, MBA, CCHP-P, Aashia M. Bade, PsyD, HSPP, James W. Butler, MD, MPH, Eric Smith, DO, MPH, Diane Skipworth, MCJ, RDN, LD, RS, CCHP, Julie Gutekunst, BS, Marjorie Naila Segula, BS, Cassie Wicken, MHS, Eric Friedman, BA, Isha Darbari, BS, Samantha Menegas, BS, Shreya Thatai, BS, and Lauren Wheeler, MLIS, ACOEM Presidential Task Force on Correctional Institutions

Objective: Maintaining healthful, safe, and productive work environments for workers in correctional settings is a matter of deep consequence to the workers themselves, the institutions they serve, the incarcerated individuals with whom they share space, and inevitably, to our wider community. We hypothesized that an examination of the academic literature would reveal opportunities for an improved approach to research in these settings. **Methods:** We performed a scoping literature review using search terms related to the occupational and environmental health of workers in correctional environments, limited to studies performed in the United States. **Results:** A total of 942 studies underwent title and abstract screening, 342 underwent full-text review, and 147 underwent data extraction by a single reviewer. The results revealed a body of literature that tends strongly toward analyses of stress and burnout of correctional staff, largely based on self-reported data from cross-sectional surveys. Those studies related to physical health were predominantly represented by topics of infectious disease. There were few or no studies examining exposures or outcomes related to diagnosable mental health conditions,

musculoskeletal injury, environmental hazards, medical or mental health staff, immigration detention settings, or regarding incarcerated workers. There were very few studies that were experimental, longitudinal, or based on objective data. **Discussion:** The National Institute for Occupational Safety and Health (NIOSH) has promulgated a research strategy for correctional officers that should guide future research for all workers in correctional settings, but realization of these goals will rely upon multidisciplinary collaboration, specific grants to engage researchers, and an improved understanding of the barriers inherent to correctional research, all while maintaining rigorous protection for incarcerated persons as an especially vulnerable population.

BACKGROUND

Correctional Facilities Are a Unique Setting

Within the walls of United States (U.S.) correctional facilities work about 729,000 staff and administrators,¹⁻³ in more than 7000 correctional institutions (1833 state prisons, 110 federal prisons, 1772 juvenile correctional facilities, 3134 local jails, 218 immigration detention facilities, and 80 Indian Country jails).⁴ Their most fundamental goal is to provide a safe and orderly environment for 2.3 million incarcerated people who may also be workers in an enormous variety of roles. Although correctional officers are the most immediately recognized and have the most obvious and direct involvement with incarcerated persons, a full review of correctional professionals must also include administrators, medical and mental health staff, social workers, maintenance or food service professionals, incarcerated workers, and many others who are essential to the successful operation of the correctional institution.

Many of these professionals maintain a perpetual presence in the facility, over nights, weekends, and holidays, subjecting them to all the deleterious effects of shift work.⁵ Their importance is reflected in institutional budgets, where their salaries constitute 70% to 80% of the total.⁶ They are the ultimate first responders and essential workers; they must be ready to respond to violence, medical and social emergencies, fires, and chemical hazards. They are administrators, social workers, maintenance, and safety professionals. Correctional officers, for example, generally hold the most immediate responsibility for surveillance of environmental hazards including broken windows, exposed wires, peeling paint, water leaks, mold growth, and fall hazards.

Corrections is a human service profession of the most demanding kind,⁷ and the professionals who do this work, more than anyone else, directly affect the practice of incarceration in the way that they perform their jobs. Therefore, the health and safety of these correctional professionals is crucial to their effectiveness and that of the institutions they serve.

Hazards—Correctional Workers

Work in the correctional setting can be singularly stressful and dangerous. Correctional workers face hazards of all types, in a combination that is highly unique to the correctional setting.⁸ (See Table 1 for a tabular list of hazards.)

For example, in 2012, Konda et al⁹ used national level data from 1999 to 2008, informed by the Census of Fatal Occupational Injuries and the National Electronic Injury Surveillance System, to demonstrate that correctional officers have one of the highest rates of nonfatal injury requiring days away from work (445.6 per 10,000 full-time workers) relative to all occupations (117.2 per 10,000 full-time workers).

From the American College of Occupational and Environmental Medicine, Elk Grove, Illinois.

This guidance paper was developed by the ACOEM Presidential Task Force on Correctional Institutions and approved by the ACOEM Board of Directors. ACOEM requires all substantive contributors to its documents to disclose any potential competing interests, which are carefully considered. ACOEM emphasizes that the judgments expressed herein represent the best available evidence at the time of publication and shall be considered the position of ACOEM and not the individual opinions of contributing authors. The authors declare no conflicts of interest.

Address correspondence to: Marianne Dreger, ACOEM, 25 Northwest Point Blvd, Suite 700, Elk Grove Village, IL 60007 (info@acoem.org). Copyright © 2022 American College of Occupational and Environmental Medicine DOI: 10.1097/JOM.0000000000002440

TABLE 1. Hazards Characteristic of Correctional Settings by Type

Hazard Type	Examples
Physical	Interpersonal violence, transportation injuries, ergonomic injuries, slip/falls
Biological	Infectious disease (COVID, TB, MRSA), blood-borne pathogen exposures
Chemical	Tear gas, pepper spray, cleaning chemicals, occupational chemicals, cigarette smoke
Radiological	Outdated medical equipment
Environmental	Thermal health, moisture, dust and pests, safety and security, water quality, noise, lighting, ventilation, air quality
Psychosocial	Stress, burnout, suicide, PTSD, depression, anxiety, substance abuse
Occupational	Disability, professional and geographic isolation, lower pay and professional prestige than non-corrections professionals, presenteeism, absenteeism, high turnover, inadequate staffing, prolonged work hours

Of these, assaults comprised the majority of the total (about 40%), followed by “bodily reaction” (ie, non-impact injuries), and contact with objects at about 20% each. Fatal workplace injuries over the study period averaged 11 per year. About 40% of these were related to transportation and about 40% were due to violence. Of the violent deaths, 62% were due to homicide, 38% were due to suicide. Among the homicides, 64% were committed by incarcerated people; 36% were committed by non-incarcerated people.

Although the Konda study is limited to correctional officers, it illustrates a working population that has an injury rate among the highest in the country, is frequently exposed to violence and has a suicide rate that is 40% to 100% higher than police officers and military veterans.¹⁰ Statistics of mental health and substance abuse professionals working with involuntarily committed patients in other settings reflects a similarly high rate of injury.¹¹

Detention settings are extremely susceptible to the rapid and disastrous spread of infectious diseases among both the incarcerated and staff population, owing to both environmental and host factors—a point extensively documented by the historical spread of influenza, tuberculosis, and most recently COVID-19.^{12–14} As individuals, prisoners tend to have a high prevalence of chronic diseases and psychiatric illness, and prisons house an increasingly aging population.¹⁵ These population factors promote more rapid infectious disease propagation and transmission. Environmental factors facilitating the spread of disease may include overcrowding, poor ventilation, close habitation, or dormitory-style housing.^{13,16} In addition, institutions strictly control sanitary supplies such as soap, cleaning supplies, hand sanitizer, and spare clothing or bedding,^{16,17} likely impeding adequate personal hygiene and contributing to disease spread. Staff can be exposed through uncontrolled physical contact, as the correctional officers move prisoners or engage in altercations, and as medical staff perform physical examinations and medical procedures.¹⁷

The Harvard T.H. Chan School of Public Health Healthy Buildings Program describes nine foundations for a healthy building (thermal health, moisture, dust and pests, safety and security, water quality, noise, lighting, ventilation, air quality),¹⁸ each of which has been documented to be lacking in some correctional settings, thus posing additional hazard to health.¹⁹ Bernd et al²⁰ cite specific examples related to water contamination with arsenic and other heavy metals, extreme heat without air conditioning, air contaminated with coccidiomycosis or coal ash, or old facilities with unabated asbestos. They also describe the effects of prisons on the local water and air, from industrial prison industries, raw sewage, or firing ranges. In another example of shared occupational hazard, the Office of the Inspector General described incarcerated workers in a prison-industries recycling operation exposed to levels of lead and heavy metals that were 40 to 200 times the regulatory limit.²¹

Prisons are often built on land that may be otherwise inappropriate for human habitation. A geographic information system (GIS) analysis demonstrated that at least 589 federal and state prisons are located within 3 miles of a Superfund cleanup site on the National Priorities List, with 134 of those prisons located within just 1 mile.^{20,22} Correctional professionals will be exposed to these environmental hazards while they are in the facility, while the incarcerated population lives there continuously.

A great deal of the literature is dedicated to the psychosocial stressors of the correctional environment, and with good reason. Correctional staff work within a “total institution,” meaning that all administrative, logistical, and social service functions are provided and managed by the correctional system.²³ While this provides a great deal of control over facility operations, it also places a burden upon the correctional workers to provide services and solve problems for which there may be inadequate resources, training, or political mandate.²⁴ The literature has described a resultant “role conflict” or “role ambiguity” which is highly associated with

stress, burnout, and a multitude of mental health sequelae. Correctional officers, for example, suffer from mental health consequences, substance use, and suicide at higher levels than the general population.¹⁰ Correctional institutions are also chronically understaffed,^{25,26} leading to longer hours and even higher rates of burnout.

Medical personnel work in correctional health systems that are chronically underfunded,²⁷ where they may lack adequate guidance, personal protective equipment, testing supplies, and access to referral. During the COVID-19 pandemic, studies have shown particularly high levels of anxiety, depression, insomnia, somatization, and symptoms of post-traumatic stress disorder (PTSD) among medical personnel.²⁸

Finally, the operation of a total institution may precipitate adverse occupational outcomes, which are of unique interest to practitioners of occupational medicine. Staff members experience professional and geographic isolation from professional counterparts who do not work in corrections. The data demonstrate generally lower pay and professional prestige among corrections-based professionals,^{29,30} which, when paired with the stressors and hazards described above, likely lead to poorer job satisfaction, higher presenteeism and absenteeism, higher turnover, and explain difficulties in maintaining staffing.³¹ Their isolation and relative lack of government investment may also serve to make them relatively invisible to the occupational health research and improvement initiatives focused on other public safety professionals.

Increased work-related injury and illness among correctional workers is a matter of urgent concern to correctional institutions, for multiple reasons. A safe work environment, derived from both occupational and environmental factors, reduces the direct and indirect costs of injuries and illness.³² It controls health care expenditures, reduces disability and turnover, improves recruitment, employee satisfaction, and reputation. These institutions have an ethical obligation to protect the wellbeing of their non-incarcerated workers as well as their incarcerated residents (and

workers) from hazards inherent to the space they share. We are forced to recognize all correctional workers as essential workers, indispensable, vital to the success of the institutions and communities they serve and deserving of safe and healthful working conditions.

Correctional workers are an understudied hidden working population, as they labor in a uniquely hazardous environment, out of community view. Fundamental academic research describing national level injury and illness rates among one segment of this working population (correctional officers) received its first attention only in 2012,⁹ leading to a dedicated section within the National Institute for Occupational Safety and Health's (NIOSH) National Occupational Research Agenda (NORA) in 2013. We hypothesize that despite this recognition of the research needs related to correctional officers, there has been little advancement in our understanding of the hazards they face.

We also hypothesize that less progress has been made in our understanding of the many other correctional professions, even though many have well-studied correlates of the profession outside the prison walls. For example, there is likely little research investigating the workplace hazards and outcomes of correctional medical and mental health staff relative to those working in hospital or clinic settings. Atkin-Plunk and Armstrong³³ identifies prison administrators as a poorly studied population.

If true, such a lack of research in correctional environments would preclude the objective knowledge necessary to inform correctional staff training, education, and retention, safety practices and guidelines, effective public policy, and efficient funding allocation. The institutions will continue to suffer the insidious and pervasive effects of staff burnout, injuries, illness, poor job satisfaction, and turnover, as well as the inability to adequately advocate for the resources to fulfill their mission. For these workers themselves, the ultimate downstream effects include poor workplace safety and health, job satisfaction, increased stress, burnout, and worsened occupational outcomes (high turnover, disability, absenteeism, and presenteeism). Incarcerated workers have fewer workplace protections and may be exposed to hazards that will result in prolonged litigation, disability, and greater difficulty integrating into society upon release.³⁴

The American College of Occupational and Environmental Medicine (ACOEM) has a mission to “[provide] leadership to promote optimal health and safety of workers, workplaces, and environments,”³⁵ prompting the recruitment of a group of highly experienced professionals

from the fields of occupational medicine, correctional health and mental health, environmental health, and workplace safety. We feel strongly that service to the working population demands special attention to those settings and professions that may have been traditionally under-represented in occupational safety and health efforts. As we aspired to fulfill our mandate, our group considered a wealth of ideas for improving the workplace health in correctional environments but agreed strongly that an assessment of the foundational research remained essential to the justification of such interventions.

Project Scope

A scoping literature review is designed to provide an understanding of available evidence across a broad body of work.³⁶ Our preliminary reviews suggested that the experiences of correctional professionals are studied across varied disciplines with a multitude of questions and study designs that may not be easily correlated. A scoping review can account for this heterogeneity, providing context and assessing for trends and gaps within the body of research, forming the basis for more precise systematic reviews, and clarifying priorities for future research.

Scoping reviews are not designed to assess the quality of research study quality or perform any systematic analysis (eg, meta-analysis), as the wide heterogeneity of the literature generally precludes the extraction of any meaningful conclusions. Deferring such analyses is consistent with guidance for the performance of scoping reviews, published by the Joanna Briggs Institute.³⁶

This review is limited to the populations in the United States. There are several aspects of the American system—mass incarceration, criminal justice philosophy, the social and political environment—that characterize a unique system that may be confounded by literature from outside the United States. We excluded articles which primarily examined race, age, gender, or other personal characteristics (eg, resilience), as a predictor of outcomes. Such variables were felt to be outside the purview of occupational health professionals to intervene. Our review maintained a wide definition of mental health to include the bulk of the literature related to stress, burnout, or job satisfaction.

Although this review is primarily focused on non-incarcerated correctional professionals, studies from the literature on incarcerated persons were included for two reasons. The first is that many exposures to incarcerated workers could also conceivably be expected to affect the health and safety of non-incarcerated correctional

professionals, and vice versa. As stated in Prisons and Health, published by the World Health Organization, “In prisons, staff and prisoners share the same space, air for breathing and water for washing or drinking, and face the same physical hazards of the prison environment. Above all, they have a common humanity.”³⁷ Numerous reports detail exposure to mold, heat, cold, poor water quality, or inadequate ventilation, but often written from the perspective of incarcerated individuals.^{38–41} Studies with other exposures that are more unique to the experience of incarcerated persons were excluded, such as solitary confinement, extant mental health demographics, or access to health care.

Second, this review recognizes that about 870,000 incarcerated persons perform some type of work, almost all within the correctional environment.⁴² They work in maintenance, manufacturing, construction, administration, and firefighting, and suffer all the hazards inherent to those professions but with few of the legal protections.³⁴ Incarcerated workers have suffered heavy metal exposure in electronics recycling facilities, styrene exposure in fiberglass manufacturing, *Escherichia coli* infection from work on a dairy farm, or the heat, ergonomic, and physical hazards within incarcerated wildland firefighting crews, to name a few.^{21,43–45} They are a large workforce, their work is essential to the functioning of the correctional system, and they are equally deserving of a safe workplace. Again, each of these hazards is potentially shared between every worker in the correctional setting.

Finally, the recent coronavirus pandemic has forced a powerful and urgent attention to the shared risk of infectious disease spread within correctional facilities.⁴⁶ According to the COVID Prison Project, as of March 24, 2021, 396,392 incarcerated people and 96,477 staff have tested positive for COVID-19; 2432 incarcerated people and 159 staff have died.⁴⁷ For all these reasons, we included research on incarcerated workers broadly to better document those hazards that they endure and may also be poorly recognized or understood in the correctional professions literature.

Primary Research Question

Our primary research question may be stated thus: what is the state of the literature describing the occupational and environmental hazards of the correctional environment? Occupational exposures for correctional workers were defined as those hazards which were directly related to the performance of their work, while environmental exposures could be defined as those arising from

TABLE 2. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Setting: correctional centers in the United States Population: correctional staff and incarcerated workers Outcomes of interest: physical health, mental health (eg, wellbeing factors, including stress, burnout, job satisfaction, and similar), and occupational outcomes (eg, disability, absenteeism, presenteeism, job turnover, etc) Independent variables/exposures: occupational and environmental factors impacting correctional staff health and safety Hypothesis-generating or hypothesis-testing research designs, dissertations, systematic literature reviews, commentaries	Populations outside the United States Primary research variables that describe individual characteristics of workers (eg, age, sex, gender, resilience) Correctional factors not directly impacting correctional worker health (eg, solitary confinement, extant mental health demographics, or access to correctional health care) Book chapters

the built environment or infectious disease. Using the results of our scoping review, we will attempt to characterize the literature based on the following:

- Absolute volume of studies meeting criteria.
- Types of studies performed, classified by study design and broad measures of quality (eg, dependence on self-reported data, or the proportion with a longitudinal, prospective, experimental, or a hypothesis testing design).
- Number of studies by year, suggesting relative levels of academic interest over time.
- Proportion of articles which study the individual correctional professions.
- Proportion of articles which study various correctional settings (eg, jails, prisons, immigrant detention, or juvenile correctional facilities).
- Proportion of studies with an exposure (independent variable) that could be classified as occupational versus environmental. Of those, what are the predominant topics? Here we should note that an occupational hazard for correctional staff may be classified as an environmental hazard for the incarcerated residents (eg, heat), owing to the differing reasons for their presence in the correctional setting. In such cases we

documented the exposure based on the primary study population’s perspective.

- Proportion of studies with an outcome (dependent variable) that could be classified as mental health or physical health. Of those, what are the predominant topics?
- Proportion of studies with an outcome that could be classified as occupational (eg, disability, absenteeism, intent to leave profession).
- Proportion of studies performed in public versus privately managed institutions.
- Proportion of studies performed in various jurisdictional types (eg, federal, state, local, or tribal).

METHODS

We performed a scoping review, assessing the literature for occupational and environmental hazards in the correctional setting. Our team librarian developed and conducted structured searches in PubMed (1809–present), Embase (embase.com, 1974–present), PsycInfo (EBSCOhost, 1937–present), SocIndex (EBSCOhost, 1937–present), and the Cochrane Central Register of Controlled Trials (Wiley). No date or language limits were applied. Searches were customized to each database to include both controlled vocabulary and text words, incorporating concepts specific to correctional staff,

incarcerated persons working in the prison system, the correctional environment, and occupational or environmental hazards (Appendix 1). See Table 2 for inclusion and exclusion criteria, and Table 3 for a summary of major conclusions.

Articles underwent initial title and abstract screening performed by two independent reviewers and with conflicts resolved by one of the project leaders. The resulting citations underwent full-text review by two reviewers, with conflicts resolved by one of the project leaders. The articles that met criteria after full text review then underwent data extraction by a single reviewer. Relevant literature reviews were screened for additional articles considered potentially relevant to the project, and those extracted citations were introduced back into the review at the stage of title and abstract screening (Fig. 1).

RESULTS

A final search of all databases was run on August 3, 2020, resulting in 875 total references after deduplication. Abstracts were reviewed by the research team, and those possibly fitting inclusion criteria were advanced to article download. Seven full-text articles could not be obtained; these were excluded. We reviewed the systematic literature reviews obtained in our initial search for additional potentially relevant

TABLE 3. Summary of Major Conclusions

A great majority of articles:	Are based on self-reported cross-sectional surveys Studied exposures that may be considered “occupational” rather than “environmental” With exposures classified as “occupational” dealt with workplace stress, burnout, and related topics Studied outcomes that could be classified as mental health
Very few or no studies:	Are hypothesis-testing, prospective, longitudinal, or experimental Studied medical or mental health staff or administrators Studied exposures that may be classified as “environmental” Studied musculoskeletal injuries, noise, or other more traditional occupational hazards Studied outcomes related to signs or symptoms of diagnosable mental health conditions Studied occupational outcomes such as absenteeism, disability, or job turnover Are published in journals specializing in occupational health and safety Studied conditions in immigration detention settings

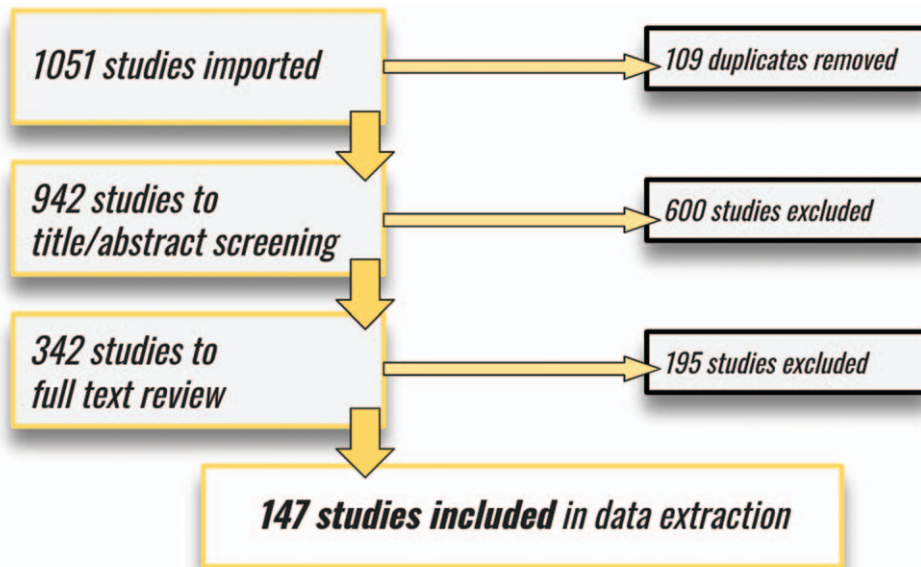


FIGURE 1. Literature Review Screening Methodology.

citations, yielding an additional 69 citations which were inserted into the title and abstract screening. In total, 942 studies underwent title and abstract screening, 342 underwent full-text review, and 147 studies underwent data extraction by a single reviewer. The results below are based on those 147 studies.

Dates of publication range from 1958 to 2020, with peaks in 2006 and 2012, and a generally increasing volume of publications over time. By proportion, 126 of 147 articles (86%) were based on a population-level hypothesis-generating or hypothesis-testing design, while the remaining studies ($n=21$, 14%) were systematic literature reviews, meta-analyses, commentaries, or case studies. Of the former 126, 111 (88%) were based primarily on self-reported data, and most of those (102, 92%) were based primarily on cross-sectional surveys. Other qualitative methods included in-depth interviews, focus groups, and ethnographies. There were only 2/147 studies that could be classified as experimental, constituting 1.3% of the population-level hypothesis-generating or hypothesis-testing articles.^{48,49} Only one study utilized a longitudinal design.⁵⁰

Regarding the populations engaged in this research, 134/147 (91%) articles studied correctional professionals and 13/147 (9%) studied incarcerated people. Of the articles that studied correctional professionals, 57/134 (43%) studied correctional professionals in multiple job positions, 56/134 (42%) studied correctional officers only, 10/134 (7%) studied medical staff, 10 (7%) studied mental health staff, and

3/147 (2%) studied administrators. In this and following analyses, the total percentages may exceed 100%, representing the small overlap between some categories.

Studies were conducted primarily in prisons ($n=93$, 63%), followed by jails ($n=19$, 13%) and juvenile detention centers ($n=8$, 5%). Thirty of 147 studies (20%) did not specify the setting type or performed analysis in multiple setting types. Explicit documentation of state versus federal versus local jurisdictions responsible for the institutions was infrequent enough that analysis of these criteria would likely be unreliable, but based on circumstantial descriptions, state departments of correction likely hosted the wide majority of these studies. Classification of private versus public management of the institutions was even more rarely defined, and there were no studies investigating conditions in immigration detention settings.

Considering that almost none of the extracted studies were designed to elicit causation, our classification of exposures and outcomes had to be based on the theoretical framework used by the authors. With this approach, exposures were classified as “occupational” in 127/147 (86%) and “environmental” in 24/147 (16%). Almost all of those classified as “occupational,” had exposures that were related to the stress of working in corrections. The theoretical constructs were diverse, measuring variables such as “job-related stress,” “role stress,” “perception of danger,” “supervisory support,” “job autonomy,” and “fear of assault,” to name a few. Only very rarely

did the studies engage more traditionally recognized occupational hazards such as noise ($n=5$), blood-borne pathogen exposures ($n=4$), or biomechanical exposures ($n=1$).

Outcomes were predominantly related to mental health (117/147, 80%), but almost none (4/147, 3%) addressed diagnosable mental health conditions or their symptoms. Instead, outcome variables included “job stress,” “burnout,” “job satisfaction,” “organizational commitment,” “work-family conflict,” and the like. Forty of 147 studies addressed outcomes we classified as “physical health.” Of those, 21 (53%) dealt with infectious disease, and only 4 (10%), or 3% of the total studies, dealt with musculoskeletal conditions or symptoms. The remainder utilized health risk assessments, physical symptom surveys, or lab results. Among all studies, 11 (7%) measured occupational outcomes such as absenteeism, duration of modified duty, or intent to leave the profession.

Finally, the data demonstrate that dissertations constituted 14% ($n=20$) of the total articles analyzed. Excluding these, the remaining articles ($n=127$) were predominantly published in journals of criminal justice ($n=72$, 57%) and far less often in journals of occupational health and safety ($n=10$, 8%), mental health ($n=9$, 7%), infectious disease ($n=7$, 6%), and public and environmental health ($n=7$, 6%).

DISCUSSION

The vast majority of articles are based on self-reported cross-sectional surveys,

only rarely augmented with a follow up survey or mixed methods approach utilizing in-depth interviews or correlation to institutional data. Even when excluding works that were written as dissertations, there is still a preponderance of the literature that is dependent upon self-reported, hypothesis-generating data, almost always in the form of cross-sectional surveys.

We believe that surveys have arisen as the preferred means of studying correctional settings due to their affordability, relative ease of administration, direct access to those with the relevant experience, and avoidance of protected health information. Our concern is that inherent in these methods are obvious biases of self-selection, self-reporting, inability to establish causation, and limited reproducibility—impediments which consequently characterize the state of the literature overall.

This literature also tends strongly toward outcomes that we have classified as “mental health,” but which may more specifically be defined within themes of stress and burnout. These articles inform our well-established understanding of stress and burnout among correctional professionals, founded upon a consistent theoretical framework, with outcomes which have been described in excellent detail by Lambert et al in 2015.⁵¹

Again, however, we must ask how the literature has become so heavily weighted toward these themes. Stress and burnout are aspects of occupational health about which each staff member would (by definition) have intimate and exclusive knowledge, unlike airborne mold concentrations or population level musculoskeletal injury rates. This direct access to a primary data source, coupled with the aforementioned advantages of survey methods, again suggests that ease of data collection may be a driving force.

Despite the body of literature devoted to mental health, there are very few articles that evaluate established diagnoses of mental health such as depression, anxiety, or PTSD. This is terribly unfortunate, especially considering the substantial attention paid to similar professionals in non-correctional settings.^{52,53} Conclusions related to stress and burnout are real and valuable, but advancing research to investigate discrete, treatable, and potentially compensable mental health diagnoses would permit advocacy for specific and tangible policy interventions.

There are barriers to engaging mental health diagnoses, however, which may include the unwillingness of employees to disclose personal medical information, the ethical mandate to provide mental health services for those who show severe

symptoms, or the need to screen all professionals in a facility to avoid institutional liability. Whatever the reason, an understanding of the mental health of these professionals is impaired without a grounding in medical diagnosis.

Correctional professionals constituted the predominant research populations, as opposed to the incarcerated people who also perform work in prisons, and without whom the operation of correctional institutions would likely be impossible.⁴² Incarcerated people are appropriately classified as a protected population with regard to research, a fact that may discourage research in correctional settings in general and has likely contributed to an almost complete lack of literature related to incarcerated working conditions.³⁴ This review has reinforced their status as an underserved occupational population, and the need for additional investigation regarding their working conditions and outcomes.

There are also no articles that address hazards in immigration detention facilities. The hazards for these professionals are very similar to those in criminal corrections, but with enough unique aspects that would warrant dedicated research. For example, articles outside academia describe understaffing, overcrowding, poor sanitation, construction near Superfund sites, uncontrolled heat exposure, and many other environmental hazards.^{54–59} People confined in immigration facilities are incarcerated in civil, not criminal detention. They are not generally kept as long as those in prisons and tend to be younger and healthier with a much greater proportion of women, children, and families.⁵⁶ They may also have higher rates of certain infectious diseases. There are linguistic or cultural barriers facing immigration detention staff as they attempt to complete their work, as well as a difference in governmental oversight (generally federal, but may utilize local jurisdictions contracted to provide space and staff). However, without the most fundamental research we will have no understanding of how these settings affect people in those settings.

Though not completely absent, there are extremely few articles in our review with experimental designs. Those that exist examine interventions that, again, examine stress and burnout among correctional professionals. As a result, we have very little information from which to design workplace improvements.

Few articles engaged outcome measures that may be classified as physical health; of those, the largest proportion studied infectious disease. Once again, the 2012 work of Konda remains the most comprehensive work describing fatal and non-fatal injuries in jails and prisons.⁹ Of the peer-

reviewed articles published, the majority were published in journals that specialize in criminal justice, with very few in journals of occupational health and safety.

Finally, the data demonstrate trends in volume of literature overall. A total of 147 articles were included in this scoping review, from which we can graph the volume of publications by year (Fig. 2). Articles were published in a date range between 1958 and 2020, with an apparent gradual increase in volume over that time. This may reflect an increasing interest in correctional settings, perhaps parallel to the rapid increase in incarcerated persons in the United States. It may also reflect an expanding volume of academic literature overall or the increasing ease of digital indexing and access. However, there also seems to be little shift in the topics engaged or research methods utilized. In summary, there appears to be an increasing absolute volume of articles, without any apparent advancement in research methods.

The lack of academic investigation in this setting demands an understanding of the structural barriers to research. Inward contends that pressures to maintain order in an inherently chaotic environment requires tight control of behavior, of both the incarcerated persons and staff.⁶⁰ Such control does not lend itself to data collection, and even less to intervention. Any evaluation must be performed in a way that satisfies the immediate logistical and political needs of the institution, as determined by administrators. Staff may be wary of research which has the potential to expose individual behavior, perceptions, or work records, exposing them to adverse employment actions, and employers may fear the results of any investigation may complicate contract negotiations. All of these factors can affect research data directly by confounding the selection and responses of study participants.

Systems of corrections in the United States are highly fragmented between federal, state, local, and tribal systems. While it allows each system to design operations according to their particular needs, there is also little coordination in data collection, knowledge sharing, or policy creation. Systems are also traditionally very insular, with a great deal of discretion over information shared with outside entities, and little incentive to do so.

Funding for corrections in general is tenuous,²⁷ and money for research can be expected to be similarly scarce. In short, research in these settings faces barriers from administrators, staff, and correctional and academic research systems. As a result, the most accessible research projects are those that are cheap, methodologically simple, not requiring sensitive institutional data

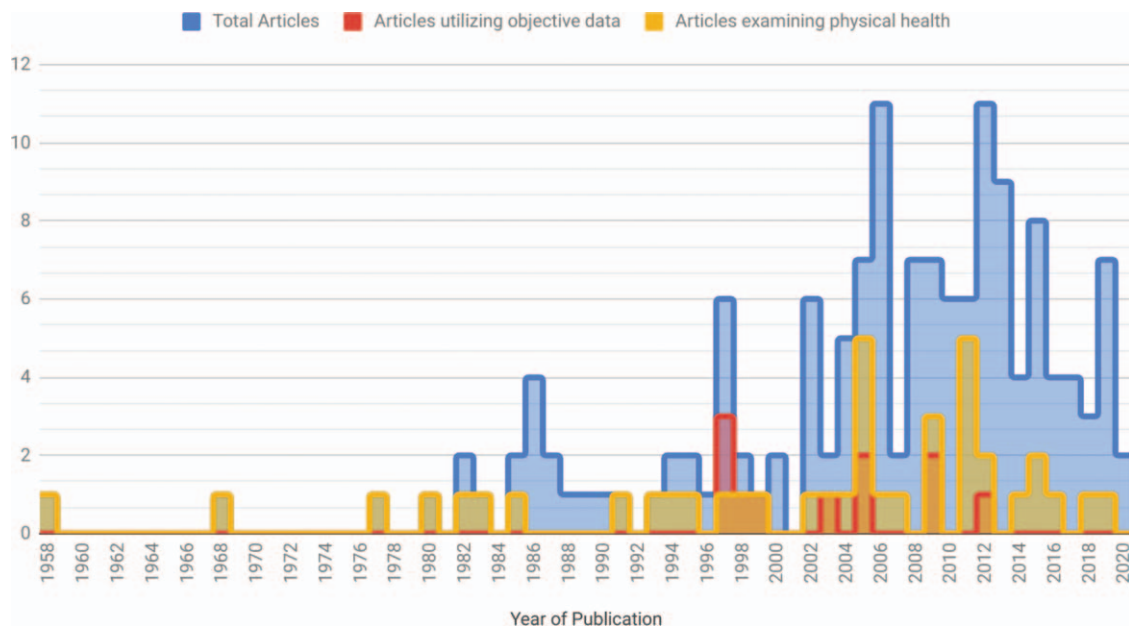


FIGURE 2. Count versus year of publication.

or interventions. Surveys fit this criteria and surveys of stress and burnout generate primary data directly from the staff.

It may also explain the relatively high volume of dissertations on the subject, which also tend toward those same criteria. Doctoral candidates may also have a tendency toward topics that carry some social justice import or are performed in an “exotic” setting such as a prison. Perhaps they are subsequently unable to continue studying corrections when they become dependent on funding sources for academic advancement.

Limitations

It is very likely that, despite the appropriate search terms and systematic method used to obtain citations, articles were missed that may have otherwise met inclusion criteria. Occupational and environmental medicine (OEM) is generally under-recognized as a medical specialty, so classification of “occupational” or “environmental” hazards may represent a relatively esoteric distinction. As a result, an apparent lack of OEM health topics may partially represent a failure of these academic databases to recognize articles as such. Future attempts to review this literature would benefit from a manual search for specific high yield subjects (eg, COVID-19 in correctional settings).

We attempted to find additional articles by extracting citations from review articles in our initial search. The review articles; however, generally dealt with issues related to correctional staff stress or burnout, likely amplifying the proportion of our review that evaluated those topics.

Although we had good reason to exclude international articles from this review, there remains a wealth of unanalyzed information within that literature. Anecdotally, several members of our review team have asserted that the research outside the United States may have engaged a greater variety of research methods, topics, and interventions, and would be an excellent place from which to draw a future research strategy.

The scope of the present study was limited to peer-reviewed academic research articles and therefore did not systematically capture the substantial body of work that has been produced by expert governmental and independent non-governmental groups. Examples include the National Institute of Corrections, the American Correctional Association, the Vera Institute of Justice, the Pew Charitable Trusts, the Prison Policy Initiative, the RAND corporation, the American Civil Liberties Union, and many, many others. These non-peer reviewed works may have access to data, funding, and social or political expertise that were not available to this review. Finally, a prodigious body of work is produced by journalists, without the academic rigor (or the barriers to access) provided by peer review, but with a responsiveness to social and political climate that can point us toward the most pressing research questions.

RECOMMENDATIONS

In 2009, NIOSH recognized a lack of occupational safety and health research by advocating several measures for improvement

across all occupations.⁶¹ Recommendations for the public safety sector professions (law enforcement, fire service, corrections, emergency medical services, and wildland fire service) were presented jointly and centered around reduction in workplace injuries and fatalities, illness and injuries from infectious disease, and workplace factors related to stress.

NIOSH’s recommendations under each topic, updated in 2013, then again in 2019, are numerous, detailed, and appropriate, and our research group would not make any recommendations for change. It is from here that we would recommend building a research strategy for correctional settings.

This present review has revealed that despite over a decade of guidance provided by NIOSH, there has been little advancement in the topics engaged by researchers and the research methods employed to study correctional occupational health. It is crucial that we ask why the recommended research has not been accomplished and how to ensure that the needed work is effectively engaged. Key barriers to completion of research in correctional settings appear to be related to data access and funding.

To address the first key barrier of data access, we recommend greater collaboration between correctional and occupational safety professionals with a specific goal of making data more available to researchers. Relevant professional organizations with a responsibility to correctional staff health include ACOEM, the American College of Correctional

Physicians, the American Correctional Association, the National Commission on Correctional Health Care, the American Public Health Association, and the National Environmental Health Association. Governmental organizations include NIOSH and the Occupational Safety and Health Administration, the Department of Labor and Bureau of Labor Statistics, the Department of Justice and the Bureau for Justice Statistics, the Federal Bureau of Prisons, and many others. Labor unions such as the American Federation of State, County and Municipal Employees represent correctional professionals as essential stakeholders and must be engaged as well.

Helpful changes would include standardization and centralization of injury and illness data collection across all jurisdictions within a relevant government body such as the Department of Labor with assistance from the Bureau of Justice Statistics. The Bureau of Labor Statistics should gather discrete data regarding which professionals (especially medical and mental health workers) are employed in correctional settings so as to make critical comparisons to non-incarcerated settings. We also recommend that researchers and database managers consider the relevance of their work to occupational and environmental health and list them as such.

Both formal and informal restrictions on research on incarcerated populations exist, and with good reason, but may discourage occupational health investigation related to correctional staff as well. Correctional administrators, members of institutional review boards, correctional researchers, and community stakeholders should be engaged to determine where these barriers exist and how research can be enabled and promoted without putting incarcerated participants at risk for exploitation. Researchers must also seek to better understand the occupational hazards and outcomes endured by incarcerated workers.

To address the second barrier, the organizations listed above should also work to create pools of research funding, preferentially disbursed for topics listed in the NORA recommendations and to investigate injury and illnesses, environmental hazards, correctional health professionals, incarcerated workers, and immigration detention settings. Additional research questions should be solicited from employee groups such as professional organizations and labor unions.

Finally, new policies and structures for correctional institutions may emerge given the increased public interest in criminal justice reform in the last decade. We strongly recommend that occupational and environmental health research, data availability, and funding be made a priority in any proposed policies.

ACOEM has a specific role to play in the coming years. The organization should issue a position statement calling for improvement and advancement of the research into correctional setting health and safety. We should forge new relationships with national professional organizations with expertise in occupational and correctional health, corrections, public health, and environmental health, and submit a collaborative resolution to the American Medical Association. ACOEM should make the topic more visible to residents and medical students by offering training rotations and research mentorships focused on correctional setting occupational health. Finally, we should recruit researchers from within our organization to engage the research questions proposed in this article, and to advocate to their home institutions for funding opportunities.

CONCLUSIONS

Maintaining healthy, safe, and productive work environments for our workers in correctional settings is a matter of deep consequence to the workers themselves, the institutions they serve, the incarcerated individuals with whom they share space, and inevitably, to our wider community. While the existing research has been foundational to our understanding of hazards in the correctional setting, especially regarding stress and burnout, this review has demonstrated a need for further research that utilizes more advanced methods that explore additional topics previously neglected. Examples include environmental exposures, prevalence, and risk factors for specific mental health diagnoses, rates of injury, illness, and disability, and effective control of correctional hazards through intervention.

We must also engage a wider variety of correctional professions and correctional settings. NIOSH has provided a research roadmap with the NORA guidelines, but realization of these goals will rely upon multidisciplinary collaboration, specific grants to engage researchers, and an improved understanding of the barriers inherent to correctional research, all while maintaining rigorous protection for incarcerated persons as an especially vulnerable population.

REFERENCES

1. Federal Bureau of Prisons. *About Our Agency*; 2021. Available at: <https://web.archive.org/web/20200430055056/https://www.bop.gov/about/agency/>. Accessed July 30, 2021.
2. US Census Bureau. *Local Government, Employment and Payroll Data, by State and Function, March 2019*; 2021. Available at: https://www2.census.gov/programs-surveys/apes/datasets/2019/2019_local.xls. Accessed July 20, 2021.
3. US Census Bureau. *State Government, Employment and Payroll Data, by State and Function, March 2019*; 2021. Available at: https://www2.census.gov/programs-surveys/apes/datasets/2019/2019_state.xls. Accessed July 20, 2021.
4. Sawyer W, Wagner P. Mass incarceration: the whole pie 2020. In: *Prison Policy Initiative*; 2020. Available at: <https://www.prisonpolicy.org/reports/pie2020.html>. Accessed July 15, 2021.
5. Swenson DX, Waseleski D, Hartl R. Shift work and correctional officers: effects and strategies for adjustment. *J Correctional Health Care*. 2008;14:299–310.
6. Liebert D. *Staffing Analysis Workbook for Jails*. 2nd ed. Collingdale, PA: DIANE Publishing; 2008.
7. Maslach C. *Burnout: The Cost of Caring*. Los Alto, CA: ISHK; 2003.
8. Hessel SM. Police and corrections. *Occup Med*. 2001;16:39–49.
9. Konda S, Reichard AA, Tiesman HM. Occupational injuries among US correctional officers, 1999–2008. *J Safety Res*. 2012;43:181–186.
10. Ferdik FV, Smith H. *Correctional Officer Safety and Wellness Literature Synthesis*. US Department of Justice, Office of Justice Programs, National Institute of Justice; 2017.
11. Bureau of Labor Statistics. Incidence rates of nonfatal occupational injuries and illnesses by industry and case types, 2019; 2020. Available at: https://www.bls.gov/web/osh/summ1_00.htm. Accessed July 30, 2021.
12. Baussano I, Williams BG, Nunn P, Beggiato M, Fedeli U, Scano F. Tuberculosis incidence in prisons: a systematic review. *PLoS Med*. 2010;7:e1000381.
13. Centers for Disease Control and Prevention (CDC). Interim guidance on management of coronavirus disease 2019 (COVID-19) in correctional and detention facilities; 2020. Available at: www.cdc.gov/coronavirus/2019-ncov/community/correction-detention/guidance-correctional-detention.html. Accessed April 30, 2021.
14. Maruschak LM, Sabol WJ, Potter RH, Reid LC, Cramer EW. Pandemic influenza and jail facilities and populations. *Am J Public Health*. 2009;99(suppl):S339–S344.
15. Wilper AP, Woolhandler S, Boyd JW, et al. The health and health care of US prisoners: results of a nationwide survey. *Am J Public Health*. 2009;99:666–672.
16. Guo W, Cronk R, Scherer E, et al. A systematic scoping review of environmental health conditions in penal institutions. *Int J Hyg Environ Health*. 2019;222:790–803.
17. Bick JA. Infection control in jails and prisons. *Clin Infect Dis*. 2007;45:1047–1055.
18. Allen J, ed. *The 9 Foundations of a Healthy Building*. Harvard T.H. Chan School of Public Health; 2017. Available at: <https://9foundations.forhealth.org/>. Accessed July 30, 2021.
19. US Comptroller General. Report to the Congress of the United States. The Department of Justice Can Do More To Help Improve Conditions at State and Local Correctional Facilities; 1980. Available at: <https://www.gao.gov/assets/ggd-80-77.pdf>. Accessed July 15, 2021.
20. Bernd C, Loftus-Farren Z, Mitra M. America's toxic prisons. The environmental injustices of mass incarceration. *Earth Island J*. 2017. Available at: <https://earthisland.org/journal/america-toxic-prisons/>. Accessed July 30, 2021.

21. Schuman A. To get stuff and sell it for as much as we can get: federal prison industries and electronics recycling. *Prison Legal News*. 2007. Available at: <https://www.prisonlegalnews.org/news/2007/mar/15/to-get-stuff-and-sell-it-for-as-much-as-we-can-get-federal-prison-industries-and-electronics-recycling/>. Accessed July 30, 2021.
22. Working Narratives. *The Prison Ecology Project*. Available at: <https://nationinside.org/campaign/prison-ecology-project/>. Accessed July 20, 2021.
23. Calavita K, Jenness V. Inside the pyramid of disputes: naming problems and filing grievances in California prisons. *Soc Problems*. 2013;60:50–80.
24. Cheek FE, Miller MDS. The experience of stress for correction officers: a double-bind theory of correctional stress. *J Criminal Justice*. 1983;11:105–120.
25. Fifield J. Many States Face Dire Shortage of Prison Guards. The Pew Charitable Trusts; 2016. Available at: <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2016/03/01/many-states-face-dire-shortage-of-prison-guards>. Accessed July 15, 2021.
26. Sonenstein B. All 50 states report prison understaffing. *Prison Legal News*. 2020. Available at: <https://www.prisonlegalnews.org/news/2020/apr/1/all-50-states-report-prison-understaffing/>. Accessed July 10, 2021.
27. Galvin G. Underfunded, Overcrowded State Prisons Struggle with Reform. *US News World Rept*. 2017. Available at: <https://www.usnews.com/news/best-states/articles/2017-07-26/understaffed-and-overcrowded-state-prisons-crippled-by-budget-constraints-bad-leadership>. Accessed July 27, 2021.
28. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. 2020;3:e203976.
29. Bureau of Labor Statistics, US Department of Labor. *Occupational Outlook Handbook: Correctional Officers and Bailiffs*; 2021. Available at: <https://www.bls.gov/ooh/protective-service/correctional-officers.htm>. Accessed July 15, 2021.
30. Bureau of Labor Statistics, US Department of Labor. *Occupational Outlook Handbook: Police and Detectives*; 2021. Available at: <https://www.bls.gov/ooh/protective-service/police-and-detectives.htm>. Accessed July 25, 2021.
31. Lambert EG, Hogan NL, Barton-Bellessa SM, Jiang S. Examining the relationship between supervisor and management trust and job burnout among correctional staff. *Crim Justice Behav*. 2012;39:938–957.
32. Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. *What Is Total Worker Health?* 2020. Available at: <https://www.cdc.gov/niosh/twh/totalhealth.html>. Accessed July 30, 2021.
33. Atkin-Plunk CA, Armstrong GS. Transformational leadership skills and correlates of prison warden job stress. *Crim Justice Behav*. 2013;40:551–568.
34. Montoya-Barthelemy A. The occupational health of prison inmates: an ignored population and an opportunity. *J Occup Environ Med*. 2019;61:e74–e76.
35. American College of Occupational and Environmental Medicine (ACOEM). About ACOEM; 2021. Available at: <https://acoem.org/About-ACOEM>. Accessed July 30, 2021.
36. Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil H. Chapter 11: Scoping reviews. In: Aromataris E, Munn Z, editors. *JBI Manual for Evidence Synthesis*. Adelaide, South Australia: JBI; 2020 Available at: <https://wiki.jbi.global/display/MANUAL/Chapter+11%3A+Scoping+reviews>. Accessed July 30, 2021.
37. Enggist S, Møller L, Galea G, Udesen C. *Prisons and Health*. Copenhagen, Denmark: WHO Regional Office for Europe; 2014. Available at: <https://apps.who.int/iris/handle/10665/128603>. Accessed November 24, 2021.
38. Caputo F, Gratteri S, Sacco MA, et al. Covid-19 emergency in prison: Current management and forensic perspectives. *Med Leg J*. 2020;88:185–186.
39. McCotter OZ, Benedict K, Engelthaler DM, et al. Update on the epidemiology of coccidioidomycosis in the United States. *Med Mycol*. 2019;57:S30–S40.
40. Nigra AE, Navas-Acien A. Arsenic in US correctional facility drinking water, 2006–2011. *Environ Res*. 2020;188:109768.
41. Skarha J, Peterson M, Rich JD, Dosa D. An overlooked crisis: extreme temperature exposures in incarceration settings. *Am J Public Health*. 2020;110:S41–S42.
42. Schwartzappel B. The great American chain gang. *Am Prospect*. 2014. Available at: <https://prospect.org/justice/great-american-chain-gang/>. Accessed July 15, 2021.
43. Centers for Disease Control and Prevention. Outbreak of Shiga Toxin-producing *Escherichia coli* O111 infections associated with a correctional facility dairy-colored, 2010. *MMWR Morb Mortal Wkly Rep*. 2012;61:149–152.
44. Hall DJ. Fiberdome pays \$18,000 in fines for worker safety violations. *Wisconsin State J*. 2014. Available at: https://madison.com/wsj/business/fiberdome-pays-18-000-in-fines-for-worker-safety-violations/article_c508212c-94e7-5742-bd95-644e07ab7d14.html. Accessed July 30, 2021.
45. Marks C. High risk, low pay for California prisoners who fight fires. *Prison Legal News*. 2019. Available at: <https://www.prisonlegalnews.org/news/2019/feb/4/high-risk-low-pay-california-prisoners-who-fight-fires/>. Accessed July 30, 2021.
46. Montoya-Barthelemy AG, Lee CD, Cundiff DR, Smith EB. COVID-19 and the correctional environment: the American prison as a focal point for public health. *Am J Prev Med*. 2020;58:888–891.
47. The COVID Prison Project. National COVID-19 Statistics; 2021. Available at: <https://covid-prisonproject.com/data/national-overview/>. Accessed June 15, 2021.
48. Backer L. The Differential Effectiveness of a Stress Inoculation Training Intervention as a Function of Coping Style Among Correctional Workers; 1990 (Doctoral dissertation, California School of Professional Psychology-San Diego).
49. McCraty R, Atkinson M, Lipsenthal L, Arguelles L. New hope for correctional officers: an innovative program for reducing stress and health risks. *Appl Psychophysiol Biofeedback*. 2009;34:251–272.
50. Dignam JT. Social Support, Job Stress, Burnout and Health Among Correctional Officers: A Longitudinal Analysis; 1986 (Doctoral dissertation, Arizona State University).
51. Lambert EG, Hogan NL, Griffin ML, Kelley T. The correctional staff burnout literature. *Crim Justice Stud*. 2015;28:397–443.
52. Lexipol Team. Trauma on the Job: Post-Traumatic Stress Disorder in Law Enforcement Officers; 2016. Available at: <https://www.lexipol.com/resources/blog/post-traumatic-stress-disorder-law-enforcement-officers/>. Accessed July 30, 2021.
53. Substance Abuse and Mental Health Services Administration. Disaster Technical Assistance Center Supplemental Research Bulletin — First Responders: Behavioral Health Concerns, Emergency Response, and Trauma; 2018. Available at: <https://www.samhsa.gov/sites/default/files/dtac/supplementalresearchbulletin-firstresponders-may2018.pdf>. Accessed July 20, 2021.
54. Clark M. As climate changes, high temperatures plague prisons and jails. *Prison Legal News*. 2019. Available at: <https://www.prisonlegalnews.org/news/2019/oct/7/climate-changes-high-temperatures-plague-prisons-and-jails/>. Accessed July 28, 2021.
55. Clark M. Burgeoning immigration detainee population stresses ICE. *Prison Legal News*. 2008. Available at: <https://www.prisonlegalnews.org/news/2008/sep/15/burgeoning-immigration-detainee-population-stresses-ice/>. Accessed July 30, 2021.
56. Ryo E, Peacock I. *The Landscape of Immigration Detention in the United States*. American Immigration Council; 2018. Available at: <https://www.americanimmigrationcouncil.org/research/landscape-immigration-detention-united-states>. Accessed July 28, 2021.
57. Sample B. Deplorable conditions at Los Angeles ICE facility result in settlement. *Prison Legal News*. 2010. Available at: <https://www.prisonlegalnews.org/news/2010/sep/15/deplorable-conditions-at-los-angeles-ice-facility-result-in-settlement/>. Accessed July 15, 2021.
58. Tsolkas P. Incarceration, Justice and the planet: how the fight against toxic prisons may shape the future of environmentalism. *Prison Legal News*. 2016. Available at: <https://www.prisonlegalnews.org/news/2016/jun/3/incarceration-justice-and-planet-how-fight-against-toxic-prisons-may-shape-future-environmentalism/>. Accessed July 15, 2021.
59. US Department of Justice, Office of the Inspector General. Audit of the Federal Bureau of Prisons Contract No. DJB1PC007 Awarded to Reeves County, Texas to Operate the Reeves County Detention Center I/II Pecos, Texas; 2015. Available at: <https://oig.justice.gov/reports/2015/a1515.pdf>. Accessed July 20, 2021.
60. Inwald RE. Research problems in assessing stress factors in correctional institutions. *Intl J Offender Ther Compar Criminol*. 1982;26:250–254.
61. National Occupational Research Agenda Public Safety Council. National Occupational Research Agenda for Public Safety; 2019. Available at: https://www.cdc.gov/nora/councils/pubsaf/pdfs/National_Occupational_Research_Agenda_for_Public_Safety_Feb_2019-508.pdf. Accessed July 20, 2021.

APPENDIX 1

Scoping Review Search Strategies: Work Hazards in Correctional Environment

Marianne Cloeren and Julie Gutekunst

Final Search run on March 8, 2020 by Lauren Wheeler

MLIS Total References on March 8, 2020: 971.

Total following de-duplication: 873
Delivery Method: Covidence.

PubMed (1809 to present)—308 references retrieved on March 8, 2020.

(prison worker*[tiab] OR correctional health worker*[tiab] OR prison personnel[tiab] OR prison nurs*[tiab] OR correction* officer*[tiab] OR correction* staff[tiab] OR correction* personnel[tiab] OR prison warden*[tiab] OR officer*[tiab] OR police[tiab] OR prison guard*[tiab] OR physician*[tiab] OR healthcare worker*[tiab] OR healthcare provider*[tiab] OR advanced practitioner*[tiab] OR prisoner*[tiab] OR inmate*[tiab] OR convict*[tiab] OR incarcerated offender*[tiab] OR incarcerated population*[tiab] OR convict labor[tiab] OR prison labor[tiab] OR "Police"[Mesh] OR "Physicians"[Mesh] OR "Health Personnel"[Mesh] OR "Prisoners"[Mesh]).

AND

(prison[tiab] OR prisons[tiab] OR correction* facilit*[tiab] OR correction* institution*[tiab] OR jail*[tiab] OR penitentiary*[tiab] OR penal institution*[tiab] OR "Prisons"[Mesh]).

AND

(occupational health[tiab] OR employee health[tiab] OR occupational disease*[tiab] OR occupational illness*[tiab] OR occupational safety[tiab] OR occupational exposure*[tiab] OR occupational hazard*[tiab] OR occupational risk*[tiab] OR occupational injur*[tiab] OR occupational death*[tiab] OR industrial health[tiab] OR industrial hygiene[tiab] OR

"occupational health"[mesh] OR "occupational injuries"[mesh] OR "Occupational Diseases"[Mesh:NoExp] OR "environmental exposure"[mesh] OR "environmental health"[mesh] OR environmental hazard*[tiab] OR environmental health[tiab] OR environmental stress*[tiab] OR environmental exposure*[tiab] OR "stress, psychological"[mesh]).

Embase—364 reference retrieved on March 8, 2020.

(prison personnel*:ti,ab OR prison nurs*:ti,ab OR correction* officer*:ti,ab OR correction* staff*:ti,ab OR correction* personnel*:ti,ab OR prison warden*:ti,ab OR officer*:ti,ab OR police:ti,ab OR prison guard*:ti,ab OR physician*:ti,ab OR healthcare worker*:ti,ab OR healthcare provider*:ti,ab OR advanced practitioner*:ti,ab OR prisoner*:ti,ab OR inmate*:ti,ab OR incarcerated offender*:ti,ab OR incarcerated population*:ti,ab OR convict labor*:ti,ab OR convict*:ti,ab OR prison labor*:ti,ab OR police/exp OR prison nursing/exp OR physician/exp OR mental health care personnel/exp OR

advanced practice provider/exp OR offender/exp OR prisoner/exp).

AND

(correction* institution*:ti,ab OR tribal jail*:ti,ab OR correctional facility*:ti,ab OR penitentiary*:ti,ab OR prison industr*:ti,ab OR penal institution*:ti,ab OR prison*:ti,ab OR prison/exp).

AND

(occupational disease*:ti,ab OR occupational illness*:ti,ab OR occupational exposure*:ti,ab OR occupational health*:ti,ab OR industr* hygiene*:ti,ab OR industr* health*:ti,ab OR employee* health*:ti,ab OR occupational safety*:ti,ab OR occupational injur*:ti,ab OR occupational hazard*:ti,ab OR occupational fatality*:ti,ab OR occupational death*:ti,ab OR occupational risk*:ti,ab OR occupational health/exp OR occupational disease/exp OR industrial hygiene/exp OR burnout/exp OR occupational accident/exp OR environmental hazard*:ti,ab OR environmental exposure*:ti,ab OR environmental stress*:ti,ab OR environmental health*:ti,ab OR environmental exposure/exp OR environmental stress/exp OR environmental health/exp).

SocIndex—44 reference retrieved on March 8, 2020.

TI ("prison personnel" OR "prison staff" OR "prison nurs*" OR "correction*officer*" OR "correction* staff" OR "correctional personnel" OR "prison warden*" OR officer* OR police OR "prison guard*" OR physician* OR "healthcare worker*" OR "advanced practitioner*" OR prisoner* OR inmate* OR "incarcerated offender*" OR "incarcerated population*" OR "Convict labor" OR convict* OR offender* OR "prison labor") OR AB ("prison personnel" OR "prison nurs*" OR "correctional officer*" OR "correction staff" OR "correctional personnel" OR "prison warden*" OR officer* OR police OR "prison guard*" OR physician* OR "healthcare worker*" OR "advanced practitioner*" OR prisoner* OR inmate* OR "incarcerated offender*" OR "incarcerated population*" OR "Convict labor" OR convict* OR offender* OR "prison labor") OR SU ("prison personnel" OR "corrections officers" OR "correctional personnel" OR prisoners OR "convict labor").

AND

TI (prison OR prisons OR "correctional institution*" OR "tribal jail*" OR "Correctional facility*" OR penitentiary* OR "prison industr*" OR "penal institution*") OR AB (prison* OR "correctional institution*" OR "tribal jail*" OR "Correctional facility*" OR penitentiary* OR "prison industr*" OR "penal institution*") OR SU ("Correctional institutions" OR "Private prison industry" OR "prisons").

AND

TI ("Occupational disease*" OR "Occupational illness*" OR "Occupational exposure" OR "Occupational health" OR "industr* health" OR "industr* hygiene" OR "employee health" OR "occupation* safety" OR "occupational injur*" OR "occupational hazard*" OR "occupational fatality*" OR "occupational death*" OR "occupational risk*" OR "environmental hazard*" OR "environmental exposure*" OR "Environmental stress*" OR "environmental health") OR AB ("Occupational disease*" OR "Occupational illness*" OR "Occupational exposure" OR "Occupational health" OR "industr* health" OR "industr* hygiene" OR "employee health" OR "occupation* safety" OR "occupational injur*" OR "occupational hazard*" OR "occupational fatality*" OR "occupational death*" OR "occupational risk*" OR "environmental hazard*" OR "environmental exposure*" OR "Environmental stress*" OR "environmental health") OR SU ("environmental exposure" OR "environmental stress" OR "environmental hazards" OR "occupational stress").

PsycInfo—245 retrieved on March 8, 2020.

TI ("prison personnel" OR "prison staff" OR "prison nurs*" OR "correction* officer*" OR "correction* staff" OR "correctional personnel" OR "prison warden*" OR officer* OR police OR "prison guard*" OR physician* OR "healthcare worker*" OR "advanced practitioner*" OR prisoner* OR inmate* OR "incarcerated offender*" OR "incarcerated population*" OR "Convict labor" OR convict* OR offender* OR "prison labor") OR AB ("prison personnel" OR "prison nurs*" OR "correctional officer*" OR "correction staff" OR "correctional personnel" OR "prison warden*" OR officer* OR police OR "prison guard*" OR physician* OR "healthcare worker*" OR "advanced practitioner*" OR prisoner* OR inmate* OR "incarcerated offender*" OR "incarcerated population*" OR "Convict labor" OR convict* OR offender* OR "prison labor") OR SU ("prison personnel" OR "corrections officers" OR "correctional personnel" OR prisoners OR "convict labor").

AND

TI (prison OR prisons OR "correctional institution*" OR "tribal jail*" OR "Correctional facility*" OR penitentiary* OR "prison industr*" OR "penal institution*") OR AB (prison* OR "correctional institution*" OR "tribal jail*" OR "Correctional facility*" OR penitentiary* OR "prison industr*" OR "penal institution*") OR SU ("Correctional institutions" OR "Private prison industry" OR "prisons").

AND

TI (“Occupational disease*” OR “Occupational illness*” OR “Occupational exposure” OR “Occupational health” OR “industr* health” OR “industr* hygiene” OR “employee health” OR “occupation* safety” OR “occupational injur*” OR “occupational hazard*” OR “occupational fatalit*” OR “occupational death*” OR “occupational risk*” OR “environmental hazard*” OR “environmental exposure*” OR “Environmental stress*” OR “environmental health”) OR AB (“Occupational disease*” OR “Occupational illness*” OR “Occupational exposure” OR “Occupational health” OR “industr* health” OR “industr* hygiene” OR “employee health” OR “occupation* safety” OR “occupational injur*” OR “occupational hazard*” OR “occupational fatalit*” OR “occupational death*” OR “occupational risk*” OR “environmental

hazard*” OR “environmental exposure*” OR “Environmental stress*” OR “environmental health”) OR SU (“environmental exposure” OR “environmental stress” OR “environmental hazards” OR “occupational stress”).

Cochrane—10 reference retrieved on March 8, 2020

(“occupational health” OR “employee health” OR “occupational disease*” OR “occupational illness*” OR “occupational safety” OR “occupational exposure*” OR “occupational hazard*” OR “occupational risk*” OR “occupational injur*” OR “occupational death*” OR “occupational fatalit*” OR “industrial health” OR “industrial hygiene” OR “environmental hazard*” OR “environmental health” OR “environmental stress*” OR “environmental exposure*”) in Title Abstract Keyword.

AND

(prison* OR “correction* facilit*” OR “correction* institution*” OR “tribal jail*” OR penitentiary* OR “prison industr*” OR “penal institution*”) in Title Abstract Keyword.

AND

(“prison worker*” OR “correctional health worker*” OR “prison personnel” OR “prison nurs*” OR “correction* officer*” OR “correction* staff” OR “correction* personnel” OR “prison warden*” OR officer* OR police OR “prison guard*” OR physician* OR “healthcare worker*” OR “healthcare provider*” OR “advanced practitioner*” OR prisoner* OR inmate* convict* OR “incarcerated offender*” OR “incarcerated population*” OR “convict labor” OR “prison labor”) in Title Abstract Keyword—(Word variations have been searched).