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Constitutional Challenges to Prison Overcrowding: The Scientific Evidence of Harmful Effects†

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In the past two decades American courts have decided numerous cases involving the constitutionality of prison and jail conditions. The traditional “hands off” approach of courts facing prison cases

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1. By 1980, at least 30 states had seen litigation involving conditions in one or more prisons in the state. 3 Nat’l Inst. of Justice, American Prisons and Jails: Conditions and Costs of Confinement 36 (1980) (Table 2.6: Litigation Involving Prison Conditions and Crowding, April 1980). Most of these cases have been decided by the federal courts. Id.

2. In the field of corrections, the words “prison” and “jail” have distinct meanings. A jail is a secure facility used for the short-term incarceration of charged offenders awaiting trial, and convicted offenders as well. Jails are operated by local governments and the federal government. A prison is a secure facility used for the long-term incarceration of convicted offenders, usually only felons sentenced to serve a year or more confinement. Some prisons house pre-trial detainees, but most do not. Prisons are operated by federal and state governments. See generally J. Levine, M. Musheno & D. Palumbo, Criminal Justice: A Public Policy Approach (1980). Unless otherwise noted, references in this Article to prisons include jails as well.

gave way to judicial activism with the 1960s litigation over barbaric
conditions in the Arkansas prisons. This activism continued unabated, and in 1974 it received the imprimatur of the United States
Supreme Court when the Court declared: "[T]hough his rights may be
diminished by the needs and exigencies of the institutional environ-
ment, a prisoner is not wholly stripped of constitutional protections
when he is imprisoned for crime. There is no iron curtain drawn be-
tween the Constitution and the prisons of this country."

A number of prison cases have turned on the court’s assessment of
the constitutionality of specific conditions, such as sanitation, fire
safety, medical care, mental health care, diet, exercise, or protec-
tion of inmates from assaults. In other cases, however, the central
issue was the constitutionality of a broader underlying problem: prison
overcrowding. In many of these latter cases the courts merely as-
sumed that overcrowding had a deleterious impact upon the other


13. See infra notes 16-128 & accompanying text.
more specific prison conditions. This Article examines the harmful consequences of prison overcrowding itself.

Consideration of the harmful effects of prison overcrowding and the constitutional implications of these effects is critical not just to inmates and the courts, but also to prison administrators and legislatures. Corrections authorities are placed in an increasingly untenable position as lawmakers establish mandatory sentences and longer minimum sentences, while at the same time restricting probation. Prisons are inundated with more inmates than ever before, at a time when budgetary constraints militate against expansion of prison facilities. The appalling conditions often exposed in overcrowding cases indicate the results. Understanding the actual impact and legal ramifications of overcrowding should help policymakers address these problems.

This Article first discusses the significance of the Supreme Court's two recent overcrowding cases and the potential legal role of evidence of harmful effects. Second, the Article examines subsequent lower court decisions and the extent to which they consider harmful effects on inmates a decisive factor. Third, the Article reviews the scientific studies of the effects of prison overcrowding on prison rule infractions and violence, illness, mental health, stress and hypertension, and mortality. We conclude that there is substantial empirical evidence that prison overcrowding is harmful to inmates. Plaintiffs should present tangible evidence of the harmful effects of prison overcrowding to support their constitutional challenges, and courts should carefully consider such evidence, comparing the circumstances at issue with those described in the empirical studies.

The Supreme Court and Overcrowding

In 1979 the Supreme Court faced its first case in which overcrowding was a critical issue. In Bell v. Wolfish, the Court considered

14. See, e.g., infra notes 77-85 and cases cited therein.


whether it was constitutional to "double bunk"17 pre-trial detainees at the federally-operated Metropolitan Correctional Center (MCC) in New York City.18 The Court characterized the design of this modern facility, constructed in 1975 for the primary purpose of housing pre-trial detainees, as "advanced and innovative."19 Yet while the original design called for housing most of the facility's inmates in individual cells of seventy-five square feet, MCC was overcrowded almost from the moment of its opening. Within a few months, nearly a third of MCC's cells were designated for double-bunking.20

The Court noted that since the pre-trial detainees housed at MCC had not been convicted of a crime, the cruel and unusual punishment clause of the eighth amendment did not apply.21 Instead, the Court stated that under the due process clause of the fifth amendment a federal detainee could not be punished at all prior to conviction.22 The Court indicated that to demonstrate that a condition of confinement constituted punishment, a detainee would have to show either an intent to punish on the part of prison officials, or the absence of a legitimate governmental purpose to which the condition was related.23 The latter determination "generally will turn on 'whether an alternative purpose to which [the restriction] may rationally be connected is assignable for it, and whether it appears excessive in relation to the alternative purpose assigned [to it].' "24 The Court stressed that lower courts should focus only on these constitutional requirements and not on the wisdom of decisions made by prison officials.25

Evaluating the conditions at MCC in light of these standards, the Court noted that detainees were allowed out of their cells from 6:30 a.m. to 11 p.m., were provided "more than adequate space for sleeping," were not housed in conditions typical of traditional jails, and were confined at MCC for short periods of time, usually less than sixty days.26 The Court concluded that the consequences of overcrowding under these conditions were not severe enough to constitute

17. "Double-bunking" is used in this Article to refer to the practice of housing two inmates in a cell designed originally for only one.
19. Id. at 525.
20. Id. at 526 n.4.
21. Id. at 535 n.16.
22. Id. at 535.
23. Id. at 538.
24. Id. (quoting Kennedy v. Mendoza-Martinez, 372 U.S. 144, 168-69 (1963)).
25. Id. at 539.
26. Id. at 541-44.
Two years later the Court heard a second double-bunking case, this time involving convicted offenders. *Rhodes v. Chapman* involved the Southern Ohio Correctional Facility (SOCF), a new prison designed to house inmates in individual cells of sixty-three square feet. Like MCC, it quickly became overcrowded and approximately two-thirds of its inmates were housed in double-bunked cells. Since the inmates in *Chapman* were convicts, the cruel and unusual punishment clause was the applicable constitutional standard. Although the Court did not adopt an explicit standard for determining when conditions of confinement constitute cruel and unusual punishment, it stated that “[c]onditions must not involve the wanton and unnecessary infliction of pain, nor may they be grossly disproportionate to the severity of the crime warranting imprisonment.”

In reviewing the district court’s findings, the Court noted that food, ventilation, room temperature, noise control, medical care, and protection of inmates were adequate. Although job and educational opportunities diminished and the number of psychiatrists and social workers did not increase after double-bunking began, the Court concluded that these minimal deprivations did not constitute cruel and unusual punishment.

The Court also addressed the five factors considered by the district court in reaching its “constitutional conclusion”: the long terms of imprisonment served by inmates at SOCF; a population that exceeded

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27. *Id.* at 543. The Court also suggested that “confining a given number of people in a given amount of space in such a manner as to cause them to endure genuine privations and hardship over an extended period of time might raise serious questions under the Due Process Clause as to whether those conditions amounted to punishment.” *Id.* at 542. At least one court subsequently focused on this language in determining the constitutionality of crowded prison conditions. See Jordan v. Wolke, 615 F.2d 749, 753 n.3 (7th Cir. 1980).


29. *Id.* at 341.

30. *Id.*


34. *Id.* at 347-48.
design capacity by thirty-eight percent; the prevailing correctional standards that inmates be provided at least fifty to fifty-five square feet of living space; the length of time that many double-bunked inmates spent in their cells each day; and the apparent permanency of double-bunking at SOCF.35 The Court concluded that, while these conditions may have inflicted pain on inmates, they did not inflict unnecessary and wanton pain in violation of the Constitution.36

In a concurring opinion joined by Justices Blackmun and Stevens, Justice Brennan stressed that the Chapman decision did not indicate that courts may avoid careful examination of the conditions in the prisons involved in litigation.37 Instead, courts should consider several factors:

In determining when prison conditions pass beyond legitimate punishment and become cruel and unusual the “touchstone is the effect upon the imprisoned” . . . . The Court must examine the effect upon inmates of the condition of the physical plant (lighting, heat, plumbing, ventilation, living space, noise levels, recreation space); sanitation (control of vermin and insects, food preparation, medical facilities, lavatories and showers, clean places for eating, sleeping, and working); safety (protection from violent, deranged, or diseased inmates, fire protection, emergency evacuation); inmate needs and services (clothing, nutrition, bedding, medical, dental, and mental health care, visitation time, exercise and recreation, educational and rehabilitation programming); and staffing (trained and adequate guards and other staff, avoidance of placing inmates in positions of authority over other inmates) . . . . When “the cumulative impact of the conditions of incarceration threatens the physical, mental, and emotional health and well-being of the inmates and/or creates a probability of recidivism and future incarceration,” the court must conclude that the conditions violate the Constitution.38

In Justice Brennan’s view, prison overcrowding cases are to be resolved on the basis of whether overcrowding has produced harmful effects on inmates in the prison at issue, not whether overcrowding “generally results in serious harm to the inmates.”39 According to Justice Brennan,

[The District Court may well be correct in the abstract that prison overcrowding and double celling such as existed at the Southern Ohio Correctional Facility generally results in serious harm to the inmates. But cases are not decided in the abstract. A court is under the obligation to examine the actual effect of challenged conditions

35. Id. at 348.
36. Id. at 348-49.
37. Id. at 352.
38. Id. at 364 (citations omitted).
39. Id. at 367.
upon the well-being of the prisoners. The District Court in this case was unable to identify any actual signs that the double ceiling at the Southern Ohio Correctional Facility has seriously harmed the inmates there ....

In a footnote, Justice Brennan contrasted the absence in *Chapman* of a finding of harmful effects with the presence of such a finding in two lower court decisions. In those cases, the deleterious effects caused by overcrowding included deteriorated physical and mental health; increased incidence of suicide, self-mutilation, homosexual rape, and assaults; inadequate sanitation; and increased levels of tension, anxiety, and fear.

Justice Brennan suggested that courts should utilize the testimony of "public health, medical, psychiatric, psychological, penological, architectural, structural, and other experts" as well as "studies on the effect of particular conditions on prisoners." He indicated that harmful effects need not be "‘demonstrate[d] with a high degree of specificity and certainty.’ . . . Courts may, as usual, employ common sense, observation, expert testimony, and other practical modes of proof."

Thus, the concurring opinion suggests that an essential element in successful constitutional challenges is evidence that studies in other prisons have demonstrated the harmful effects of overcrowding, supplemented by evidence of harmful effects in the prison at issue.

The majority opinion did not directly address whether the harmful effects of overcrowding must be demonstrated by the parties. Indeed, the Court's suggestion that lower courts have become too enmeshed in the operation of America's prisons and jails might be construed to give lower courts a convenient basis for rejecting inmate complaints about overcrowded conditions. Several aspects of the Court's opinion, however, are consistent with Justice Brennan's view. First, the majority concluded that the district court's findings of fact did not support a determination of cruel and unusual punishment at SOCF. Second, the Court demonstrated its concern for a showing of harmful effects in a footnote commenting on Justice Marshall's dissenting opinion. The

40. *Id.* at 367-68 (emphasis in original) (footnotes omitted).
42. *Id.*
43. *Id.* at 363.
44. *Id.* at 367 n.16.
45. *Id.* at 351-52. *See also* Bell v. Wolfish, 441 U.S. 520, 539 (1979) (judicial decisions in condition of confinement cases must reflect facts and not a court's judgment as to what constitutes wise policy); Robbins, *supra* note 3.
Court noted that while the dissent stressed the testimony of experts that double-bunking could be expected to produce adverse psychological effects, it overlooked the district court’s finding that there had been no increase in the rate of violence at SOCF after the double-bunking began.47 Third, the Court commented on respondent’s contention that the close confinement of double-ceiling for long periods “creates a dangerous potential for frustration, tension and violence.”48

In respondents’ view, it would be an infliction of unnecessary and wanton pain if double-ceiling led to rioting. The danger of prison riots is a serious concern, shared by the public as well as by prison authorities and inmates. But respondents’ contention does not lead to the conclusion that double-ceiling at SOCF is cruel and unusual, whatever may be the situation in a different case. The District Court’s findings of fact lend no support to respondents’ claim in this case.49

Seen in this light, the result in Chapman does not indicate that the Court is indifferent toward the harmful effects of overcrowding, but rather appears to rest upon respondents’ failure to present strong evidence of such harmful effects at SOCF.

Moreover, the test for cruel and unusual punishment fashioned in Chapman is consistent with a concern for harmful effects. Under this test, cruel and unusual punishment would be found whenever conditions inflict pain unnecessarily and wantonly or are grossly disproportionate to the severity of the inmate’s crime.50 The greater the harmful effects of prison overcrowding, the greater the likelihood that inmates can satisfy this test. Furthermore, a court logically would need to assess the necessity of a practice or condition in light of the costs associated with it. The greater the costs, such as the infliction of pain on inmates, the more difficult it would be to demonstrate that the practice or condition is necessary.

Similarly, it is important to demonstrate harmful effects in cases concerning the overcrowding of pre-trial detainees. As indicated earlier, the Wolfish Court established two alternative tests for punishment. Pre-trial detainees must show either an intent to punish or the absence

47. Id. at 349-50 n.15. The incidence of violence had increased at SOCF, but no more than would have been expected given the increase in the number of inmates. Id.

48. Id. at 349 n.14.

49. Id. This sentence implies that a showing that overcrowding had resulted in rioting would have constitutional significance, but is immaterial in this case because there was no such rioting. In the next sentence, however, the Court seemingly contradicts itself: “Moreover, a prison’s internal security is peculiarly a matter normally left to the discretion of prison administrators.” This following sentence implies that such rioting would not be significant because rioting stems from matters better left to the expertise of prison officials.

50. Id. at 347.
of a legitimate governmental purpose justifying the conditions of detention. Pre-trial detainees are more likely to be able to show excessively harsh conditions if the prison is overcrowded.

The opinion and concurrence in *Chapman* and the punishment standard set forth in *Wolfish* compel the conclusion that harmful effects on inmates should be an important factor in judicial resolution of prison overcrowding cases. In the next section, lower court opinions decided after *Wolfish* are examined to determine the extent to which they have considered evidence of harmful effects.

**The Lower Courts and Evidence of Harmful Effects**

In examining the concern of post-*Wolfish* courts about harmful effects, it is useful to divide the cases into four general categories. Class I cases are those in which harmful effects were viewed as unimportant in reaching a decision or in which harmful effects were not addressed at all. Class II includes cases in which harmful effects were only addressed implicitly. In Class III cases, the courts considered harmful effects important to the outcome, but based their findings as to harmful effects on impressionistic evidence, such as opinions of witnesses or a few extreme incidents. In Class IV cases the courts considered harmful effects important and based their consideration on some statistical or scholarly evidence.

**Class I Cases**

Class I cases demonstrate the least concern about harmful effects. In one Class I case there was no dispute between the parties that the institution was overcrowded and that this overcrowding was the cause of considerable problems; thus, there was no need for any systematic

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51. See *supra* text accompanying notes 23-24.
52. See *infra* text accompanying notes 56-69.
53. See *infra* text accompanying notes 70-85.
54. See *infra* text accompanying notes 86-105.
55. See *infra* text accompanying notes 106-28.
investigation of harmful effects. In another overcrowding case, *Atiyeh v. Capps*, a final injunction was stayed by Justice Rehnquist in his capacity as Circuit Justice. Justice Rehnquist granted the stay in large part to delay judicial interference with the operation of the Oregon prison system until the Supreme Court decided *Rhodes v. Chapman*, then pending before the Court. Of particular interest is the fact that the district court had rendered a Class IV opinion, pointing to several harmful effects of overcrowding. Justice Rehnquist referred to these findings of fact as having "missed the point of several of our cases," including *Wolfish*. Although he did not specify the missed point, from his comment it appears that Justice Rehnquist did not believe harmful effects to be a critical issue in prison overcrowding cases.

In the remaining Class I cases, the issue of harmful effects was not central. Rather than examine the consequences of overcrowding, these courts based their decisions on the similarity or dissimilarity of the challenged conditions to the conditions that existed in *Chapman* or *Wolfish*. A typical case is *Nelson v. Collins*. As a result of previous court decisions dealing with overcrowding, Maryland had constructed a new prison. Before the new prison was completed, however, the total prison population in the state had so increased that the new prison

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59. While the precedential value of an opinion written by a Supreme Court Justice in the role of Circuit Justice is unclear, it does provide an insight into the thinking of that Justice and also may guide future decisions by Circuit Justices. One authority has indicated that "some of the Justices have emphasized that when they act in their capacity as Circuit Justices they act primarily as a spokesman or 'surrogate' for the entire Court." R. STERN & E. GRESSMAN, SUPREME COURT PRACTICE 811 (1978). Justice Douglas suggested that "apart from granting stays, arranging bail, and providing for other ancillary relief an individual Justice of the Court has no power to dispose of cases on the merits." Locks v. Commanding General, Sixth Army, 89 S. Ct. 31, 32 (1968) (Douglas, Circuit Justice). Whether or not Justice Rehnquist's decision in *Atiyeh* constitutes precedent, the opinion is of interest because Justice Rehnquist wrote the majority opinion in *Wolfish*.
61. See infra text accompanying notes 107-28.
63. In other Class I cases, the implication is that inmates can win overcrowding cases without showing harmful effects. Justice Rehnquist seems to say that harmful effects are not the proper focus of inquiry.
66. *Id.* at 421-22.
PRISON OVERCROWDING could not handle both the old excess and the new influx of inmates. Consequently, Maryland decided to double bunk the cells in its new prison. The Fourth Circuit Court of Appeals, impressed with the similarities between the new Maryland prison and SOCF, overturned the district court's refusal to approve Maryland's plan. This comparison approach avoids the question of harmful effects. If conditions are similar to those in *Wolfish* and *Chapman*, they are constitutional. If conditions are significantly worse, they are unconstitutional. If conditions fall between these extremes, however, the court must make a rather arbitrary finding that may be difficult to justify.

In sum, Class I cases demonstrate little or no concern with harmful effects. It is not clear if this lack of concern represents a conscious decision by the courts or simply results from the courts' commitment to a different method of analysis, such as the comparison approach, which does not require an examination of harmful effects.

**Class II Cases**

The cases grouped together in Class II show more concern about evidence of harmful effects than Class I cases, but deal with the issue only implicitly. In general, they tend to assess the harshness of the overcrowding to determine whether conditions are too severe to be constitutionally acceptable.

Some opinions make a fleeting reference to the harmful effects of overcrowding, but the reference does not play an important role in the court's decision. A typical case is *Gross v. Tazewell County Jail*, in which a county jail designed to accommodate thirty-three adult males had averaged eighty. To handle the overflow, the sheriff housed some

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67. *Id.* at 422-23.
68. *Id.* at 423.
69. *Id.* at 427. In so ruling, the appellate court compared the two prisons: "The facilities and conditions of confinement at the Jessup Annex are as good, if not better than those at SOCF. The cells are roughly the same size; there is no significant difference in the recreational opportunities; the provision for food, medical, dental and psychiatric services are comparable; the facilities in the cells are practically the same; all in all, both facilities—those in Ohio and those in Maryland—are in line with the facilities in the most modern penal institutions." *Id.* at 428.
73. *Id.* at 416.
of the inmates on mattresses in the dayroom.\textsuperscript{74} As a result, the inmates had no opportunity to exercise because they were "scarcely able to even walk around the dayroom without stepping on another inmate's bed or body."\textsuperscript{75} The court concluded that such conditions were "inhumane, shocking to the conscience, and constitutionally unacceptable."\textsuperscript{76} Such conclusory statements are common in Class II cases.

Other courts, including those not in the Class II category, have referred to conditions "beyond the limits of contemporary standards of civility,"\textsuperscript{77} "so harsh as to shock the general conscience,"\textsuperscript{78} "excessive in relation to the alternative purpose assigned [to them],"\textsuperscript{79} "incompatible with 'the evolving standards of decency,'"\textsuperscript{80} "inhumane,"\textsuperscript{81} causing "genuine privations and hardship,"\textsuperscript{82} depriving inmates of the "minimal civilized measure of life's necessities,"\textsuperscript{83} "unnecessarily excessive,"\textsuperscript{84} and "unfit for human habitation."\textsuperscript{85} Conditions only become excessive, harsh, inhumane, severe, or unfit, however, when they adversely affect inmates. To the extent that courts using such formulas assume, consciously or unconsciously, that harmful effects are caused by severe overcrowding, they are not likely to require evidence of such effects.

Class III Cases

Courts in Class III cases demonstrate a greater concern for harmful effects. They base their findings on explicit but impressionistic evidence of such effects.\textsuperscript{86} For example, in \textit{French v. Owens},\textsuperscript{87} inmates at

\begin{footnotesize}
\begin{enumerate}
\item[74.] \textit{Id.}
\item[75.] \textit{Id.}
\item[76.] \textit{Id.} at 417.
\item[78.] Bono v. Saxbe, 620 F.2d 609, 613 (7th Cir. 1980) (quoting La Batt v. Twomey, 513 F.2d 641, 648 (7th Cir. 1975)).
\item[79.] Epps v. Levine, 480 F. Supp. 50, 51 (D. Md. 1979) (quoting Bell v. Wolfish, 441 U.S. 520, 538 (1979) (citations omitted)).
\item[80.] Villanueva v. George, 659 F.2d 851, 854 (8th Cir. 1981) (en banc).
Indiana Reformatory complained of rampant double-bunking both in cells with less than 50 square feet and in dormitory units. The court found inadequate ventilation, temperature control, sanitation, and lighting in the prison. The court did not discuss harmful effects at any length before concluding that these conditions constituted cruel and unusual punishment. The court did point out, however, that "[a]ll witnesses, including the defendants' experts, agree that the prison is severely overcrowded and that such overcrowding, in particular the doublecelling and doublebunking, coupled with all of the other conditions in evidence, has caused the confined persons unusual stress, discomfort, aggravation, and pain." Thus, the court apparently based its finding of harmful effects upon the impressions of expert witnesses who visited the prison.

_Hutchings v. Corum_ better illustrates the use of impressionistic evidence. The court relied on the testimony of a corrections consultant who visited the jail and of an osteopath who treated inmates at the jail. The court established that overcrowded conditions had created significant physical and psychological problems in inmates. The witnesses, however, based their testimony merely on observations and not on any systematically collected evidence. The court also used the corrections consultant's testimony in determining the number of inmates who could be housed in the jail without harmful effects.

Some Class III opinions demonstrate significant concern about harmful effects and rely on more tangible evidence of such effects. For example, in _McMurry v. Phelps_ the court found the overcrowded con-


87. 538 F. Supp. 910 (S.D. Ind. 1982).
88. _Id._ at 913-15.
89. _Id._ at 925-26.
90. _Id._
91. _Id._ at 926 (emphasis added). This court also utilized the comparison approach, discussed _supra_ text accompanying notes 65-70.
94. _Id._ at 1294.
95. _Id._ at 1281-91.
96. _Id._ at 1294.
97. 533 F. Supp. 742 (W.D. La. 1982).
ditions at the Ouachita Parish Jail unconstitutional, both as to convicted offenders and pre-trial detainees. The court stressed the adverse effect of overcrowding on the mental and emotional well-being of the inmates as well as the threat overcrowding posed to their personal security. The court relied upon the testimony of a forensic psychiatrist who toured the jail and testified that overcrowding increases "homosexual activity and encourage[s] aggressive and psychotic or suicidal behavior since there is no territorial space allotted an inmate." This expert also testified that he had observed "signs of evident emotional and mental trauma" in the jail. In addition, the court noted the testimony of another expert, a former prison warden, that "when an inmate has approximately twenty-two square feet of space in a total lock-down situation incidents of inmate violence such as rape and fights are increased." The court further relied on statistical evidence of harmful effects. It noted that "[e]ven a cursory review of the medical records, and Jailer's Daily Security Log, shows an unusually high rate of stabbings, assaults, fights, threats, suicide attempts, and self-mutilation."

In many Class III cases, the courts do not explicitly require evidence of harmful effects. However, the courts may indicate implicitly the importance of such evidence by frequently referring to the specific harmful effects demonstrated by the evidence or by referring to harmful effects at a crucial stage in their opinions.

In sum, Class III courts are more likely to be concerned with

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98. Id. at 760-61.
99. Id. at 762.
100. Id. at 751.
101. Id.
102. Id.
103. Id. at 753.
104. For example, in Lareau v. Manson, 507 F. Supp. 1177 (D. Conn. 1980), modified, 651 F.2d 96 (2d Cir. 1981), the court indicated that: "[c]onditions at the HCCC [Hartford Community Correctional Center]. . . cause serious harm to the health and well-being of the inmates and the security of the institution," id. at 1178; "[t]he crowding of the 'dayrooms' increases the level of tensions, and the incidence of fighting, among inmates at the HCCC," id. at 1180; "[t]ensions and fights among inmates have increased," id. at 1181; and "experience confirms that overcrowded conditions of confinement may aggravate [disciplinary] problems and lead to the collapse of discipline, including violence within correctional institutions," id. at 1190.
105. In French v. Owens, for example, the court's statement of the "unusual stress, discomfort, aggravation, and pain" suffered by inmates in overcrowded facilities directly precedes its finding of cruel and unusual punishment. 538 F. Supp. 910, 926 (S.D. Ind. 1982). The close proximity of the statement about harmful effects to the court's conclusion that the overcrowded conditions were unconstitutional suggests that the presence of harmful effects was an important factor in the court's decision.
harmful effects. As a result, they are more likely to look for some tangible evidence of a relationship between overcrowding and harmful effects than to presume that such a relationship exists.

Class IV Cases

Only three post- 
Wolfs 
ich cases fall into Class IV. The line between Class III and IV cases, like that between each of the adjacent classes, is not distinct. Unlike Class III courts, however, Class IV courts demand more rigorous evidence of harmful effects.

The first of these cases is Capps v. Atiyeh, in which inmates at three crowded Oregon prisons challenged the constitutionality of their conditions of confinement. The court demonstrated its concern about harmful effects by including in its opinion a section entitled “Effects of Crowding.” The court based its findings of harmful effects in part on the testimony of several experts. A psychiatrist from the University of North Carolina Medical School testified that “severe overcrowding prevents the development of appropriate social skills and leads instead to aggressive, violent, and destructive behavior patterns.” A psychology professor from the University of Texas testified that “studies of penal institutions reveal that overcrowding leads to depression, tension, and increases in disciplinary infractions, assaults and suicide attempts.” In addition, the warden of one of the prisons involved in the lawsuit testified that “large numbers of inmates and high proportions of idleness significantly increase the probability of violence.” This testimony alone represents a more aggressive effort to identify harmful effects than the efforts exhibited in Class III cases.

In addition to testimony about harmful effects of prison overcrowding generally, the Capps court considered evidence of harmful effects in the prisons being challenged. Another expert witness testified that at one of the prisons the mood of the inmates was “pervaded by a ‘hopeless feeling, air of frustration, [and] fear of personal safety.’”

108. Id. at 803-04.
109. Id. at 810.
110. Id. at 811.
111. Id.
112. Id.
113. Id.
The court also considered monthly prison reports that "overcrowding was resulting in increased idleness; more assaults on inmates and staff; growing numbers of disciplinary reports; an increase in inmate defiance, disturbances, and rumors of impending or possible riot; and an overall negative effect on morale."\(^{114}\) In addition, the court noted several other harmful effects including increased health risks from communicable diseases and the diminished ability of the prisons to provide proper physical or mental health care, maintain rehabilitation programs, and protect inmates from violence.\(^{115}\) Thus, while sharing the McMurry court's concern for specific evidence of harmful effects, the Capps court required more systematic evidence.

The second Class IV case is Smith v. Fairman.\(^{116}\) The parties in Fairman took a Class III approach to the case, presenting impressionistic evidence. The inmate-plaintiffs presented testimony from five inmates about life at the Pontiac Correctional Center in Illinois and the dangers faced by inmates in double-bunked cells.\(^{117}\) The plaintiffs also presented testimony from two penologists as to the deleterious effects of double-bunking, particularly on the emotional well-being of inmates.\(^{118}\) In rebuttal, the defendants presented the warden of a Rhode Island prison and the Secretary of Corrections of Louisiana. Both testified that Pontiac was well administered, neat and clean, not characterized by "undue tension among the prisoners," and not out of line with current standards of decency and humanity.\(^{119}\)

Rather than base its opinion on such impressions, the court appointed its own expert witness\(^{120}\) "to survey existing literature in the field describing the effects of long term close confinement of human males [and] to inspect the Pontiac Correctional Center."\(^{121}\) The expert interviewed inmates at Pontiac and examined a report by the Illinois Correctional System describing conditions at Pontiac in 1977. He concluded that Pontiac was overcrowded and that overcrowding caused increased frustration, stress, tension, transmission of disease, and violence.\(^{122}\) The court relied on evidence from the expert and others\(^{123}\) in

\(^{114}\) Id. at 812.
\(^{115}\) Id. at 810.
\(^{117}\) Double-bunked cells at Pontiac ranged in size from 55.3 to 64.5 square feet. Id. at 188-89.
\(^{118}\) Id. at 194-95.
\(^{119}\) Id. at 194.
\(^{120}\) Id. at 197. The court did not describe the expert's credentials.
\(^{121}\) Id.
\(^{122}\) Id. at 197-98. Fortunately, the court did not make clear whether the report con-
holding that the overcrowded conditions at Pontiac constituted cruel and unusual punishment.\textsuperscript{124}

The third Class IV case is \textit{Ruiz v. Estelle}.\textsuperscript{125} In the district court's decision on the merits of the overcrowding claim, the court engaged in the most explicit and careful discussion to date of the need to show harmful effects of overcrowding:

Defendants have steadfastly maintained that crowding cannot be found to violate the eighth amendment, unless there is a showing of "a concrete injury prescribed [sic] by the Eighth Amendment that is directly caused by crowded conditions." Defendants argue for an exceedingly strict standard of proof on these points; they criticize plaintiffs' evidence, for its alleged failure to demonstrate with a high degree of specificity and certainty that harms have been caused to the inmates by overcrowding.

It is clear from a reading of cases in which overcrowded conditions have been found that the unconstitutional characterization of the plaintiffs' burden of proof is erroneous. Detailed, scientifically exact proof of harm has never been required. Courts have reached conclusions concerning the extent of harm from overcrowding based on common sense reasoning from observable facts, such as popula-

\textsuperscript{123} Id. at 201. The court recognized that empirical studies of the effects of overcrowding are not universally accepted. The court heard from a psychologist and a psychiatrist who testified that studies of the effects of overcrowding are not scientifically valid because of the inability to control for other variables. \textit{Id.} at 198. See \textit{infra} note 129 for a discussion of this point.

\textsuperscript{124} Id. at 201. The district court's decision was overturned on appeal by the Seventh Circuit Court of Appeals, 690 F.2d 122 (1982), which determined that the basic necessities of life of inmates at the Pontiac Correctional Center were being met adequately. The court noted:

Although numerous experts and prisoners testified that crowding was causing tension among the prisoners, the topic of institutional safety was barely discussed in the lower court's opinion, except for a few references to prisoners' remarks that they felt unsafe or were afraid of homosexual assaults. In contrast, the record testimony of Pontiac Warden James W. Fairman demonstrated that the total number of incidents of physical violence, force, or assault had been reduced by nearly 50% since his administration took office in 1978. His figures—unchallenged on cross-examination—supported his conclusions. Warden Fairman also testified that no inmate had killed another inmate during his two year tenure, nor had any guards been killed or seriously injured by inmates during that period.

\textit{Id.} at 124.

tion levels, space per inmate, incidence of violence and staffing levels.\(^\text{126}\)

The court heard testimony from inmates, prison employees, and experts. The experts presented evidence on both the general effects of prison overcrowding and the specific effects of overcrowding on inmates in the Texas prison system. The court noted:

Included among the consequences were the spread of disease and the enhancement of stress, tension, anxiety, hostility and depression. Among the distinguishable manifestations of hostility and depression, the experts found, were increased blood pressures, aggressive behavior, and extreme psychological withdrawal. These expert witnesses also concluded that overcrowding at [Texas Department of Corrections] has substantially contributed to increased rates of disciplinary offenses, psychiatric commitments, and suicides. Not surprisingly, they additionally concluded that all of these effects are counter-productive to rehabilitation and are creative of serious behavioral and disciplinary problems.\(^\text{127}\)

The court concluded that these overcrowded conditions violated the eighth amendment prohibition against cruel and unusual punishment.\(^\text{128}\) Like the other Class IV courts, the court in *Ruiz v. Estelle* relied on evidence of harmful effects provided by empirical studies of prison overcrowding elsewhere and evidence of specific harmful effects on inmates in the prisons involved in the litigation.

In sum, an analysis of the four categories of post-*Wolfish* decisions suggests that the demonstration of actual harmful effects on inmates has played a significant role in overcrowding cases. The three Class IV cases most closely approximate the model of overcrowding cases envisioned by Justice Brennan in his concurrence in *Chapman*. They consider the results of social science research generally as well as specific evidence of harmful effects in the prison at issue. These cases suggest that the demonstration of harmful effects may become increasingly important to the courts. Hence, both courts and litigants should understand as fully as possible the actual consequences of prison overcrowding.

**The Consequences of Prison Overcrowding**

Researchers have investigated both the general social and psychological consequences of prison overcrowding and the specific consequences of the double-bunking of cells designed for single occupancy.


\(^{127}\) *Id.* at 1282 (footnote omitted).

\(^{128}\) *Id.* at 1287-88.
This section reviews all the available studies to determine whether prison overcrowding adversely affects prisoners. This survey should help litigants and courts understand the existing research as well as identify the potential harmful effects of overcrowding in the particular prison being challenged. Such evidence would satisfy Justice Brennan's suggestion that social science research be considered and that specific harmful effects be demonstrated in prison overcrowding cases.

Although social scientists have investigated a variety of consequences of overcrowding, this review is limited to those effects that courts are likely to consider in determining constitutional issues: prison rule infractions and violence, illness rates, mental health, stress and hypertension, and inmate mortality.

Prison Rule Infractions and Violence

One of the most difficult tasks confronting prison administrators is the maintenance of order. Because a large proportion of a prison's population consists of society's most violent individuals, the prevention of rule violations, assaults and riots is always problematic. It has long been hypothesized that overcrowding causes increased prisoner misconduct. A number of social scientists have studied the relationship between overcrowding and prisoner misconduct to determine whether this hypothesis is supported by the evidence.

129. The scientific literature reviewed in this Article was collected during the Spring and Summer of 1981. Every effort was made to collect all of the studies that empirically examined the consequences of prison overcrowding. To this end, major computerized bibliographies were searched, as well as more specialized bibliographies, and the Social Science Citation Index was used. Based on the studies culled from these initial sources the project then developed its own bibliography. In addition, unpublished reports were included by contacting either the author or the funding agency. Although it is impossible to guarantee the completeness of the bibliography, it does, to our knowledge, include all the relevant studies published through the Summer of 1981. Some studies that came to our attention between then and the Fall of 1983 are also included in this Article. The coverage is not as complete after 1981, however, as it is through 1981.

130. Although many individual studies suffer from some methodological flaws, e.g., unrepresentative samples, or lack of true experimental designs, they are reasonably well done and the flaws are not of major significance. In other words, the basic findings of these studies would not be changed by an alternate design. One must also bear in mind the overall "weight of the evidence" in interpreting the results presented in this section. The studies discussed here suggest that prison overcrowding has a negative impact on the inmates exposed to such conditions. Since the methodological weaknesses of these studies vary from study to study they could not account for the uniformity of the results observed in this body of empirical literature. Methodological flaws with individual studies are noted when appropriate.

131. See generally T. Thornberry, supra note 15, at 66-100.

A study by Megargee examined the relationship between population density and disruptive behavior at the Federal Correctional Institution at Tallahasee, Florida. From November, 1971, to October, 1974, the Institution's population fluctuated between 523 and 627 inmates per month. Because of renovations, inmate living space ranged from 35,560 square feet to 40,650 square feet.

Megargee studied the effect on inmate behavior of the following variables: average monthly population, total space available for the inmates, and a density index of the number of square feet of living space available per man per month. Inmate behavior was measured in terms of incident reports of disciplinary infractions, "which might range from a fairly minor infraction, such as refusing to report for work or insolence to an officer, to a serious offense, such as assault with a deadly weapon or attempted escape."

The results of Megargee's study indicate that when the inmate population was high, the number of rule infractions increased but the rate of infractions per hundred inmates did not. When Megargee examined the total amount of living space available to inmates, however, he found a consistent inverse relationship between space and rule infractions. As the total amount of space decreased, both the number and the rate of infractions increased. Moreover, the association between living space and infractions remained strong when the total population was held constant. Finally, the strongest association observed in Megargee's study was between the density index and infractions. A reduction in the number of square feet of living space per inmate corresponded with a significant and substantial increase in both the number and rate of disciplinary infractions.

In general, Megargee's study suggests that prison overcrowding increases rule infractions primarily because each inmate has less available living space. Megargee states: "In a prison community, where

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134. Density, supra note 133, at 293.
135. Id. at 292.
136. Id. at 293-94.
137. Id. at 293.
138. Id. at 294.
139. Id. at 294-95.
140. Id.
141. Id.
crowded conditions are chronic rather than temporary and where people prone to antisocial behavior are gathered together, there is a clear association between restrictions on personal living space and the occurrence of disciplinary violations.”142

Megargee's study is limited in two basic respects. First, Megargee did not distinguish between serious and minor rule infractions. Second, Megargee studied only a single institution. Studies conducted by other social scientists, however, were not limited in this manner and are therefore more valuable.

For example, Nacci, Teitelbaum, and Prather gathered data concerning density and rule infractions in thirty-seven federal correctional facilities from 1973 to 1976.143 They grouped the institutions according to the type of prisoner housed: juveniles and youth; young adults; adults serving intermediate terms; and adults serving long terms.144 The authors also used three different, but not mutually exclusive, measures of rule infractions. The first measure included "serious offenses," such as "contraband, homosexuality, escapes, and assaults," the second focused on assaultive behavior and the third measure was limited to inmate against inmate assaults.145 Each measure was expressed as a rate of the number of occurrences per one-hundred inmate days.146 Following the findings of Megargee, overcrowding was measured in terms of density, "calculated by dividing the average daily population for any institution by the year-end physical capacity."147 A density index greater than one indicates an overcrowded institution. The average density index for all thirty-seven institutions for the four-year study period was 1.14.148

The results indicate that density generally corresponds with the rate of inmate rule violations. For all types of institutions there was a moderate association between the density index and each of the three measures of rule infractions, particularly the second and third assault measures.149 The association between density and rule infractions was particularly strong in institutions that housed juveniles and young

142. Id. at 295.
144. Id. at 28.
145. Id.
146. Id.
147. Id.
148. Id.
149. Id. at 29.
adults.\textsuperscript{150} Within the adult institutions, however, the correlations tended to be low and inconsistent.\textsuperscript{151}

Carr's study of overcrowding in Georgia prisons reached a similar conclusion.\textsuperscript{152} Under a variety of measures of crowding, Carr found only a weak and inconsistent relationship between levels of crowding and rates of rule infractions for the general prison population.\textsuperscript{153} In the correctional institution that housed teenagers and young adults, however, Carr discovered strong associations between crowding and rule infractions.\textsuperscript{154} After controlling for the effects of rural versus urban background, race, and type of crime—violent versus property—Carr reported that "by far the strongest effects were exerted by the crowding variable."\textsuperscript{155}

In a study of four state prisons in Florida between 1972 and 1975, Jan examined the relationship between overcrowding and disciplinary infractions.\textsuperscript{156} He found that overcrowding, measured by the ratio of population to capacity, was not related to the rate of escapes.\textsuperscript{157} Overcrowding was related, however, to the rate of disciplinary confinement, especially in institutions that housed younger offenders.\textsuperscript{158} Overcrowding was also significantly related to the rate of inmate assaults on other inmates in both the youthful offender and the older adult offender institutions studied.\textsuperscript{159} Although methodologically unsophisticated,\textsuperscript{160} the study produced results consistent with earlier studies, especially in its analysis of the association between overcrowding and assaultive behavior among younger inmates.

McCain, Cox, and Paulus collected rule infractions data at the Federal Correctional Institution at El Reno to compare the effects of single and double-ceiling.\textsuperscript{161} The authors only collected data on

\textsuperscript{150} Id.  
\textsuperscript{151} Id. at 29-30.  
\textsuperscript{153} Id. at 148.  
\textsuperscript{154} Id. at 149.  
\textsuperscript{155} Id. at 167.  
\textsuperscript{156} Jan, Overcrowding and Inmate Behavior: Some Preliminary Findings, 7 CRIM. JUST. & BEHAV. 293 (1980).  
\textsuperscript{157} Id. at 296.  
\textsuperscript{158} Id.  
\textsuperscript{159} Id. at 298.  
\textsuperscript{160} Jan's analytic techniques do not allow for clear interpretation of the magnitude of some of these effects.  
\textsuperscript{161} G. MCCAIN, V. COX & P. PAULUS, THE EFFECT OF PRISON CROWDING ON INMATE BEHAVIOR (Nat'l Inst. of Justice 1980) [hereinafter cited as EFFECT]. Although this
nonaggressive infractions "because aggressive infractions would be reduced in single occupant housing by the lack of additional housing partners." Nevertheless, the study found that residents of double-bunked units had significantly higher rates of disciplinary infractions than residents of single units. When the length of time in the institution, in the housing condition, and in the custody level were held constant, these higher rates remained relatively unchanged. Moreover, "when one examines only those who have been in the housing for six weeks or longer, most of the above-mentioned findings are obtained even more strongly."

McCain and his colleagues also studied disciplinary infractions in the Texas Department of Corrections when overcrowding was a problem. The study covers the period from 1969 to 1978, when the population increased by ninety-one percent and the housing facilities increased by only thirty percent. "During the same period the rate of disciplinary infractions nearly quadrupled (83 per 1,000 to 312 per 1,000)." Statistically, this difference was highly significant.

Seemingly discordant results regarding infractions appear in a Canadian study of the relationship between population and misconduct reports in the Ottawa-Carleton Detention Centre. "No relationship between the total male population and the daily number of institutional misconducts was found." However, there was relatively little variation in the daily population (the minimum was 126 and the maximum was 156). More importantly, the detention center was not overcrowded during the time of the study. In fact, the maximum daily population represented only seventy-four percent of capacity which allowed for a density of 109 square feet of living space per inmate. These findings suggest that population increases will not ad-

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study was conducted at five federal prisons, data on rule infractions were collected only at the El Reno facility.

162. Id. at 12.
163. Id. at 19-22.
164. Id.
165. Id. at 22.
166. Id. at 103-18.
167. Id. at 103.
168. Id. at 110.
169. Id.
171. Id. at 205.
172. Id.
173. Id. at 206.
174. Id.
versely affect inmate behavior when the institution is not overcrowded and when a substantial amount of living space is available per inmate.\textsuperscript{175}

In conclusion, the studies that have examined the relationship between overcrowding and disruptive behavior suggest that overcrowding elevates the rate of disciplinary infractions. Assaults by all inmates and infractions by younger inmates show the most pronounced rate increases. Moreover, the increased rate of rule infractions depends more on the institution’s population density than on the sheer number of people in confinement. As the amount of living space per inmate declines, especially when the institution as a whole is operating above capacity, the rate of rule infractions tends to increase.

Inmate Illness

One of the most serious prison problems is inmate illness. There is convincing evidence that overcrowded prisons increase the rate of such illnesses.

\textsuperscript{175} Three additional topics concerning inmate infractions and assaults should be briefly considered. First, there is some evidence that overcrowding is related to the rate of homosexual assaults. Withers v. Levine, 449 F. Supp. 473 (D. Md. 1973), aff’d, 615 F.2d 158 (4th Cir. 1980), cert. denied, 449 U.S. 849 (1980); Ibrahim, Deviant Sexual Behavior in Men’s Prisons, 20 CRIME & DELINQ. 38 (1974); Wilson, Homosexual Rape: Legacy of Overcrowding, 3 CORRECTIONS MAG. 10 (1977). The support for this conclusion however, is very impressionistic.

Second, several researchers report that violent inmates have a significantly greater sensitivity to the approach of others than do nonviolent inmates. Curran, Blatchley & Hanlon, The Relationship Between Body Buffer Zone and Violence as Assessed by Subjective and Objective Techniques, 5 CRIM. JUST. & BEHAV. 53 (1978) [hereinafter cited as Curran]; Hildreth, Derogatis & McCusker, Body Buffer Zone and Violence: A Reassessment and Confirmation, 127 AM. J. PSYCHIATRY 1641 (1971); Kinzel, Body Buffer Zone in Violent Prisoners, 127 AM. J. PSYCHIATRY 59 (1970). Curran studied the reactions of inmates who had “histories of repeated incidents of violent behavior during and prior to incarceration” with a matched sample of inmates who did not. Curran, \textit{supra}, at 56. Both verbal response and galvanic skin response confirmed the hypothesis that “violent subjects have a significantly greater sensitivity to approach than nonviolent subjects.” \textit{Id.} at 58. Although these studies do not measure actual violence in response to infringements on one’s buffer zone, they are worth noting since social density is related to assaults and since overcrowding reduces buffer zones that individuals can claim in their living space.

Third, although overcrowding is related to rule infractions, it does not appear to carry over to post-prison behavior as measured by recidivism. Carr examined this relationship using data from the Georgia prisons between 1971 and 1974. Although the level of overcrowding was substantial during the middle of this period ("prisoners were sleeping in hallways, on floors, between bunks and single cells were doubled, and some were tripled"), consistent relationships between overcrowding and recidivism were not found. Carr, \textit{supra} note 152, at 59. Although there was a basic correlation between these variables, once the variable of age was held constant, the correlation between overcrowding and recidivism disappeared.
Tuberculosis

King and Geis examined the spread of tuberculosis in one tier of the Cook County, Illinois, Jail where an active case of tuberculosis was discovered. On the tier in question, 107 inmates were housed in an area of 184 square meters, far below the amount of space advocated by any correctional standard. Of the inmates on the tier, twenty-three percent of those tested for tuberculosis showed a positive PPD reaction of 10mm or more, a reactivity rate considerably higher than that found in the general population. Three months later, thirteen percent of the fifty-four inmates assigned to the tier after the index patient was removed had a positive response to the tuberculin test. Moreover, of the fourteen patients previously exposed to the index patient, but whose initial test was negative, seventy-one percent showed a positive response three months later.

King and Geis concluded that "[c]rowded jail conditions promote close contact among large numbers of young men from urban areas, where the incidence of tuberculosis remains high." This study suggests that overcrowded jail conditions promote considerably higher rates of tuberculosis than those found in the general population. Moreover, the conversion rate observed for the fourteen patients who remained on the tier between the first and second testing periods suggests that the tuberculin rate is associated with exposure to tuberculosis while in confinement, and not the importation of tuberculosis into the jail by high risk individuals.

The interpretation that the higher tuberculin rate is associated with exposure to tuberculosis while in confinement is substantiated by Stead, who examined the rate of tuberculosis at an Arkansas prison

177. Id. at 791. 184 square meters equals 1980.56 square feet.
178. The amount of space recommended by the various correctional standards differs somewhat, but the range is from 60 to 80 square feet per single cell. See T. Thornberry, supra note 15, at 5.
179. King & Geis, supra note 176, at 791. PPD refers to the “purified protein derivative” of tuberculin that is used in tuberculosis skin tests. PPD is injected under the skin and produces a skin reaction in persons hypersensitive to tubercle bacilli, whether from vaccination or from harboring the infection. A hardened mass of more than 8 mm in diameter at the site of the injection after 48 to 72 hours represents a positive result. Harrison’s Principles of Internal Medicine 875-76 (6th ed. 1970).
180. King & Geis, supra note 176, at 791.
181. Id.
182. Id. at 792.
183. Id.
housing 1,500 older, serious offenders. Following the discovery of two infectious cases of tuberculosis in one of the prisons in 1974, a large-scale tuberculin survey was conducted. Twenty-four percent of the inmates had a positive PPD reaction of 15mm or more, and an additional 11 percent had a positive reaction between 10 and 14mm.

In 1976 the discovery of two additional cases led to another tuberculin survey. Twenty-six percent of the inmates tested showed a reaction of 15mm or greater and five additional clinical cases were discovered. By November of that year, "ten cases of pulmonary tuberculosis were discovered . . . in a population of 1,500, giving a case rate of 670/100,000 for that year. (The rate for the United States in 1976 was 15/100,000] and for Arkansas, [21.1/100,000])." Thus, the tuberculosis rate in the prison was forty-four times the general population rate in the nation and thirty-two times the rate in Arkansas.

Stead's research demonstrated once again that the infection was spread within and not imported into the prison. First, previous incarcerations of an inmate at that institution "increased by three-fold the incidence of a positive tuberculin reaction." Second, the length of an inmate's incarceration increased his chances of becoming infected with M tuberculosis. Indeed, "forty percent of the inmates who had negative tuberculin reactions in 1973 and remained to 1977 had acquired an infection, as shown by large tuberculin reaction."

Stead's survey of other state prison systems supports his analysis in Arkansas. In forty states with prisons housing 500 or more inmates, Stead reports 139 cases of tuberculosis among a total of 176,400 inmates, which is a case rate of seventy-nine per 100,000 as compared to a general case rate of thirteen per 100,000 for the same states. There is no indication in Stead's article whether the prisons he studied in Arkansas or the other states were overcrowded. One might safely assume, however, that at least some of these prisons were overcrowded.

In general, the studies of tuberculosis indicate that large populations, as well as inmate overcrowding, in prisons and jails is associated

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184. Stead, Undetected Tuberculosis in Prison: Source of Infection for Community at Large, 240 J. A.M.A. 2544 (1978). Data were also collected at a smaller prison housing 500 inmates that did not experience a substantial tuberculosis problem. Id.
185. Id.
186. Id.
187. Id.
188. Id. at 2545.
189. Id.
190. Id. at 2545-46.
191. Id. at 2546.
192. Id. at 2546-47.
with substantially elevated rates of tuberculosis. The disease appears to spread among prisoners and is not primarily a product of widespread importation of active cases into prison by new inmates.

**Illness Complaints**

Other studies of inmate health have examined the relationship between overcrowding and rates of illness complaints for a variety of ailments. One study by Paulus, Cox, and McCain collected data at the Texarkana Federal Correctional Institution and the Dallas County Jail when both institutions were substantially overcrowded.\(^\text{193}\) Housing arrangements varied from one and two man cells to dormitories housing forty-six men (Texarkana) and seventy men (Dallas).\(^\text{194}\) "The most frequent complaints in [the] sample were backache, nausea, rash, sinus, constipation, chest pain, and asthma."\(^\text{195}\) Illness complaint rates in both prisons were found to be approximately twice as high in the more crowded dormitory conditions than in the less crowded cell conditions.\(^\text{196}\)

Another study by McCain and his colleagues examined the relationship between overcrowding and illness complaint rates among a sample of sixty-four inmates at a Texas prison.\(^\text{197}\) The inmates had lived a minimum of thirty days either in a dormitory, which was defined as the more crowded condition, or in a one- or two-man cell, defined as the less crowded condition.\(^\text{198}\) The results indicate that the inmates in the cells had significantly lower illness complaint rates than did the inmates in the dormitories.\(^\text{199}\) Moreover, the rates remained unchanged when the length of residence was held constant.\(^\text{200}\)

Data collected by McCain, Cox, and Paulus in a county jail cor-
roborated these results. Over a five-week period inmates tended to have higher rates of illness complaints if they resided in units with high spatial density (the amount of space available per individual) and social density (the number of individuals sharing the same living quarters). During three of the five weeks studied the differences were significant. During the fourth week the difference was small but in the expected direction, and during the fifth the two rates were equal.

In a subsequent study conducted in three county jails in Texas, Paulus and McCain did not find that social density had a significant effect on illness complaints. This finding may have been affected by the overall low level of illness complaints and by "[t]he relatively short stays of inmates in jails [which] may not be sufficient to build up the substantial medical histories required for an adequate assessment of crowding effects."

McCain, Cox, and Paulus also collected data on illness complaints in their major study on the effects of double-bunking. The study was conducted in five federal correctional institutions: El Reno, Atlanta, Texarkana, Danbury and Fort Worth.

At the El Reno prison, inmates in double units had markedly higher illness complaint rates than those in single units. For example, during the first six weeks of residence, the illness complaint rates per week were .06 for the singles and .16 for the doubles. After the first six weeks the rates were .07 for the singles and .14 for the doubles. Moreover, isolation of the illness complaints for noncontagious diseases resulted in similar findings.

The results at the Atlanta prison followed a strong gradient: inmates in single cells had the lowest complaint rates followed by steadily
increasing rates as one moved from three-man to six-man cells.\textsuperscript{213}

The Atlanta study also compared the effects of social density with those of spatial density. In the one-man and three-man cells, spatial density varied little: fifty square feet per inmate in single cells versus fifty-nine square feet per inmate in three-man cells.\textsuperscript{214} However, social density in three-man cells was three times greater than social density in single cells.\textsuperscript{215} The higher rate of illness complaints in three-man cells suggests that "social density effects may be more important than spatial density effects at these levels" of crowding.\textsuperscript{216}

At the Texarkana prison, McCain, Cox, and Paulus compared illness complaint rates of inmates in single cells to those of inmates in double cells. The authors did not find significant differences in illness complaint rates.\textsuperscript{217} Moreover, no differences appeared in the rates of inmates living in small rather than large single cells.\textsuperscript{218}

In contrast, the data collected at Danbury indicates that inmates in double-decked bunks had higher rates of illness complaints than inmates in single bunks. Although the differences were not significant (possibly because of the small number of inmates in the study),\textsuperscript{219} the trend in the differences is consistent with other findings. During the first six weeks of confinement the inmates in double-decked bunks had an illness complaint rate of .351 per week while those in single bunks had a rate of .197 per week.\textsuperscript{220} After six weeks in confinement the same trend is evident: double-decked inmates had a complaint rate of .152 per week while single-bunked inmates had a rate of .105 per week.\textsuperscript{221}

Finally, the study conducted at Fort Worth provides data on crowding and illness complaints for both male and female inmates. In general, residents of single cells had significantly lower illness complaint rates than residents of cubicles located in dormitories.\textsuperscript{222} The pattern of these differences varied somewhat with length of confinement; the higher rate appeared only after the inmates lived in more crowded conditions for over six weeks.\textsuperscript{223} The rates also varied with

\begin{itemize}
\item \textsuperscript{213} Id. at 28, 32-33.
\item \textsuperscript{214} Id. at 28.
\item \textsuperscript{215} Id.
\item \textsuperscript{216} Id. at 36.
\item \textsuperscript{217} Id. at 72.
\item \textsuperscript{218} Id. at 65, 71. The small single cells measured 54 square feet and the larger ones measured 66 square feet. Id. at 55.
\item \textsuperscript{219} Id. at 47-48.
\item \textsuperscript{220} Id. at 47.
\item \textsuperscript{221} Id.
\item \textsuperscript{222} Id. at 100.
\item \textsuperscript{223} Id.
\end{itemize}
the sex of the inmates. "[The] illness complaint rates for [men in single cells] were slightly lower than [for men in] high-partitioned cubes [cubicles]. For women, illness complaint rates in [single cells] were about half as high as [in] low-partitioned cubes in the period less than six weeks."224

Although data on female inmates is not extensive, it appears that crowding has similar effects on illness complaint rates for both males and females. The authors concluded that “[t]he reactions of males and females to their housing environments were quite similar suggesting that females as well as males will show negative effects of living under crowded conditions.”225

To summarize, at three of the federal institutions studied by McCain, Cox, and Paulus, inmates in less crowded environments had significantly lower rates of illness complaints. At the fourth facility, the results were in the expected direction but were not statistically significant. Only at the Texarkana institution was there no relationship between illness complaint rates and type of housing.

Walker and Gordon also report a positive relationship between crowding and illness in prisons.226 In addition, they report on a study by the American Medical Association that found “an extremely high incidence of communicable diseases among inmates in United States correctional institutions. An examination of 641 prisoners showed that forty-eight percent had some type of infectious disease transmissible to other inmates.”227

In conclusion, studies of illness complaint rates yield results similar to those found for the other consequences of prison overcrowding examined here. In general, inmates residing in more crowded living arrangements, especially when the institution is itself overcrowded, experience higher rates of illness complaints than inmates living in less crowded arrangements. This conclusion holds for local jails and for state and federal prisons.

Mental Health

McCain, Cox, and Paulus also examined inmate mental health and the relationship between the total capacity of an institution and its

224. Id.
225. Id. at 101.
227. Id. at 56.
psychiatric commitment rate. 228 From 1974 to 1975, the psychiatric commitment rate for large institutions (1,450 or more inmates) in the Texas prison system was .984 per 100 inmates while the rate for small institutions (1,000 or fewer inmates) was .575 per 100 inmates. Thus, the rate in the large facilities was 1.71 times higher than the rate in the smaller facilities 229 As the authors noted:

Although the simple size of a prison is, at best, an indirect measure of overcrowding, it is related to social density: prisons with exceptionally large inmate populations probably bring each inmate into contact with a larger number of other inmates than do small prisons. Thus, the effects of the size of prisons on inmates, although not equivalent to the effects of overcrowding, are worth reporting.230

In another study, McCain and his colleagues provided more direct information on this relationship.231 They compared population changes with the rate of inmate psychiatric commitments in two major state institutions in Texas.232 From 1953 to 1969 there was a strong positive correlation between population and commitments; as the population increased, so too did the rate of psychiatric commitments.233

One cannot draw firm conclusions concerning the relationship between mental health and overcrowding on the basis of only two studies. Nevertheless, the results of these studies conform to the now expected pattern: prisons with large populations and those that experience sharp increases in inmate population experience an increase in harmful effects on inmates. In this case, the harmful effect is that associated with psychiatric commitments.

Inmate Stress and Hypertension

A number of studies of inmate health have focused on the relationship between overcrowding, stress, and hypertension. In one of these studies, D’Atri and Ostfeld investigated the relationship between prison overcrowding and hypertension, as measured by systolic and diastolic blood pressure,234 which “can be viewed as indexes of CNS

228. Effect, supra note 161, at 113.
229. Id. at 113-15.
230. Id. at 113.
232. Id. at 110-11.
233. Id. at 112.
234. "Blood pressure is expressed in terms of the systolic pressure; the greatest force exerted by the heart and the highest degree of resistance put forth by the arterial walls.” Taber's Cyclopedic Medical Dictionary at S-116 (1962). Diastolic pressure is the "point of the greatest cardiac relaxation. If the diastolic pressure does not drop in propor-
The authors hypothesized that stress would increase with: "(1) a crowded environment; (2) an enforced stay in that environment; and (3) a continuous subjection to that environment."236

To test this hypothesis D'Atri and Ostfeld collected data from three correctional institutions. In the first, inmates resided in either single cells, double-bunked cells, or somewhat larger cells shared with three or more inmates.237 In the second and third institutions, inmates were housed in either single cells or large dormitories.238 The blood pressures of inmates housed in single cells were compared with those of inmates housed under other conditions.239

In general, the results strongly support the first hypothesis. Inmates in the more crowded conditions exhibited significantly higher systolic pressure in all three institutions and significantly higher diastolic pressure in the first two institutions.240 Moreover, when height, weight, age, duration of confinement, and race were statistically controlled, the association between crowding and blood pressure did not change.241 Thus, prison housing arrangements were found to be significantly related to levels of stress as measured by blood pressure.242

D'Atri and Ostfeld also examined the relationship between blood pressure and length of confinement.243 Blood pressure was elevated during the first two weeks of confinement, dropped during the next two weeks and then began a fairly steady increase over the remainder of the confinement period.244 D'Atri and Ostfeld suggest that the increase in blood pressures after the first month is directly associated with prolonged confinement in a crowded environment.245

D'Atri and his colleagues later examined the relationship between crowding and blood pressure in a longitudinal design,246 following a
total of 568 inmates at a correctional facility from the date of incarceration until the date of release.\textsuperscript{247} Data were collected shortly after incarceration, at the end of the second week in confinement, and then at successive thirty day intervals.\textsuperscript{248} The last interview and clinical testing session took place a few days before the inmate's scheduled release.\textsuperscript{249}

D'Atri found the inmates' blood pressure to be high during the earliest stage of confinement, to drop after an initial period of adjustment, and then to rise again.\textsuperscript{250} The results varied substantially among inmates housed in different types of cells.\textsuperscript{251} The systolic blood pressure of dormitory residents increased more than the systolic blood pressure of single-cell residents, but the diastolic blood pressure of both groups remained relatively constant over time.\textsuperscript{252}

D'Atri and his colleagues used data from their study to examine changes in blood pressure following transfers from single cells to more crowded dormitories, and retransfers from dormitories to cells.\textsuperscript{253} The findings are compelling. Inmates transferred from cells to dormitories experienced a significant increase in their systolic blood pressures immediately following the transfer, while those who remained in cells throughout the study period experienced no substantial increase.\textsuperscript{254} Inmates transferred from regular cells to cells associated with a work release program experienced a substantial, although non-significant, decline in blood pressure.\textsuperscript{255} Moreover, inmates retransferred from


\textsuperscript{248} Id. at 97.

\textsuperscript{249} Id. at 97.

\textsuperscript{250} Findings were based on data from "352 men who were in confinement four or less (sic) days at the time of the first interview and who subsequently completed the second and third interviews." \textit{Psychophysiological}, supra note 246, at 81.

\textsuperscript{251} The blood pressure of inmates who remained in single cells dropped from "117 mm/Hg to 115 mm/Hg from \textit{[Time 1]} to \textit{[Time 2]}, followed by a return to 117 mm/Hg at \textit{[Time 3]}." The blood pressure of inmates who were moved to dormitories at \textit{Time 3} "remained at a constant 118 mm/Hg from \textit{[Time 1]} to \textit{[Time 2]} and then rose to 121 mm/Hg at \textit{[Time 3]}." \textit{Id.} at 82.

\textsuperscript{252} Id.

\textsuperscript{253} Id. at 96.

\textsuperscript{254} Id. at 99.

\textsuperscript{255} Id. The difference was substantial since the difference in the mean values was large, but the difference did not reach conventional values of statistical significance.
dormitories back to cells also experienced a noticeable, but not statistically significant decline in systolic blood pressures.\textsuperscript{256} The researchers then held constant a number of variables—age, weight, length of confinement, race, education, religion, recidivism, and length of stay at last address—and the findings remained unchanged.\textsuperscript{257}

Although D'Atri and his co-authors in this later study found that crowding was associated with changes in systolic blood pressure, they did not find that it was related to changes in diastolic blood pressure. "\textit{No statistically significant findings [for diastolic pressure] emerged. The general pattern of results, however, paralleled [systolic pressure].}\textsuperscript{258}

The findings from this longitudinal study are important because they demonstrate a significant change in blood pressure following a change in the level of crowding in the inmate's housing. That crowding, rather than the mere transfer itself, plays the causal role in this relationship is demonstrated by three other findings in the study. First, inmates who stayed in cells did not experience an increase in blood pressure.\textsuperscript{259} Second, inmates shifted from cells to work-release cells experienced a decline in blood pressure.\textsuperscript{260} Finally, transfers from dormitories back to cells also resulted in a decrease in blood pressure, albeit non-significant.\textsuperscript{261} Thus, only transfers from less to more crowded housing resulted in increases in systolic blood pressure.

A survey conducted by McCain, Cox, and Paulus at the Texarkana Federal Correctional Institution collected information on the relationship between crowding and stress for forty-six inmate volunteers.\textsuperscript{262} Stress was measured in terms of palmar sweat, which "has been employed as an index of arousal . . . and has been shown to vary with social stress generated by audiences and group competition in laboratory studies."\textsuperscript{263} The data, like those of D'Atri and his co-authors, indicate an association between crowding and stress that is due to the number of cellmates rather than the amount of space available.\textsuperscript{264}

McCain and his colleagues also collected data on blood pressure in

\begin{itemize}
\item \textsuperscript{256} \textit{Id.} at 100.
\item \textsuperscript{257} \textit{Id.} at 101.
\item \textsuperscript{258} \textit{Id.} at 102.
\item \textsuperscript{259} \textit{Id.}
\item \textsuperscript{260} \textit{Id.} at 99.
\item \textsuperscript{261} \textit{Id.} at 100.
\item \textsuperscript{262} \textit{Monograph, supra} note 193, at 6; \textit{Field Research, supra} note 193.
\item \textsuperscript{263} \textit{Monograph, supra} note 193, at 5.
\item \textsuperscript{264} \textit{Id.} at 8.
\end{itemize}
two federal institutions during their investigation of the effects of double-bunking. At the El Reno facility, the inmates in the single units had a significantly higher diastolic blood pressure than did those in the double units, a finding that is inconsistent with D'Atri and Ostfeld's results. During the 1978 study at the Texarkana prison, housing arrangements were not significantly related to blood pressure. In 1979, however, "a significant diastolic blood pressure effect was found with regular single [cell] inmates having lower blood pressure than those in the other types of housing."

Paulus and McCain's investigation of the relationship between blood pressure and overcrowding in three county jails in Texas led to rather equivocal results. In two of the jails no effects were observed, while in the third jail blood pressure was highest in eight-man cells but dropped in cells housing more than eight inmates.

Finally, a study by McCain, Cox, and Paulus compared the effects of residence in two-man cells with twenty-nine square feet per inmate, three-man cells with nineteen square feet per inmate, and six-man cells with nineteen square feet per inmate. The data indicated that the inmates in the two-man cells had significantly lower systolic blood pressures than did those in the three-man and six-man cells. In accord with the studies of D'Atri and Ostfeld, the data for diastolic blood pressure did not reveal any significant differences.

With the exception of the data from the El Reno facility and the Texas jails, the data suggest that prison overcrowding increases stress.

Mortality

The strong and consistent link between overcrowding and illness has led social scientists to investigate the relationship between prison overcrowding and death rates.

Given the results of the studies on stress, Carr hypothesized that

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265. EFFECT, supra note 161.
266. Id. at 21-22.
267. See supra notes 238-61 & accompanying text.
268. At the Texarkana prison, the inmates in the double cells had resided in the institution and in the double cells for a shorter period of time than had residents of the single cells. These variables were held constant in the analysis. EFFECT, supra note 161, at 61, 64, 69.
269. Id. at 68.
270. Id.
272. Id. at 98, 99, 103.
274. Id. at 113.
275. Id.
overcrowding should be related to the death rate for cardiovascular diseases.276 After controlling for the subject's age, Carr found that the correlation between aggregate density and death rates in the Georgia prison system was not significant.277 Moreover, at the individual level, i.e., comparing inmates who died from cardiovascular disease with a matched sample who did not, Carr also found no association between crowding and death rates.278 Carr's analysis was severely limited, however, because there were only nineteen cardiovascular deaths in a prison system with over 10,000 inmates.279

McCain, Cox, and Paulus examined the link between overcrowding and general mortality rates in the Texas and Oklahoma prison systems.280 The Texas data covered the period from 1968 to 1978 when the population increased from 12,500 to 23,000, or by eighty-four percent, while the housing facilities increased by only thirty percent.281 The data from Oklahoma spanned the period from 1973 to 1976, during which time the population decreased and then increased, allowing for a comparison of the effects of shifting population on inmate mortality.282

Suicide rates in the Texas prison system bore a strong relationship to prison overcrowding. While the prison population increased by ninety-one percent during the study period, the suicide rate increased by over 1,000 percent.283

The violent death rates also rose in overcrowded prisons. "The violent death rates in the higher population years (1973-1977, .160 per 1,000 inmates) were forty percent higher than in the low population years (1968-1972, .115 per 1,000 inmates)."284 These differences are consistent with the other findings discussed in this section.

The relationship between population and mortality observed in Texas was also observed in Oklahoma where McCain, Cox, and Paulus examined violent deaths.285 This category included suicide, homicide and "other."286 "In each case the two highest population years had

276. Carr, supra note 152, at 131.
277. Id. at 132-33.
278. Id. at 138-39.
279. Id. at 138.
281. Id. at 103.
282. Id. at 103-04.
283. Id. at 104.
284. Id. at 108.
285. Id. at 104.
286. "The 'other' category included two deaths during escape and three from accidental
higher rates than the low population years, with rates in the high population years 2.5 and 2.8 times higher than in the low population years." Figure 1 graphs the strong relationship between population levels and death rates in the Oklahoma prisons. Clearly, death rates changed with the population. McCain, Cox, and Paulus reached a similar conclusion in their studies of the Illinois prison system.

![Figure 1](attachment:image.png)

**Figure 1**

Oklahoma Prison Population and Death Rate

Source: McCain, Cox, and Paulus, 1980:106

Another way of examining the relationship between prison population and death rates is to compare the rates of large and small institutions. In the Texas system, McCain, Cox, and Paulus found that large institutions had higher death rates (excluding suicides, homicides, poisoning.) The results were unchanged whether the "other" deaths were included in or excluded from the analysis.

287. *Id.*
288. *Id.* at 104, 107.
289. See *supra* text accompanying note 229.
and accidents) than did small institutions. Moreover, this relationship persisted when age was held constant. The same pattern was observed for the rate of suicide.

Paulus, McCain, and Cox examined the association between overcrowding and death rates at a psychiatric unit with a rated capacity of 600 men. The data cover the period between 1953 and 1969, when the total average population per year ranged from a low of 369 to a high of 630. During that time there was a substantial and significant relationship between the population and the death rate. A comparison of the death rates for the years with the lowest populations with those with the highest populations yielded the same results: "The proportion of deaths was significantly higher in the high population years."

In sum, although overcrowding was not associated with cardiovascular deaths in the Georgia prison system, in all other studies it was associated with elevated death rates in general and with elevated suicide and violent death rates in particular.

**Conclusion**

*Wolfish, Chapman,* and subsequent lower court opinions suggest that inmates should continue to seek judicial relief from overcrowded conditions, and that courts will continue to rule in favor of inmates under certain circumstances. It is therefore important to understand the constitutional grounds on which future cases may turn.

*Wolfish* and *Chapman* established the standards for evaluating the constitutionality of overcrowded conditions. Prison conditions for convicted inmates are judged by the standard of cruel and unusual punishment, which prohibits the wanton and unnecessary infliction of pain or treatment grossly disproportionate to the seriousness of the offense. Pre-trial detainees are protected from conditions intended to punish or conditions not justified by a legitimate governmental purpose. A careful application of these standards invites a court to examine the harmful effects of overcrowding on inmates since, under each standard,
the presence of such effects is evidence that the standard has been violated.

With few exceptions, the empirical studies indicate that prison overcrowding has a number of serious negative consequences. Overcrowding is related to rule infractions and assaultive behavior, especially in institutions that house younger inmates, and to the rate of communicable disease, illness complaints, psychiatric commitments, stress and hypertension, and death. The studies whose results do not conform to this pattern are few in number and do not seriously challenge the conclusion that prison overcrowding can have pronounced negative consequences on the lives of individual inmates.

The shortcoming of the Wolfish and Chapman opinions is their failure to clearly delineate the role that harmful effects should play in the application of the constitutional standards. Although corrections authorities must be afforded considerable discretion in dealing with overcrowding, their discretion should be limited when their decisions create harmful conditions that are unconscionable or do not conform to any acceptable penal philosophy. The studies demonstrate that at some level of overcrowding detrimental effects on inmates can be anticipated. In light of these consequences, courts should intervene and limit the discretionary authority of corrections officials. In so doing, courts should require evidence that will enable them to compare the circumstances in the prison at issue with those in studies of the harmful effects of overcrowding. In addition, courts should demand tangible evidence from the inmates' counsel that demonstrates the existence of these harmful effects in the prison or jail being challenged. Evidence of this nature will enable courts to render the carefully reasoned decisions that inmates, corrections authorities, and the public have a right to expect.