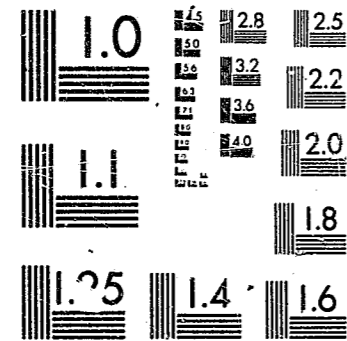


National Criminal Justice Reference Service

**ncjrs**

This microfiche was produced from documents received for inclusion in the NCJRS data base. Since NCJRS cannot exercise control over the physical condition of the documents submitted, the individual frame quality will vary. The resolution chart on this frame may be used to evaluate the document quality.



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

Microfilming procedures used to create this fiche comply with the standards set forth in 41CFR 101-11.504.

Points of view or opinions stated in this document are those of the author(s) and do not represent the official position or policies of the U. S. Department of Justice.

National Institute of Justice  
United States Department of Justice  
Washington, D. C. 20531

DATE FILMED

9/04/81

**nij**

U. S. Department of Justice  
National Institute of Justice

# The Effect of Prison Crowding on Inmate Behavior



67444

a publication of the National Institute of Justice

## About the National Institute of Justice

The National Institute of Justice is a research, development, and evaluation center within the U.S. Department of Justice. Established in 1979 by the Justice System Improvement Act, NIJ builds upon the foundation laid by the former National Institute of Law Enforcement and Criminal Justice, the first major Federal research program on crime and justice.

Carrying out the mandate assigned by the Congress, the National Institute of Justice:

- Sponsors research and development to improve and strengthen the criminal justice system and related civil justice aspects, with a balanced program of basic and applied research.
- Evaluates the effectiveness of federally-funded justice improvement programs and identifies programs that promise to be successful if continued or repeated.
- Tests and demonstrates new and improved approaches to strengthen the justice system, and recommends actions that can be taken by Federal, State, and local governments and private organizations and individuals to achieve this goal.
- Disseminates information from research, demonstrations, evaluations, and special programs to Federal, State and local governments; and serves as an international clearinghouse of justice information.
- Trains criminal justice practitioners in research and evaluation findings, and assists the research community through fellowships and special seminars.

Authority for administering the Institute and awarding grants, contracts, and cooperative agreements is vested in the NIJ Director, assisted by a 21-member Advisory Board. The Board recommends policies and priorities and advises on peer review procedures.

NIJ is authorized to support research and experimentation dealing with the full range of criminal justice issues and related civil justice matters. A portion of its resources goes to support work on these long-range priorities:

- Correlates of crime and determinants of criminal behavior
- Violent crime and the violent offender
- Community crime prevention
- Career criminals and habitual offenders
- Utilization and deployment of police resources
- Pretrial process: consistency, fairness, and delay reduction
- Sentencing
- Rehabilitation
- Deterrence
- Performance standards and measures for criminal justice

Reports of NIJ-sponsored studies are reviewed by Institute officials and staff. The views of outside experts knowledgeable in the report's subject area are also obtained. Publication indicates that the report meets the Institute's standards of quality, but it signifies no endorsement of conclusions or recommendations.

Harry M. Bratt  
*Acting Director*

# THE EFFECT OF PRISON CROWDING ON INMATE BEHAVIOR

Garvin McCain  
Verne C. Cox  
Paul B. Paulus

December 1980

U. S. Department of Justice  
National Institute of Justice

**National Institute of Justice**

Harry M. Bratt  
*Acting Director*

This project was supported by Grant Number 78-NI-AX-0019, awarded to the University of Texas at Arlington by the National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, U. S. Department of Justice, under the Omnibus Crime Control and Safe Streets Act of 1968, as amended. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the U. S. Department of Justice.

TABLE OF CONTENTS

Acknowledgements . . . . .	1
Executive Summary . . . . .	111
Abstract . . . . .	1
Introduction . . . . .	2
General Procedures . . . . .	8
Findings . . . . .	15
Site-Collected Data	
El Reno . . . . .	17
Atlanta . . . . .	26
Danbury . . . . .	37
Texarkana 1978 & 1979 . . . . .	52
La Tuna 1978 & 1979 . . . . .	77
Fort Worth . . . . .	94
Archival Data . . . . .	103
Inter-institutional Analyses . . . . .	119
Summary of Findings Related to Crowding . . . . .	125
Conclusions and Recommendations . . . . .	131
Additional Considerations . . . . .	134
Some Possible Interpretations . . . . .	137
Recommendations for Future Research . . . . .	140
Cross Institutional Illness Effects Unrelated to Crowding . . . . .	142
References . . . . .	146
Appendix A. Data Collection Forms	
1. Questionnaires . . . . .	149
2. Background and Medical Form . . . . .	154
3. Informed Consent Form . . . . .	155
4. Crowding Tolerance Task . . . . .	156

### Acknowledgments

A project of this scope was not completed solely by the efforts of the three principal investigators. We were aided greatly by Dr. Marylie Karlovac who joined our team in March 1979. Dr. Karlovac assumed the primary responsibility for computer analyses of the project data.

We are particularly grateful to the large number of inmates who gave of their time and often provided insights into their own experiences. The U.S. Bureau of Prisons provided cooperation and aid that was indispensable and went far beyond ordinary access and courtesy. We would also like to thank the students at the University of Texas at Arlington and other institutions who cheerfully worked long hours, often under demanding conditions.

Below is a list of people who have contributed their time and efforts to this project.

#### U.S. Bureau of Prisons

Norman Carlson, Director  
Howard Kitchner, Director of Research

Warden F. Arnold	Dr. Syed A. Hosain
D.K. Adams	Arles Keckler
Dr. John Bland	Warden T.M. Keohane
Dr. Fred Carrington	Dr. Bill Lucker
Deverue Colvin	Dr. Jerry Mabli
Steve Fisher	Warden William Nelson
Warden Fred Frey	Dr. Louis Rogol (Deceased)
Dr. Carl Gates	Dr. Jerry Stringfellow
Warden Louis Gengler	Dr. Jerome Sullivan
Bruce Grant	Betty Terry
Warden Jack Hanberry	Elmer Watson
Dr. Gary Henman	

#### University of Texas at Arlington

Margaret I. Casler	Jerry La Valley
Dr. Frank Cheavens	Dr. Robert Matthews
Linda Chernick	Richard McDaniel
Roma Eckrich	Elaine Phelps
Douglas C. Eveland	Sharon Powell
Vanessa Genung	Sam Saunders
Carolyn Hamm	Dr. Janette Schkade
Dr. Ben Judd	Carolyn Smith
Raymond Keel	

University of Texas at El Paso

Adolfo Alvarez  
Jorge Ayalas Lara  
Richard Saavedra  
Richard Samaniego

Texarkana Junior College

Charles Jones  
William Russell

Yale University

Randall Billington  
Marjorie Carpenter  
Paula Durlach  
Amy Goldberg

Georgia State University

Charles Hopper  
Jim Purvis

Department of Justice

Charles Ory  
David Vanderhoof

The principal investigator designation was determined by random lot. The order of authorship on this report reflects the outcome of this procedure. Each of the three investigators played a full and co-equal role in this project.

Executive Summary

The purpose of this research was to identify the effects of prison crowding on inmate health and behavior. The findings were derived from two sources: 1) on-site data collection at prisons that vary greatly in housing modes and degree of crowding; 2) data for ten year periods taken from the archives of the Texas and, for a shorter period, from the Oklahoma prison systems. These findings provide new information relevant to prison housing standards as well as confirmation of previous findings about the negative effects of prison crowding.

A. Housing and Inmate Behavior

1. Methods. Data was collected from 1400 inmates serving in six federal prisons. The prisons ranged from a large penitentiary to a minimum security co-ed institution, included a variety of housing modes and differed in degree of crowding. The inmate populations varied greatly in age, time served, prior commitments, and ethnicity. Female inmates were included in one sample. At all sites inmates were confined to their living quarters only during sleeping hours.

Data collection consisted of testing inmates for: 1) blood pressure; 2) crowding tolerance; 3) affective state; 4) evaluation of their living quarters; 5) perceived control of environment; 6) biographical data. In addition, data was collected from institution records on inmate demographic characteristics, illness complaints, and disciplinary records.

Housing modes were classified into several categories: single member units, double units, multiple units; distinctions were made between

cells, open and segmented dorms, sub-units within dorms, and high/low partition cubicles. Thus the most common prison housing variations (including double bunking) are included in this study.

Inmate housing modes were analyzed from two perspectives: spatial density (square feet per individual) and social density (number of occupants per living unit). These two variables are sometimes partially independent of one another as some housing units of high social density actually provided greater space per inmate (i.e., some large open dormitories provided more square feet of space per individual than was provided by some single cells and cubicles).

2. Findings. The findings were generally consistent across all institutions and inmate populations. The basic finding, which confirms common sense, is that there is a progressive and measurable increase in negative effects with an increase in housing density. However, while a decrease in square feet per individual is an important factor, it is the increase in social density that is most significant. Increasing an individual's space in an open dormitory will not inevitably improve the quality of the housing environment from either the individual's perception or as measured by such indicators as illness complaint rates, disciplinary incidents and other objective measures. Stated otherwise, these findings indicate that once space per person exceeds 50 square feet, the number of people that one is living with and how that space is arranged (single bunking, cubicles, etc.) may be more important factors in determining reactions to housing than mere space per person.

Further confirmation of the importance of social density was the finding that the negative effects of open dormitories could be greatly attenuated through the use of single occupancy cubicles. Although the minimally adequate amount of square feet per individual could not be established in this study, the findings do indicate that such cubicles could be as small as 50 square feet without being detrimental to the individual as compared to the effects seen in open dormitories.

Thus one finding of this study is consistent with the view that individuals prefer privacy and a clearly demarcated boundary of "my space" to shared or open territory, even if square footage must be reduced in order to achieve such privacy. Inmates consistently rated individual rooms as most desirable, and open dorms as least desirable. Even double cells were found to be more desirable than open dorms, although double bunking was not favorably perceived in any housing mode, possibly because double bunking eliminates the vestiges of personal territory.

This finding is particularly important because it suggests that providing 50 square feet in single cells or cubicles is superior to more spacious multiple occupant housing. The picture is less clear regarding adequate space parameters for single occupant housing. We found no measurable difference in our measures between 50 and 60 square feet but this may in part reflect the limitations of our measures.

Additional findings about housing and inmate behavior include:

- ° large dormitories can be improved through sub-dividing open

space into smaller units that house small (10-20 individuals) groups; the positive effects are less than those obtained through individual cubicles of 50 square feet;

- ° tolerance of crowding was found to vary greatly among individuals, apparently due to personal background factors. Differences in tolerance were also found among ethnic groups with Mexican Nationals exhibiting the greatest tolerance and Anglo-Americans the least; Black Americans and Mexican-Americans had tolerance levels that were between that of the Anglos and Mexican Nationals;
- ° there is some evidence that tolerance of crowded housing does not improve with time; that is, individuals apparently do not become adjusted to their crowded environment over time;
- ° illness complaint rates exhibited a consistent but unexplained pattern of increasing for six weeks for individuals who enter housing units, then declining and leveling off;
- ° inmate affect or moodiness appeared to be influenced more by the individual's security level and how long he/she had been incarcerated than by housing environment;
- ° crowding effects were not found to be associated with individual participation in religious, education or recreational programs;
- ° Blood pressure readings were not found to be indicative of crowding related stress. This is inconsistent with previous studies and perhaps, in the researcher's opinion, reflect the relatively benign milieu of federal prisons.

#### B. Institution Size and Inmate Health/Behavior

This part of the study examined the consequences over time of increases in total institutional populations. Data was available for Texas prisons for the period 1968-1978, a period in which institution populations nearly doubled but housing capacities increased by only 30%. In Texas, the rates of suicides, violent deaths, disciplinary incidents, natural deaths for "elderly" (age 50 or more) inmates, increased beyond statistical expectancies. The larger prisons in the Texas system (1600 average daily population) consistently demonstrated rates higher than the smaller (800 average daily population) prisons, a consistency that could

not be readily explained by demographic characteristics of the populations, housing mode, or average amount of space per inmate.

Data from Oklahoma on crowding and violent deaths corroborated the Texas data. The apparent explanation of this data is that sheer population size of an institution exerts a negative influence on its inmates, an influence that is seemingly independent of other factors.

## Abstract

Data from over 1,400 prison inmates together with substantial archival data were used to evaluate the psychological and physiological effects of crowding and various housing arrangements on inmates. Measures used included: illness complaint rates, disciplinary infraction rates, blood pressure, perception of crowding, sleep, and inmate evaluations of housing, death rates (both violent and non-violent), suicide rates, psychiatric commitment rates, self mutilation and suicide attempt rates. The findings supported the following principal conclusions.

1. High degrees of sustained crowding have a wide variety of negative psychological and physiological effects including increased illness complaint rates, higher death and suicide rates, and higher disciplinary infraction rates.

2. Large institutions produce much more severe negative psychological and physiological effects than small institutions, as expressed in higher death, suicide, and psychiatric commitment rates.

3. Partitioning of open dormitories into privacy cubicles has a strong positive effect as indicated by the reduction or elimination of negative effects typically associated with open dormitories.

4. Both number of occupants in housing quarters (social density) and space per person (spatial density) contributed to crowding effects. Social density was typically the most influential factor. Some of these effects were time related.

5. Our findings also indicated that there are substantial individual differences in response to crowding as well as racial and ethnic group differences.

Recommendations regarding optimum housing arrangements policies are included. Future research needs are also discussed.



### Introduction

The United States prison population is increasing at a faster rate than prison housing facilities. Consequently, crowding in prisons is becoming more intense and frequent. An all too frequent example of intense crowding is illustrated in Figure 1. It is widely accepted that crowding in prisons is a major source of administrative problems and adversely affects inmate health, behavior, and morale. For example, the recent tragedy at the New Mexico State Prison has been blamed at least in part on crowding. In spite of these concerns there has been relatively little systematic research on prison crowding. Such research is necessary if we are to accurately identify the consequences of crowding and establish housing standards that will minimize these effects. The current interest in revision of prison housing standards would be greatly aided by additional information regarding the psychological effects of prison housing. The present project was directed at providing a systematic evaluation of crowding effects in prisons. The project began in March 1978 and the initial phases involved locating suitable research sites. Data collection began in May 1978 and continued through May 1979. Preparation of data for computer analysis and statistical analyses continued through January 1980.

Research has indicated that nonprison crowding can have negative psychological and physiological effects (see Paulus, 1980 for a review). Yet some investigators are not convinced that crowding has generally negative effects (e.g., Freedman, 1975, 1979). This view is apparently derived from the fact that a number of studies have shown no effect of crowding while others show effects only under special conditions (e.g., all male environments). Another problem with past crowding research is a paucity of good evidence from naturalistic or real life settings. Many studies done in

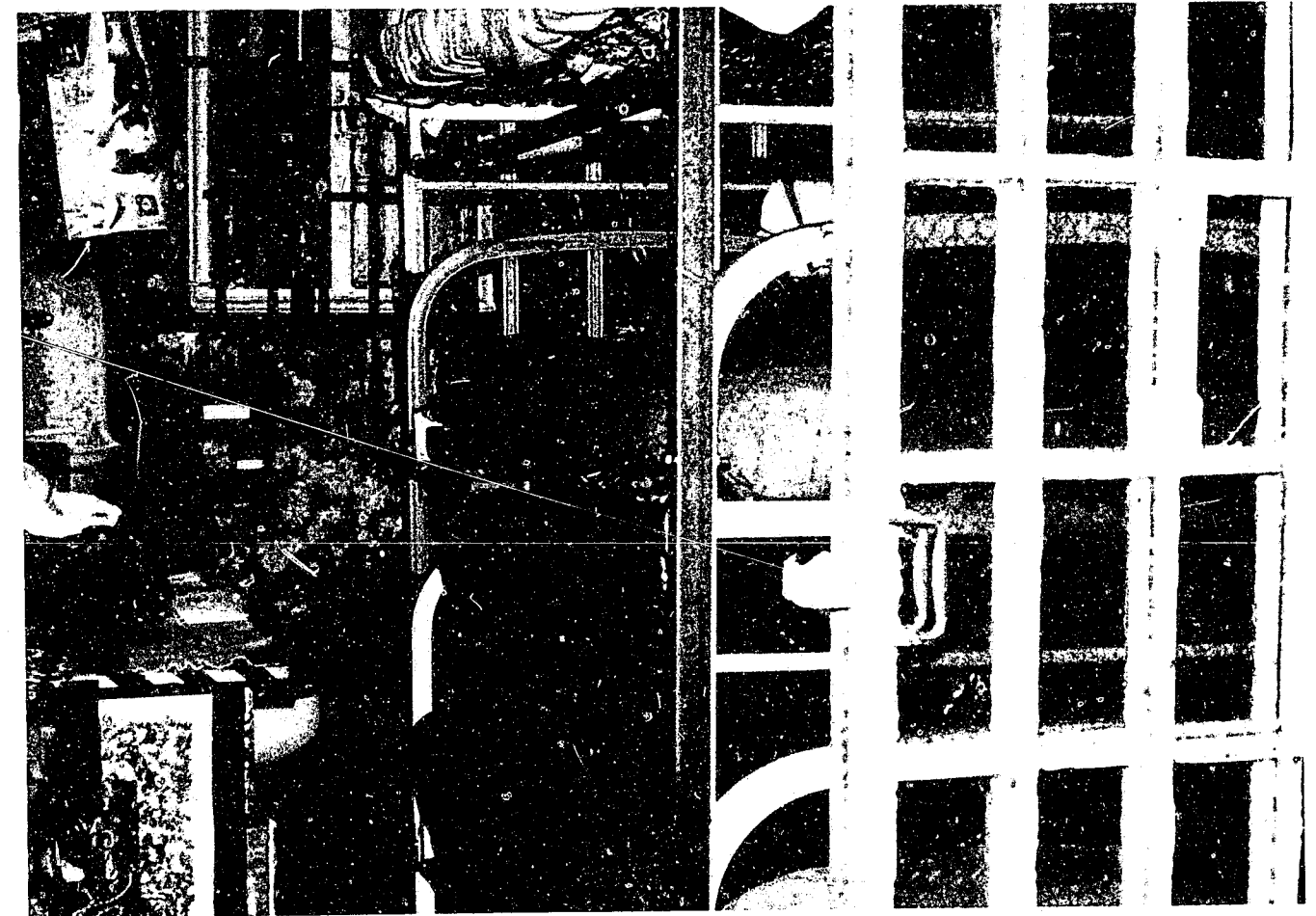


FIGURE 1. Triple-bunked, single cell in a large state prison, providing 19 square feet per inmate.

laboratory settings may have little relevance for residential or institutional environments. Other studies have focused on urban environments but often reported no crowding effects or failed to eliminate alternative interpretations of obtained results. Nevertheless, a number of consistent trends have appeared in the study of residential crowding.

A series of studies in college dormitories have found that increasing the residents in a room from two to three increases feelings of crowding, loss of control, physiological stress, and illness complaints (Aiello and Epstein, 1979; Baron, Mandel, Adams, & Griffen, 1976). Some studies (Baum and Valins, 1977) have demonstrated that dormitory designs that increased the number of unwanted interactions with other students led to social and psychological withdrawal.

Our previous research on crowding in prisons has focused on the effect of different types of prison housing. This research has demonstrated that inmates living in open dormitories felt more crowded, rated their environment more negatively, had higher illness complaint rates and greater psychological stress than inmates living in single or double occupant rooms (Paulus, Cox, McCain, & Chandler, 1975; McCain, Cox, & Paulus, 1976; Cox, Paulus, McCain, & Schkade, 1979). A study of a county jail revealed that the inmates living in the most crowded units also had the highest illness complaint rates (McCain et al., 1976). In a state prison we found that feelings of crowding and systolic blood pressure increased as the number of inmates in a cell increased from one to six (Paulus, McCain, & Cox, 1978).

Several other researchers have also examined the effects of prison housing. D'Atri (1975) found that inmates in open dormitories have higher blood pressures than those in single cells. Ray (1978) found that high

social density in dormitories led to increased blood pressure and illness complaint rates. Megargee (1971) found that crowding was related to increased disciplinary infractions.

A number of studies have also assessed the effects of institutional size or changes in institutional population. Nacci, Teitelbaum, & Prather (1977) surveyed all of the federal correctional institutions and found that the ones that were most overcrowded relative to their capacity had the highest disciplinary infraction rates, especially in the case of institutions with young offenders. We were able to examine effects of variation in population in a psychiatric hospital within a state prison system (Paulus et al., 1978). As population increased and then decreased, the death rate also increased and decreased. In the same state system the death rate for males over 45 was found to be higher when inmate population was higher.

In summary, there exists some evidence that high levels of density can produce negative emotional reactions as well as increasing the occurrence of disciplinary infractions, illness complaints, and even death. However, in an area of study as important as crowding, this evidence is still relatively meager. Only a small number of published studies have shown some health related effects of institutional crowding. Since this is a very serious consequence it is clearly important to obtain much more information about the health related effects of institutional crowding.

There also exists very little information on the effects of different types of prison housing conditions. Most studies have involved comparisons of different levels of overall institutional crowding or comparisons between single or double occupant rooms and crowded dormitories. There is hardly

any evidence available about the effects of amount of space in various types of housing (e.g., single rooms and dormitories) and the nature of dormitory design (e.g., the use of privacy partitions). Also, all of the relevant studies have used only a restricted range of measures. A comprehensive understanding of the effects of crowding requires the use of psychological, physiological, and behavioral measures.

The goal of this project was to deal with these gaps in our knowledge as well as a number of other issues. Our primary goals were as follows:

1. Generality. We sought to determine the degree to which effects of crowded housing conditions could be consistently observed in a variety of correctional institutions. Our previous work was limited primarily to the Federal Correctional Institution at Texarkana. We wanted to examine the effects of crowding across different types of institutions and institutional populations. Hence, we examined inmates in six different institutions ranging from minimum to maximum security.

2. Individual Differences. We were also interested in examining the effects of inmate racial or ethnic group and sex. Some studies suggest that blacks and Mexican Americans might be more tolerant of crowding than whites (Baxter, 1970). A number of studies have shown that females react more negatively to residential crowding than males. The effects of inmate background (rural vs urban), age, and custody level were also of interest.

3. Social and Spatial Density. One major gap in the literature is our knowledge about the precise effects of different levels of social density (number of occupants in living quarters) and spatial density (square feet per person). These two factors are often difficult to disentangle, but it is important to determine the extent to which these factors

contribute to the observed effects of crowding. Several of our previous studies (e.g., Paulus et al., 1975) suggested that social density is the most important. It is of course quite likely that both of these factors have an impact. So our goal was to determine the relative contributions of these two factors to crowding effects by examining a wide variety of housing conditions and institutions.

4. Institutional Density. Since several studies have shown that large, densely populated nonprison environments (e.g., Levy & Herzog, 1974) can have negative effects on the health of residents, we also examined the effect of population levels of institutions.

5. Crowding Tolerance. In one of our previous studies we had examined crowding tolerance using a task involving a simulated dormitory task. This task yielded results indicating that living under crowded conditions decreased crowding tolerance. Furthermore, the longer inmates were exposed to crowding, the less their tolerance for it. These findings have been replicated in a number of other studies (e.g., Baum & Valins, 1977). We wanted to examine this effect further using both the simulated room task and a modified version.

#### Methodological Considerations

1. Multiple Measures. To determine the potentially broad range of effects of crowding we employed measures of mood, attitudes, social behavior, blood pressures, health, and crowding tolerance.

2. Assessment of Confounding Factors. Although in many of the institutions housing assignment appears to occur on a semi-random/space available basis, there is a tendency at some institutions for inmates to move into more desirable housing as they attain seniority through length

of time in the prison. Consequently we examined the contributions of such variables as age, time in prison, time in housing, custody level, and months left on sentence to the various effects of crowding.

#### General Procedures

Our general approach was determined by the practical considerations governing research in a prison environment. We sought a wide range of housing conditions that reflected variation in spatial density (square feet per person) and the social density (number of occupants in living quarters) as well as other features such as cubicles. Each research site was chosen after careful planning. Blueprints of various prisons were examined and details obtained regarding housing conditions. On the basis of information obtained by telephone, written correspondence and blueprints, potential research sites were selected and were visited. Following on-site inspection, some sites were selected for data collection and negotiations ensued to provide for a data collection visit. Data collection visits were typically three to four days in duration and involved processing a large number of inmate volunteers in a relatively short time and obtaining information from their records. Each visit involved all three investigators and several assistants, some of whom were hired at the prison locale. These trips involved intensive effort during the day within the prison and in the case of La Tuna, night data collection as well. Following data collection during the day many hours were spent each night organizing collected data. These data collection visits were extremely demanding physically and mentally, and because of the ever present risks inherent in a prison environment, emotionally as well. We received superb cooperation from the U.S. Bureau of Prisons Director Norman Carlson and the U.S. Bureau of Prison personnel at every administrative level. This cooperation together with

the superiority of records in the Federal Prison System led us to confine our research visits to federal institutions. The following prison facilities have been employed in the project: Atlanta FCI, Georgia; Danbury FCI, Connecticut; El Reno FCI, Oklahoma; La Tuna FCI, Texas; Fort Worth FCI, Texas; and Texarkana FCI, Texas. Each of these sites were chosen because they offered special types of housing conditions and were accessible for research.

#### Unutilized Sites

A number of potential research sites were visited but proved to be unsuitable and/or inaccessible for our research purposes. In some cases the prison population had declined to the point where the existing types of housing provided limited variation in spatial and social density and little or no crowding. In the case of the Florida and Texas prisons, our access was initially approved by prison officials but subsequently denied because of pending litigation. Listed below are the prisons that were site-visited but not utilized as research sites.

Allenwood FCI, Pennsylvania

Huntsville Unit, Texas

Lake Butler Reception Center, Florida

Lawtey Prison, Florida

Leavenworth FCI, Kansas

Lewisburg FCI, Pennsylvania

McAlester State Prison, Oklahoma

McNeil Island FCI, Washington

Milan FCI, Michigan

Reception Center, Huntsville, Texas

Trenton State Prison, New Jersey

Union Prison, Florida

#### Scope of the Study

We have collected data for over 1400 inmates in six different institutions. We were able to obtain information in 90 separate categories per inmate and now have in excess of 100,000 data entries. This does not include archival data from 20 institutions which cannot easily be classified according to the number of entries. The institutions have provided a wide range of variation in spatial and social density of housing conditions. Some of the housing we have examined include different sizes of single occupant cells, double bunk cells, single and double bunk partially open cubicles, large (70 occupant), medium (40 occupant), small housing areas (10 occupant), and multiple occupant housing ranging from three to six man cells.

#### Measures

We attempted to collect data regarding the effects of crowding with measures that were feasible to use in a prison setting. Some of our measures, such as the questionnaire and blood pressure, required brief direct contact with inmates while others involved prison records, as in the case of illness complaint rate and disciplinary infraction rate. Our questionnaire involved several psychological scales designed to measure perception of crowding, evaluation of living quarters, and mood state. In addition we obtained biographical information from inmates (e.g., number of people in home during childhood) or from records (e.g., number of prior incarcerations, age). Many of these measures have been examined to determine their relationship to specific housing conditions and inmate reactions to

housing. Our data collection form was modified over the course of the data collection phase of the project. The most complete and recent version is included in Appendix A1. Our report will focus on only a subset of all measures taken. Some measures are not discussed because they have not proven useful and others remain to be analyzed. The measures that have received the major part of our attention have been perceived crowding, blood pressure, illness complaint rate, disciplinary infraction rate, housing unit evaluation, mood state, and perception of control. Archival measures included death, psychiatric commitment, and suicide rates.

#### Blood Pressure

We included this measure as a potential physiological index of crowding-induced stress because of previous findings by ourselves and others which indicated higher blood pressure values in crowding housing. Measurements were taken with a programmed Electro-sphygmomanometer (PE 300 NARCO Biosystems) and a chart recorder. This procedure provided for consistent maximum cuff pressure, constant cuff inflation and deflation rates and a written record of blood pressure data. Because of the lack of consistency in our blood pressure findings, we do not recommend this measure except for special situations.

#### Illness Complaint Rate

In each institution we examined and recorded from medical records individual illness complaints during the period of time (up to six months) the individual was in the housing quarters in which he was residing on the day of testing. We obtained medical records from infirmary files at each research site. Inmate infirmary visits were recorded by date and

nature of complaint. We have employed four measures of illness complaints. Overall rate reflects all volitional visits to a medical facility except those compelled by serious injury, emergency illness conditions and physician scheduled examinations such as x-rays and work-related physicals. The second measure involves the further exclusion of colds and flu. Finally, we also separately examined contagious and non-contagious illnesses. In all measures no more than one complaint in a given day was recorded for an individual.

In the course of analyzing the relationship between housing and illness complaints it was discovered that transfer to different housing was accompanied by a high level of illness complaints. Further examination indicated that this period of high illness complaints was concentrated in a period of about six weeks following transfer. After six weeks the complaints tended to be stable. This measure has discriminated among one and two man cells, racial groups, and a variety of other factors. It should be noted that illness complaint behavior can be promoted by psychological stress with or without actual changes in physical health. (Mechanic, 1976).

#### Disciplinary Infractions

Thus far we have collected data from disciplinary records with sufficient number of infractions for analysis at El Reno. At this institution we analyzed the relation between housing and disciplinary infractions. We focused on nonaggressive disciplinary infractions because aggressive infractions would be reduced in single occupant housing by the lack of additional housing partners.

#### Crowding Tolerance Task

One version of this task involved asking inmates to place figures

in a model of a dormitory until it appeared crowded. The number of figures placed was used as a measure of crowding tolerance. In the past this task has shown a modest relationship to the social density. We wished to collect further data with this task to further assess its utility. Since the task is time consuming and cumbersome to administer, we also devised a simplified version that requires that inmates select from a series of drawings the ideal number of beds for a standard size dormitory.

#### Perceived Crowding

This measure simply asked inmates to characterize their housing as uncrowded, moderately crowded, crowded, or very crowded. The question was asked orally and was designed to circumvent problems with inmates of limited literacy and/or intelligence. One reason for our interest in perceived crowding scores is that, as will be seen later, they are related to illness complaint rates.

#### Inmate Evaluation of Housing Units

We have employed a number of scales on our questionnaires that focus on the inmates' evaluation of their living quarters. These focused on dimensions such as Good--Bad, Attractive--Unattractive, Pleasant--Unpleasant, Quiet--Noisy, and Crowded--Uncrowded.

#### Mood Scales

Another set of scales was directed at measurement of psychological mood state and focused on dimensions such as Relaxed--Bored, Tense--Calm, Satisfied--Unsatisfied, Happy--Unhappy, and Important--Unimportant.

#### Perception of Control

Other research (Cohen, Glass, and Phillips, 1978) has indicated that the degree of perception of control of one's life situation can determine ability to cope with stress. Consequently we asked inmates to rate the amount of control they felt they had over their situation and over others in the prison and how much choice they thought they had over housing assignment and prison activities.

#### Background Questionnaire

Information on this questionnaire (see Appendix A2) was taken directly from the inmates records. Commitment date, offense, race, housing record, and disciplinary infractions were the items of greatest interest. A number of other items were obtained, but either have not yet been analyzed or proved to have little utility.

#### Archival Data

Archival data was obtained from the Texas and Oklahoma prison systems. These data of interest were related to death rates, suicide rates, self mutilation and attempted suicide, disciplinary rates, and psychiatric commitments as they related to institutional population level and institutional size. Data from the Texas Department of Corrections was extensive and covered, in some cases, periods of time up to 15 years.

#### Data Collection Procedure

A similar procedure was employed at each institution. A typical research visit involved the three principal investigators and three to eight assistants. On the day prior to data collection, one of the principal investigators prepared an inmate "call-out" list for each testing day. This

list consisted of inmates selected from specific types of housing. In some cases length of stay in housing, ethnic identification, type of offense, and sex (at Fort Worth) were used as criteria for determining inmate inclusion in the "call-out." When an individual inmate came to the testing area, their first contact was with one of the research group acting as a receptionist. Here the general nature of the study was explained and consent forms were signed (see Appendix A3) if the inmate wished to participate. Participants proceeded to the first station where their blood pressure was measured. From this station the inmate was sent to a nearby location and given the Crowding Tolerance Test (see Appendix A4). They were then directed to a third location to fill out a questionnaire. The questionnaire was explained by one of the investigators. If the inmate could not read, the investigator helped fill out the questionnaire. Spanish language forms were given to Spanish-speaking inmates. Our test procedure allowed for testing four to six inmates every 15 minutes and up to 100 inmates per day. At the same time two or three members of the team were consulting records for background medical and disciplinary data (see Appendix A5).

#### Findings

The data are divided into two sections for purposes of this report. The section on Site-Collected Data includes those measures taken at the research sites. The bulk of our analyses of site-collected data were based on within institutional data to insure that the data were derived from a common institutional milieu. Archival Data include information from various reports and records. The greater part of the latter data is from institutions in which, for various reasons, we were not able to carry on direct observations. Findings for some variables such as

disciplinary infractions will appear under both Site-Collected and Archival headings due to the different sources of the data. All statistical comparisons and correlations in the report were significant at the .05 level or less if not otherwise noted. Differences at or beyond the .001 level are reported as .001.

Field research, by its very nature, does not often provide for the kind of control typical of laboratory research. This is certainly true of this project and consequently the statistical tests cannot have the same validity as when used in laboratory or highly controlled field research. We made every effort to collect data that would meet the assumptions and requirements of conventional tests. However, because of the nature of the project, this goal was, at best, only approximated. Equally important, from our perspective, were findings that were consistent across institutions. We are especially cautious in attaching importance to findings unique to one institution though they often suggest further lines of research.

#### SITE-COLLECTED DATA

##### El Reno

The Federal Correctional Institution at El Reno is a medium security institution. At the time of our research visit it had 1,212 residents, 45% of whom were over 28, with an average age of 29.9. The inmates are initially housed in an admissions and orientation cell block. They stay there for about two months and then are transferred to other units in the prison. Most of these units consist of either cubicled dorms or enclosed rooms. Four single-story buildings contain two wings of cubicles separated by sanitary facilities, a lounge, and an administrative office. The partitions of the cubicles are 5'6" high and enclose a 7' by 7' area of living space. The cubicles provide some storage and writing space. Each wing contains 48 such cubicles. Nineteen of these cubicles contained double bunks. Figure 2 shows cubicles at El Reno.

Two double-story buildings contained enclosed rooms measuring 5'10" by 10'. Each floor contained two wings of 35 rooms arranged on both sides of a hallway. Eleven rooms in each section of the hallway contained two men. Except for Youth Corrections Act (YCA) inmates, assignment of inmates in our sample to a particular type of housing is done on a completely random basis. Within a unit residents are initially assigned to a double and moved to a single on a seniority basis.

We were primarily interested in two aspects of the El Reno housing. First, we wanted to obtain data on the effects of cubicles. Second, we wanted additional data on singles as compared to doubles.

##### Housing Units

One hundred and eighty-three inmates were tested on July 11-13, 1978.





FIGURE 2. Cubicles, El Reno Federal Correctional Institution.

Four buildings were sampled and contained both single and double units. The inmates were distributed as follows: Building 2, 23 singles, 17 doubles; Building 3, 29 singles, 23 doubles; Building 5, 20 singles, 22 doubles; and Building 6, 22 singles, 27 doubles.

Our first analysis was concerned with overall differences among residents of the different housing units. Table 1 shows the various factors on which residents of the various units differed significantly as determined by analysis of variance. It can be seen that Unit 5 which contained the YCA inmates had the youngest and most infraction prone population. The cubicles were rated as more attractive than the rooms and residents in the cubicles had relatively lower blood pressures (see Table 1). The blood pressure effect was only marginally significant ( $p < .06$ ) for systolic blood pressure and the low diastolic blood pressure of the Building 5 residents can be attributed to their age. A comparison of black and white inmates showed that blacks tended to rate their housing a little more negatively.

#### Singles versus Doubles

Inmates who lived in singles were compared with those who lived in doubles (in the cubicles and rooms combined). Those who lived in the doubles rated themselves to be more crowded and rated their living quarters more negatively on all of the room rating scales as compared to those who lived in singles. Double residents also had higher nonaggressive disciplinary infractions and less involvement in club activities than residents who were singles (see Table 2). Double residents differed from single residents in having been in the institution a shorter time period, having shorter times in their housing units, and having a lower custody

Table 1  
Results for El Reno Buildings

	2 Cubicles	3 Cubicles	5 Rooms	6 Rooms	F-Values	Significance Levels
Age	29.9	30.2	23.9	32.3	$F(3,179) = 16.01$	$p < .001$
Room Attractiveness <sup>a</sup>	3.1	3.1	1.9	2.2	$F(3,179) = 4.99$	$p < .01$
Nonaggressive Infractions	.09	.23	.45	.06	$F(3,179) = 3.16$	$p < .05$
Diastolic Blood Pressure	50.9	53.8	50.3	56.6	$F(3,179) = 3.07$	$p < .05$
Systolic Blood Pressure	111.1	110.3	114.5	115.9	$F(3,179) = 2.45$	$p < .06$

Note: a. Higher number means more attractive.

Table 2

El Reno Results for Singles vs Doubles

	Singles	Doubles	F-Values	Significance Level
Perceived Crowding <sup>a</sup>	2.4	3.3	F(1, 180) = 30.47	p < .001
Summary Room Rating <sup>b</sup>	15.6	11.6	F(1, 181) = 20.66	p < .001
Nonaggressive Infractions	.07	.35	F(1, 181) = 7.63	p < .01
Club Activities	.52	.22	F(1, 181) = 6.44	p < .05
Time in Institution (weeks)	59.6	29.1	F(1, 180) = 33.55	p < .001
Time in Housing (weeks)	29.4	9.2	F(1, 181) = 37.64	p < .001
Custody Level	2.25	1.72	F(1, 177) = 8.22	p < .01
Crowding Tolerance <sup>c</sup> (More than 6 weeks)	18.1	14.2	F(1, 105) = 4.08	p < .05
Diastolic Blood Pressure (More than 6 weeks)	55.6	51.2	F(1, 105) = 3.97	p < .05

- Notes: a. Higher number means more crowded.  
 b. Higher number means more favorable rating.  
 c. Higher number means more tolerance.

level. When one controls for the effect of time in the institution and for custody by analysis of covariance, the discipline effect remains strong, but it is weakened somewhat when one controls for time in housing conditions ( $p < .10$ ). Similar analyses of covariance controlling for time in institution, time in housing condition, and custody revealed that all of the effects of room rating and perceived crowding were not significantly influenced by these variables. However, the club effect disappeared when time in housing unit was used as a covariate. 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. In addition, the singles had higher crowding tolerance scores (indicating more crowding tolerance) and higher diastolic blood pressure. For inmates who had been in a particular housing unit over six weeks, the disciplinary infraction effect remains strong even when one controls for time in housing ( $p < .01$ ).

#### Cubicles versus Rooms

In comparing cubicles and rooms we found that the cubicles were rated as more attractive than the rooms, while systolic blood pressure was higher in the rooms (see Table 1). When one examines only those who have been in the housing six weeks or more the effect for systolic blood pressure weakens ( $p < .11$ ). There was also a slight tendency for room residents to have more trouble sleeping ( $p < .06$ ). Custody, age, and length of stay in housing and in the institution did not differ between these two housing types.

#### Illness Complaints

Residents of double occupant rooms or cubicles were found to have

higher illness complaints than residents of singles. When the rates were calculated for the first six weeks of residence in the housing units, the weekly illness complaint rates for the singles were .06 and for the doubles .16 ( $p < .05$ ). For the period after six weeks of living in the housing units the rates were .14 for the doubles and .07 for the singles ( $p < .03$ ) (see Figure 3). When only noncontagious illnesses are considered, the relative differences remain large. In the period before six weeks the doubles (.089) are about 2-1/2 times as high as the singles (.036). The ratio is two to one for the period after six weeks. Illness rates for inmates in cubicles were slightly higher than for those living in rooms. The differences were not statistically significant. For this period of time, the rates for the blacks were also higher than those for the whites (.13 vs .07). However, this effect was not significant.

When illness rates are calculated separately for different periods of time, it appears that in both one and two man units illness rates are high during the first six weeks and considerably lower after the initial six weeks, especially for one man units (see Figure 3). The difference between these periods is highly significant ( $p < .005$ ).

#### Perceived Crowding and Illness

A detailed analysis of the relationship of perceived crowding to illness indicates that inmates who feel more crowded within particular housing units have higher illness rates. Individuals in two-man units were divided into those reporting that they were very crowded and those reporting they were less crowded. For the period less than six weeks those reporting "Very Crowded" the illness rate (average = .200 per week) was over four times as high as those reporting less crowding (average =

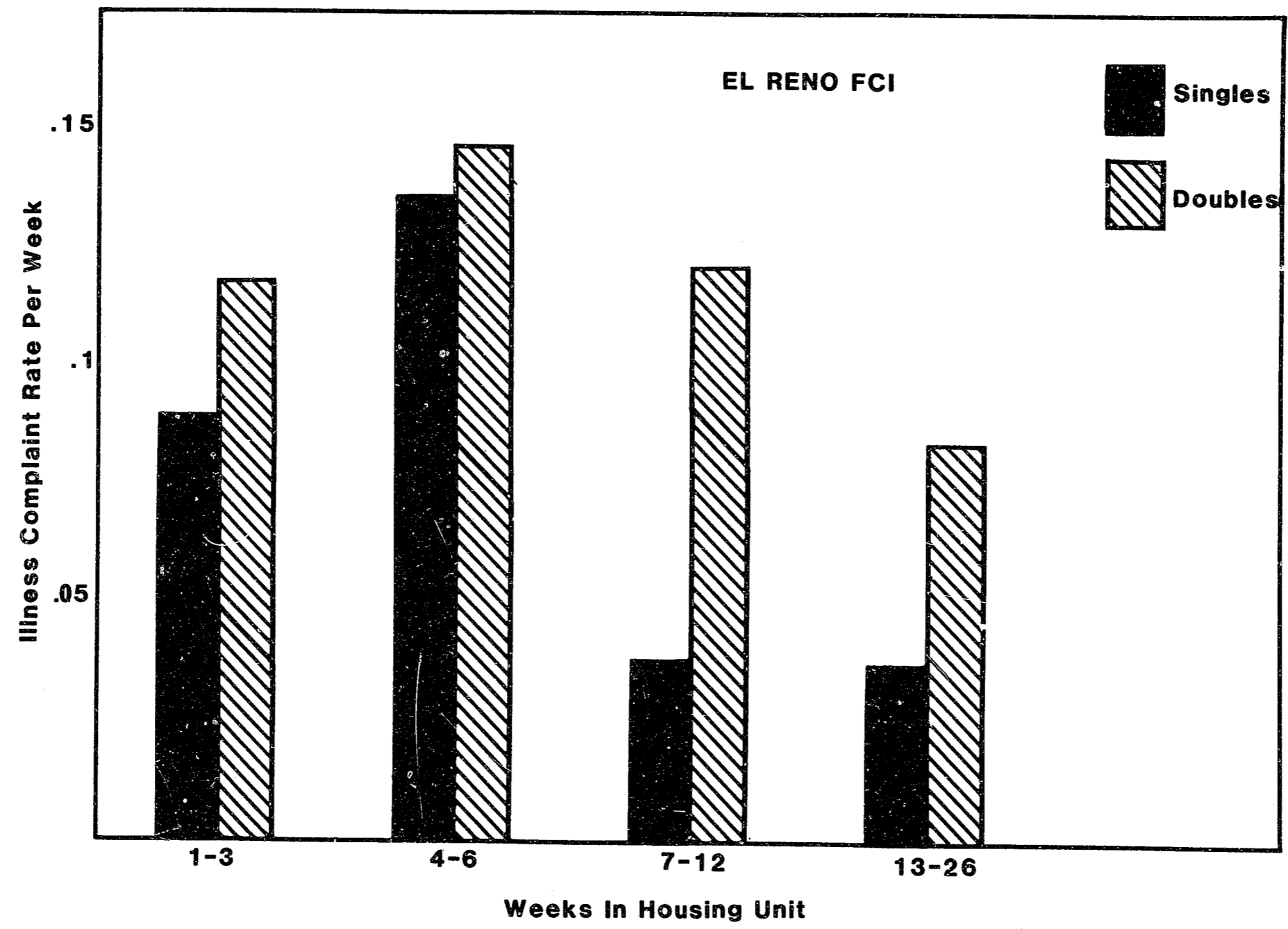


Figure 3

.042 per week). This difference was statistically significant ( $p < .015$ ). For the period over six weeks the inmates reporting very crowded had illness rates over twice as high as those reporting less crowding. However, the number of subjects available was too small for statistical analysis.

#### Summary

The results for El Reno indicate that double occupant housing produced greater feelings of being crowded, more negative ratings of the living units, greater disciplinary problems and higher illness complaint rates than singles. High perceived crowding scores were accompanied by higher illness complaint rates. Blacks had higher illness complaint rates than whites. Cubicles were rated as more attractive than rooms and the residents in these units had lower systolic blood pressures. The fact that there were no other statistically significant differences between the rooms and the cubicles indicates that cubicles are quite effective in reducing the crowding effects typically encountered in open dorm living.

### Atlanta

The primary objective in our data collection at Atlanta was to compare the effects of housing in single and multiple occupant cells (see Figure 4). Earlier work had covered singles, doubles, and dorms. This was an opportunity to examine 3, 4, 5 and 6 man cells. The secondary objective was to collect data in a high security institution in order to test the generality of our findings.

The Atlanta Federal Penitentiary is a large, old, maximum security institution. The population at the time of our site visit (September 12, 1978) was 1,924. This decreased by about 200 at the time of our research visit (January 2-4, 1979). Inmates are older (average age 37) than in most institutions. The average inmate spends approximately six years in this institution. There are several types of housing at Atlanta. Our primary interest in Atlanta was in the potential comparisons among single and several types of multiple occupant cells, since multiple cells such as those at Atlanta are extremely rare. The single cells had approximately 50 square feet. The multiple occupant cells are 22' x 8', providing a total of 176 square feet (see Figure 4). Multiple occupant cells had three to eight inmates at the time of the site visit with space per person ranging from 22 to 59 square feet. Housing assignment for inmates in our sample was made initially on the basis of availability except for maximum security inmates who are ordinarily assigned to A and B blocks. We did not test any inmates from the special units, Detention and Security. At the time of the site visit Atlanta was converting to a unit management system.

Our research visit included the days of January 2-4, 1979. We collected data on 121 inmates in single, 3, 4, 5 and 6 man cells. Due to a

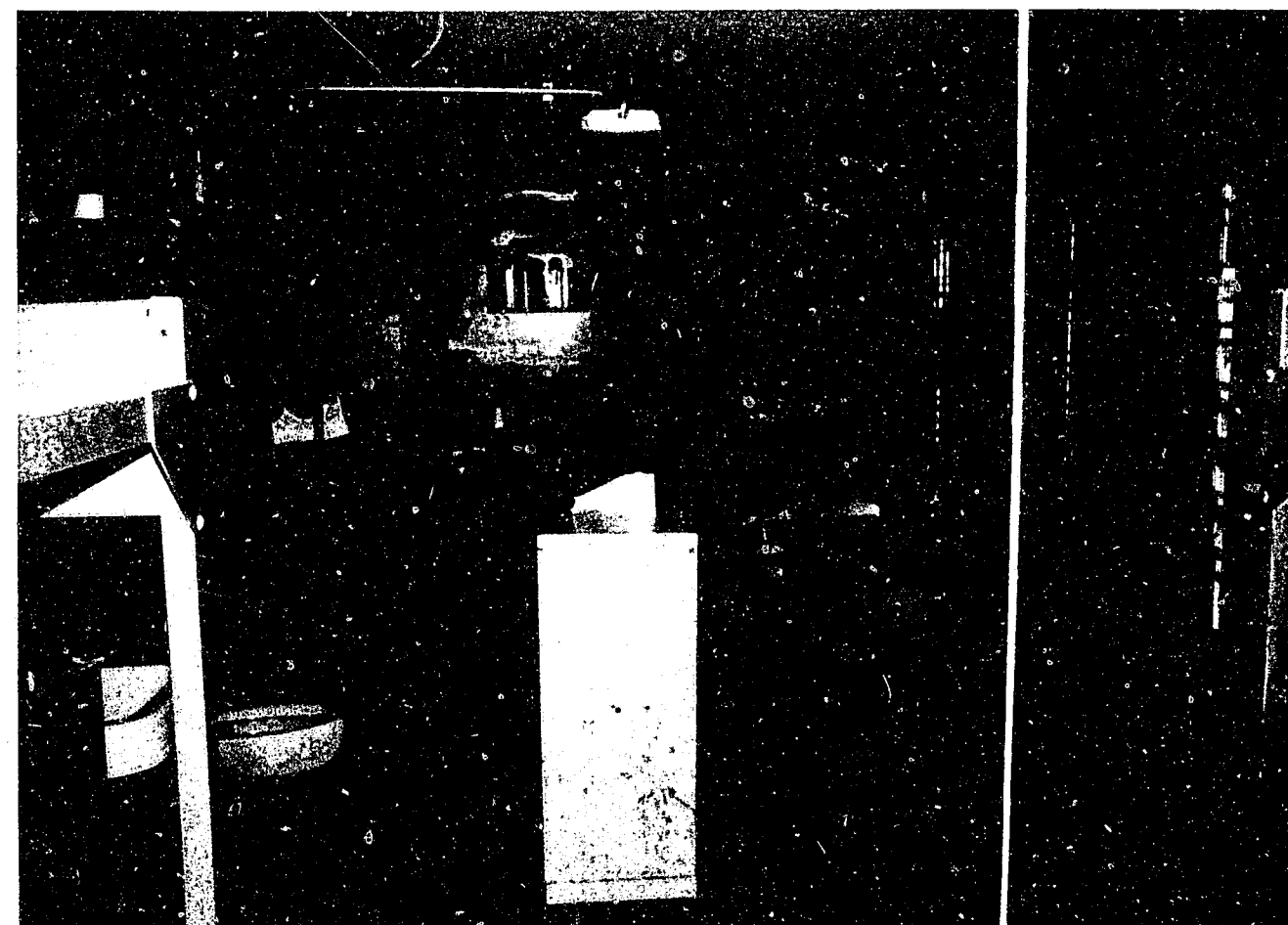


FIGURE 4. Eight-bunked cell in Atlanta Penitentiary.



decrease in overall population there were no longer any seven and eight man cells.

#### Perceived Crowding

There was a significant effect for perceived crowding among the housing conditions ( $p < .001$ ). Figure 5 shows the increase in perceived crowding as the number of men per cell increases. Since space per man increases from 50 square feet in the one man cells to 59 square feet in three man cells, the social density factor seems to be more influential than spatial density in this particular comparison. Both social and spatial density increased in the three to six man range. Consequently we are unable to say which factor was more influential in that range.

In Figure 6 we have plotted the average perceived crowding scores for blacks and whites. In the 1, 3, 4 and 6 man units the whites are higher in perceived crowding. These results are similar to those obtained at other institutions.

#### Housing Unit Ratings

Single cell inmates rated their housing more favorably than did inmates from the multiple cells on four of the six room rating measures ( $p < .01$ ). Results on two of the scales, Attractiveness and Pleasantness, did not yield statistically significant differences but were in the same direction (see Table 3).

#### Illness Complaints

A comparison of single cells versus multiple occupant cells yielded a significant difference in illness complaint rates ( $p < .05$ ) with singles having lower illness complaint rates. A similar comparison, excluding

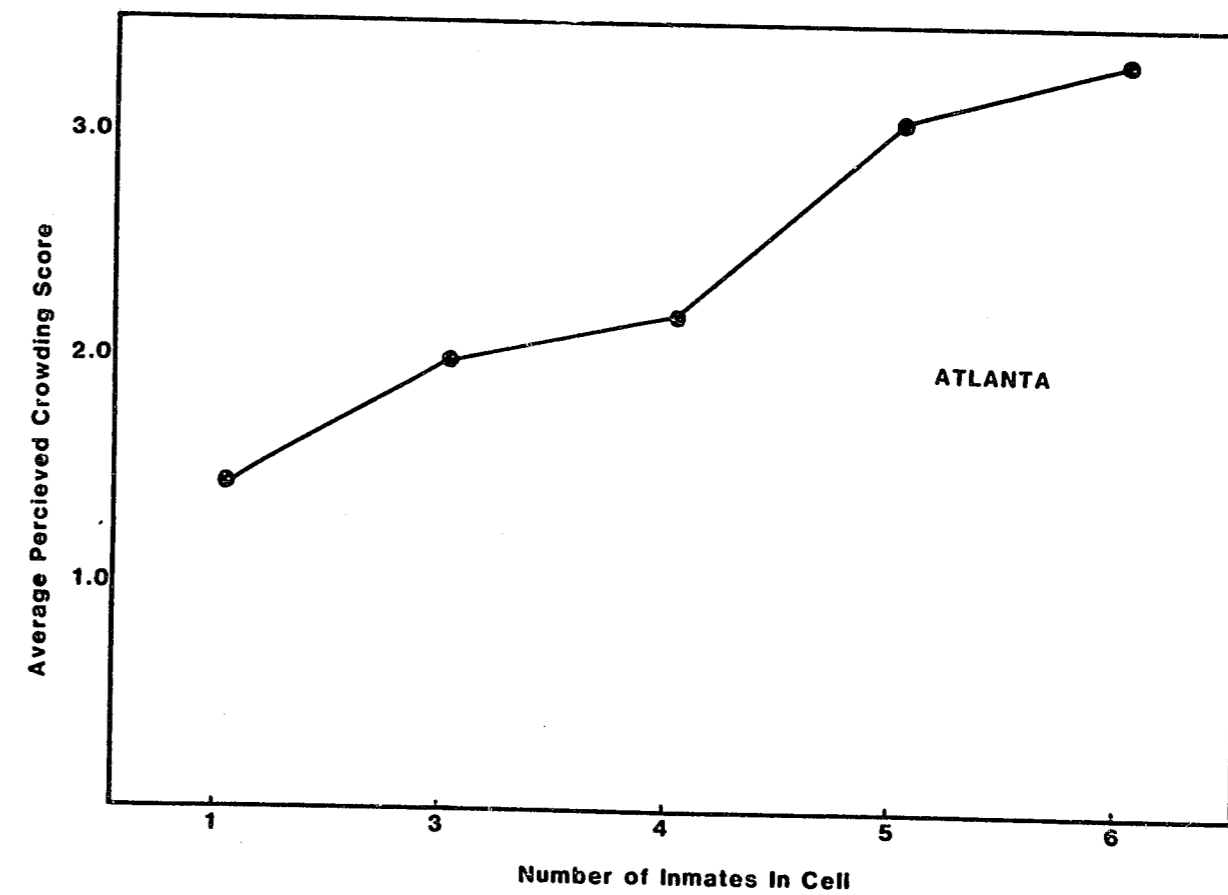


Figure 5

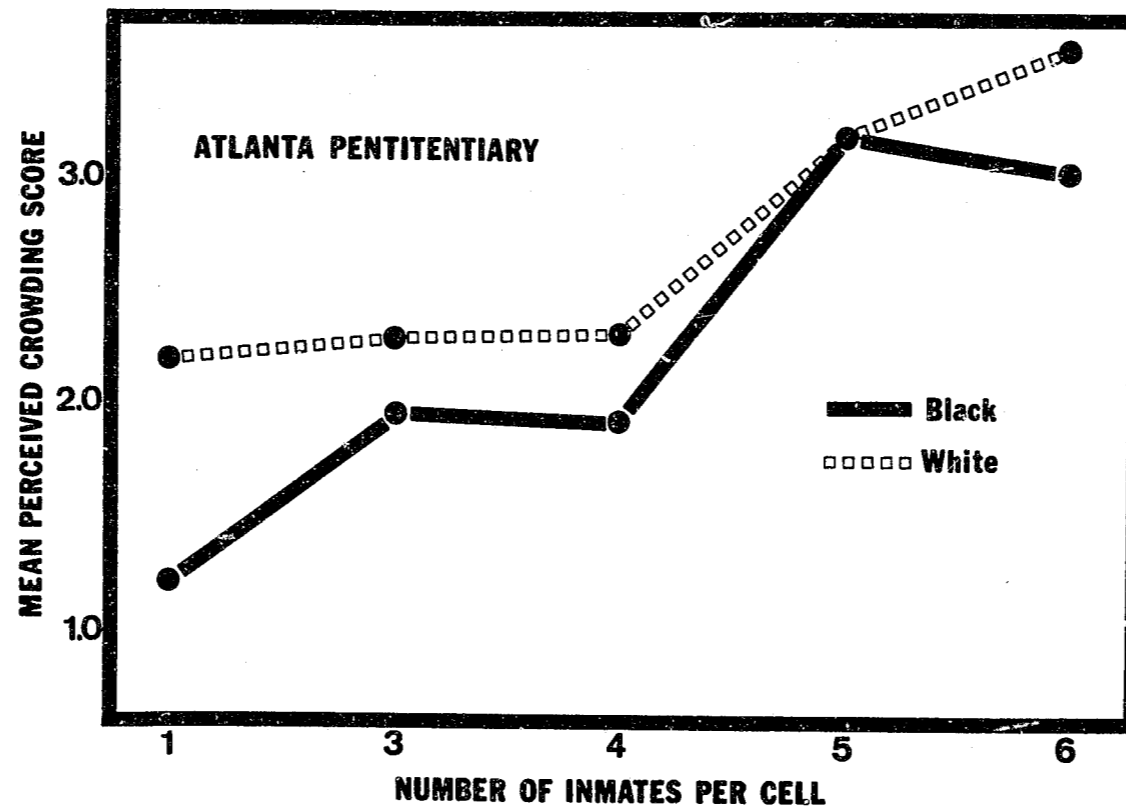


Figure 6

TABLE 3  
Atlanta Results

Variables	Housing Units					F-Values	Significance Levels
	1	3	4	5	6		
Social Density	1	3	4	5	6		
Space (sq.ft. per man)	54	59	44	35	29		
Number of Subjects	24/27	18/20	39/40	26/27	8/9		
Perceived Crowding <sup>a</sup>	1.4	2.4	2.1	3.1	3.3	F(4,119) = 9.47,	p < .001
Summary Room Ratings <sup>b</sup> (6 scales)	21.7	18.6	19.0	15.8	15.0	F(4,113) = 3.85,	p < .01
Blood Pressure	60.6	52.7	65.7	64.8	52.4	F(4,113) = 5.30,	p < .001
Custody <sup>c</sup>	1.3	1.6	1.7	1.6	1.3	F(4,119) = 3.43,	p < .01

Notes: a. The higher the number, the more crowded.  
 b. The higher the number, the more positive.  
 c. A high score means more favorable custody.

colds and flu, also yielded a significant difference ( $p < .05$ ).

Figure 7 shows the trend of illness complaints for the housing conditions. There is an obvious and significant increase (Spearman Rank Order Correlation,  $p = .05$ ) in illness complaints as crowding increases. These data are for illness rates after the initial six weeks in any particular housing condition. Data for the period before six weeks could not be analyzed by individual housing unit because there are too few inmates in some housing conditions. The trends in racial differences, though not statistically significant, are consistent with findings at other institutions where blacks had higher illness rates than whites.

Illness rates in the period before six weeks were approximately 80% higher than in the period after six weeks. This is in agreement with findings from other institutions.

#### Blood Pressure

There was no significant difference among housing conditions for systolic blood pressure. With regard to diastolic blood pressure, a significant result was obtained, but it bore no systematic relationship to crowding (see Table 3).

#### Sleeping Problems

The single cells were compared with 3, 4, 5, and 6 man cells as a group on the degree to which they reported problems with sleeping. The three through six man cells had 75% more complaints of sleeping problems than did the single cell inmates. This difference was significant ( $p < .021$ ).

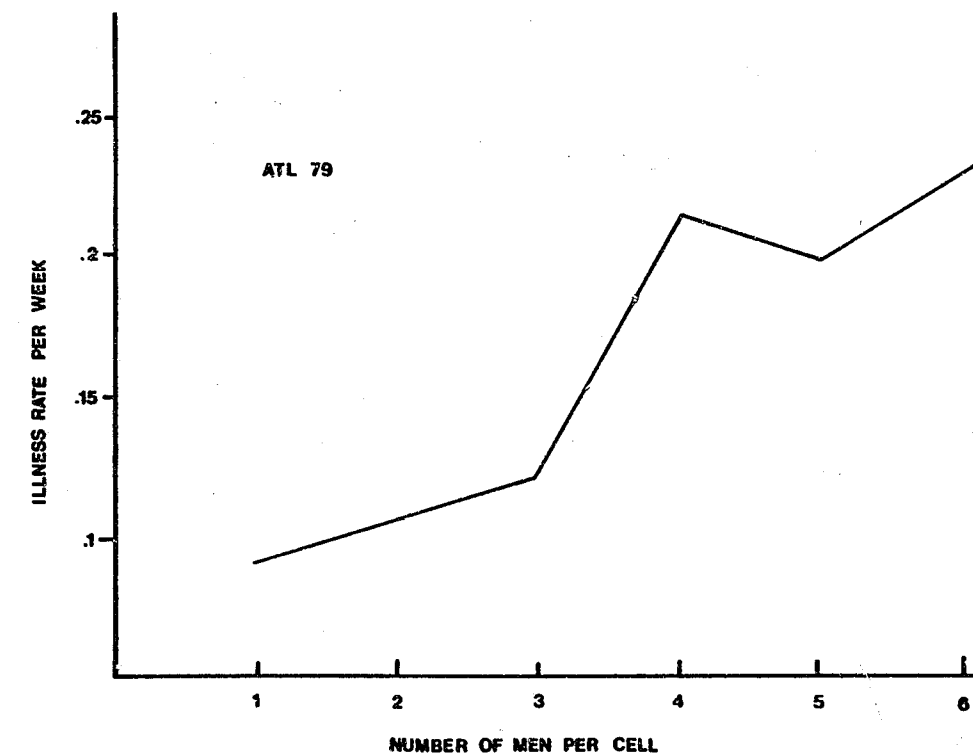


Figure 7

#### Housing Related Complaints

The single and multiple cell inmates showed a different pattern of complaints regarding their housing conditions. A goodness-of-fit test indicated the difference in patterns was statistically significant ( $p < .05$ ). While the single cell inmates scattered their complaints over five categories, the overwhelming primary complaint for the multiple cell occupants was crowding.

The primary complaint for the single cell inmates and multiple cell inmates are shown in Figure 8 for those inmates who had one or more complaints. In one instance we were able to identify complaints solely with social density. The three man cell inmates complaints regarding crowding were over twice as high as single cell inmates, in spite of the fact that the three man cells had 59 square feet per man as contrasted with 50 square feet in the single cells.

We also asked inmates what bothered them most, too many people or too little space. Only the inmates in four man cells were sufficient in number and distribution of responses to allow for analysis of this question. Number of people was the chosen complaint for 44% and amount of space for the remainder. Those indicating too many people as the primary complaint also had higher perceived crowding scores than those indicating the greatest problem was space. This difference was significant ( $p < .03$ ). In the period of less than six weeks those who said people were the greatest bother also had illness complaint rates (average = .446 per week) over twice as high as those who selected space (average = .209 per week). The number of individuals in each group is relatively small and the difference was not statistically significant. These groups were almost identical for the period after six weeks. These data should only be considered suggestive.

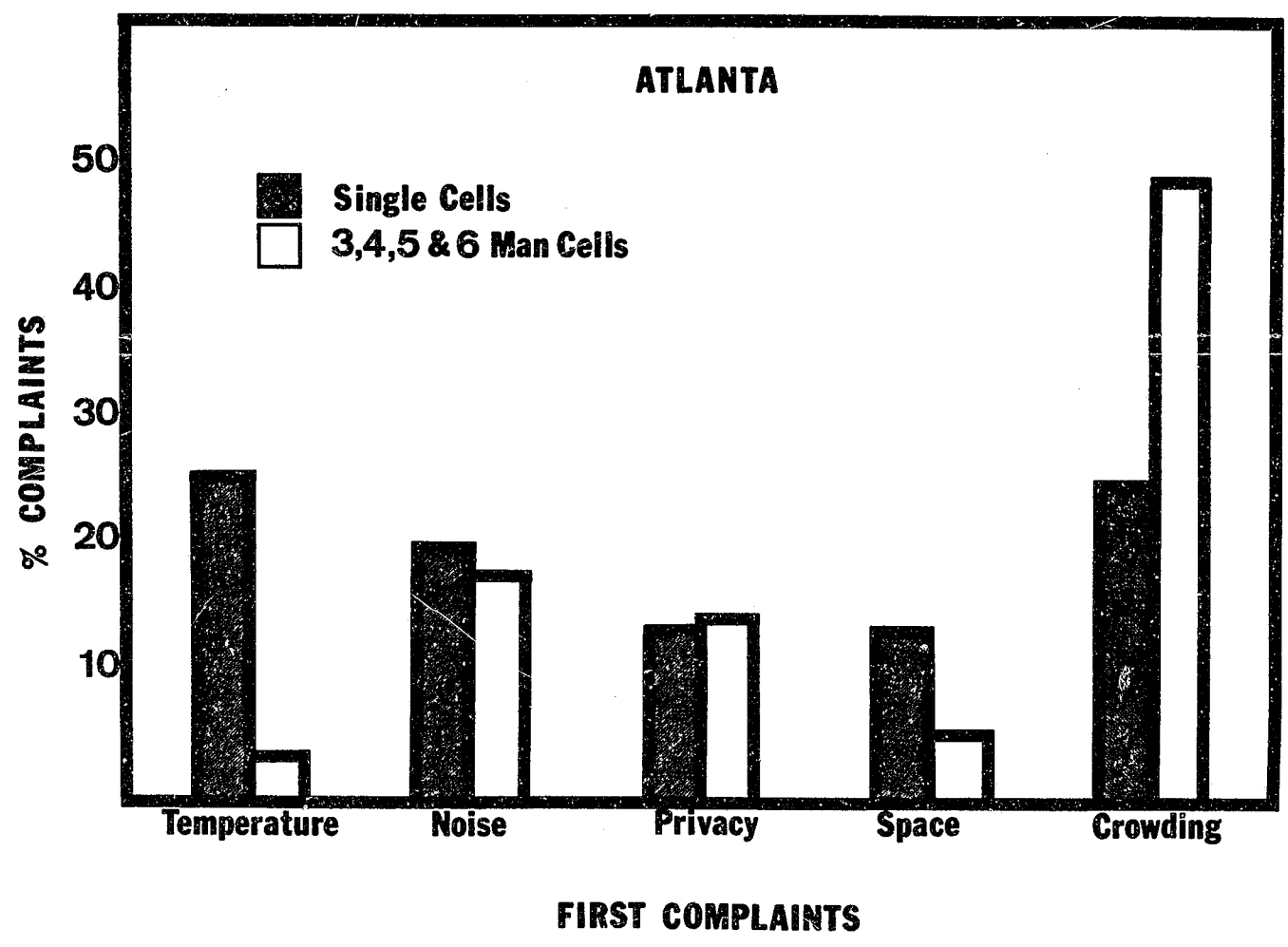


Figure 8

### Analysis of Confounded Variables

The inmates in the various housing units did not differ in regard to such factors as age, months left, weeks in housing, and weeks in prison. There was a significant variation in custody level among the housing conditions (see Table 3). When one controls for custody by analysis of covariance, the perceived crowding, room rating, and blood pressure effects remain essentially unchanged.

### Summary

There was essentially a linear relationship between crowding and both perceived crowding and illness complaints. That social density effects may be more important than spatial density effects at these levels was seen in the relation between the one and three man cells since the three man units had more space per person but higher social density. The data from Atlanta are particularly important because they provide information about housing in the range between double cells and conventional dormitories. These data indicate that our findings based on single cells, double cells, and dormitories are applicable to housing of intermediate social density values.

### Danbury

Housing at Danbury consists of singles, cubicles and dorms. Within the singles and dorms it was possible to make comparisons where social density was constant but spatial density differed. Examination of the effects of cubicles and spatial density were the primary objectives.

The design of the cubicles at Danbury FCI was like those at El Reno with 5-1/2 foot high walls providing 49 square feet for a single occupant (see Figure 9). Danbury FCI had many different housing units and different units were assigned to different programs including alcohol abuse, drug abuse, life skills, and industries. Consequently we were also able to examine the influence different programs might have on crowding effects typically associated with different types of housing (see Table 4). At the time of our data collection the total inmate population was 669 as compared to 887 one year earlier. Danbury is a medium security prison with inmates classified in either security level 2 or 3. The average age of inmates at Danbury FCI was 36 years.

### Perceived Crowding

The perceived crowding scores for dormitory inmates were twice as high and significantly different from the scores for inmates in cubicles and cells ( $p < .001$ ). The perceived crowding scores for single cubicles and single cells were identical (see Table 5).

There has been some question as to whether individuals adapt to crowding over time. In Figure 10 perceived crowding is plotted in terms of those who have been in a particular housing condition less than or more than six weeks. Clearly there is a slight increase in perceived crowding for both the single and dormitory inmates. In this measure, at least,

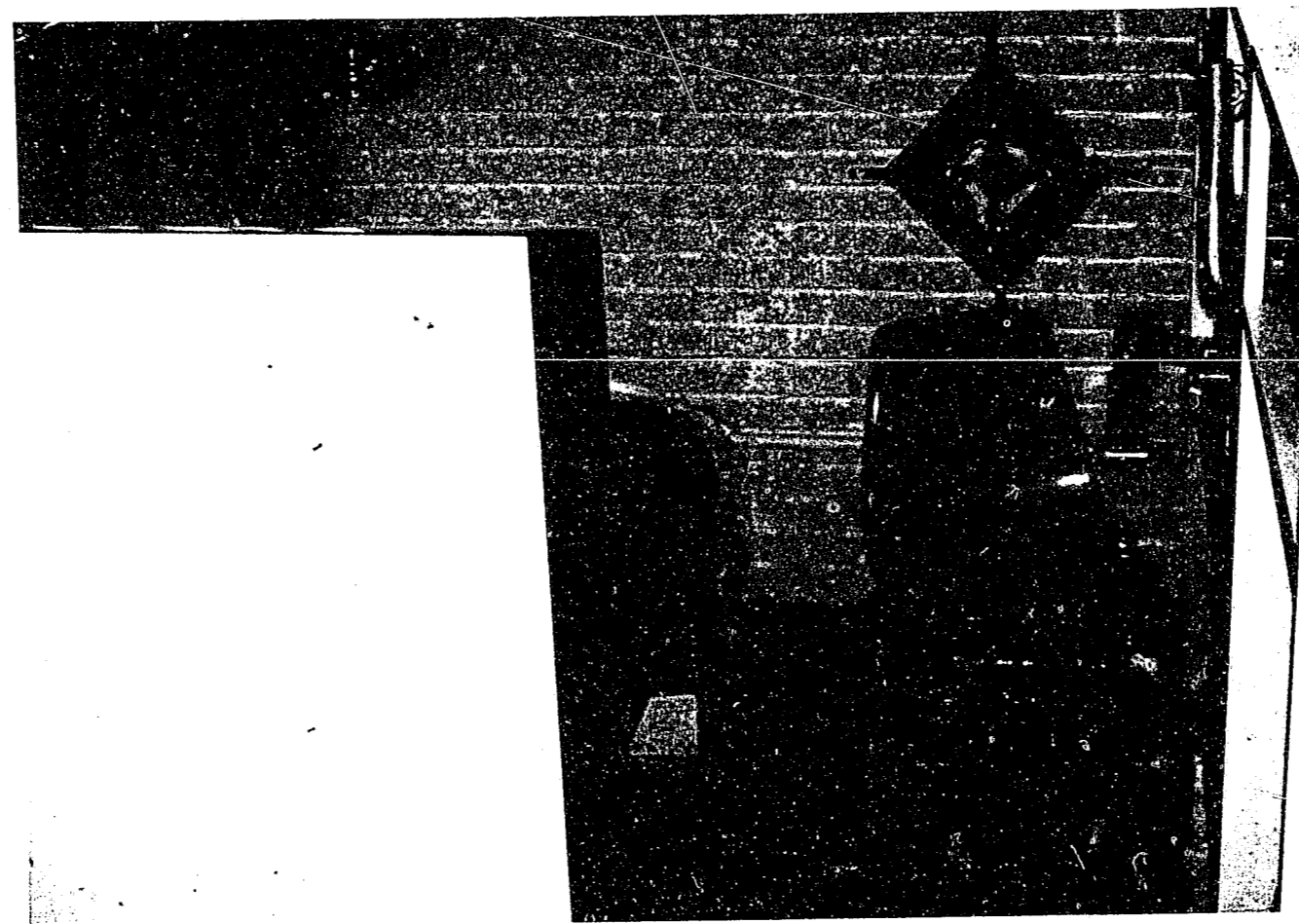


FIGURE 9. Inside view of cubicle, Danbury Federal Correctional Institution.



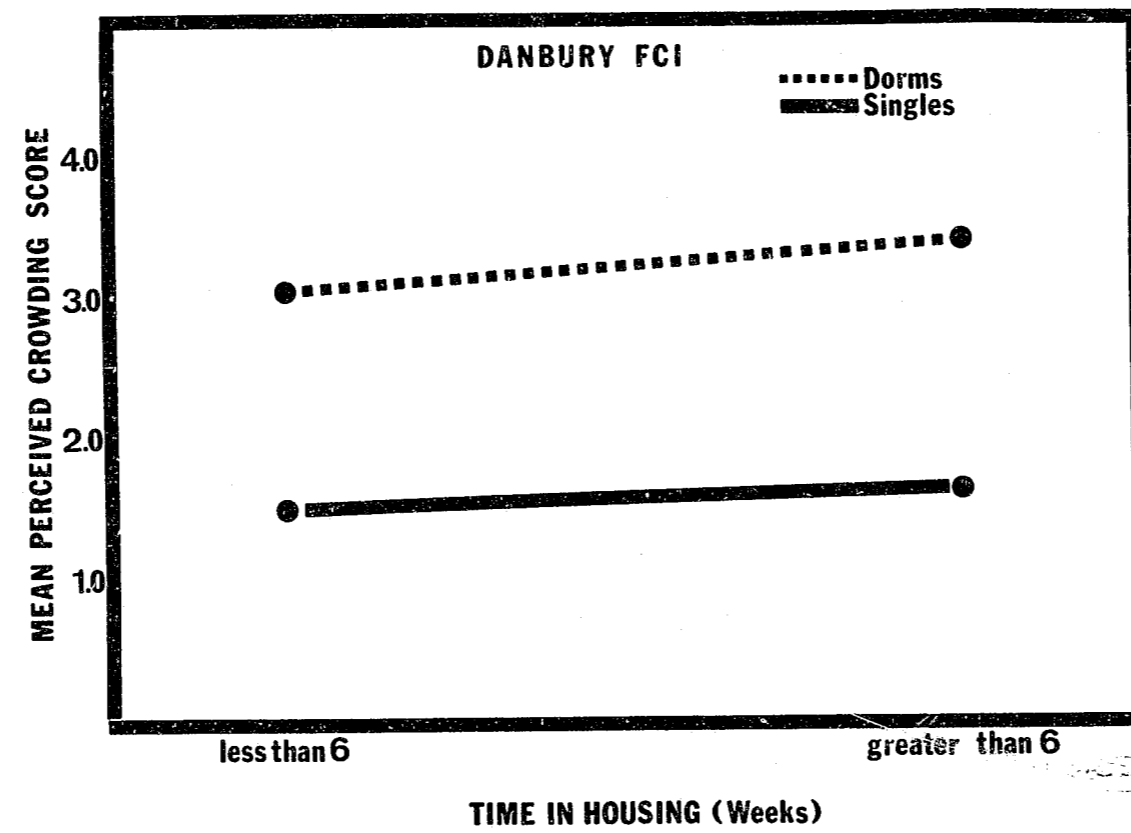


Figure 10. Perceived Crowding  
Related to Time in Current Housing

TABLE 4  
Danbury Housing Units

Unit	Social Density	Spatial Density (sq.ft/person)
<b>Singles</b>		
Industry	1	60
Industry	1	48
Alcohol Abuse	1	60
Life Skills	1	60
<b>Dormitories</b>		
Industry	65	49
Unassigned	65	49
Alcohol Abuse	54	59
<b>Cubicles</b>		
Unassigned	1	50

TABLE 5  
Danbury Results

Variables	Singles	Cubicles	Open Dorms	F-Values	Significance Levels
Number of Occupants	1	1	54/65		
Space (sq.ft/person)	48/60	50	49/59		
Number of Subjects	60/75	20/24	47/63		
Perceived Crowding <sup>a</sup>	1.5	1.5	3.2	F(2,157)=79.89,	p < .001
Summary Room Rating <sup>b</sup>	25.9	29.7	14.4	F(2,156)=39.60,	p < .001
Relaxed <sup>b</sup>	4.6	4.1	2.7	F(2,125)=10.14,	p < .001
Weeks in Prison	71.9	61.4	28.3	F(2,156)=32.52,	p < .001
Weeks in Housing	21.3	14.8	14.7	F(2,158)= 3.26,	p < .05
Custody	3.2	3.5	2.6	F(2,155)=20.23,	p < .001

Notes: a. A high score is more crowded.  
b. A high score is more positive.

there is no indication of adaptation to crowding over time. The contrary seems more likely. Our earlier work at Texarkana in 1974 yielded similar results. This does not necessarily conflict with the evidence from illness complaints. The temporal course of crowding effects is complex and merits further investigation.

#### Housing Unit Ratings

All of the six room rating scales yielded more positive scores for the single cells and cubicles as compared to dormitory housing. On one scale, Attractiveness, cubicles were rated more favorably than either open dormitories or single cells. In all other cases the response was very similar for cubicles and single cells and more positive than dormitory scores (see Table 5).

#### Mood Scales

Only one of the scales designed to measure mood and emotional state was different for dorms as compared to cubicles and cells. Scores for cubicles and cells were equivalent and more positive than dormitory scores (see Table 5).

#### Inmate Complaints

Inmates were asked an open-ended question as to "some of the things that bother you about your housing." We assumed that the first complaint mentioned was the most important to that inmate. Figure 11 provides a distribution of the percentages of most common complaints. Where the complaints were less than 5% in that housing condition, they are shown as a uniform short bar. The far left of the graph indicates the percentage of inmates who did not offer a complaint or indicated they had no

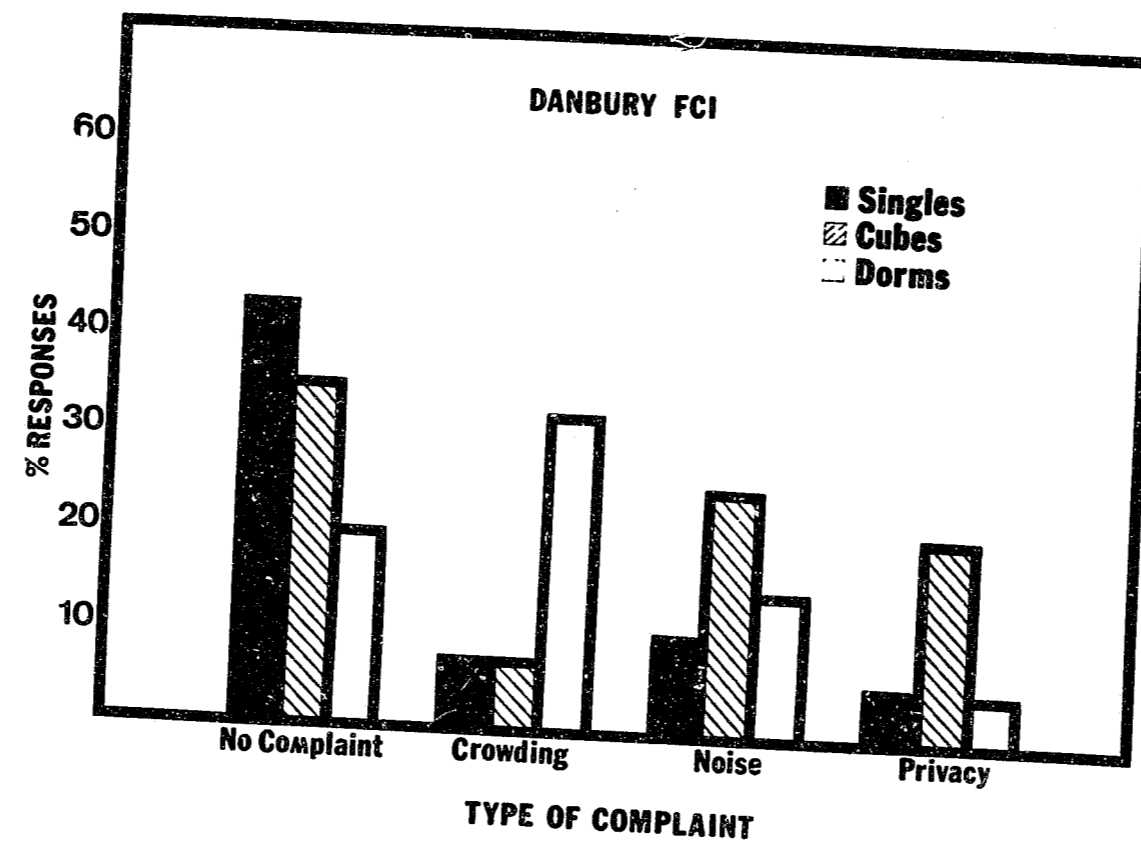


Figure 11

complaints. As can be noted 43% of the single cell inmates, 36% of the cubicle inmates and 20% of the dorm inmates did not report any complaints. There was a significant difference in the "no complaint" category in comparison of single cells and dorms ( $p < .05$ ) and comparisons of dorms with the combined cubicles and single cells ( $p < .05$ ). The primary complaints from single cell inmates concerned noise (10%), the people in their unit (6.5%), the amount of space in their cell (14%), and cleanliness (7%). Primary complaints from cubicle inmates involved noise (25%) and privacy (21%). In the dorms crowding (31%) and noise (14%) were the sources of most complaints.

#### Illness Complaint Rates and Housing

Illness complaint rates were not substantially different for the open dormitories, cubicle dormitories, and single cells for the period representing the first six weeks in a particular type of housing. However, for the period after the first six weeks there was an overall significant difference ( $p < .01$ ) between the single cells (average = .081 per week), the dorms (average = .165 per week), and cubicles (average = .183 per week). The difference between the cubicles and dorms was not significant. However, the difference between the singles and the combined dorms and cubicles is highly significant ( $p < .002$ ). As found elsewhere, illness rates in the dorms were over twice as high as in the single cells.

Illness complaint rates for the cubicles did not change substantially from the period of less than six weeks to greater than six weeks. This is contrary to the general finding and may account for the lack of differences between cubicles and dorms in the period greater than six weeks. We were able to establish that illness rates in the cubicle unit (8-0) rose very

sharply in one six week period shortly before our research visit. Administrators indicated there had been a substantial change in program status in the unit at the time illness complaints rose. This change left the inmates uncertain as to their future program assignments. While we cannot be sure that stress aroused by the uncertainty was responsible for an increase in illness complaint rates, this seems a plausible interpretation. There were several inmates with relatively large scores. If these extremely high scores are dropped for all groups, the relationship for the first six weeks among housing conditions is similar to the period greater than six weeks. The singles (average = .117 per week) were much lower than either the cubicles (average = .195 per week) or the dorms (average = .237 per week). The overall difference is highly significant ( $p < .001$ ). A similar result is obtained if you eliminate all those inmates who had less than six weeks in their particular housing unit. The resulting order is singles (average = .103 per week), cubicles (average = .218 per week), and dorms (average = .228 per week) yielding a significant overall difference ( $p < .003$ ). In sum, single occupants clearly have lower illness complaint rates than either dormitories or low-partitioned cubicles.

Additional analyses were conducted in which illness complaints were separated into contagious and noncontagious categories. This provided an opportunity to examine illness complaints that were not influenced by transmission factors. The contagious category is probably overestimated since all illnesses, such as rashes and diarrhea, were classed as contagious even though we are aware that this is not necessarily the case. Results for both the contagious and noncontagious categories are shown in Figure 12. Note that for the period of less than six weeks the single rate would have been substantially less with extreme scores excluded. For the period beyond six weeks the singles rate (average = .031 per week) is much less than either the dorms (average = .058

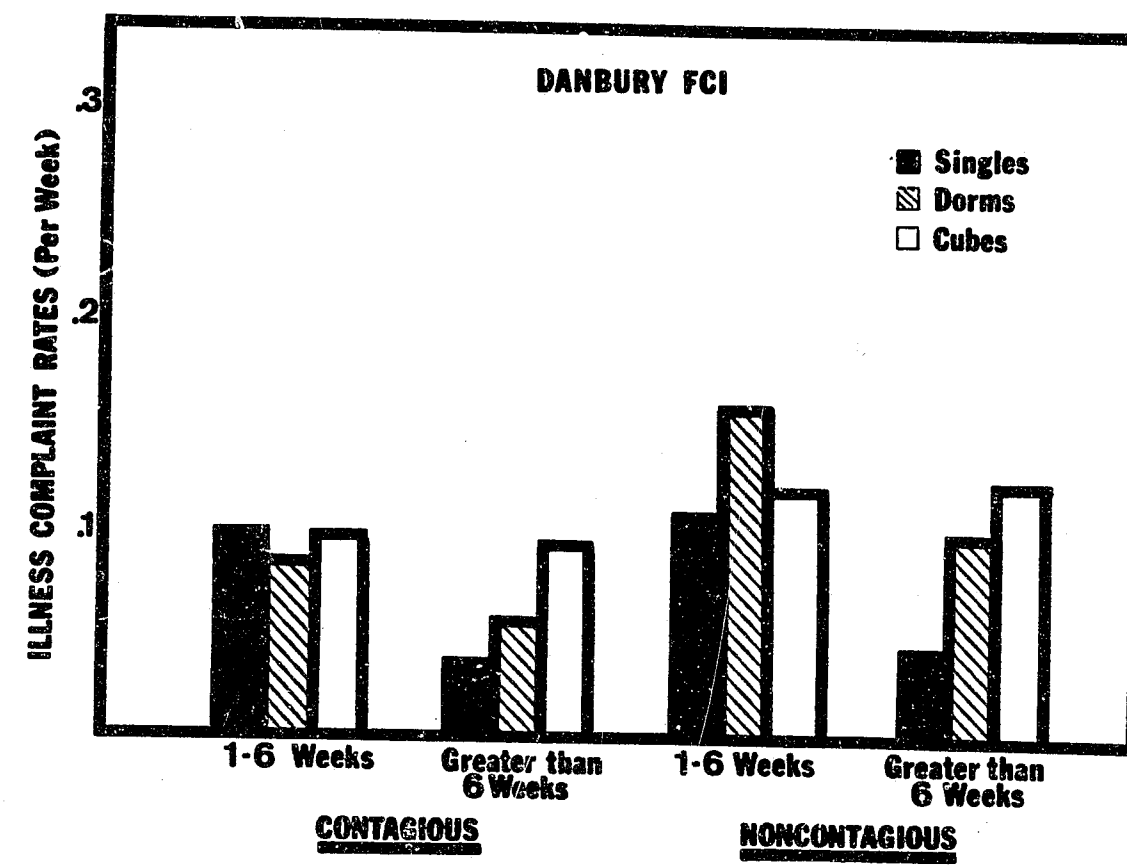


Figure 12

per week) or the cubes (average = .096 per week).

Results for complaints in the noncontagious category are also shown in Figure 12. For the period less than six weeks the cubes and singles have somewhat lower rates than the dorms. In the period over six weeks the dorm rate (average = .109 per week) is nearly four times higher (average = .028 per week) than the singles ( $p < .05$ ). The rates for the cubicles were very similar in the less than and greater than six weeks categories. These results indicate that the differences in illness complaint rates between housing conditions is not limited to complaints of contagious illness. While dormitories yielded higher illness rates than less crowded housing, within the dormitories the typical relationship between high perceived crowding scores and illness complaint rates was not present.

There were no significant racial differences in illness complaint rates at Danbury and the small differences observed were opposite those found at all other institutions we examined.

#### Illness Complaint Rates and Single and Double Bunks

Danbury provided our only opportunity to examine the effects of single and double-decked bunks within the same dormitory. In two dormitories (6-0 & 4-I) there are both single and double bunks. We compared illness rates for two different bunk conditions. Inmates in double-decked bunks (average = .351 per week) had 78% higher illness rates than inmates in single-decked bunks (average = .197 per week) in the period before six weeks. The same trend was found for the period after six weeks. Here the double-decked inmates (average = .152 per week) had 45% higher illness rates than the single bunk inmates (average = .105 per week). Neither of the differences was statistically significant and was probably related to



the fact that the number of inmates in the sample was rather small (N = 5 in one group). Consequently these results must be considered as no more than suggestive.

#### Bother and Illness Complaints

Inmates who indicated that people bothered them most had higher illness complaint rates than those who indicated "space" bothered them most. This was true for both the periods before and after six weeks. This finding was similar to Atlanta but was not statistically significant.

#### Spatial and Social Density Effects

The wide variety of housing conditions at Danbury FCI allowed for evaluation of the influence of variations in spatial and social density on our measures of crowding effects. We were able to compare space and social density levels in a factorial design that allowed for assessment of the independent effects of these variables. This comparison involved dormitories versus single cells and 60 square feet versus 50 square feet housing. This comparison required combinations of housing groups that differed in program assignments. Consequently we first determined that there were no significant differences among programs within the spatial and social conditions. We found significant independent contributions of social and spatial density to perceived crowding scores. The spatial density effects reflected significantly lower scores for the 60 square foot condition as compared to the 50 square foot condition in both singles and dormitories. Thus ten additional square feet was psychologically perceptible in terms of perceived crowding due to spatial density. The effect of space was evident for comparisons both within program housing and across program housing. Although a difference of ten square feet may

seem relatively small, it represents an increase in free floor space of about 40%.

#### Potential Confounding Variables

The length of time in prison, length of time in housing, and custody level varied significantly among residents of singles, dorms, and cubicles (see Table 5). Only effects which remained significant when these factors were controlled by analysis of covariance are reported. The housing assignments at Danbury FCI are organized in terms of inmate programs such as alcohol treatment and industries. Consequently we were concerned with the possibility that differences in inmate responses in different housing conditions might be due to the influence of different programs rather than housing variables. We were able to examine this question with regard to programs and social density. We assessed the effects on perceived crowding of three programs: Industries, Alcohol Treatment, and Unassigned; and two social density conditions: single cell or cubicle versus multiple occupant housing. This analysis yielded a significant social density effect but no significant program effect. There was also a significant program by social density interaction which suggests program assignment influences perceived crowding scores to some degree. Consequently we are confident that when program assignment and social density are found to be inextricably confounded, findings with regard to perceived crowding can be attributed primarily to social density.

#### Summary

The dorm inmates were much higher on perceived crowding than either the singles or cubicles. On both housing unit ratings and affective scales the cubicles and singles were very similar with the dorms giving more

negative responses in each case. Dorm inmates made more complaints overall and more complaints about crowding than either the cubicles or singles. The dorms were clearly higher than the singles in illness complaint rates. Results from the cubicles were not so clear. Similar results were obtained for noncontagious illness complaints and overall illness complaint rates. Double-decked bunks had higher illness rates than single-decked bunks within the same dormitories. Inmates having higher perceived crowding scores had lower illness rates in the dorms. Even small changes in spatial density had an effect on perceived crowding with higher spatial density giving higher scores. Possible confounding variables were examined but found to have no statistical significant influence.

The finding that dormitories yielded more negative responses than single units was expected and consistent with other findings of the project and earlier work. Of particular interest was the finding that on all measures except illness complaint rates cubicles resemble single unit housing. These data corroborate findings from El Reno, La Tuna, and Fort Worth FCI and support the conclusion that cubicles substantially reduce most of the negative effects of open dormitories. The illness findings are discrepant from those at El Reno, La Tuna, and Fort Worth FCI and as indicated earlier may reflect administrative actions. One of the most interesting findings at Danbury was evidence that rather small changes in available space (ten square feet) can have measurable psychological effects.

The results from Danbury differ in several significant ways from other institutions in this project. First, the cubicles showed no decline in illness rates during the period over six weeks. Second, blacks had lower illness complaint rates than whites. Third, in the dorms illness complaint

rates for inmates reporting "very crowded" were less than those reporting less crowded. The basis for these differences from the general trends is not known. They do suggest that in these specific instances the Danbury data should be treated with some degree of caution.

Texarkana

The Federal Correctional Institution at Texarkana is a medium security institution which has housed up to 780 inmates. We made research visits to this institution on May of 1978 and 1979. The population was approximately 710 in 1978 and 510 in 1979. The population was also somewhat older in 1979 than in 1978 (34.1 vs 32.8).

Texarkana FCI was chosen because of its great variety of housing conditions. Specifically, inmates are housed in single rooms, double rooms, and dormitories that have from 20 to 50 people in them. Some of the singles and doubles are located along very short hallways while others are along relatively long hallways. Two of the dormitories are designed so that the inmates are separated into three visually separate groupings or bays containing from 10 to 20 inmates per bay and will be referred to as special dorms. Another dormitory houses approximately 20 inmates in a single-bunk configuration. The different types of housing are summarized in Table 6 and Figures 13 and 14 show the population levels of the various units in Texarkana FCI at the time of our two visits. Figures 15 to 18 illustrate housing types.

Inmates are assigned on a space available basis to one of the five different units of the prison. Typically they are initially assigned to dormitories and then can move to single or double rooms on a seniority basis within their unit.

Texarkana provided the opportunity to make a number of interesting comparisons: singles versus doubles, large versus small singles, singles and doubles versus dorms, three different types of dormitories, and unit size. These various comparisons allowed an assessment of the relative importance of spatial and social density.

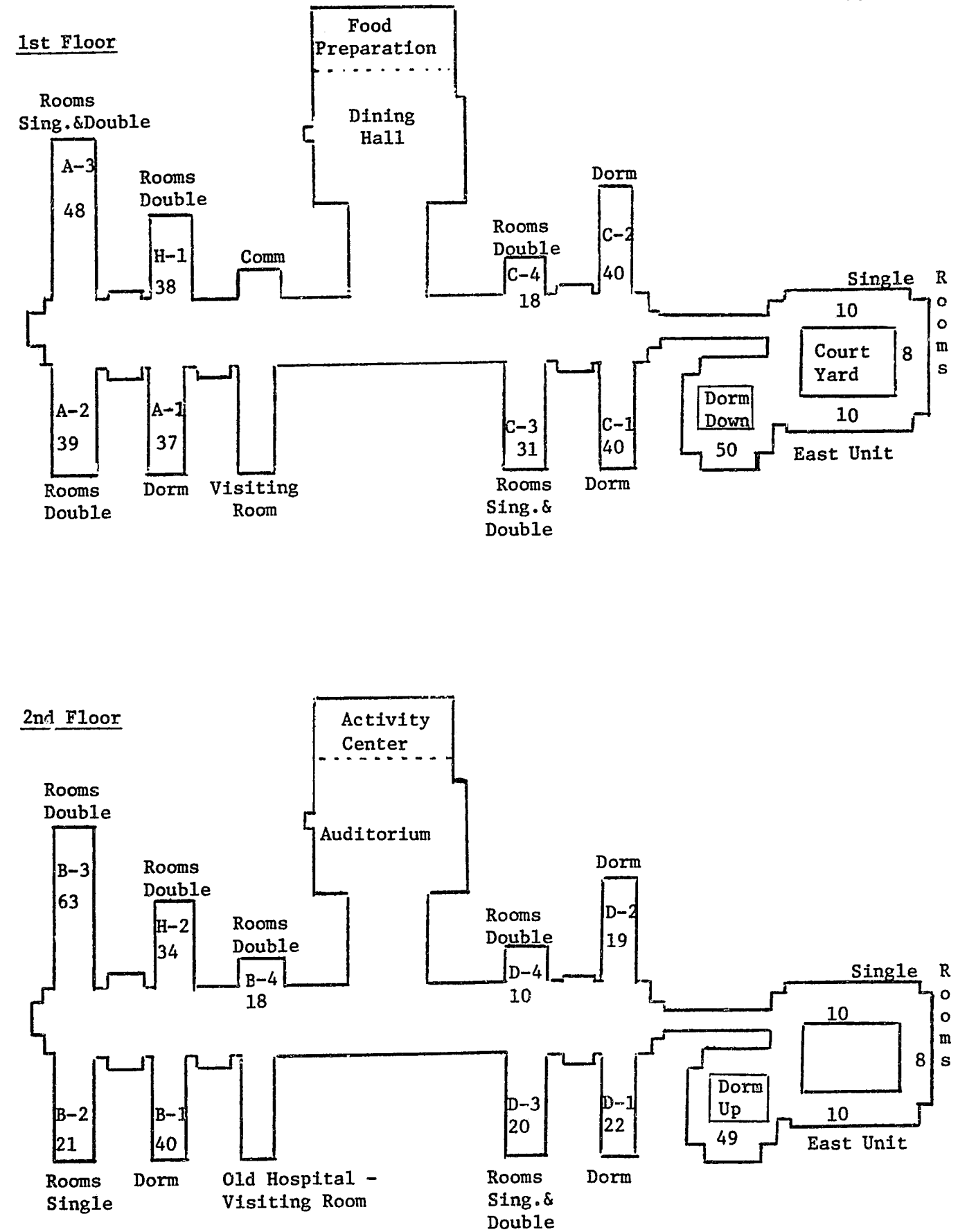
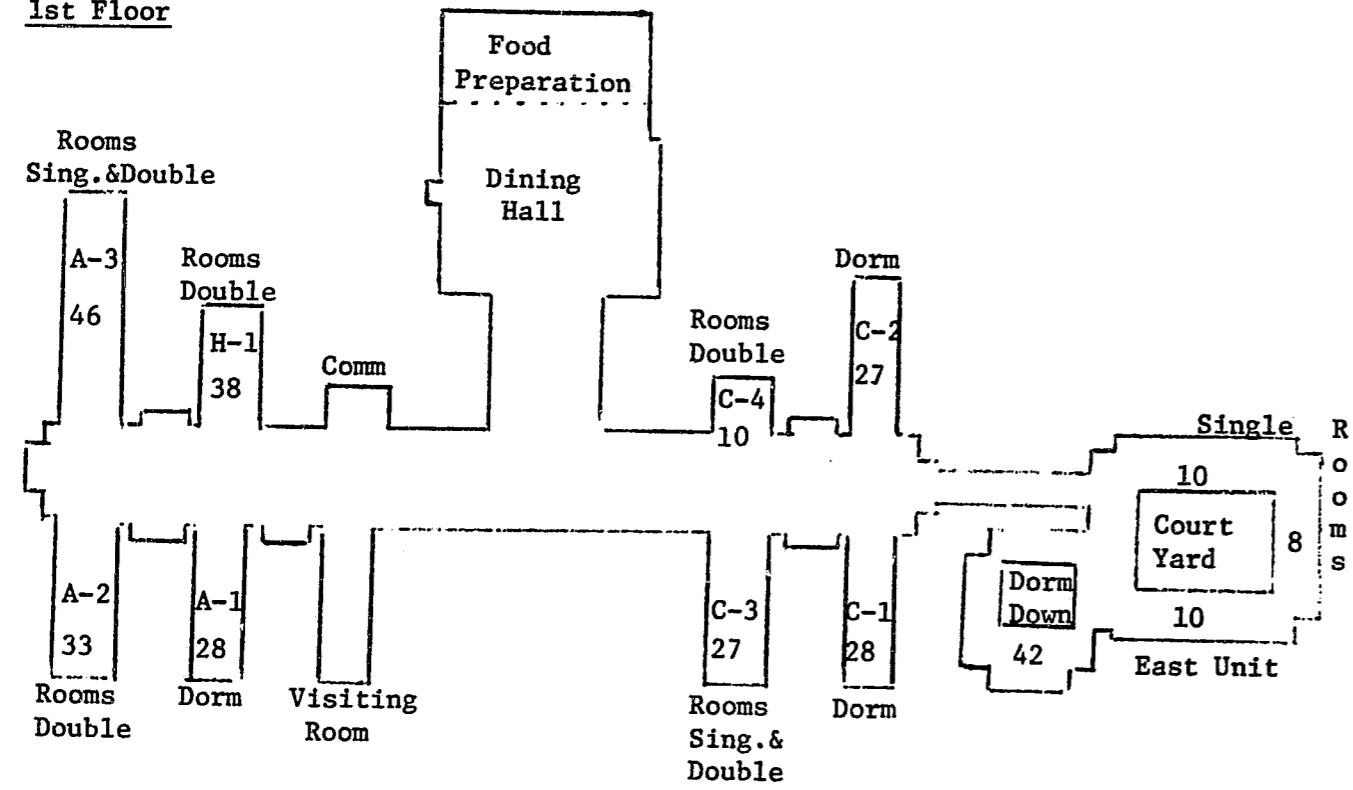


Figure 13. Floor Plans and Population Levels in Units for Texarkana 1978

1st Floor



2nd Floor

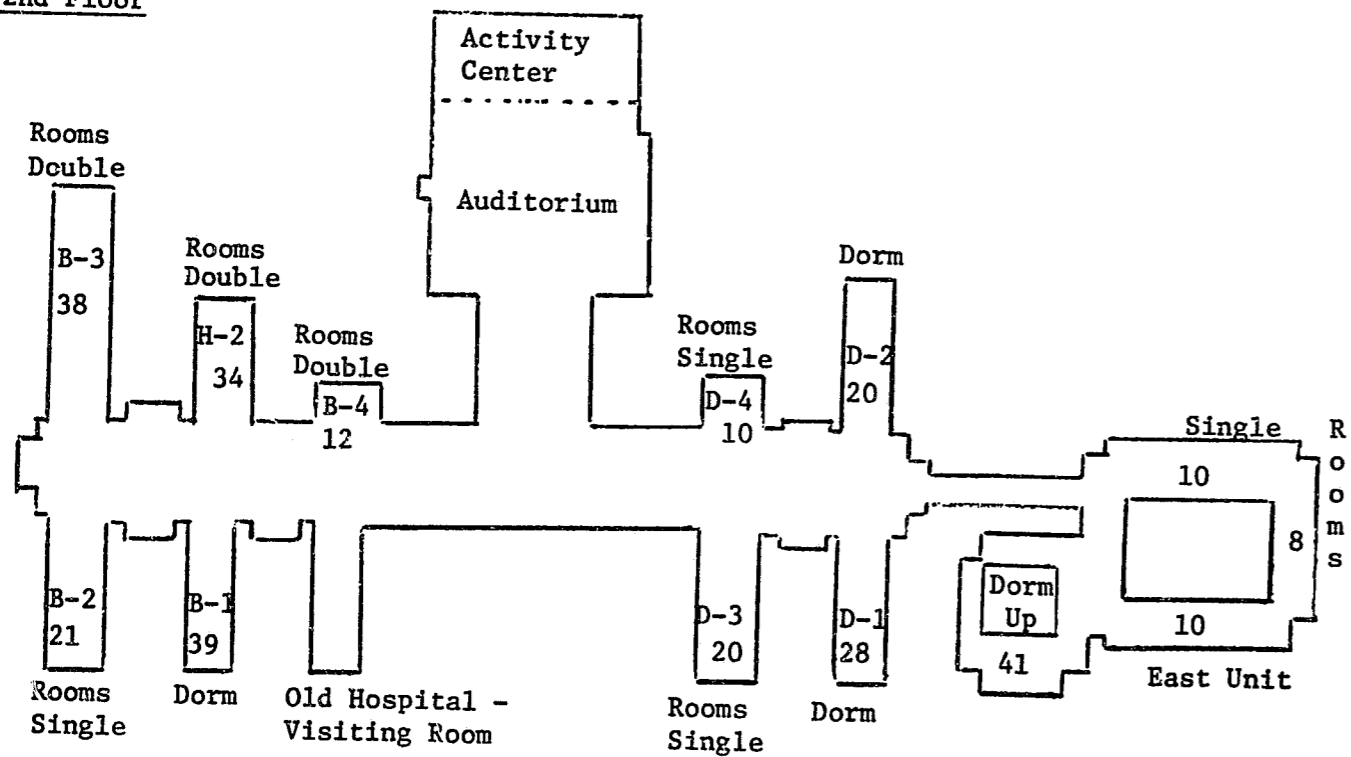


Figure 14. Floor Plans and Population Levels in Units for Texarkana 1979

TABLE 6

	Social Density	Spatial Density (Sq. Ft./Person)
Regular Singles	1	54
Large Singles (E-dorm)	1	66
Doubles	2	27
Regular Dorms		
At Capacity	40	34
At 75% Capacity	30	45
Single-bunked	20	68
Spacious Dorm		
At Capacity	50	42
At 80% Capacity	40	51



FIGURE 15. Large single cell, Texarkana  
Federal Correctional Institution.



FIGURE 16. Double cell, Texarkana  
Federal Correctional Institution.

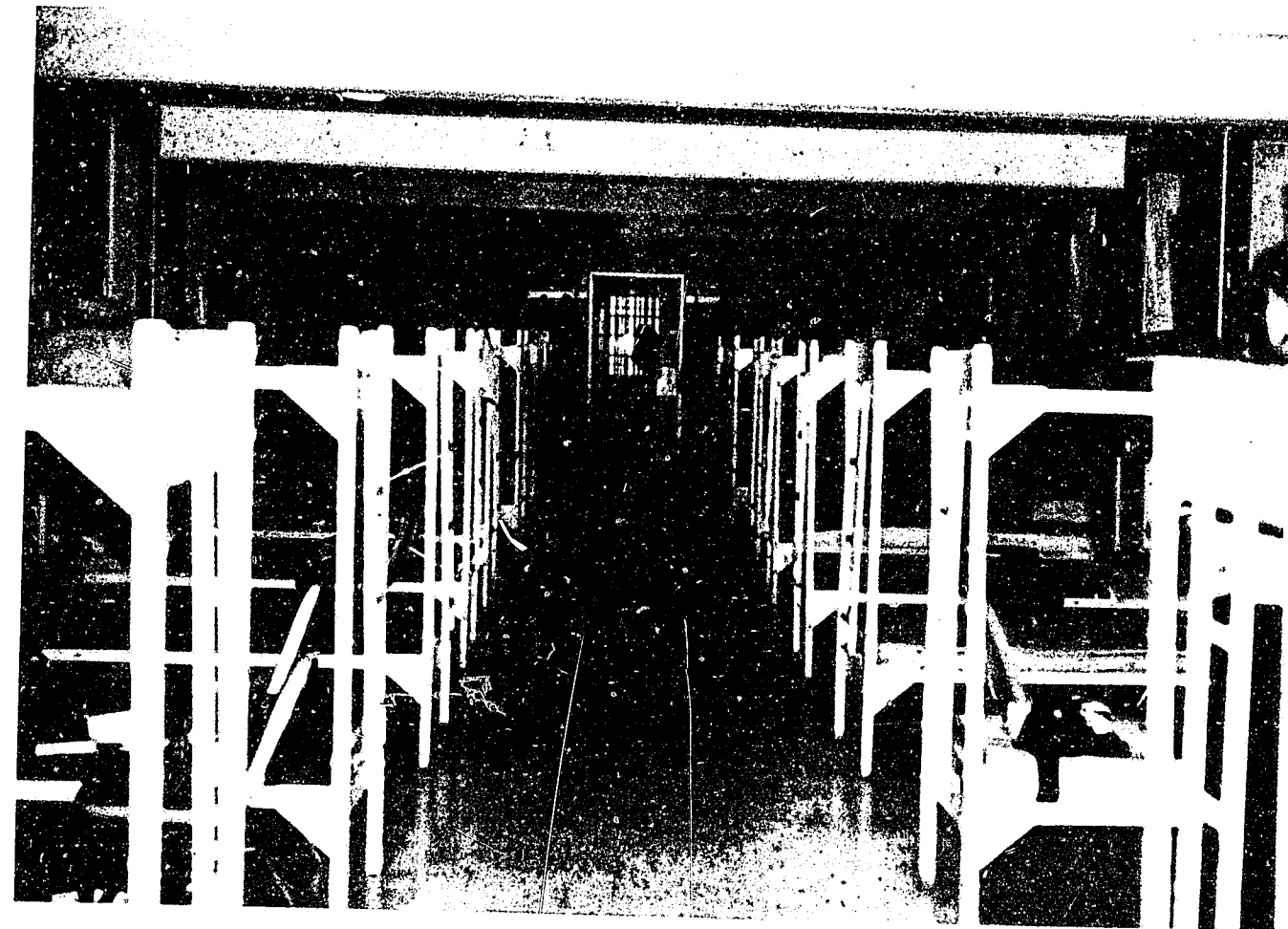


FIGURE 17. Regular open dormitory, Texarkana Federal Correctional Institution.



FIGURE 18. A bay of a special dormitory  
Texarkana Federal Correctional Institution.



### Results

Many new measures were introduced during our second Texarkana visit, but a number of measures were the same for both visits. We will discuss the results for each individual visit, and for two measures provide an analysis of the combined data from both visits. The first analyses presented involve a comparison of the six major types of housing units--regular singles, large singles, doubles, regular dorms, single-bunk dorm, and the special dorms. We were able to obtain only seven volunteers from the single-bunk dorm. Consequently the data from these inmates were not included in the statistical analyses, but the means for the various measures are discussed and presented in the summary table for reference. During the 1978 visit, we collected data only for the regular singles, the doubles, the regular dorms, and the special dorms. During the 1979 visit we collected information on all six different types of housing.

#### Type of Housing

Perceived Crowding. Perceived crowding varied significantly among the various housing conditions in both 1978 and 1979. In 1978, the singles were rated as less crowded than the doubles and the dorms. The doubles and the regular dorms were rated equally crowded, while the special dorms were rated somewhat less crowded than those two (see Table 7). Similarly, for the 1979 sample the residents of the regular dorm and the doubles rated themselves as "crowded" while the residents of the singles and the single-bunk dorm rated themselves as "moderately crowded" or less (see Table 8). The larger singles had the lowest rating of being crowded, while the special dorm inmates rated themselves as less crowded than the regular dorm inmates. These results indicate that both the number of people one is living with and

# CONTINUED

# 1 OF 3

TABLE 7  
Texarkana 1978 Results

Variables	Singles 54 sq.ft. N <sup>a</sup> = 32-33	Doubles 27 sq.ft. N = 39	Regular Dorm 34 sq.ft. N = 45-46	Special Dorm 66 sq.ft. N = 33-35	F-Values	Significance Levels
Perceived Crowding <sup>b</sup>	2.33	3.36	3.30	3.1	F(3,149)= 8.01,	p < .001
Summary Room Rating (6 scales) <sup>c</sup>	19.6	12.5	11.5	17.2	F(3,149)= 8.89,	p < .001
Weeks in Housing	42.0	12.1	12.2	15.9	F(3,149)=13.37,	p < .001
Weeks in Prison	89.7	31.2	24.0	17.8	F(3,147)=33.27,	p < .001
Custody <sup>d</sup>	2.6	2.4	2.2	2.0	F(3,145)= 2.93,	p < .05

- Notes: a. N is number of subjects in each housing type.  
 b. A high score means more crowding.  
 c. A high score is more positive.  
 d. A high score means more favorable custody.

TABLE 8  
Texarkana 1979 Results

Variables	Regular Singles 54 sq.ft. N <sup>a</sup> =43/50	Large Singles 66 sq.ft. N = 30/32	Doubles 27 sq.ft. N = 35/40	Regular Dorms 34/35 sq.ft. N = 31/45	Special Dorms 51 sq.ft. N = 24/32	Single Bunk Dorm 68 sq.ft. N = 4/7	F-Values	Significant Levels
Perceived Crowding <sup>b</sup>	1.8	1.5	2.9	3.2	2.5	(1.9)	F(4,178)=19.17,	p < .001
Summary Room Rating <sup>c</sup> (6 scales)	25.8	28.2	15.6	11.8	16.0	(21.9)	F(4,175)=20.78,	p < .001
Summary Room Rating <sup>c</sup> (8 scales)	34.4	36.5	21.0	16.3	20.3	(27.4)	F(4,164)=21.58,	p < .001
Relaxed <sup>c</sup>	3.9	3.1	3.1	2.3	2.6	(2.9)	F(4,174)= 3.30,	p < .02
Satisfied <sup>c</sup>	3.5	3.2	2.4	2.1	2.5	(4.0)	F(4,174)= 3.14,	p < .02
Stimulated	3.7	3.6	3.7	4.0	4.8	(4.9)	F(4,174)= 2.44,	p < .05
Illness Complaint Rate (greater than 6 weeks)	.14	.14	.08	.33	.23		F(4,106)= 3.62,	p < .01
Diastolic Blood Pressure	60.2	65.3	65.4	63.0	64.4	(69.7)	F(4,179)= 2.4,	p < .05
Crowding Tolerance (Revised Version)	10.6	8.0	9.5	10.4	7.8	(10.3)	F(4,172)= 6.01,	p < .001
Weeks in Prison	46.8	64.7	42.9	42.6	24.1	(18.9)	F(4,204)= 5.11,	p < .001
Custody Level	2.7	2.7	2.7	2.6	2.0	(2.5)	F(4,160)= 4.21,	p < .01
Months Left to Serve	16.1	11.3	21.5	11.2	15.3	(30.9)	F(4,169)= 2.63,	p < .05

Notes: a. N is the number of subjects in each housing type. It varies because all of the information was not obtained from all of the inmates.  
b. A high score means more crowding.  
c. A high score is more positive.

the amount of space are important factors. Space by itself is important because increasing the amount of space in a single and a dormitory reduces the perception of crowding. However, even the special dorms (with 40/50 residents) divided into bays were rated as more crowded than equally spacious singles. The combined results for the two visits are shown in Table 9. Perceived crowding did not change over time in housing units.

It should also be noted that absolute values of the perceived crowding scores in 1978 were higher than in 1979 for each of the four housing types sampled during both visits and the difference was particularly large for single cells. This effect was highly significant ( $p < .001$ ) and probably reflects the higher population of the prison in 1978 relative to 1979.

Housing Unit Ratings. During our 1978 visits we employed six scales on a questionnaire to determine inmate evaluation of their housing units, and in 1979 we added two more. Since the results on these scales were highly intercorrelated, only the analysis of the overall summary scores will be presented. The patterns of results for these scores were very similar to those obtained with the perceived crowding measures. In the 1978 sample, the singles were rated most positively (see Table 7). In 1979, using either a six-scale or eight-scale summary score, the singles were rated most positively while the regular dorm was rated most negatively. The doubles and the special dorm were also rated rather negatively, while the single-bunk dorm received a relatively favorable evaluation (see Table 8). Thus the ratings were similar for the two visits with the exception of the relatively poorer 1979 evaluation of the special dorms. The combined results for the six-scale measure are shown in Table 9. As with the perceived crowding measure the ratings were more favorable in 1979 than in 1978, especially for regular singles ( $p < .001$ ).

TABLE 9

Summary of Results for Texarkana FCI - 1978 and 1979

Variables	Regular Single 54 sq.ft.	Doubles 27 sq.ft.	Regular Dorm 34/45 sq.ft.	Special Dorm 42/50 sq.ft.	F - Values	Significance Levels
Perceived Crowding <sup>a</sup>	2.1	3.1	3.2	2.8	F(3,300)=21.01,	p < .001
Overall Housing <sup>b</sup> Rating (6 scales)	23.5	14.2	12.0	17.0	F(3,294)=28.71,	p < .001
Illness Complaint Rate (Without colds and and flu)	.11	.09	.23	.17	F(3,154)= 4.55,	p < .01
Custody	2.6	2.5	2.4	2.1	F(3,272)= 4.25,	p < .01
Weeks in Prison	64.8	38.6	34.7	23.6	F(3,327)=19.80,	p < .001
Weeks in Housing Unit	30.3	17.5	18.6	18.2	F(3,346)= 6.30,	p < .001

Notes: a. A high score means more crowding  
b. A high score is more positive

Mood Ratings. Ratings of general mood state were obtained only in 1979. Three of the eight mood scales resulted in significant differences. On the relaxation scale, the regular single inmates were most relaxed, the residents of the regular and special dormitories were least relaxed, and the residents of the other housing units were in between. The satisfaction scale scores showed that the residents of the single cells were more satisfied than those of the regular and special dormitory. The single-bunk dorm received the most positive rating on this scale. The residents of the dormitories also rated themselves as more stimulated as opposed to being relaxed than the residents of the other housing units (see Table 8). The mood scale results are not as clear as those of the perceived crowding and room rating scales. However, if one takes all three scales into account at the same time they show a generally more negative mood state for residents of regular and special dormitories than the other residents.

Illness Complaint Rate. Illness complaint rates were analyzed for those inmates who had been at least six weeks in their housing units. Excluding colds and flu, significant effects of housing on illness complaint rate were found both for the 1978 and 1979 data ( $p < .01$  in both cases). In 1978, the rates of the regular dorms and the special dorms were higher than that of the doubles and singles, with the regular dorms having the highest rate (see Figure 19). In 1979 we found a similar pattern of results (see Figure 20), indicating that high social density dormitory living is associated with increased levels of illness complaints.

Perceived Crowding and Illness Complaint Rates. Inmates from the dormitories (combined for 1978 and 1979) who reported themselves as "very crowded" had higher illness complaint rates for the period greater than six weeks, than those reporting less crowding. Data from double cell

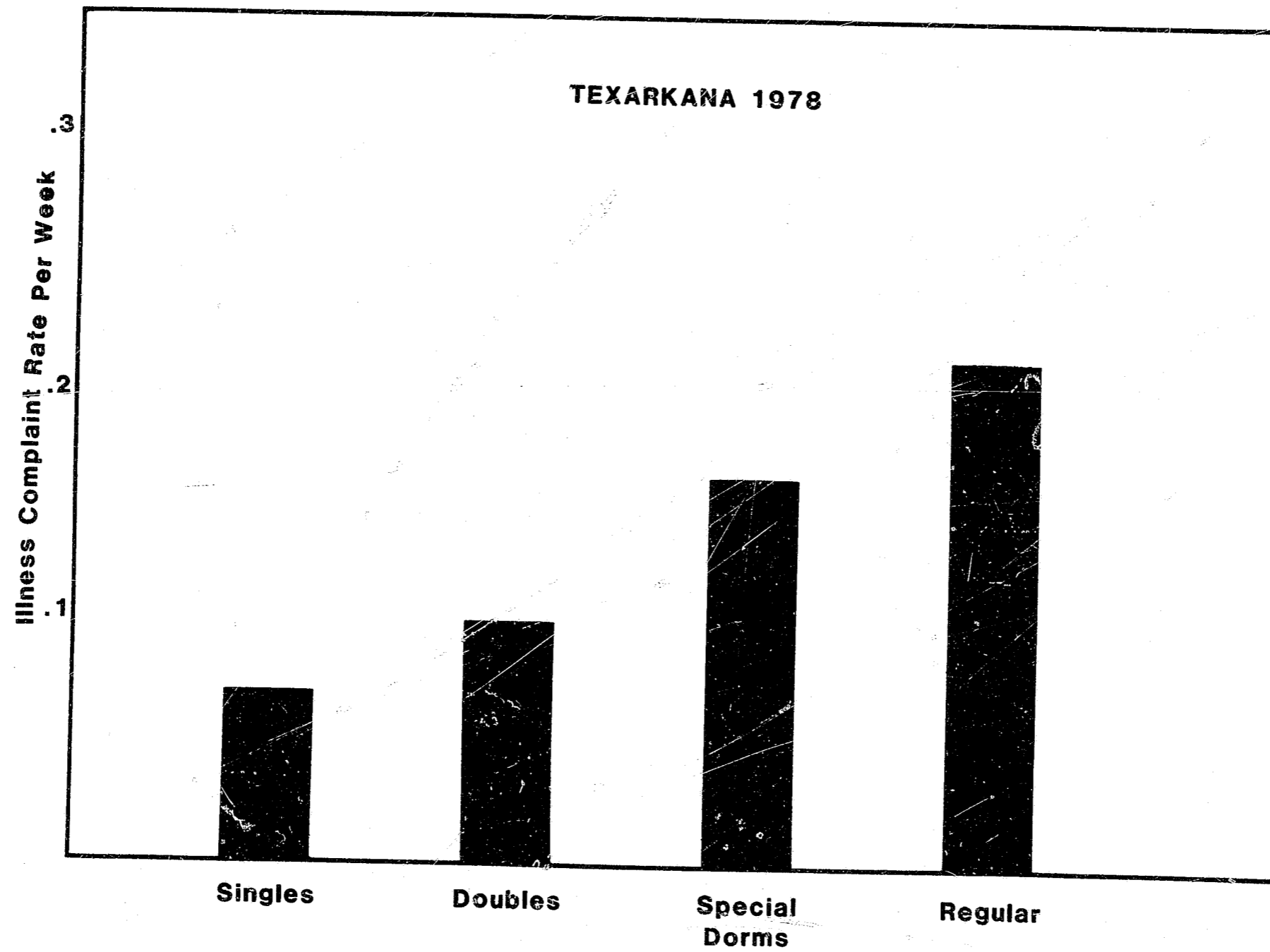


Figure 19

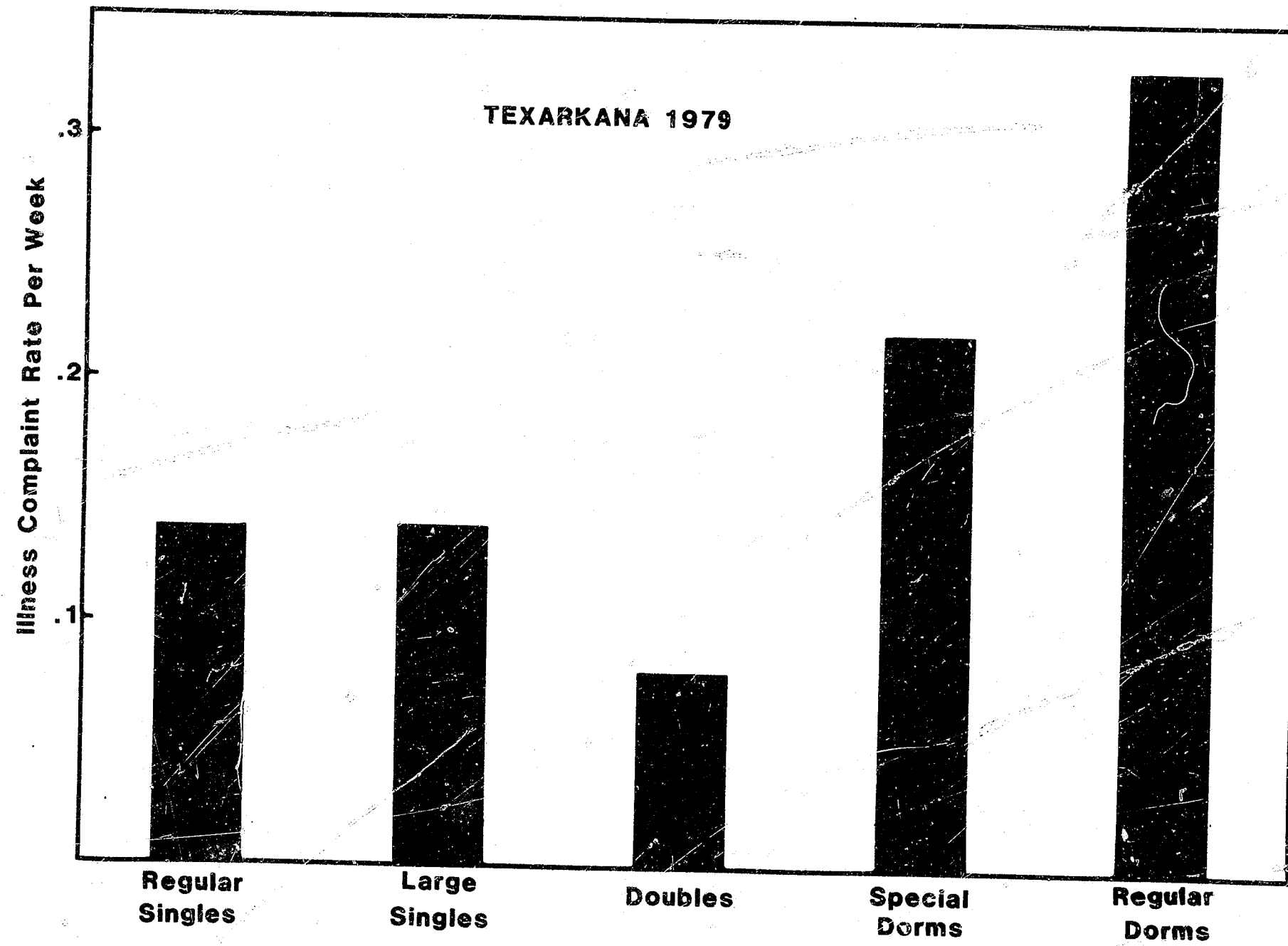


Figure 20



inmates for 1978 and 1979 were also combined and gave the same sort of results. Although these findings were not statistically significant, the results for both the dormitory and doubles agreed with results from other institutions, except Danbury.

Blood Pressure. There were no significant differences in blood pressure among the housing units in 1978. However, in 1979 a significant diastolic blood pressure effect was found with regular singles inmates having lower blood pressure than those in the other types of housing (see Table 8).

Control and Choice. In 1979 we asked several questions to determine the extent to which inmates felt some degree of choice or control over their lives in the prison. The only finding for the questions was a trend for the doubles and regular dorm inmates to feel somewhat less control over others. This finding is in the expected direction but only marginally significant ( $p < .10$ ).

Crowding Tolerance. During the 1978 visit we employed a task that we had used in previous studies to examine crowding tolerance. This task involved the actual placement of small figures into a miniature room until the inmate felt it was crowded. The room was said to represent an open dormitory drawn to scale relative to the size of the figures which represented people. It was assumed that placing more figures in the room would represent greater tolerance of crowded living conditions. The analysis of the results from this task revealed no significant differences among the housing conditions.

During our 1979 visit we employed a revised version of the tolerance task that consisted of showing the inmates drawings of increasingly crowded dormitories. They were asked to say at what point having any more bunks in

the dormitory would make it too crowded. Again, a higher score here would reflect greater tolerance. The analysis of these data revealed that the residents of the East Unit which contained the large singles and special dorms had a lower tolerance than residents of the other housing types (see Table 8). The crowding tolerance of the residents of doubles was slightly greater than East Unit residents. Scores for inmates in other housing types were similar to each other and represented the highest tolerance scores. It is interesting to note the average tolerance for a dormitory that was drawn exactly to the scale of the regular Texarkana dormitory was about 9.5 people. This contrasts to a typical population of 30 to 40 inmates. The results for the tolerance measure do not show a clear relationship to either social or spatial density. They do indicate, however, that the crowding experienced in the dormitories is greater than the expressed tolerance.

Analysis of Confounded Variables. The residents of the various housing units also differed in time in prison, custody level, and months left to serve on sentence (see Tables 7 and 8). Controlling statistically for these factors did not reduce any of the reported findings to statistically unreliable levels. In fact, in almost all cases, the effects remained strong. In addition, it should be noted that on five other measures significant effects of housing type were obtained, but these effects disappeared when one controls for one or more of the confounded variables and hence are not reported.

#### Additional housing Comparisons

Dormitory Density. Earlier we reported that the special dormitory and the single-bunked dorm were rated more favorably than the regular

dormitories. However, the regular dormitories actually had two different population levels. In 1978 all of the regular dorms tested had about 40 occupants. In 1979 only one regular dormitory was at this level while the other regular dormitories had populations of about 28 inmates. Because of sample size limitations, the only feasible comparison involved comparing the 40 person dorms with the 28 person dorms. This, of course, confounds dorm size with visit. However, there were no significant differences between these two dormitory conditions in either perceived crowding or housing unit evaluation. It appears that in densely populated open dormitory environments, moderate reductions in number of people do not significantly reduce negative emotional reactions. This lack of change in ratings is also somewhat surprising in light of the almost 25% reduction in total institutional population that occurred between the two visits.

Regular Dorm versus Special Dorm. Our earlier analyses indicated that the special dormitories produced generally more positive reactions than the regular dormitories. This result is quite interesting since it suggests that dormitory design and arrangement may be an important influence that is independent of spatial and social density. To determine more precisely the nature of the differences between these two types of dormitories, results from these two dormitories were analyzed separately. For those measures common to both visits, the data were combined for the analyses. The other measures reflect data obtained only in 1979. For the combined data, it was found that the regular dorms were rated as more crowded and evaluated more negatively on the housing evaluation scales than the special dorms. For the period greater than six weeks, the regular dorms had 62% higher illness complaint rates ( $p < .05$ ). The regular dormitory inmates had also been in the prison longer and had a higher custody level. The

analysis of measures unique to the 1979 visit revealed that the regular dorm inmates felt less relaxed and had more tolerance for crowding than special dorm inmates. Analysis of covariance controlling for the contributions of weeks in prison and custody eliminated only the relaxation effect.

The general conclusion that can be drawn from these results is that dormitory design can have a significant impact on inmate reactions. Even though the special dormitory housed more residents overall than the regular dormitory, the residents in this special dormitory were segmented into three visually separated bays. The special dorms also had mostly single bunks and somewhat more space per person. All three of these factors may have contributed to the relatively favorable reactions of the special dormitory inmates.

Large versus Small Singles. These two cell types were compared to determine more precisely on what basis these two differed. The small singles had 54 square feet of space while the large ones had 66 square feet. The small cells are represented in four of the prison units, but the large singles are found only in the East Unit. The inmates in the large cells had been in the institution longer; this factor was controlled by analysis of covariance. The only effects obtained were that the large cell inmates had higher diastolic blood pressure ( $p < .01$ ), rated their rooms as more attractive ( $p < .07$ ), and had less tolerance for crowding ( $p < .01$ ) than the small cell inmates. The finding suggests that small increases in space for regular size single cells did not have a beneficial impact and is inconsistent with our findings from Danbury.

Singles versus Doubles. Since residents in doubles have a shorter time in prison and in housing, the following analyses controlled for

these factors by analysis of covariance. Comparison of the residents in these two housing types indicated that the doubles residents rated their unit as more crowded and less attractive than did the singles residents ( $p < .001$ ). The doubles residents also felt relatively less wide awake and less satisfied ( $p < .05$ ). They also seemed to be relatively less tolerant of crowding as indicated by lower tolerance ( $p < .08$ ) and higher ideal scores ( $p < .05$ ). At Texarkana the doubles lead to more negative reactions than singles, but these reactions were not severe enough to lead to statistically significant differential illness complaint rates.

Unit Size. At Texarkana FCI the residents who are housed in singles and doubles live in units that vary greatly in number of rooms on the corridor. Some have only ten rooms and ten residents while others have up to 32 rooms and 64 residents. The population of these units vary with institutional population and consequently differed somewhat between our 1978 and 1979 visits. The work by Baum and Valins (1977) suggests residents living in large units will show more negative psychological reactions than those living in small units due to the high number of unwanted interactions encountered in the large units. By combining the subjects from both visits we were able to compare the effects of living in small (10-22), medium (23-33), or large units (34-63). Since these units do not have an even number of single and double-bunked residents, this factor was analyzed in conjunction with the unit size factor.

Only a small number of significant effects were obtained. In contrast to the other residents, residents of the medium size units rated themselves as more crowded, having less choice about recreation activities, and having less problem with headaches, and they gave a lower score when asked what the ideal number of residents in a dormitory would be. The residents of

the small units felt least crowded, had the highest ideal scores, and had the most problems with headaches. Since the residents of the medium size units had been in the institution the longest, appropriate analyses of covariance were performed. None of the effects were changed substantially as a result of these analyses. While these results suggest that smaller units may be somewhat preferable, it is quite clear that this variable was not a major contributor to stress-related reactions at Texarkana FCI.

#### Housing Complaints

Housing complaints for 1978 and 1979 were combined since there was a very high degree of uniformity between the two years. In Figures 21 & 22 we have plotted the complaints by racial groups. In those categories where there was a substantial percentage of complaints there are some clear racial differences. Percentages of responses from the Mexican Americans and blacks were much more similar to one another than to the Anglo Americans. The principal differences by category were in: the no complaint category, where Anglos were much lower; noise, with Anglos substantially higher; space, where Anglos were lower; crowding, where Anglos were much higher; and people, with Anglos the lowest. The differences in distribution of complaints were statistically significant ( $p < .01$ ).

The basis of these differences is not clear. For example, differences in the degree of literacy may be an important factor. Attitudes toward criticism of a system may also be quite different. Unfortunately, Texarkana is the only institution in which we had sufficient numbers of the three ethnic groups--Mexican Americans, Blacks, and Anglos--to make a comparison. While the differences are quite interesting and potentially important, additional data are badly needed.

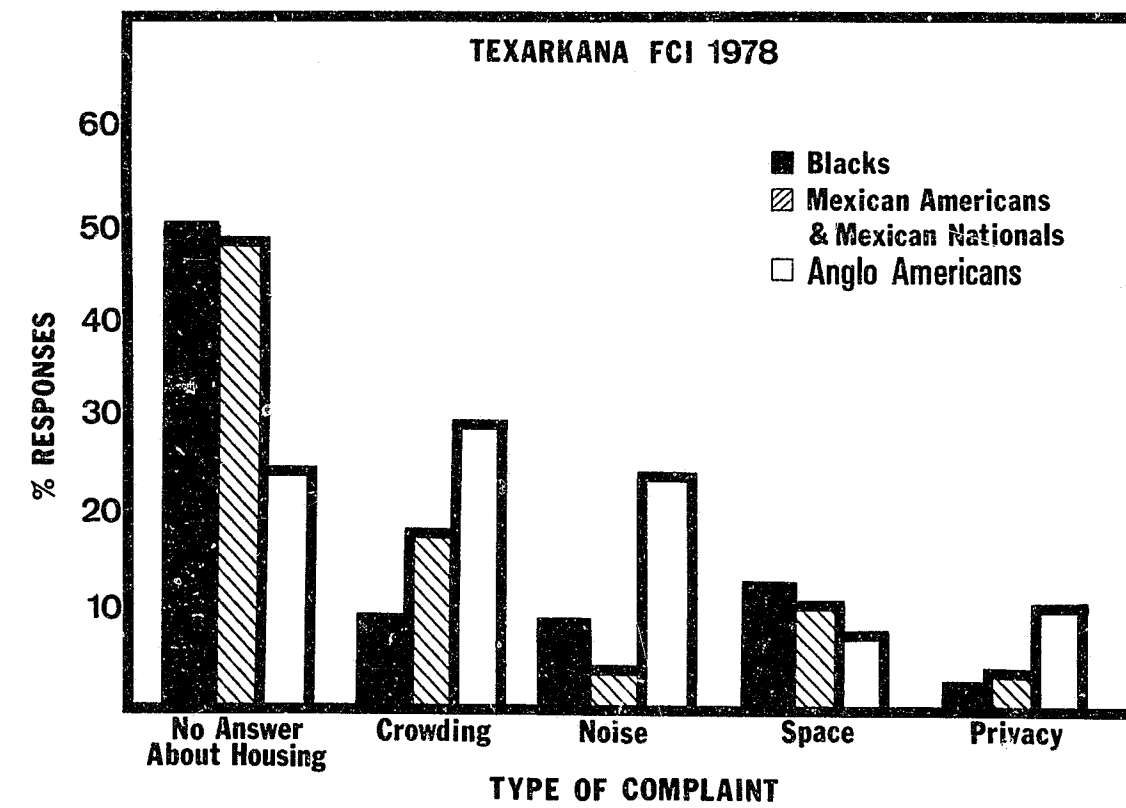


Figure 21

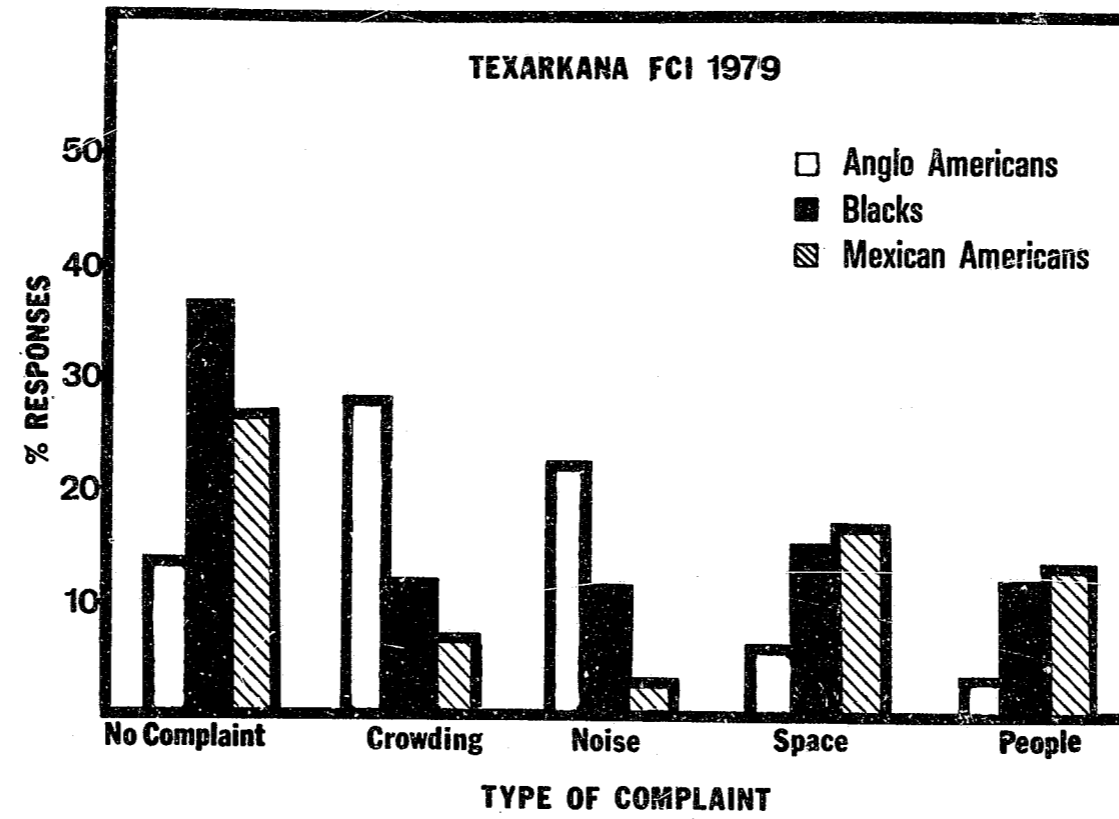


Figure 22

### Summary

At Texarkana perceived crowding and negative room rating increased with increased social density and spatial density. Doubles were rated more negatively than singles, and dormitories (except for the spacious single-bunk dorms) were rated most negatively. Measures of mood and illness complaint revealed primarily negative effects of dormitory living relative to other housing. Thus, while evaluation of housing units is affected both by amount of space and number of people in the unit, negative mood state and illness complaint rates were elevated only in socially dense dormitories. A variation of twelve square feet of space in the single rooms had very little effect on resident reactions. However, singles were rated much more favorably than doubles with half the space per person. Illness rates did not vary significantly for singles and doubles.

The special dormitory residents rated their environment more favorably, felt more relaxed than regular dorm inmates, and had lower illness complaint rates. Yet a reduction of ten inmates in the regular dormitories did not ameliorate the negative reactions to this dormitory.

The number of residents living in a unit of singles and doubles did not appear to have a systematic influence on inmate reactions.

The inmates gave more favorable reactions during the less crowded 1979 visit than during the 1978 visit (except for the regular dormitory inmates). This finding indicates that overall density of the prison housing areas is also a contributor to inmate evaluation of their living environment.

### La Tuna

The La Tuna Federal Correctional Institution consists of a medium security prison and a minimum security camp. The La Tuna facility was chosen as a research site because it offered a unique opportunity to compare the responses to housing conditions of Anglo American, Mexican American, and Mexican National inmates. Since there are substantial numbers of the latter two ethnic groups in U.S. prisons it seemed important to determine if they differed in any significant ways from Anglo Americans in their responses to various degrees of social and spatial density. We made data collection visits to La Tuna FCI in July 1978 and May 1979. The housing in the prison consists of an honor dorm of two man cells and several large double-bunked open dorms containing from 65-70 occupants. The space per person in the honor dorm double cells is 27 square feet and in the large open dormitories approximately 30 square feet. The camp housing consisted of bays or cubicles which contained three or four men during 1978 and four men in 1979. These cubicles are shown in Figure 23. They provided 31 square feet per person when occupied by four occupants. Figure 23 and 24 are photographs of the two types of prison housing. Total institutional population during both research visits was approximately 700. The 1978 visit provided data from the three types of housing for Anglo Americans and a combined Mexican American-Mexican National sample. The 1979 visit focused on two types of housing, camp cubicles and prison open dorms. Data were obtained from three separate ethnic groups: Anglo Americans, Mexican Americans, and Mexican Nationals. A substantial number of Mexican Nationals are incarcerated at La Tuna for illegal entry involving no other individuals. To insure that all three ethnic groups were approximately comparable in terms of offense history

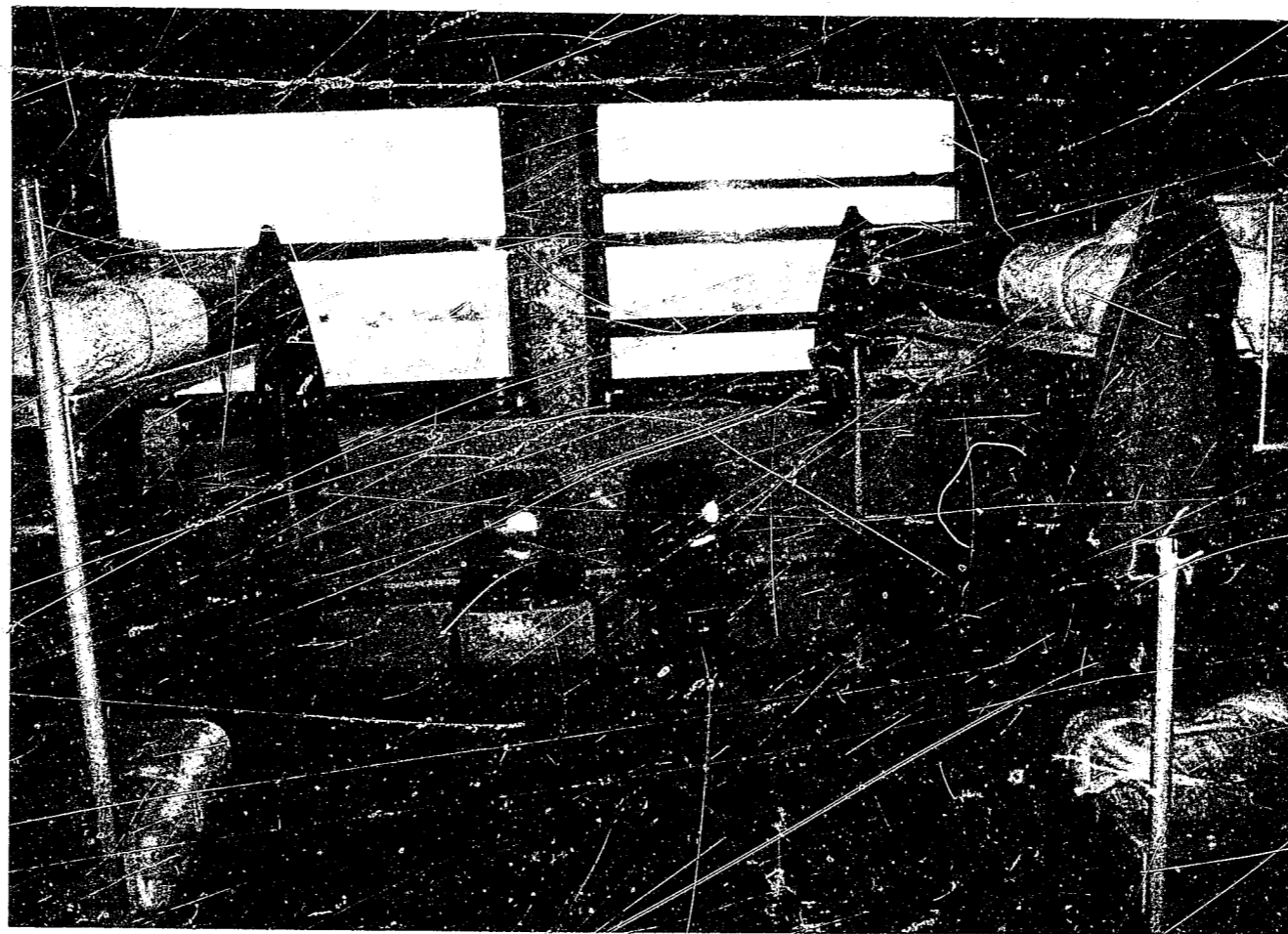


FIGURE 23. Cubicle in Comp. Unit, La Tuna Federal Correctional Institution.



FIGURE 24. Large open dormitory, La Tuna Federal Correctional Institution.



we included in our sample only Mexican Nationals convicted of some offense other than individual illegal entry. Spanish-speaking assistants were employed with Spanish-speaking inmates and Spanish language forms were provided for Spanish-speaking inmates.

The majority of analyses for the La Tuna 1978-1979 visits are two factor ANOVAS with housing and ethnic group as factors. Findings from these analyses, presented in tables 10 and 11, represent analyses that were significant when several potential confounding variables such as length of time in prison, length of time in housing, months left to serve, and age were used as covariates.

1. Perceived crowding. In the 1978 sample, perceived crowding was significantly different for housing conditions ( $p < .002$ ) and for ethnic group ( $p < .001$ ). The camp cubicles were perceived the least crowded as compared to the open dormitory or double cells in the prison. The double cell inmates yielded lower ratings relative to the dormitory inmates but the difference only approached statistical significance with a one-tailed test ( $p < .08$ ). Anglo Americans had higher perceived crowding scores than the combined Mexican groups.

In our 1979 sample the Anglo Americans were substantially higher in measures of perceived crowding than the Mexican American and National inmates. Mexican Americans had higher perceived crowding scores than Mexican Nationals. A two-factor ANOVA yielded significant effects for housing conditions ( $p < .001$ ) and ethnic groups ( $p < .001$ ). Thus both ethnic group and housing influenced perceived crowding. Dormitories were perceived as more crowded than camp housing and Mexican Nationals felt

least crowded and Anglo Americans most crowded in each housing condition. Figure 25 illustrates the perceived crowding score for each ethnic group in each of the two housing conditions.

#### Housing Unit Ratings

For the La Tuna 1978 visit two factor ANOVAS for housing and ethnic group indicated that four of the room rating scales were significantly different for housing conditions and ethnic group. The scales that yielded differences were Attractive--Unattractive, Right Number of People--Too Many People, Unpleasant--Pleasant, Comfortable--Uncomfortable. The cubicles were rated more positively than the double cells and dormitories which were equivalent in value ( $p < .01$ ). It is particularly interesting that four-man cubicles were rated more positively than double cells indicating that higher social density can be compensated for by one or more variables represented in the camp environment, one of which is slightly greater space per person. With regard to ethnic groups, Anglo Americans rated their housing less positively than the combined group of Mexican Americans and Nationals.

For the La Tuna 1979 visit a summary housing unit score was employed that reflected the sum of all six rating scales. Significant differences between dormitory and cubicle residents were obtained for summary housing unit rating with cubicle residents rating their environment more positively. There were reliable differences in housing rating related to ethnic group membership as well. The Anglo American and Mexican National groups were the most different in all cases but the Mexican American ratings shifted toward one or the other ethnic group for different questions. In general, Anglo Americans viewed their environment as less attractive than the Mexican National residents.

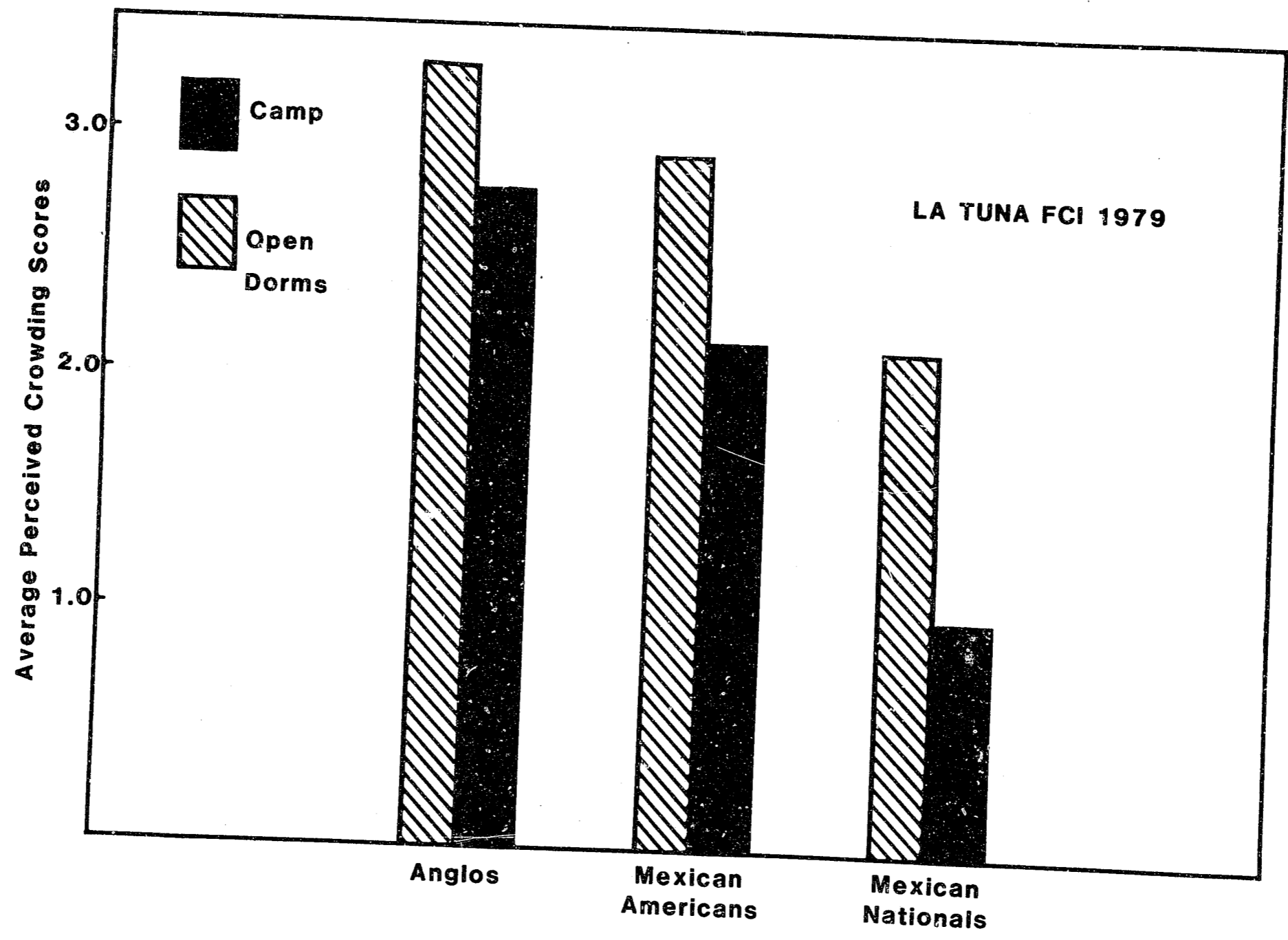


Figure 25

### Housing Complaints

As can be seen in Figure 26 the pattern of housing complaints for the cubicles and dorms is quite different. The difference in crowding complaints is most striking. The percentage of crowding complaints from the dorms was almost five times as great as those from the cubicles. A goodness-of-fit test indicates this difference is highly significant ( $p < .01$ ).

### Affect Scales

The data collection for the 1979 La Tuna visit included use of several scales to measure emotional state or mood. Two self-affect scales were reliably different with regard to ethnic group. These were Questions 5 (Satisfied--Unsatisfied) and 8 (Tense--Calm). On question 5 Mexican Nationals yielded the most positive affect and Anglo Americans the least positive affect with Mexican Americans equidistant between the other ethnic groups. For question 8 the Anglo Americans reported less tension and Mexican Americans the most with Mexican Nationals in between.

### Illness Complaint Rates

Ethnic Groups. For the 1979 sample, a two-factor ANOVA of illness complaints with housing and ethnic group as factors yielded a significant effect for ethnic group ( $p < .05$ ). Anglo Americans had the highest weekly illness complaint rate (.18) followed by Mexican Americans (.13) and finally Mexican Nationals (.07). A similar finding was obtained for illness complaints with colds and flu excluded ( $p < .033$ ). For the La Tuna 1978 sample ethnic group differences between Anglo Americans and a combined sample of Mexican Americans and Mexican Nationals did not achieve statistical significance but was in the same direction as the ethnic difference

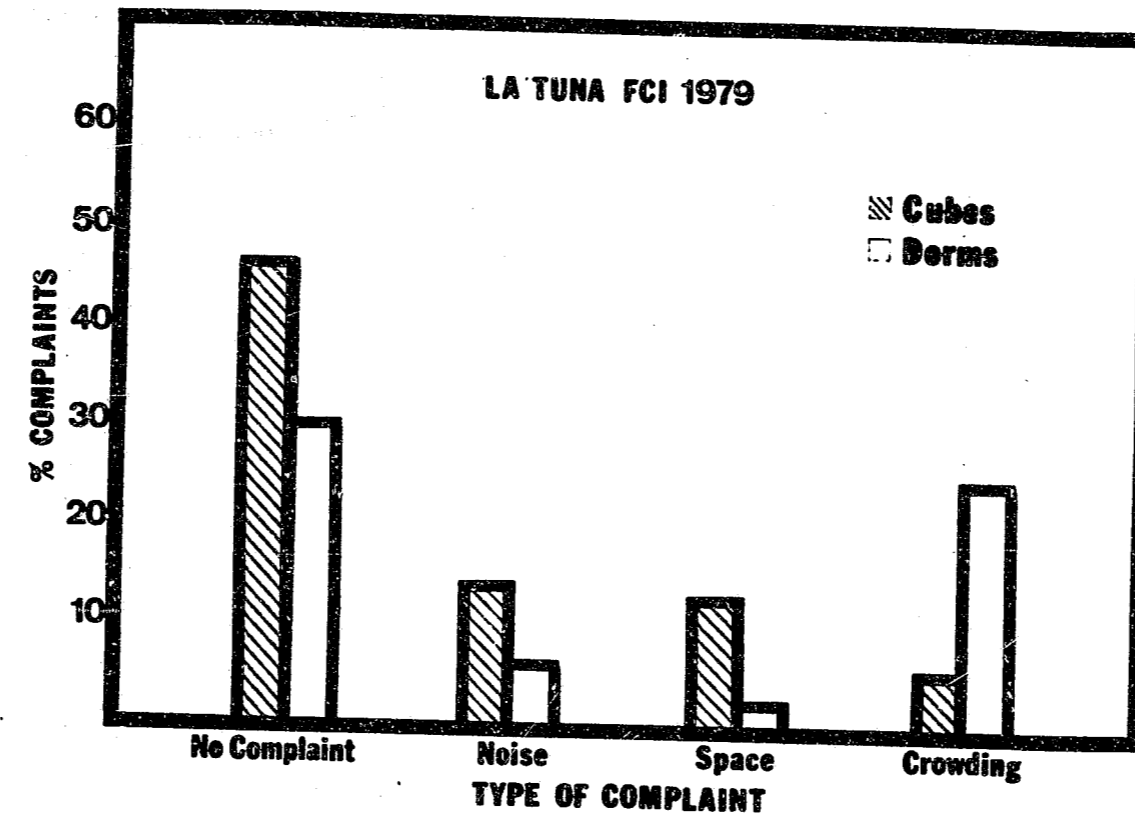


Figure 26

observed in the 1979 sample. The Anglo Americans had higher illness complaint rates than the combined Mexican American and Mexican National inmates. The number of Mexican Nationals and Mexican Americans was much less than in the 1978 sample and the necessity of combining them for statistical analysis probably accounts for the attenuation of differences between those inmates and the Anglo Americans.

Data on illness complaints were combined for 1978 and 1979 for the period greater than six weeks and analyzed in terms of ethnic identification. The Anglo American group had much higher illness rates than either the Mexican American or Mexican National groups. The difference was significant ( $p < .012$ ).

Housing Conditions. A two-factor ANOVA for the 1978 La Tuna data yielded significant differences among housing conditions with dormitory illness complaint rates highest, .28 complaints per week as compared to .16 for camp cubicles and .13 for honor double cells ( $p < .01$ ). Illness complaints with colds and flu excluded were also different but fell just short of statistical significance ( $p < .06$ ) when time left to serve was employed as a covariate in an analysis of covariance. Unlike perceived crowding scores, the illness complaint rate was significantly higher for the period after the initial six weeks ( $p < .05$ ) and near significant for the initial six week period ( $p < .06$ ). The illness complaint rate for the dormitories was over twice as high as the double cells in both cases. For the period less than six weeks the dorm illness complaint rates were over twice as high as the cubicles. The difference was significant ( $p < .025$ ). In the period over six weeks dorms were over three times as high as the cubicles. The difference was highly significant ( $p < .001$ ).

In 1979 sample illness complaint rates for the dormitories (average rate = .127) were about three times as high as for the cubicles (average rate = .044) for noncontagious illness complaints occurring during the first six weeks of stay in housing. The difference was significant ( $p < .05$ ). As in our other findings at other prisons, dormitory illness complaints declined in the period beyond the first six weeks of stay. However, quite unexpectedly, illness complaints of cubicles residents rose substantially after the first six weeks. The failure to find higher illness complaints in the crowded dormitories for the post six-week period was discrepant from our findings obtained in our 1978 visit as well as our findings from other institutions. A detailed analysis of the data indicated a four-fold increase in noncontagious illness complaints occurred during a six-week period in the six months preceding our visit. We determined that the period of increased illness in the camp was associated with a particular physician's assistant and the elevated rates existed only during the time the assistant served at the camp; consequently the elevated illness complaint rates probably eliminated what would otherwise have been a difference in illness complaint rates between the two housing conditions. For housing stays of less than six weeks the overall illness complaint rate findings for La Tuna 1979 were not statistically significant but were in the same direction as those observed for La Tuna 1978 in the camp and open dormitory. That is, the dormitories yielded 41% higher illness complaint rates (average = .190 per week) than the camp cubicles (average = .135 per week).

#### Illness Complaint Rates Over Time

In Figure 27 we have plotted the course of illness rates. The first

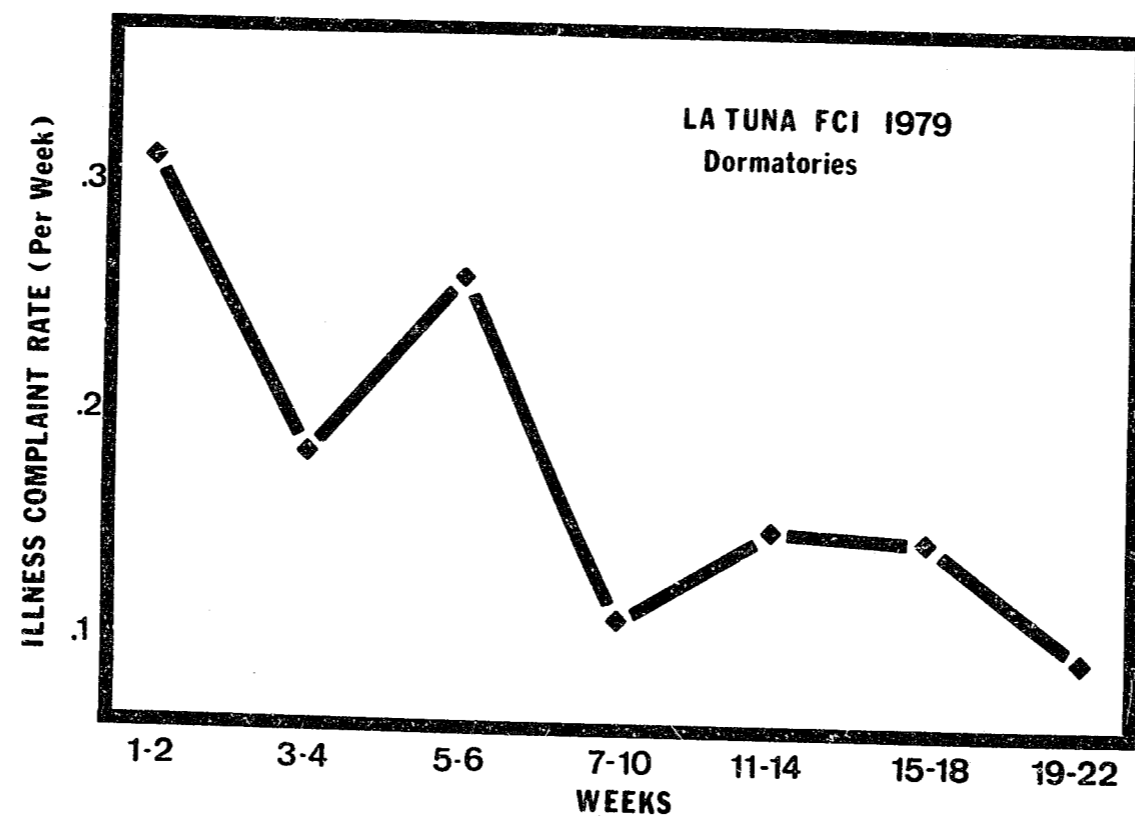


Figure 27

six weeks are plotted in two week blocks. The remaining data are shown in four week blocks. It appears that as indicated elsewhere illness complaint rates are highest during the first six weeks. The curve thereafter appears to be relatively flat.

#### Perceived Crowding and Illness Complaint Rates

As found at all other institutions, except Danbury, there was a strong relationship between perceived crowding and illness complaint rates at La Tuna for 1978 and 1979. In 1978 the combined cubicled dorm and doubles were compared on the basis of those rating their housing "very crowded" and those rating "moderately crowded" or "uncrowded." Those rating "very crowded" had an illness rate four and one-half times as large as the less crowded raters for the period greater than six weeks. The difference was highly significant ( $p < .001$ ). The same comparison for the period of less than six weeks was not significant. However, those rating "very crowded" had approximately 60% higher illness complaint rates.

For 1979 the only possible comparison was for the dorms. For the period less than six weeks, the illness complaint rate for those rating "very crowded" was over three times as high as for those rating "moderately crowded" or "uncrowded." The difference was significant ( $p < .02$ ). In the comparison for the period greater than six weeks those rating "very crowded" had approximately 90% higher illness complaint rates. The difference was not significant.

#### Blood Pressure

In the 1978 sample no differences were found between housing conditions in blood pressure measures. For the 1979 La Tuna sample systolic blood

pressure was higher among camp residents as compared to dormitory residents ( $p < .003$ ), while no difference was observed for diastolic blood pressure. No difference was observed among ethnic groups in blood pressure. This finding is inconsistent with earlier findings reported by ourselves and others indicating higher blood pressure in more crowded conditions.

#### Crowding Tolerance Task

During the 1978 visit we employed the model room version of the Crowding Tolerance Task. This version failed to differentiate housing or ethnic group. During our 1979 visit to La Tuna FCI we employed a modification of The Crowding Tolerance Task that required subjects to simply indicate both the ideal and the highest tolerable number of beds in a dormitory by selecting from a series of drawings of a dormitory with various numbers of beds. A two-factor ANOVA for housing and race indicated that this test, when ideal number was examined, reliably differentiated residents in the two types of housing dormitory and cubicles ( $p < .001$ ) but yielded no difference for ethnic group. The higher scores for dormitory residents (18) as compared to camp residents (9) indicated the ideal number of occupants was higher as crowding increased. There were no differences for housing conditions or ethnic groups when the value for the highest tolerable number of beds was examined.

#### Choice Questions

The feeling of having choices in a situation can influence the amount of psychological stress associated with a particular environment. Consequently for the La Tuna 1979 visit residents of various housing conditions were asked how much choice they felt they had over certain aspects of their



living situation. None of these questions yielded different scores for the cubicles as compared to the dormitory. However, one of the four questions, Choice of Living Unit, was answered differently ( $p < .001$ ) by the three ethnic groups. Anglo Americans felt the least choice over these variables, Mexican Nationals the most, and Mexican Americans fell approximately midway between. These findings suggest the interesting possibility that perception of more choice in their situation may lead Mexican Nationals to perceive their prison environment more positively and attenuate crowding-induced stress.

#### Control

In the La Tuna 1979 visit questions pertaining to control over one's situation or other people were used. Neither question was answered differently in relation to housing condition. With regard to ethnic groups, Mexican Nationals viewed themselves as having more control over others than the other two ethnic groups ( $p < .01$ ). There were no ethnic group differences in response to a question regarding control over one's situation.

#### Summary

The findings from the La Tuna visits clearly indicate that there are substantial differences in the perception of crowding among three ethnic groups: Anglo American, Mexican American, and Mexican Nationals. The Anglo Americans yielded the lowest tolerance of crowding and Mexican Nationals the highest as indicated by measures of perceived crowding. These findings were paralleled by illness complaint rates which were highest for Anglo Americans. The 1978 findings also indicated that open dormitory housing generated higher illness complaint rates as compared to doubles

or four-man cubicles. The cubicles were associated with much lower perceived crowding scores than the double cells or dormitories in the prison. In the 1979 sample the cubicles were again associated with much lower perceived crowding scores than the dormitories. Some affect measures were different in relation to ethnic group but not housing condition. Housing unit ratings differed both with respect to housing condition and ethnic group with lowest ratings associated with dormitories and Anglo American inmates.

TABLE 10  
La Tuna 78<sup>1</sup>

Variable				F-Values	Significance Values
	Doubles	Cubicles	Dorm		
Perceived Crowding	2.81(N=25)	2.19(N=27)	3.02(N=42)	F(2,93)= 6.89,	p < .002
Illness Complaint Rate	.13	.16	.28	F(2,87)= 4.91,	p < .01
Housing Unit Rating					
Attractiveness	2.84	4.56	2.22	F(2,92)=11.73,	p < .001
Optimal Occupants	2.32	4.14	2.00	F(2,92)= 7.86,	p < .001
Pleasant	1.48	2.97	2.19	F(2,92)=14.20,	p < .001
	<u>Anglo</u>	<u>Mexican</u>			
Perceived Crowding	3.05(N=64)	2.17(N=35)		F(1,93)=20.12,	p < .001
Housing Unit Rating					
Attractiveness	2.56	3.88		F(1,92)= 5.25,	p < .024
Optimal Occupants	1.87	4.17		F(1,92)=27.70,	p < .001
Pleasant	1.15	2.19		F(1,92)=18.41,	p < .001
Comfort	2.68	3.93		F(1,93)= 8.67,	p < .004

<sup>1</sup>Group sizes vary slightly across variables due to missing values.

TABLE 11

La Tuna 79<sup>1</sup>

Variable				F-Values	Significance Values
	<u>Dormitory</u>	<u>Cubicles</u>			
Perceived Crowding	2.79(N=49)	1.92(N=38)		F(1,81)=21.90,	p < .001
Systolic Blood Pressure	117	126		F(1,78)= 9.68,	p < .003
Crowding Tolerance (Ideal)	18.13	9.22		F(1,79)=15.90,	p < .001
Summary Housing Rating	17.59	25.48		F(1,79)=20.99,	p < .001
Frequency of Talk to Others	2.82	2.41		F(1,75)= 5.16,	p < .026
Feeling-Satisfaction	2.71	3.98		F(1,80)=10.74,	p < .002
	<u>Anglo Am.</u>	<u>Mex. Am.</u>	<u>Mex. Nat.</u>		
Perceived Crowding	3.08(N=25)	2.62(N=31)	1.58(N=31)	F(2,81)=21.79,	p < .001
Illness Complaint Rate	.18	.13	.07	F(2,69)= 4.10,	p < .02
Summary Housing Rating	16.38	19.42	26.77	F(2,79)=12.92,	p < .001
Choice, Living Unit	1.36	1.60	2.32	F(2,80)=10.97,	p < .001
Control of Others	2.07	2.96	3.99	F(2,79)= 7.11,	p < .001
Feeling-Satisfaction	2.50	3.24	3.95	F(2,80)= 4.97,	p < .009
Feeling-Tension	3.29	4.13	4.75	F(2,79)= 3.29,	p < .04
Sport Participation	.41	2.05	2.97	F(2,79)= 8.86,	p < .001

<sup>1</sup>Group sizes vary slightly across variables due to missing values.

Fort Worth

We had several objectives at Fort Worth FCI. It presented a unique opportunity to gather data in an institution housing both males and females, allowed for male-female comparison, and provided for examination of both high and low-partitioned cubicles, singles, and dorms. The institution has at least ten different types of housing. Females are typically housed in single and double rooms and low-partitioned cubicles. Occasionally they are housed in groups of five to six in open bays at the end of large corridors. The rooms were 10' by 8-1/2' and 9' by 12' yielding 85 square feet and 108 square feet for single inmate rooms. The cubicles were approximately 8' long and 6' wide yielding 48 square feet of space per person. The partitions were 5-1/2' high. The males were housed in comparable housing units as well as high-partitioned one, two, and three-man cubicles and non-partitioned dormitory housing with 15 men. The one three-man cubicle was twice as large as the one and two-man cubicles. Some men were housed in open spaces adjacent to the cubicles.

Fort Worth FCI is a minimum security institution and is one of only two Federal prisons housing both males and females. Because of the proximity of this institution a number of visits were made during a one-year period. During that year institutional population ranged from 596 to 653. The average age of the inmates was in the low 30's.

A large percentage of the inmates spend relatively short times at Fort Worth. Records and measures on 212 inmates were collected. However, due to the fact that at this institution there were both males and females, a wide range of housing conditions, and generally short confinement times, sample sizes were in some instances too small for analysis.

*[The following text is extremely faint and largely illegible due to heavy scanning artifacts and bleed-through from the reverse side of the page. It appears to be a continuation of the report's findings.]*

Housing Unit Rating. Both males and females rate the single rooms more favorably than the cubicles (Table 13). Again the ratings of the males are practically identical.

Crowding Tolerance. Tolerance for crowding as measured by the blindfold room test was greater for the residents of the single than for the

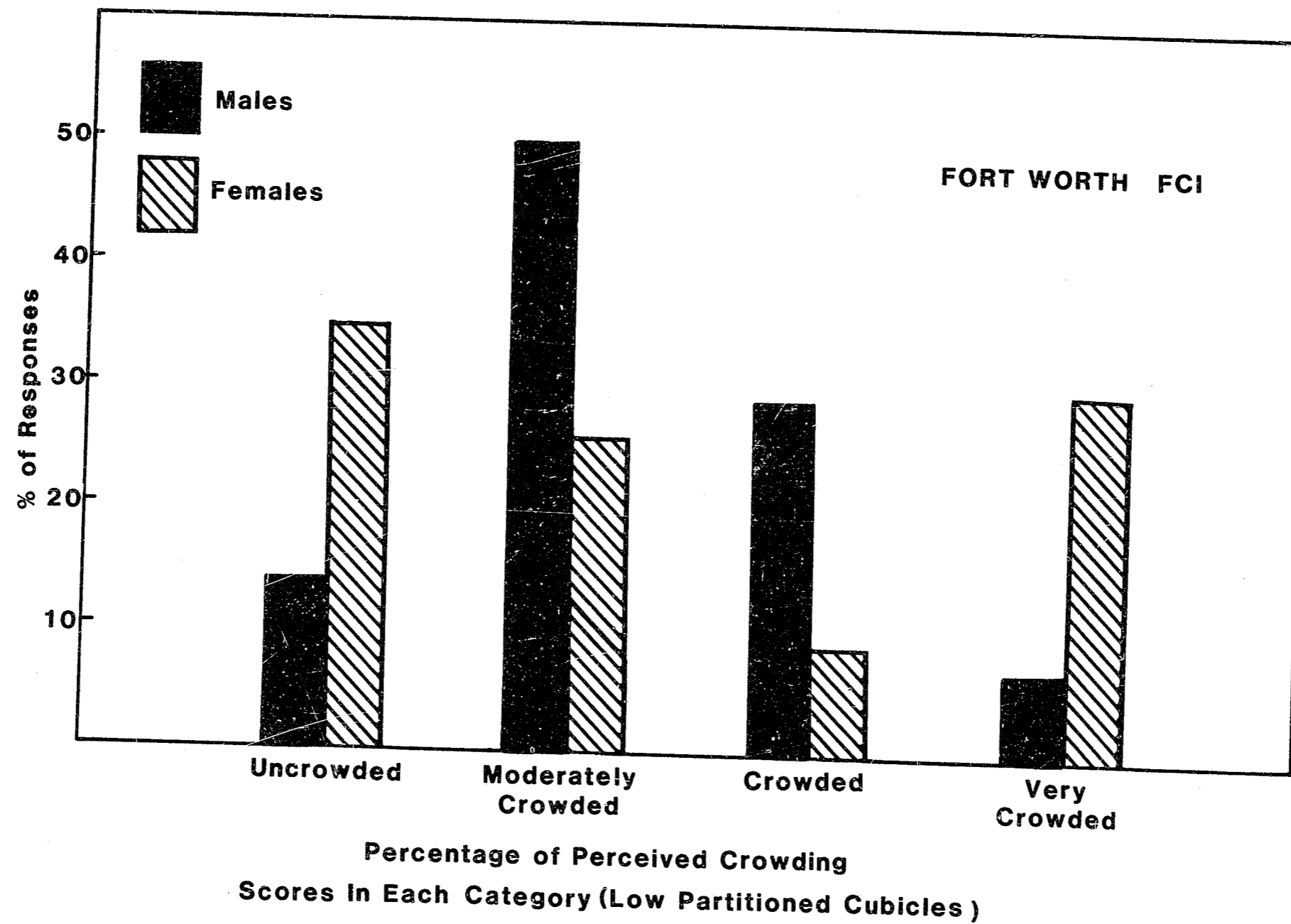


Figure 28

TABLE 12  
Results of Singles and Cubicles Comparison for Fort Worth

Variables	Singles		Cubicles		F-Values	Significance Levels
	Males	Females	Males	Females		
Number	37	51	17	27		
Space per Person (sq.ft.)	85/108	85/108	49	49		
Perceived Crowding <sup>a</sup>	1.5	1.7	2.2	2.1	F(1, 130) = 8.62, p < .01	
Room Rating <sup>b</sup> (6 scales)	29.6	30.1	20.8	21.0	F(1, 129) = 30.22, p < .001	
Talking	2.8	2.9	2.4	2.6	F(1, 129) = 3.42, p < .07	
Crowding Tolerance	17.0	10.5	10.4	9.8	F(1, 130) = 5.94, p < .02	

Note: The scores of males and females were combined for the analysis.

a. A high scores is more crowded.

b. A high score is more positive.

TABLE 13  
Results for Male Housing at Fort Worth

Variable	Singles	High Cubes	Low Cubes	Alcoves	Open Dorm	F-Value	Significance Level
Number	37	28	17	18	21		
Program	Drug	Health	Alcohol	Drug	Orientation		
Social Density	1	1/3	1	5/6	15		
Space (sq.ft./person)	85/108	60/120	48	80/96	74		
Perceived Crowding <sup>a</sup>	1.5	1.2	2.2	2.3	2.6	F(4, 116) = 10.75, p < .001	
Room Rating <sup>b</sup> (6 scales)	29.6	30.0	20.8	22.0	18.9	F(4, 114) = 9.46, p < .001	
Crowding Tolerance	17.0	17.2	10.2	17.2	10.9	F(4, 116) = 2.72, p < .05	
Talking	2.8	3.2	2.4	2.5	2.4	F(4, 116) = 2.61, p < .05	

Note: a. A high score means more crowded.

b. A high score is more positive.

residents of the cubicles. This effect was due primarily to the males, however (Table 12).

Talking. There was a marginally significant effect for both the male and female residents of the cubicles to report that they spend less time talking with others than the residents of the singles (see Table 13).

#### Comparison of Male Housing Units

There were five different types of housing for which we had a sufficiently large sample of males for statistical analysis--singles, high cubicles, low cubicles, alcoves at the end of hallways, and an open dormitory.

Perceived Crowding. As seen in Table 12, the residents of the singles and high cubicles gave similarly low ratings of perceived crowding relative to the residents of the other units. The residents of the open dorm gave the highest crowding ratings.

Housing Unit Rating. The ratings of the housing on the six scales produced a similar pattern to perceived crowding with the singles and high cubicles residents giving a relatively positive response and the open dorm inmates the most negative response (see Table 13).

Crowding Tolerance. The tolerance for crowding scores were lower for the residents of the open dorm and the low cubicles than for the other residents (see Table 12).

Talking. The residents of the singles and high cubicles reported more talking than the other residents.

#### Illness Complaints and Housing

Only a limited number of comparisons were possible since sample size



was too small in a number of cases. A comparison between men housed in singles and those housed in open sleeping areas indicated that in illness complaint rates for the period over six weeks the open areas had rates over twice as high as the singles. This is in agreement with findings at other institutions except that in this case the differences were not statistically significant.

In the period before six weeks illness rates for men in singles were slightly lower than for low-partitioned cubes. High-partitioned cubes had much lower illness complaint rates than either singles or low-partitioned cubes. The differences were not significant. In the period over six weeks illness complaint rates for singles were slightly lower than the high-partitioned cubes. For women, illness complaint rates in singles were about half as high as low-partitioned cubes in the period less than six weeks. This difference was not significant. However, when data from men and women were combined the singles were significantly lower ( $p < .05$ ) than the low-partitioned cubes.

#### Race and Illness Complaints

For both men and women, whites had higher illness complaint rates than blacks for the periods less than and greater than six weeks, although the differences were not statistically significant.

#### Sex Differences and Illness Complaints

In the singles, women's illness complaint rates were higher than males in both the period before and the period after six weeks. In the low-partitioned cubes female rates were over twice as high as the men for the period less than six weeks, although the differences were not statistically significant.

#### Summary

The 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. High cubicles, which consisted of partitions which reached almost to the ceiling and contained doors, elicited positive reactions similar to the single rooms even though they contained from one to three men. However, the low cubicles which had no doors and which were less elaborate than those at Danbury and El Reno were rated more negatively than the singles and high cubicles. The low cubicles were also smaller in space than the singles. As was the case in our other prisons, the open dorm was rated most negatively.

The comparison of the singles and the alcove residents is also of interest. These residents lived in the same unit and have similar space per person. Yet the ratings of the alcove residents are more negative than those of the singles, again indicating the importance of social density. The comparison of the singles and the low cubicles suggests that space may also be an important factor. However, this effect could also be due to the lack of privacy afforded by these cubicles.

Because the Fort Worth data was the last to be prepared for analysis, our analysis is still somewhat incomplete. The contributions of potential confounding factors such as time in prison have yet to be dealt with, although these factors have not negated the perceived crowding and housing rating results in any of our other studies. However, the crowding tolerance and talking effects should be considered tentative.

Program type was partially confounded with housing type at Fort Worth. However, inspection of our pattern of findings does not indicate it to be

a major contributor to our results. At Danbury we found that program type also had little influence on our findings.

## ARCHIVAL DATA

### Introduction

Archival data were obtained from two prison systems, the Texas Department of Corrections (TDC) and the Oklahoma Department of Corrections (ODC). The great majority of archival data was from the TDC and was related to deaths, suicides, psychiatric commitments, self mutilations and attempted suicides and disciplinary infractions.

### Changes in Population Without Parallel Increases in Housing Facilities

A number of state correctional systems have experienced increases and decreases in population with only minor changes in housing space over the same period of time. We obtained data from official state sources on deaths, suicides, psychiatric commitments, and disciplinary infractions which allowed us to evaluate some of the behavioral and physiological consequences of changes in population.

In the Texas Department of Corrections the population from 1968 to 1978 increased from 12,500 to 23,900 when housing facilities increased approximately 30%. During this period there was a disproportionate increase in the number of suicides, disciplinary infractions, and deaths of inmates over 50. Data from the Oklahoma Department of Corrections covered 1973-1976. During those years the population decreased, then increased.

Suicides. Information was obtained on all deaths in the TDC for January 1968 through August 1978. This information included an inmate's name, date of birth, cause of death, date of death and unit of assignment, and in most cases racial identification. Some of these data came from TDC records; other data were obtained from individual death certificates. An

additional source of data was a masters thesis on suicide in the TDC authored by David L. Smith (Sam Houston State University, October 1977). Smith's thesis covered the period 1964 through 1976, while the TDC records covered 1968 through November 1978. The two sources of data were in very close agreement as to the number of suicides in any given year. Consequently they were combined to provide an unbroken 14-year period. In Figure 29 suicide rates and mean populations are plotted in three year blocks. Over this period population increased 91% while suicide rates increased over 1000%. A comparison of the first and last seven years yielded a very substantial difference ( $p < .001$ ). These data indicate that an increase in housing was accompanied by a dramatic increase in suicide rates. This is the case in spite of the fact that no suicides were reported in 1976. (see Page 108 for a comment).

Deaths Due to Violence. Data on deaths for the four years 1973-1976 were obtained from the Oklahoma Department of Corrections. The report did not include any deaths from natural causes, which reflects Oklahoma's policy of releasing or removing to a civilian hospital inmates who appear to be terminally ill. Causes listed were suicide, homicide and other. The category "Other" included two deaths during escape and three from accidental poisoning. Figure 30 shows the population and death rate trends, including the "Other" category. Whether the "Other" category is included or excluded does not make any substantial change in the conclusions. In each case the two highest population years had higher rates than the low population years, with rates in the high population years 2.5 to 2.8 times higher than in the low population years. The difference was significant ( $p < .05$ ). The results complement our earlier findings from the Illinois prison system where population first rose and then declined (see Figure 31).

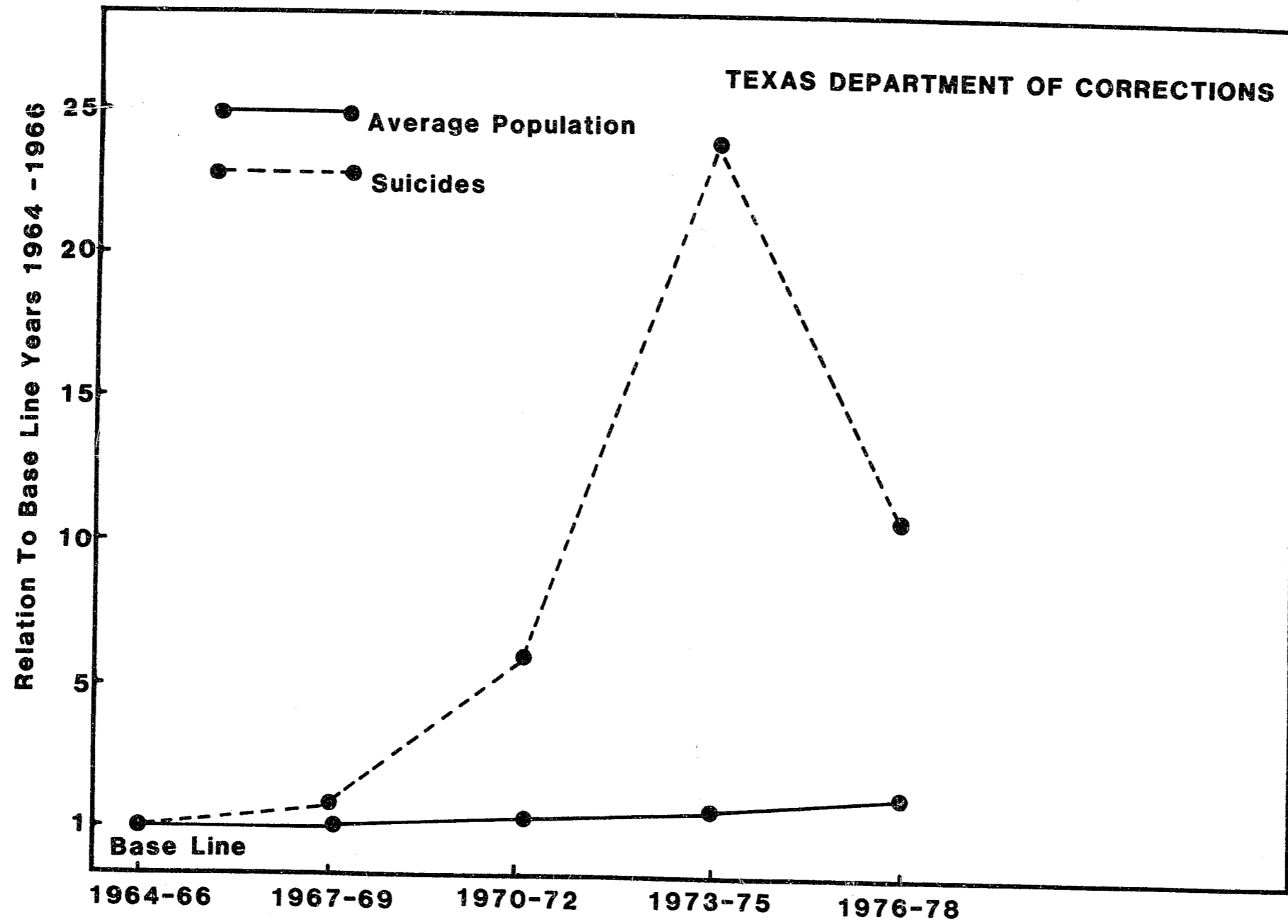


Figure 29

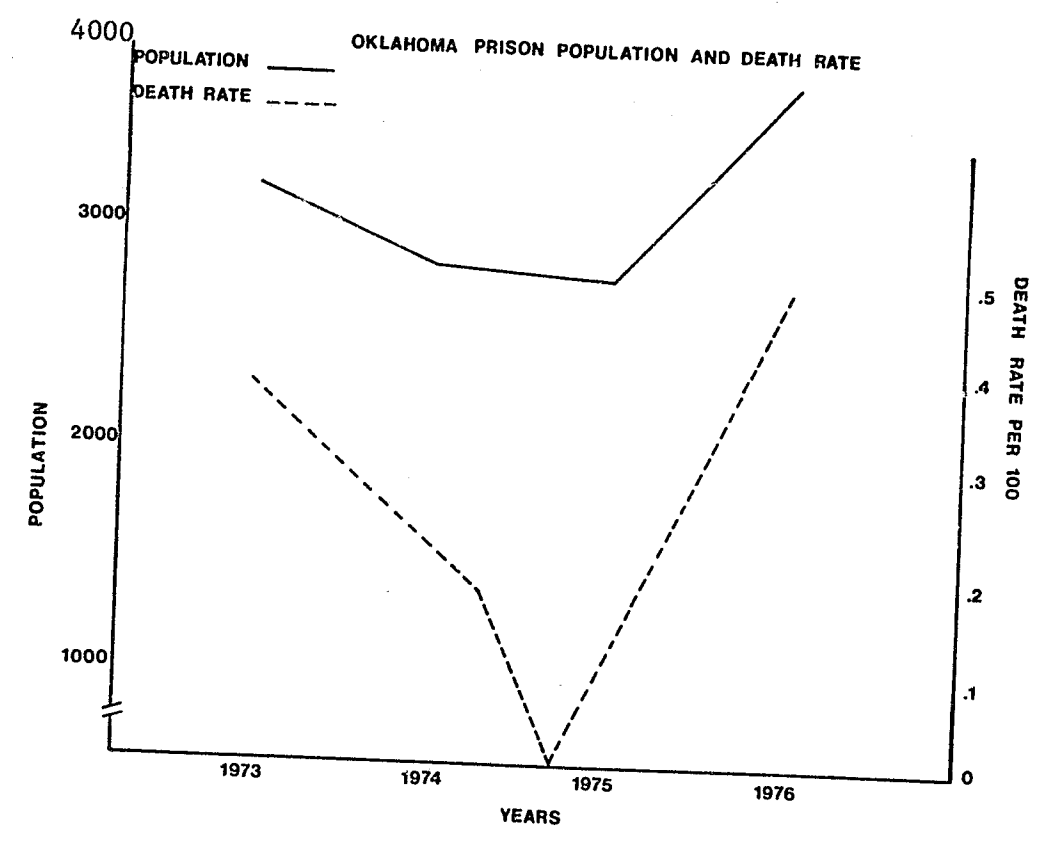


Figure 30

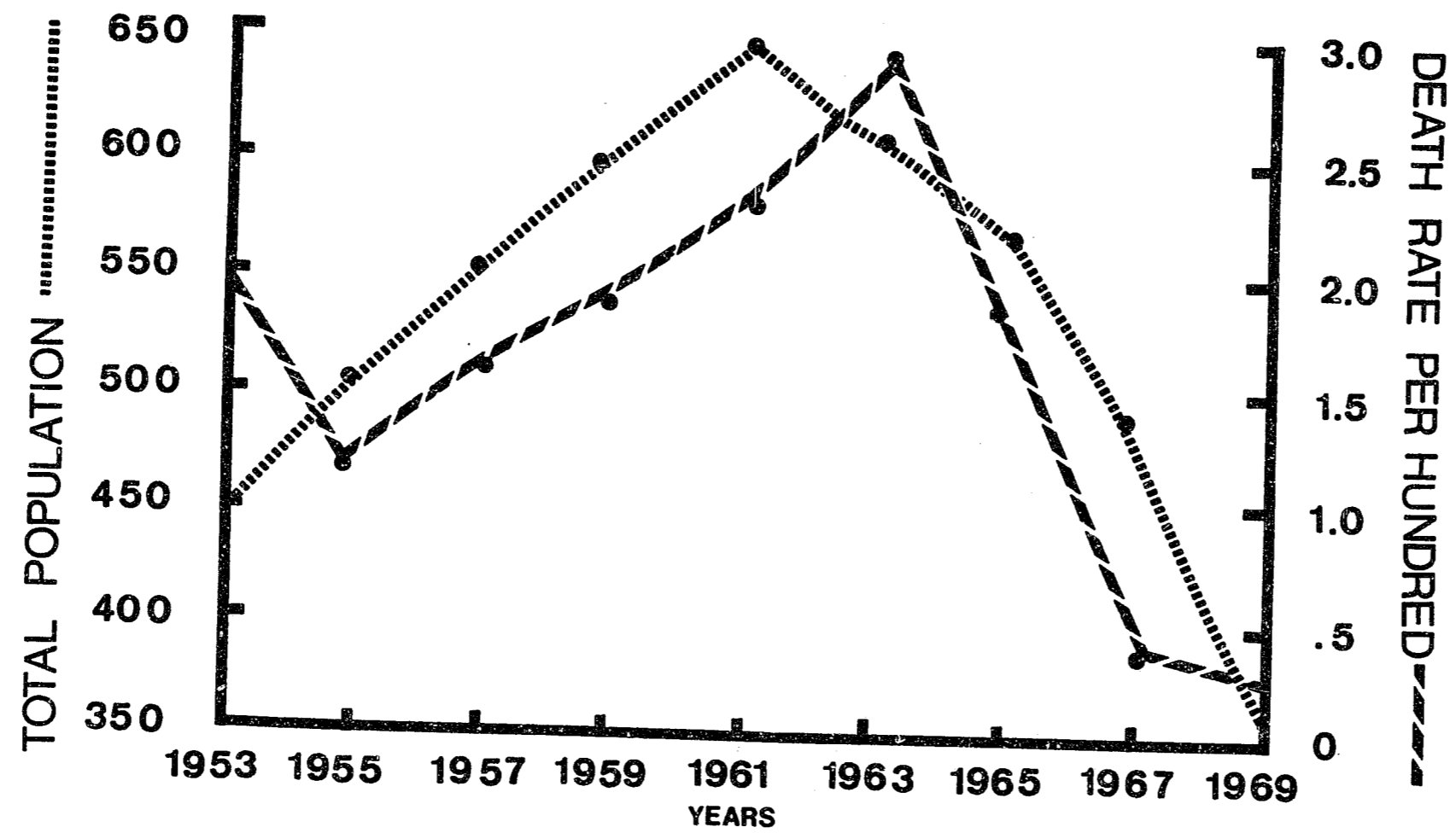


Figure 31

Data obtained from the TDC regarding violent deaths were compared over the period 1968-1977. The violent death rates in the higher population years (1973-1977, .160 per 1,000 inmates) were 40% higher than in the low population years (1968-1972, .115 per 1,000 inmates). Although this trend was not statistically significant it is clearly parallel to the violent death data obtained from the Oklahoma Department of Corrections and suicide and psychiatric commitment data described elsewhere in this report.

Deaths from Natural Causes. In an earlier published report we presented evidence indicating that death rates in the Illinois prison system were greater in periods of higher populations and fixed housing capacity. The effect appeared to be most pronounced in inmates over 50 years old. In Figure 32 we have plotted the expected and actual death rates in TDC of inmates over 50 using 1971 as the base year. On this basis the actual death rates are higher than the expected death rates at all points. Overall the actual death rates are 220% of the expected rates. The difference between the expected and actual rates is statistically significant ( $p < .001$ ). We also examined the data using an average of 1971 and 1972 as the base year. The difference remains significant ( $p < .01$ ). These findings are particularly striking in light of evidence presented recently in The New England Journal of Medicine which indicated that overall U.S. death rates fell 17.7% in the period 1968-1977.

Special note should be taken of the data from 1976. There is a very substantial drop in the death rates to approximately 39% of the previous year. In addition there were no reported suicides or killings in 1976. We have not been able to determine the basis for this rather astounding decrease.

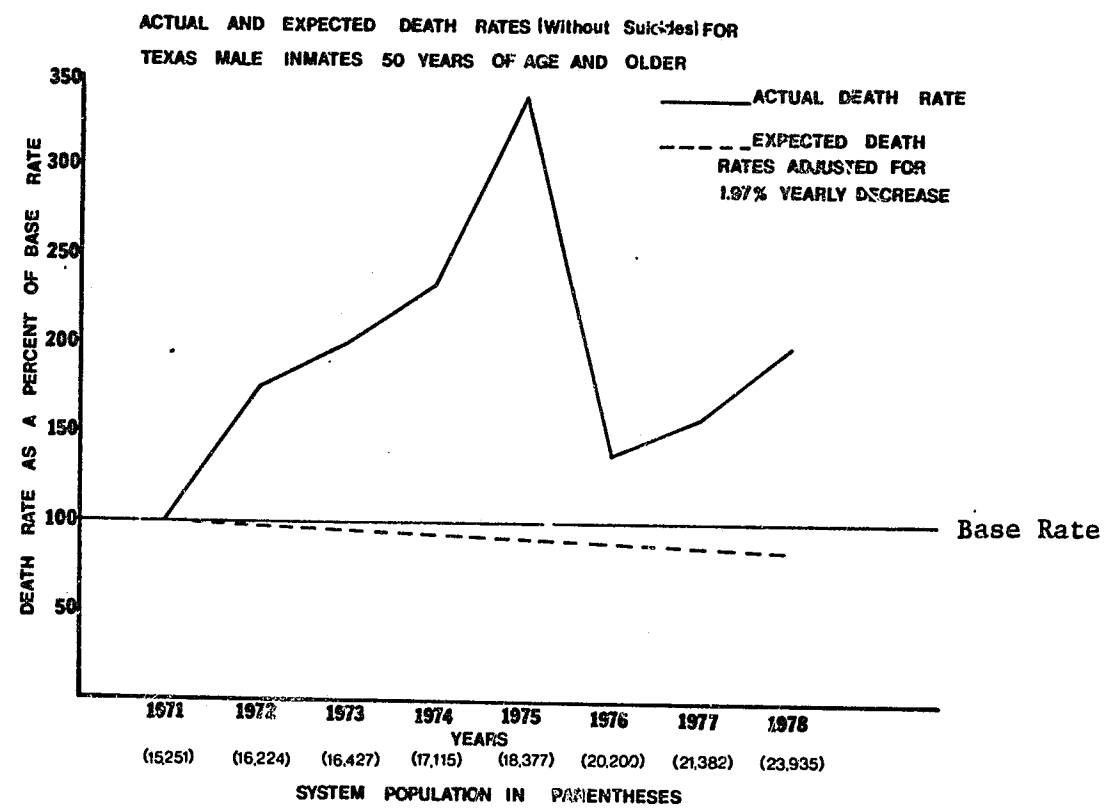


Figure 32



Disciplinary Infractions. Disciplinary infraction data from TDC covered the period 1969 through 1978. As may be seen in Figure 33 inmate population in 1978 was approximately 91% higher than inmate population in 1969 (12,482 to 23,935). During the same period the rate of disciplinary infractions nearly quadrupled (83 per 1,000 to 312 per 1,000). TDC housing facilities are estimated to have increased approximately 30% during the period. The difference was highly significant ( $p < .001$ ). Population increased much more rapidly than housing facilities, and was accompanied by a very sharp rise in the rate of disciplinary infractions. These results are similar to those recently reported by Nacci, et al. (1977) for the entire Federal prison system. It seems reasonable to attribute at least part of the disproportionate increase in disciplinary infractions to crowding induced stress.

#### Institutional Size

Previous findings in nonprison settings have indicated that other things being equal sheer size, that is the total population of an institution, is a variable that can produce physiological and psychological effects. Large institutions have a greater negative impact on individuals than smaller institutions that are in other respects equivalent. We sought to determine if this relationship was relevant to prison size.

Deaths. Four smaller units of the Texas system were compared with five larger units in terms of death rates excluding suicide, violence and accidents. The period covered is 1971-1978. Earlier years were not included since reliable information on ages was not available. As shown in Figure 34 the larger units had higher death rates at every age level surveyed (17-25 ratio 1.68 to 1, 26-35 ratio 3.15 to 1, 36-45 ratio 1.77 to 1,

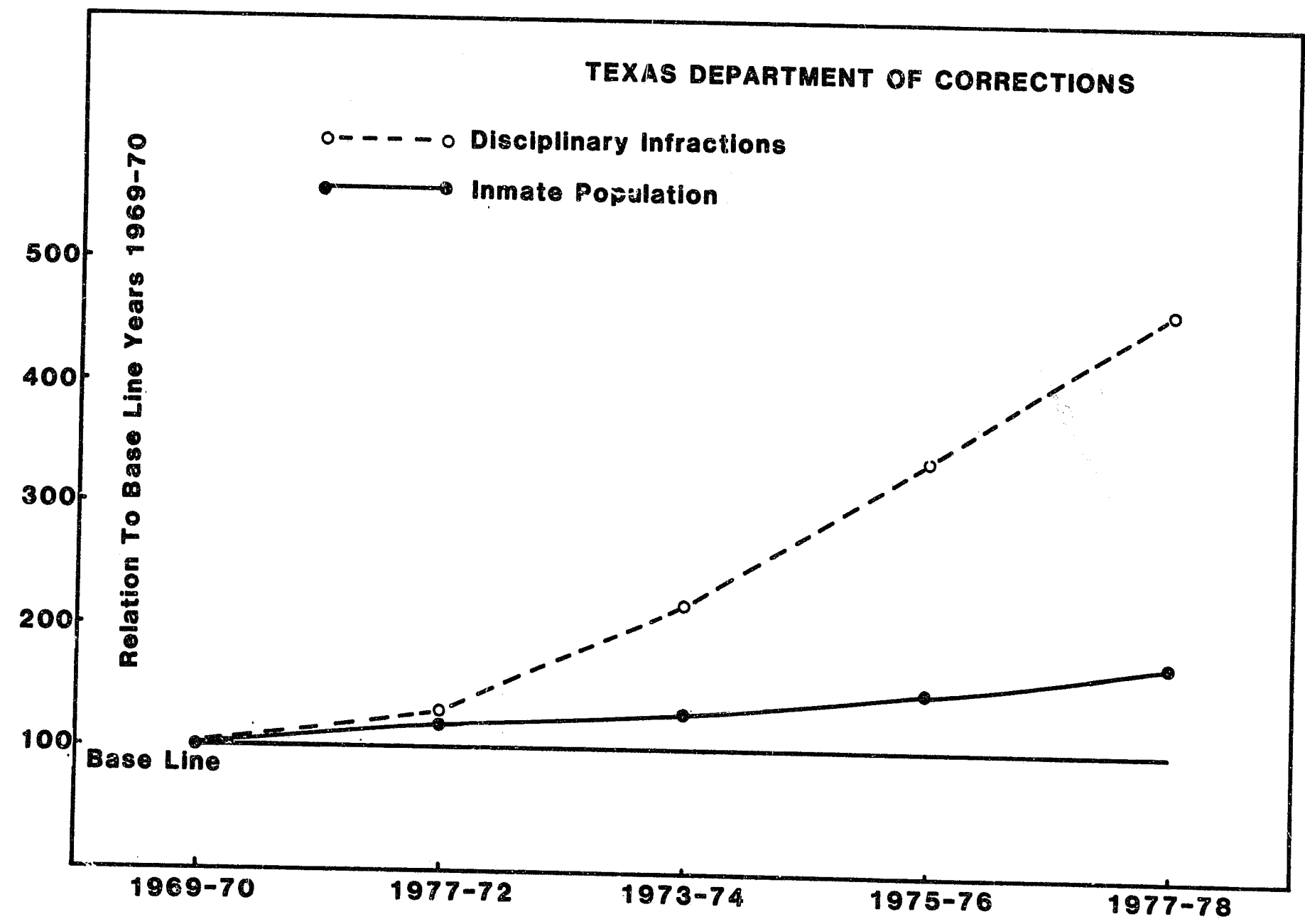


Figure 33

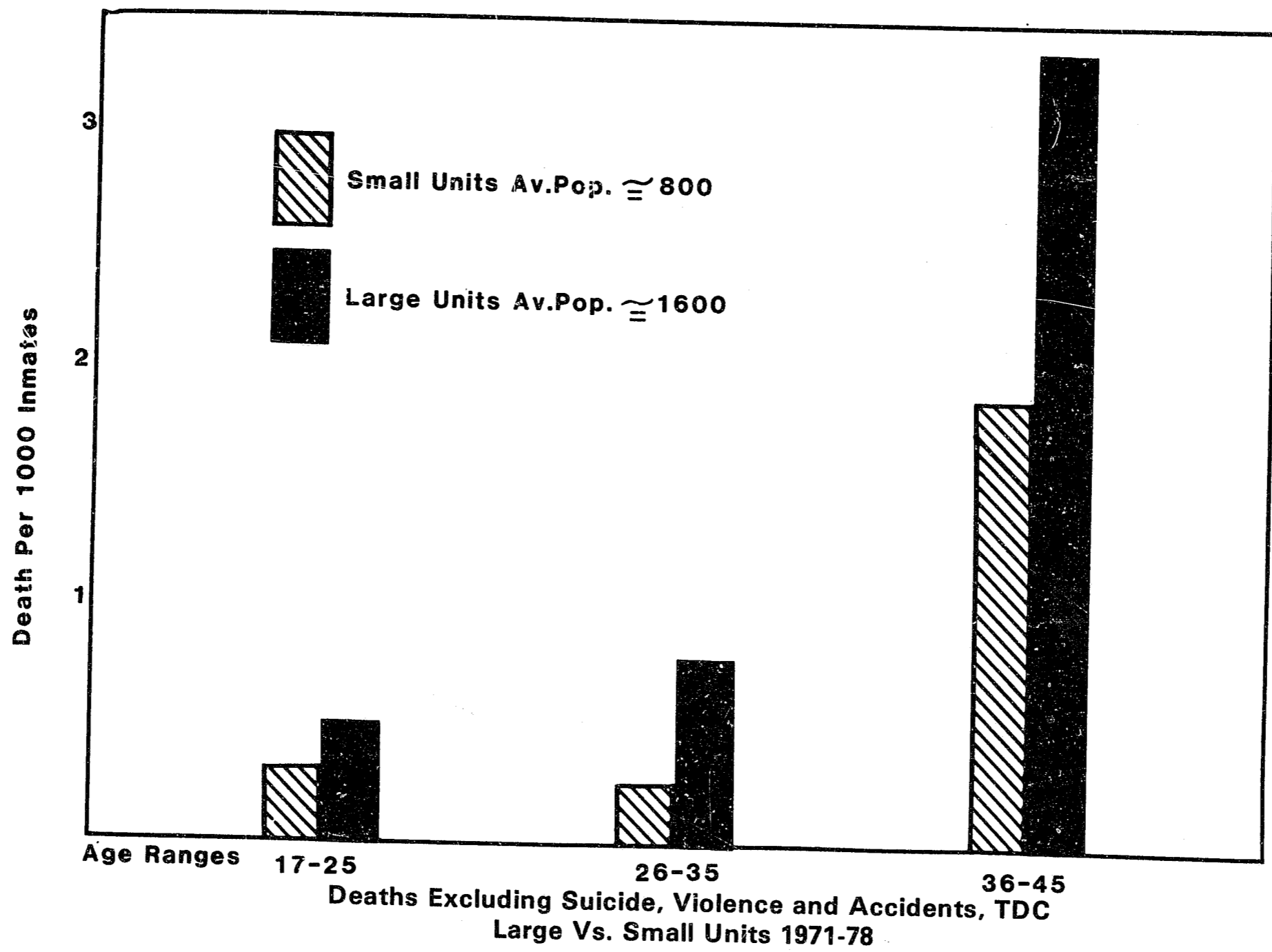
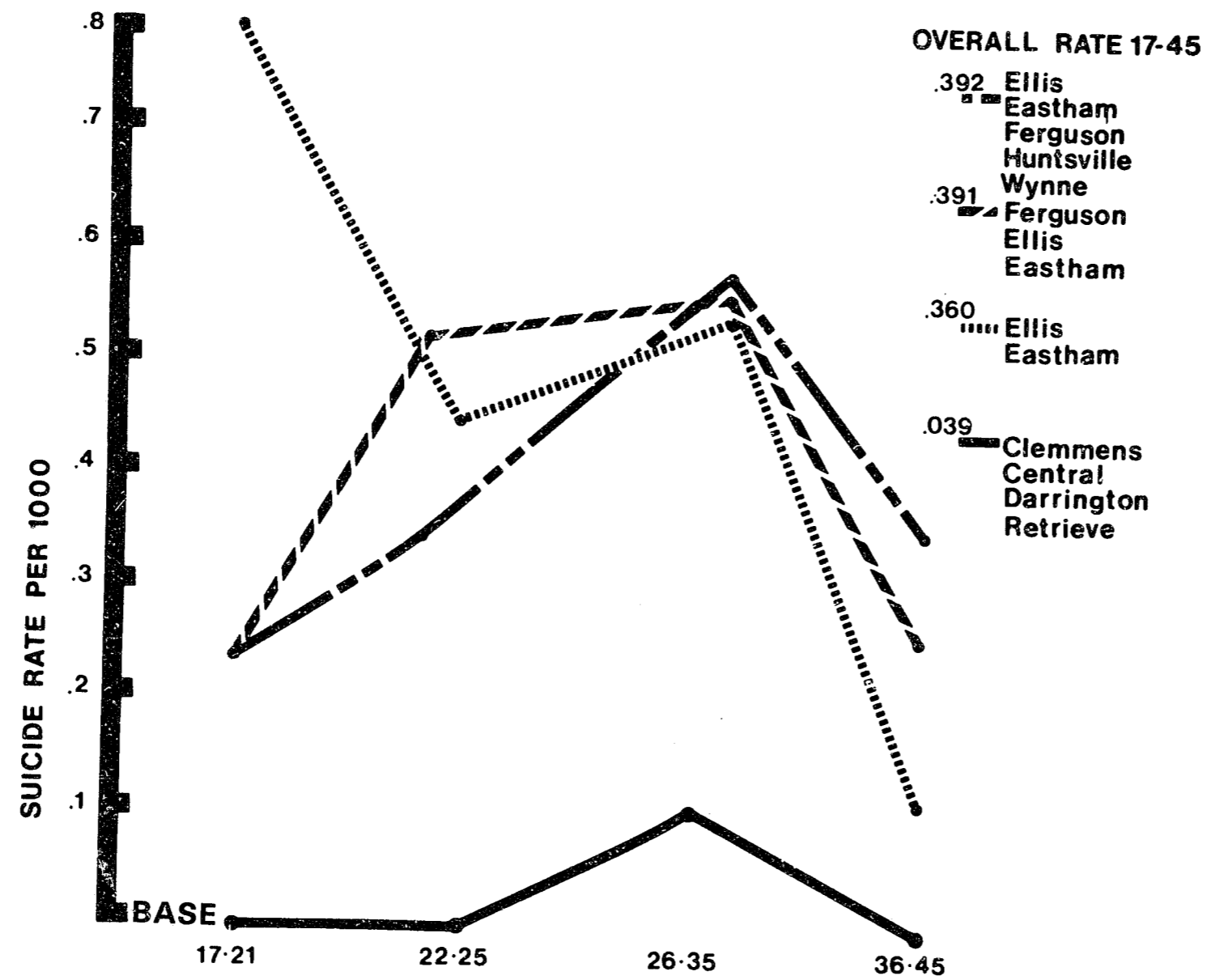


Figure 34

overall ratio 2.81 to 1). The ages above 45 were not considered since the number of inmates in the small units above this age was too small for statistical analysis. Compared at the individual age levels none of the group differences were statistically significant. However, a comparison of large and small units based on the age range 17-45 yielded a statistically significant difference in death rates ( $p < .025$ ). Two of the large units (Huntsville and Wynne) have more extensive hospital facilities than any of the small units. However, removal of these units from the analysis does not change the trend (17-25 ratio 1.58 to 1, 26-35 ratio 1.73 to 1, 36-45 ratio 1.09 to 1). While the difference was not statistically significant the violent death rate in large units (.207 per 1,000 inmates) was 59% higher than in small units (.130 per 1,000 inmates).

Suicides. In the TDC, units with large populations had much higher suicide rates than units with small populations. A comparison was made between the large and small population units. As can be seen in Figure 35 the suicide rate for all age groups was much higher in the large as compared to the small population units with the suicide rates in the large units about ten times as high as in the small units ( $p < .05$ ). These results are compatible with other published data.

Psychiatric Commitments. Two reports from the Texas Department of Corrections provided information regarding the units of origin for psychiatric commitments (Special Study No. 12 dated March 1975 and Technical Note No. 28 dated April 1975). The Technical Note covered the period September 1, 1974 through February 28, 1975. During this period the commitment rate for large units (1,450 or more inmates) was .984 per 100 inmates. The rate for small units (1,100 or less inmates) was .575 per 100 inmates. The rate in large units was 1.71 times as high as in the



small units ( $p < .05$ ).

The Special Study No. 12 covered all of 1974. The results from the Special Study are very similar to those from the Technical Note (see Figure 36). The large units had a yearly commitment rate of 2.10 per 100 inmates (1.05/100 on 6-months basis). The small units had a rate of 1.18 per 100 (.58/100 on 6-months basis). The rate in the large units was 1.78 times as high as in the small units ( $p < .001$ ).

On the basis of these reports it appears that larger units produce higher rates of psychiatric commitments and this is in general agreement with other published work.

Self Mutilation and Attempted Suicides. Data from TDC on self mutilations and suicide attempts varied in quality among institutions. The data from six institutions were of sufficient completeness to allow for a comparison of three small units (Central, Clemmens, and Darrington, average population 924) with three larger units (Ellis, Eastham and Coffield, average population 2,981). These were selected since they seemed comparable in a number of ways. Their records reports were also much more complete than others. In terms of self mutilations and attempted suicides the rate in the large units was much higher than in the small units (ratio 2.35 to 1). The differences were statistically significant ( $p < .05$ ).

Taken alone the self mutilation and attempted suicide data should be viewed with considerable reservation. However, they are parallel to and provide corroborative support for our data on death rates, suicides, and psychiatric commitments.

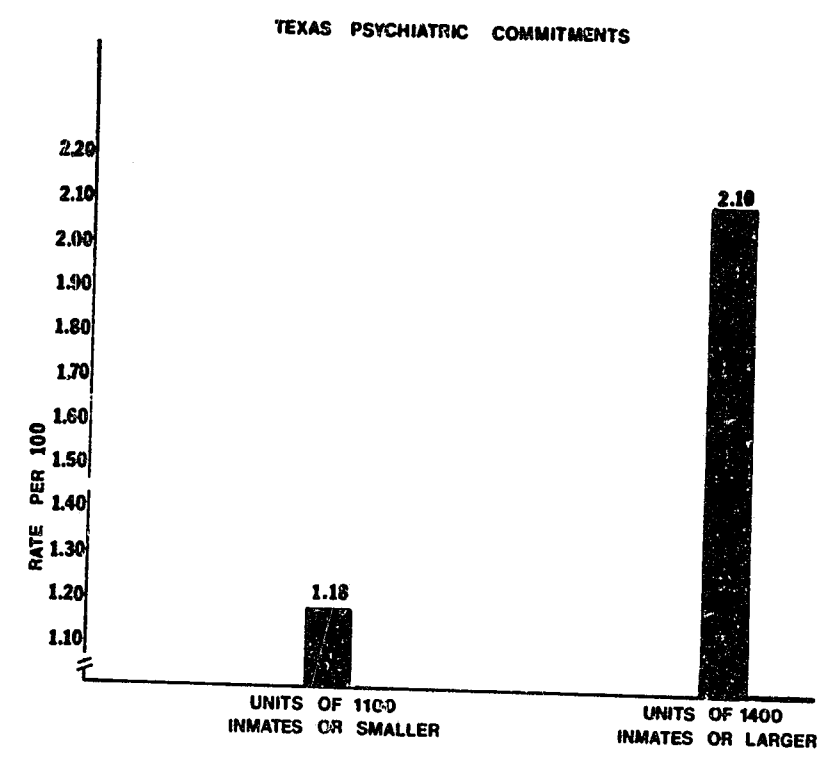


Figure 36

#### Summary of Archival Findings

There are two major findings, each supported by several lines of evidence. First, our archival data indicate that increases in inmate population without concomitant increases in housing facilities produce a number of very undesirable effects as indicated by disproportionate increases in disciplinary infraction rates, suicide rates, rates of death by violence, and death rates of inmates over 50. Second, other things being equal, large prisons appear to produce more undesirable effects than units with small populations as indicated by higher psychiatric commitment rates, death rates, and suicide rates. In other words, in addition to space per person and number of occupants in housing quarters, sheer size of the institution is important with larger size related to more deleterious effects.

Since our data regarding large and small prisons come from TDC, we examined floor plans and numbers of inmates in individual cell blocks in the institutions involved. Most housing is in two man cells with 23 square feet per inmate. These appear to be standard for both large and small institutions. Space and social density in the dorms is confounded between large and small institutions and does not seem a consistent factor. The small units have a larger percentage of inmates housed in dorms, due in part to the fact that one unit (Central) is almost exclusively dorms. Our confidence in the probability that size is the major factor is bolstered by the fact that Ferguson (large) has a higher suicide rate than the small units (all ages included) even though the overwhelming majority of Ferguson inmates are 22 or younger. And the evidence is very clear that younger individuals are the least likely to commit suicide in or out of prison.



In sum, we have not found any factors other than total population that seem to account for the differences between large and small institutions.

Acceptance of archival findings should of course be tempered by awareness of the potential contribution of unrecognized confounding variables. To the extent possible we accounted for the potential contribution of age and race. These and other potential confounding variables were examined in a recent dissertation study by Timothy Carr (1980) which involved an extensive analysis of the Georgia prison system. Carr found a strong relationship between population level and aggression but failed to find a similar relationship for cardiovascular deaths. In the latter case the total number of deaths was quite small. The Carr study was stimulated by this project and Professor Paulus served on the dissertation committee.

#### Inter-institutional Analyses

One measure of the generality of findings and conclusions is how consistent results are for similar housing conditions in different institutions. In this project there were several housing conditions common to two or more institutions. For example, double occupant cells and open dormitories were found at La Tuna FCI and Texarkana FCI. Summarized below are findings for several comparisons of housing common to two or more institutions.

##### Single versus Double Occupant Cells

At El Reno and Texarkana FCI illness complaint rates in double cells were substantially higher (over 50%) and from a statistical standpoint significantly greater than in single cells ( $p < .015$ ). The results from perceived crowding were parallel to the illness data. The difference was highly significant ( $p < .001$ ). There was no interaction between housing condition and institution indicating that the housing effects were uniform across institutions.

##### Double Cells versus Dormitories

At Texarkana FCI and La Tuna FCI there was a large (73%) and statistically significant ( $p < .01$ ) difference in illness complaint rates between double occupant housing and open dormitories. Again, there was no substantial interaction between housing conditions and institutions. The differences in perceived crowding were in the same direction as the illness data but very small.

##### Single Cells versus Dormitories

For Texarkana FCI and Danbury differences in illness complaint rates

between singles and dormitories were large (105% higher in dorms) and statistically significant ( $p < .001$ ). The results from perceived crowding were parallel to the illness results. The difference was highly significant ( $p < .001$ ). As in the earlier comparisons there was no interaction of housing condition and institution.

#### Relative Influence of Social and Spatial Density

We were interested in determining the relative contribution of social and spatial density to crowding effects. To evaluate this issue we calculated for each housing condition in our study a score for spatial density, social density, institutional size, perceived crowding, rating of housing quarters, and illness rates for the period after the first six weeks in a housing condition. The correlations among these variables were obtained and then partial correlation techniques were employed to determine the relative strength of association of each variable to spatial and social density. Pearson correlation values were obtained as well as values for two nonparametric correlation procedures, Spearman and Kendall. All three correlation procedures yielded essentially the same values.

Perceived crowding was significantly related to both spatial density (Pearson,  $r = -.59$ ,  $p < .04$ ) and social density (Pearson,  $r = .45$ ,  $p < .01$ ). Neither correlation value was appreciably changed when the other density variable was controlled by partial correlation. Consequently it appears that both social and spatial density have a moderately strong and independent relationship with perceived crowding. The relationship of spatial density to perceived crowding was slightly stronger than that of social density to perceived crowding. Figure 37 is a scatter plot of individual housing units and regression line for the relationship between perceived

crowding and spatial density. Considering the fact that this includes different security levels, institutions, social densities and times, the relationship is remarkable.

Ratings of housing quarters bore a strong relationship to spatial density (Pearson,  $r = .57$ ,  $p < .006$ ) and moderate relationship to social density (Pearson,  $r = .39$ ,  $p < .05$ ). The correlation between ratings of housing quarters and social density was enhanced when the influence of spatial density was controlled by partial correlation procedures (Pearson,  $r = .47$ ,  $p < .02$ ). The correlation between housing quarters ratings and spatial density was not appreciably changed when partial correlation procedures were used to control the influence of social density. In contrast to perceived crowding and ratings of housing quarters, illness complaint rates were moderately related to social density (Pearson,  $r = .38$ ,  $p < .05$ ) but not spatial density (Pearson,  $r = -.19$ ,  $p < .33$ ). Figure 38 illustrated the relationship of illness complaint rates to social density when units of the same social density are combined for all institutions. These data yielded a Spearman correlation coefficient of .98 ( $p < .001$ ). Again, this is a remarkable and very sturdy relationship. A similar analysis of perceived crowding yielded a Spearman rank order coefficient of .60 ( $p < .05$ ).

#### Inter-institutional Summary

Combining data from two or more institutions indicated that single cells had fewer negative effects than double cells. Double cells had fewer negative effects than dormitories.

Perceived crowding increased as social or spatial density increased. The relationship was stronger with spatial density. Ratings of housing

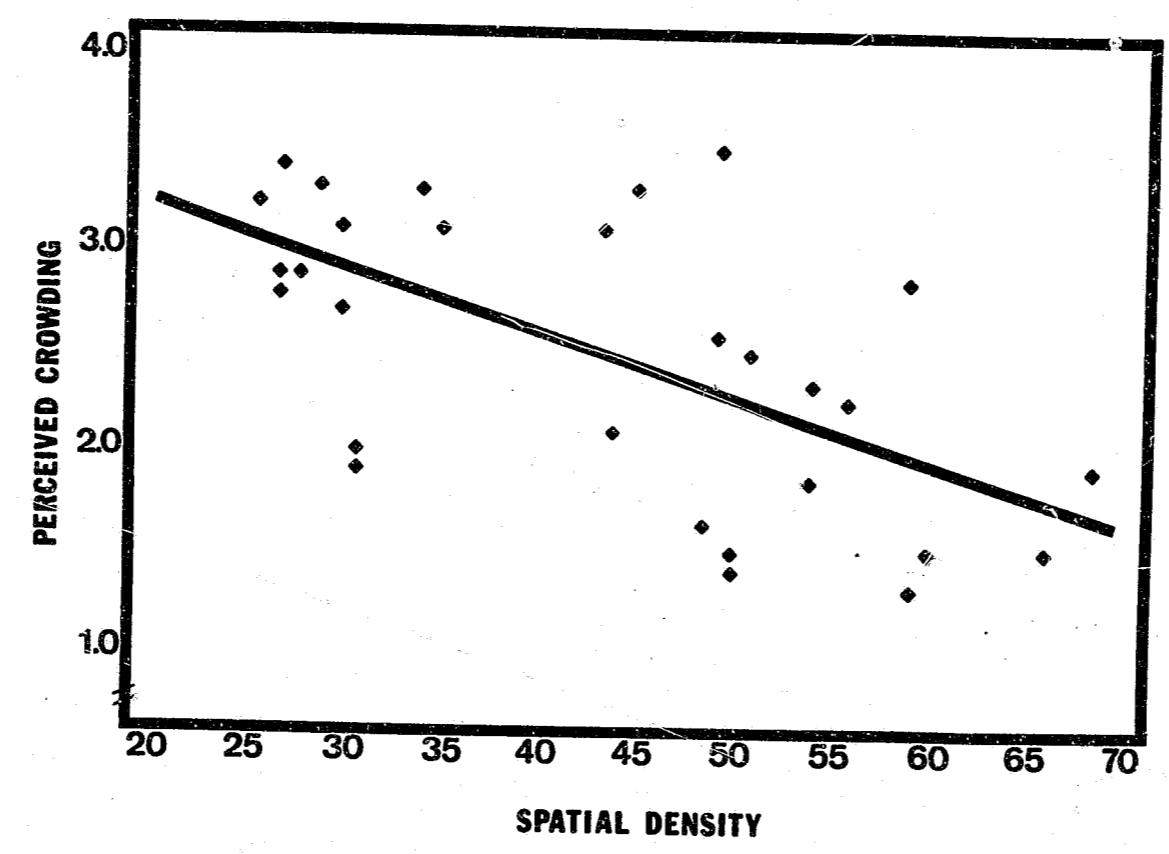


Figure 37

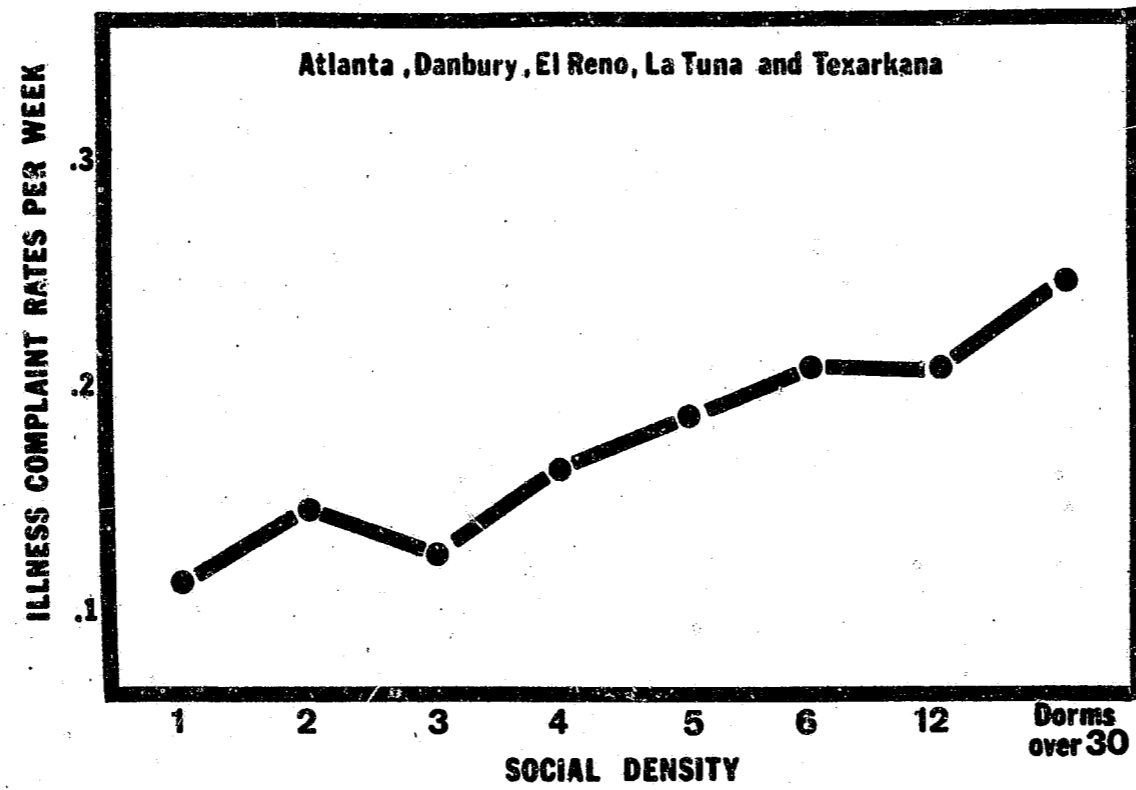


Figure 38

varied with both social and spatial density. The relationship was stronger with spatial density. Illness complaint rates increased as social or spatial density increased. The relationship with social density was the stronger of the two.

#### Summary of Findings Related to Crowding

##### Singles versus Doubles

Double occupant housing is a common response to increases in prison population. We were able to compare these two types of housing at two institutions, El Reno and Texarkana FCI. We found that double cells or cubicles had measurably greater negative effects than single unit housing. Differences were observed in illness complaint rates, perceived crowding scores, nonviolent disciplinary infractions, mood states, ratings of environment and perception of choice and control. We noted that a small number of individuals preferred double occupant housing and this was primarily found among inmates living in the more crowded housing at La Tuna FCI. All of the double cells we have examined also had double-decked bunks and greater spatial density than the singles. These factors could possibly contribute to the differences between singles and doubles.

##### Single versus Small Multiple Occupant Units

At Atlanta it was possible to compare single cells to small multiple occupant cells housing three to six men. Perceived crowding and illness complaints, as well as other measures, increased as the number of inmates increased from one to six. The difference between single and three-man cells could be attributed primarily to social density since three-man cells had more space per person than the single cells.

##### Single Units versus Open Dormitories

If there is any one set of findings from this project or earlier work that seems beyond serious question, it is that dormitories have more negative consequences than one-man units. While this may seem intuitively

obvious, we have been able to document a number of ways this difference is expressed, as well as the magnitude of the difference. Our evidence consists of illness complaint rates (both contagious and noncontagious), housing ratings, perceived crowding scores, mood states, and perception of choice and control. The findings were consistent across race and ethnic groups, security level, program assignments, and length of time in institution.

#### Doubles versus Dormitories

A comparison of double cells and open dormitories was possible at both Texarkana and La Tuna FCI. The dorms were higher in illness rates and perceived crowding, though the effects were not large at La Tuna. Measures of mood, perceptions of control and choice, and environmental ratings generally supported the contention that dormitories produce more negative impact on residents than double cells or rooms.

#### Open versus Segmented Dormitories

Texarkana FCI provided an opportunity to examine inmates living in open dormitories with inmates housed in segmented dormitories. The segmented dormitories consisted of three bays containing ten to twenty residents. These segmented dormitories were associated with lower illness rates, perceived crowding scores, more positive mood, and favorable ratings of housing units.

#### Cubicles versus Rooms

This comparison was possible at El Reno, Danbury, and Fort Worth. At El Reno and Danbury the effects of cubicles were comparable to rooms on all measures except illness complaint rates which were higher in cubicles at

Danbury. At Fort Worth the cubicles were rated more negatively and were associated with higher illness complaint rates than rooms. The cubicles at Fort Worth are less elaborate than at El Reno and Danbury. They are lower and consist only of partitions. The cubicles at Danbury and El Reno include storage and desk space and are visually more attractive. At these two institutions the cubicles almost completely attenuate the effects of open dormitory living.

#### Cubicles versus Open Dormitories

Since cubicles, in fact, represent an inexpensive means of affording privacy in otherwise open dormitories, we compared the effects of living in cubicles and open dormitories at La Tuna, Danbury, and Fort Worth. In general, open dorms produced stronger negative effects than the dorms with cubicles. Open dorms were higher on perceived crowding scores, yielded more negative mood states and lower ratings of housing quarters. With the exception of Danbury, cubicles yielded lower illness rates than open dorms.

#### Illness Complaints and Perceived Crowding

At all institutions, except Danbury, we found that inmates who rated themselves "very crowded" had higher illness rates than those rating themselves as less crowded. These comparisons were made within individual housing units (see Figure 39).

#### Changes in Population Without Parallel Changes in Facilities

Over a ten year period total population in the Texas Department of Corrections increased sharply while facilities increased only slightly. Death rates, suicide rates and disciplinary rates rose even more sharply

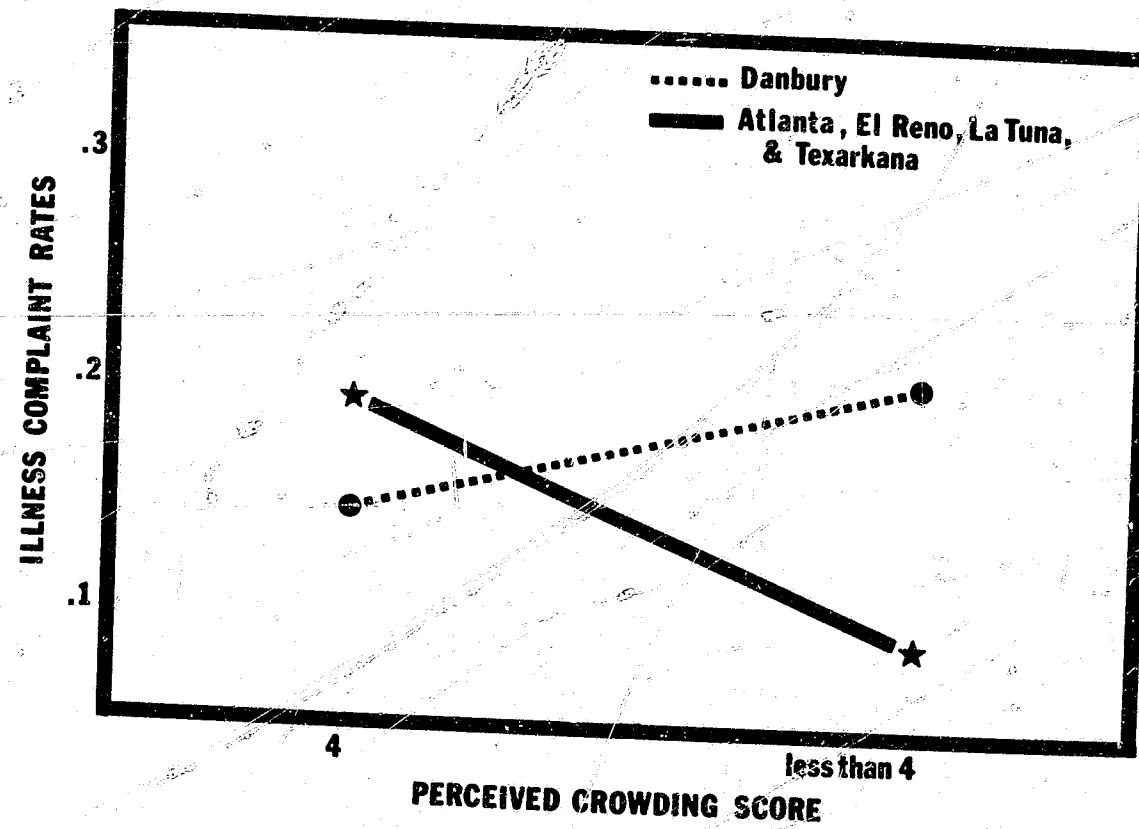


Figure 39

than population. In the Oklahoma system when population dropped there was an even greater drop in rates of deaths due to violence. These results confirm earlier findings from Illinois. Thus, when facilities are relatively fixed, increases in population lead to disproportionately higher negative effects. Population reduction had opposite results as seen in the Oklahoma data.

#### Institution Size

There is evidence that institutions with larger populations produce more negative effects than units with smaller populations. Differences were found in death rates (violent and nonviolent), suicides, psychiatric commitments and self mutilation and attempted suicides. The comparisons were between institutions with approximately 1,500 and those with about 1,000 inmates.

#### Racial and Ethnic Group Differences

An examination of data for black and white inmates indicated that on most measures whites reacted more negatively to crowding than blacks as revealed in higher perceived crowding scores, more negative mood states, housing related complaints, feelings of choice and control, and ratings of housing quarters. With regard to housing related illness complaint rates, blacks in all but one institution were higher than whites.

At La Tuna FCI it was possible to compare Anglo Americans, Mexican Americans, and Mexican Nationals. The Anglo Americans had the most negative responses to crowding on almost all measures, including illness complaint rates, followed in order by Mexican Americans and Mexican Nationals. A similar result for illness complaint rates was found at Texarkana in a



comparison of Anglo Americans and a combined sample of Mexican Americans and Nationals.

#### Individual Differences in Responses to Crowding

Racial and ethnic differences in responses to crowding are discussed elsewhere. Individuals who perceive themselves to be more crowded in a particular housing unit produce more negative responses, such as illness complaints, than those who perceive themselves as less crowded. Individuals who say they are bothered more by too many people rather than too little space also have higher illness rates.

#### Time Related Factors

Length of time in a particular housing unit was important in determining illness complaint rates. There is an initial high level for about six weeks following housing assignment, followed by a drop, then the rates level off. This is independent of any particular type of housing. Our data also indicate that perceived crowding does not decline as a function of time in housing. This was found to be the case at all of the institutions studied, although we have not reported it for each institution separately.

#### Conclusions and Recommendations

The most straightforward conclusion that can be drawn from our reported research is that both the amount of space and the number of residents must be considered in assessing the suitability of prison housing. Most prison standards emphasize the amount of space rather than the number of inmates in one's unit. Yet we have found that negative reactions increase both as space is reduced and as the number of inmates in the housing unit increase. Further, increases in the number of inmates in the housing unit is more influential than reduced space in determining illness complaint behavior.

More specifically, we have found that singles are most desirable and open dorms least desirable as housing quarters. However, even dormitories can produce relatively favorable reactions under certain conditions. Single bunking, spaciousness, and segmenting the dormitories into small bays were all associated with reductions in the negative reactions typically associated with open dormitories. Dividing open dorms into small cubicles is particularly effective in reducing the negative effects of open dorms. In the case of two prisons in which fairly elaborate cubicles were used, almost all of the effects, with the exception of illness complaints, associated with dormitory crowding disappeared.

Another new trend in prison housing is the use of prison camps outside of the main prison. These camps are a very low security level. At La Tuna, such a camp was rated very favorably even though inmates were housed four men to a cubicle.

When comparisons were possible, we found that males, females, blacks, whites, Mexican Americans and Mexican Nationals all show similar

patterns of reaction to different housing units. However, we did find overall differences in reaction to prison housing as a function of ethnic group, with Anglo Americans being most negative and Mexican Nationals least negative.

Although we did not find a systematic relationship between institutional size and inmate reactions for the institutions we tested, archival data did suggest that this is an important factor. The data indicates that substantial variation in total institutional population can have dramatic effects on health related behavior. The larger an institution is in terms of total population the higher the death, suicide, and psychiatric commitment. Increases in population without parallel increases in facilities had the same type of effects. Also, at Texarkana we found inmate reactions were considerably more positive when the institutional population declined from 710 to 510.

If we had to suggest a design for an ideal prison solely from the perspective of reducing crowding effects, and independent of other prison management considerations, it would be relatively small (certainly less than 1,000 and preferably 500) and consist of single rooms or cubicles. The amount of space required for these inmates is harder to pinpoint. We found that increasing square footage from 50 to 60 square feet improved inmate reactions at Danbury, but a similar variation from 54 to 66 square feet had no appreciable effect at Texarkana. In fact, even the 50 square foot singles received quite favorable reactions at Danbury. While making single cells more spacious than 50 square feet seems desirable and may improve inmate reactions, we have found no evidence to indicate that a 50 square foot cell is psychologically inadequate. Since we have found no single cells smaller than that, we do not know whether 50 square feet

represents the minimally adequate size for a single room. Certainly, simply from the standpoint of being able to move around in one's cell, smaller units do not seem feasible. Whether extremely large single cells can produce additional benefits remains to be seen. It should be noted that the large single rooms at Fort Worth were rated about the same as the smaller singles at Danbury and Atlanta on perceived crowding. However, they were rated more favorably on the room evaluation scales.

The data on the effects of space in dormitories is also not very clear. Although the more spacious dormitories at Danbury were rated more favorably, a reduction of 12 men in a 40 man dorm at another institution did not improve inmate reactions. While the two dormitory types at Texarkana that received relatively favorable ratings were more spacious than the negatively rated double-bunk dormitories, they also had special design features (small bays) and/or single bunks.

In brief, it appears that once one reaches space per person levels of 50 square feet or higher, the number of people one is living with and how one's space is arranged (single bunking, cubicling, segmenting into bays) may be the main factors determining reaction to one's housing.

#### Additional Considerations

Although small variations in space did not lead to strong effects in our studies, it is possible that space may be a more important factor in prisons where inmates are confined for large parts of the day to their housing units. In all samples in this project inmates were confined to their housing units only during sleeping hours. In our only study of a state prison where inmates are confined for large parts of the day in their cells, we did find stronger effects of space than of social density. The space levels in these cells varied from 19 to 58 square feet while social density varied from 1 to 9.

One factor to consider in evaluating the inmates' rating of their housing units is that this may in part be a relative matter. At all of our sites there was a variety of housing types and inmates may have evaluated their housing relative to the other housing in the prison. That is, inmates may find small single cells attractive relative to dormitories, but these same cells might be rated much more negatively in an institution that has only single cells. In fact, inmates sometimes mentioned spontaneously that they were rating their housing on their implicit standards for prison housing rather than on an absolute scale.

The strongest statistical effects of spatial and social density were obtained for the perceived crowding and the room rating measures. In contrast, the scales designed to assess mood state showed less consistent and weaker results, especially when such factors as custody level and time in prison are taken into consideration. This pattern of results suggests that while the inmates' evaluations of their environment are strongly determined by spatial and social density, their mood states may be more dependent on their custody level and length of confinement. When mood

effects were obtained, they occurred primarily for comparisons between singles or doubles and open dormitories. This parallels the strong effects of social density on illness complaints.

Our most consistent behavioral measure was illness complaint rate. Our illness complaint measure is based on a physician's medical record. This feature is important in increasing its validity as a measure of stress (Mechanic, 1976). However, we have no straightforward way of knowing whether the complaints reflect actual increased pathology, increased sensitivity to pathology, or mere complaining. Whatever its basis, there is much evidence suggesting that illness complaint behavior is increased under stressful conditions (Mechanic, 1976) while other research indicates that stress can increase one's susceptibility to disease (Rogers et al., 1979). Also some studies have found crowding in prisons to be associated with physiological indices of stress (D'Atri, 1975; Cox, et al., 1979; Paulus et al., 1978). So, at the least, we suspect that illness complaint behavior is a response to a stressful situation. Further, while our study does not provide direct evidence of a pathological basis for these complaints, we suspect, on the basis of other research on stress, that the illness complaints may in part reflect real pathology. Certainly, direct proof of this will require further research.

Calculation of illness complaint rates was based on length of stay in housing. Length of stay did not differ for housing conditions at Texarkana and failed to influence illness complaint rates findings when employed as a covariate in analyses of data from the La Tuna 1978 visit. At El Reno we matched two groups of inmates for length of stay in either singles or doubles and found much higher illness rates associated with

doubles. A similar matching of single and dormitory residents at Danbury yielded illness complaint rates that were twice as high in dormitory residents. There was no systematic relationship between length of stay in housing and social density at Atlanta. Taken together, these findings indicate that our illness complaint rate results were not significantly determined by length of stay in housing.

The strong and consistent effects of density on illness complaint behavior contrast sharply with the general lack of effects on other behavioral measures. We found no effects of density on reported religious, club, and educational activities, and only one effect on talking. In most institutions reported incidences of infractions were too low to allow meaningful analysis.

The failure to find consistent density related effects on blood pressure indicate that this may not be a useful measure of exposure to moderate stressors such as crowding in federal prisons. Long periods of exposure to intense stressors or very strong situational stressors may be required to elevate blood pressure. Our choice of blood pressure as a measure of stress was motivated both by its convenience and past research indicating that it was sensitive to variations in density (D'Atri, 1975; D'Atri and Ostfeld, 1975; Paulus et al., 1978). All of these studies were done in state prisons. It is possible that the greater degree of confinement to housing units, higher density levels, and the greater fear of violence in these prisons may have elevated stress levels high enough to influence blood pressures.

Another interesting feature of our data is that for all of the prisons studied perceived crowding did not decline with length of stay in a housing unit. This supports findings of research cited earlier that individuals do not seem to adapt to crowding over time.

#### Some Possible Interpretations

There exist many different perspectives about the important factors underlying crowding effects (c.f., Paulus, 1980). One popular approach is that crowding has negative effects on people because it induces a feeling of loss of control over one's life, or helplessness. This state of helplessness is supposedly associated with depression and deterioration in health (c.f., Baron & Rodin, 1978). Another interpretation holds that crowding serves to overstimulate the individual. This overstimulation is a source of stress and leads to behavioral and psychological withdrawal (Saegert, 1978). A third approach argues that crowding has negative effects because of the "fear-reaction" produced by too many strange others in confined areas (Paulus, 1980). In other words, crowding increases the chance of having negative encounters with others. A fourth view proposes that environments are aversive to the extent that they interfere with an individual's attempts to attain a desired privacy level (Altman, 1977). Privacy can be attained by physical mechanisms such as spatial and visual separation or behavioral mechanisms such as territoriality or modification of social contact.

Some of our findings of the negative effects of reduced space, increased social density, and increased population density are of course consistent with all four of these models. All of these analyses predict negative effects of these variables. They only differ in the presumed determining factors.

The failure of the results of our control and choice questions to be significantly related to density variables certainly goes counter to the predictions of a "perceived control" theory. The failure to find reduced reports of social and educational activity among the more crowded

residents goes counter to expectations based on an overstimulation model.

Some of our data suggests that privacy or territoriality may be important factors. The finding that partitions in open dormitories significantly, and sometimes completely, reduce the reactions associated with such dormitories is consistent with such a view. These partitions provide each inmate with a territory to call his or her own. The findings for the various Texarkana dormitories are also supportive of this perspective.

A reduction of ten inmates in the 40 man double-bunked dorm did not lead to a change in housing evaluation. However, the 20 man single-bunked dorm and the 50 man special dorms were rated more positively than those 30 and 40 man dorms. The special dorms had three separate bays and large numbers of single bunks. It is impossible to be certain whether the relatively positive reactions of these two dormitory types were due to spaciousness, low social density (20 in single-bunk dorm and 20 or less in the bays). Yet the failure to find positive reactions to reduced density in the regular dorms suggests the possibility that having single bunks may be an important factor. A single bunk may provide a feeling of individual territory not possible with a double bunk. The finding at Danbury that double-decked bunks have higher illness rates than single-decked bunks is compatible with a privacy or territorial interpretation. Thus, it appears that the degree to which inmates have their own space or territory may be an important factor underlying our major results. Social and spatial density variations may have their effects largely through their impact on the degree to which inmates have privacy or territory.

This analysis of our findings seems most consistent with Altman's (1977) in that having one's own space may increase feelings of privacy and territoriality and thus have positive psychological and physiological effects. However, our analysis is not necessarily inconsistent with the other views. Having one's own space can indirectly serve to reduce social stimulation, reduce negative social encounters, and increase one's sense of control over interactions with others. A more detailed analysis of our data and future research may allow us to determine more precisely the relative adequacy of these differing views of crowding.

### Recommendations for Future Research

The results of the current project point to a number of areas that merit additional research. These areas are listed below.

1. Of particular interest is the sensitivity of illness complaint rate to variations in housing conditions. This variable may prove even more informative if analyzed in terms of specific illness categories. Specifically, it would be of interest to examine noncontagious illness categories that can be readily diagnosed by a physician.
2. The utility of blood pressure as an index of psychological stress has not met our expectations, which were based on earlier findings reported by ourselves for the Statesville Prison in Illinois and Dr. David D'Atri's findings based on three prisons in Massachusetts. The intensity of crowding in the Federal prisons never approached those that we observed at Statesville and this may account for our findings in the Federal prisons. Far more promising is the use of urine chemistry measures of stress related adrenal gland activity. This approach is more complex than blood pressure measurement but has been shown to be related to psychological stress in many situations, including incarceration. We would encourage consideration of a research project which uses this approach to measurement of stress related to housing as well as other prison stress. The results on this measure would then be related to illness complaint rate.
3. More data is needed on the long-term effects of crowding. Most of our findings are based on data obtained from inmates with exposure to crowding of three years or less.
4. Individual differences in responses to crowding need much more study. There are a variety of factors which seem to influence responses to crowding. Some of the variables identified in our project were ethnic

group, number of individuals in the home during childhood, and size of city of residence prior to incarceration. Of particular interest are housing preferences. For example, a minority of inmates prefer double cells to single cells. Understanding the determinants of such individual differences would be helpful in devising housing assignment policies.

5. Cubicles appear to be very effective in diminishing crowding effects typically associated with open dormitories. More research is needed to determine the range of positive effects that might be obtained by partitioning open dorms with cubicles and the effects of different types of cubicles.

6. Additional research needs to be done regarding time related crowding effects. We have observed that a variety of responses to crowding during the initial six weeks of stay are different than later periods. A systematic study may reveal other time related effects.

7. The double cells and cubicles we have examined were the same size as single cells in the same institution. In addition, they were double-bunked. Double-bunking and spatial density could well account for some of the negative effects found. Comparisons of double cells with single bunks and the same spatial density as single cells should resolve some problems of negative effects and individual preferences. Locating such conditions may be difficult.

8. A more detailed analysis of the effects of housing type at Fort Worth would be desirable since this institution has a broad range of housing units and has both males and females.

Cross Institutional Illness Effects  
Unrelated to Crowding

Illness Complaint Rates  
and Institutions

As indicated in two of the cross institution comparisons, illness complaint rates vary among institutions. For example, the rates for singles were: El Reno .036, Atlanta .099, Danbury .108, Texarkana .147. Note that the rate at Texarkana is over four times as high as El Reno. These differences are not solely due to different proportions of housing types. For example, we compared singles and doubles at Texarkana and El Reno. Texarkana's illness complaint rate was over twice as high as El Reno. The difference was highly significant ( $p < .001$ ). In a similar comparison based on singles and dorms at Danbury and Texarkana, the rate at Danbury was about half that at Texarkana. The difference was significant ( $p < .01$ ). The causes for these differences are not clear. They do not appear related directly to crowding. Inmates in these institutions do differ in several ways such as age, custody level and racial or ethnic identification. None of these factors seem to provide a consistent explanation of the ordering.

Time Course of Illness Complaints

Illness rates over time have been analyzed in several different ways and from several institutions. Figure 40 represents only some of these analyses. The absolute rates of the various curves should be disregarded since they were calculated in different ways. It is apparent that rates are very high initially but drop rather rapidly. The curves appear to begin to flatten somewhere around twelve weeks. We have examined data from

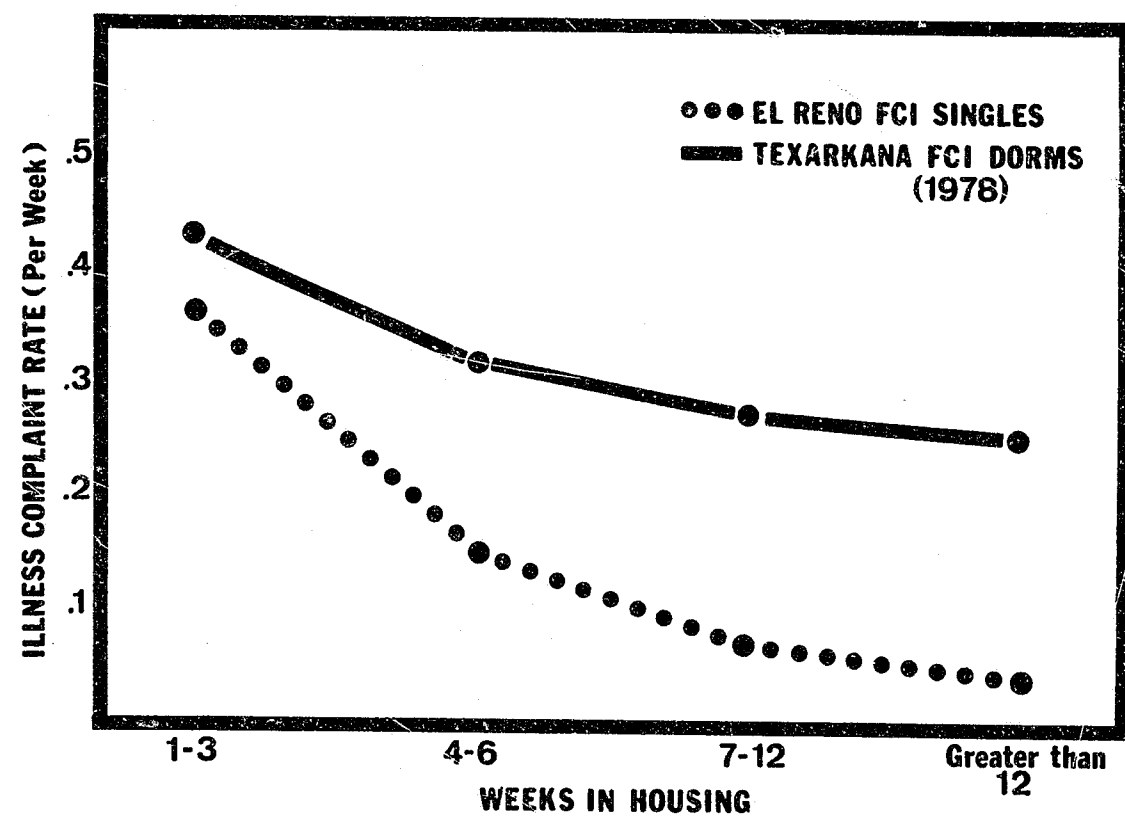


Figure 40



the period greater than six weeks. It is not completely clear whether these curves are flat or show a slight decline after this period. Much more data will be required to resolve this point.

Illness rates were also summed across all institutions and all housing by periods of less than and greater than six weeks since this type of breakdown is used in several parts of this report. The trend from the initial six weeks period ( $\bar{X} = .253$ ) to the period greater than six weeks ( $\bar{X} = .165$ ) is clear. Illness rates at less than six weeks are 53% higher. Further, in all eight institutions the trend was essentially the same. Of 32 housing conditions measured, 30 (94%) showed the same trend. Considering the fact that a large variety of housing conditions, administrations, levels of security, racial groups, etc. are involved this is a very sturdy finding.

#### Racial and Ethnic Differences

At La Tuna there was clear evidence that Anglo Americans had higher illness rates than Mexican Americans who in turn had higher rates than Mexican Nationals. Those samples did not have enough blacks to compare with the other groups. While we had found blacks to be higher in illness complaint rates at all institutions except Danbury, the results were typically not statistically significant. This seemed to be due to the small sample sizes and uneven distribution across housing conditions.

In order to overcome some of these problems and to get an overall perspective we looked at black-white illness complaints across all institutions except La Tuna. La Tuna was omitted since there were no blacks in the 1979 sample and only a small number in the 1978 sample. In the 1978 sample the blacks had substantially higher illness rates than any of the other groups.

In compiling data across institutions we equated the racial representation for each housing condition at each institution. For example, if there were 10 blacks and 20 whites in doubles cells at Texarkana, all 10 blacks were included and only 10 randomly selected whites. The results are very clear, blacks have about 40% higher illness complaint rates in both the period of the first six weeks ( $p < .05$ ) and the period after six weeks ( $p < .035$ ). Taken together with the La Tuna results, this indicates a consistent pattern. Illness complaint rates in descending order are black, white, Mexican American and Mexican National. The patterns in each group are very similar, illness complaint rates decrease after the first six weeks and each group responds to increased crowding by increasing the rate.

The most reasonable explanation of these findings seems to lie in the cultural background of these groups. We have considered such factors as size of family and prior medical care, but they do not explain the data.

## References

- Aiello, J.R., & Epstein, Y.M. Effects of residential social density on human behavior: A longitudinal field experiment. Unpublished manuscript, Rutgers University, 1979.
- Altman, I. The environment and social behavior. Monterey: Brooks-Cole, 1975.
- Baron, R.M., Mandel, D.R., Adams, C.A., & Griffen, L.M. Effects of social density in university residential environments. Journal of Personality and Social Psychology, 1976, 34, 434-446.
- Baron, R.M., & Rodin, J. Personal control and crowding stress: Processes mediating the impact of spatial and social density. In A. Baum, J. Singer, & S. Valins (Eds.), Advances in environmental psychology (Vol. 1). Hillsdale, N.J.: Lawrence Erlbaum Associates, 1978.
- Baum, A., & Valins, S. Architecture and social behavior: Psychological studies in social density. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1977.
- Baxter, J.C. Interpersonal spacing in natural settings. Sociometry, 1970, 33, 444-456.
- Carr, T.S. The effects of crowding on recidivism, cardiovascular deaths, and infraction rates in a large prison system. Unpublished doctoral dissertation, Georgia State University, 1980.
- Cohen, S., Glass, D.C., & Phillips, S. Environment and health. In H.G. Freeman, S. Levine, and L.G. Reeder (Eds.), Handbook of medical sociology. Englewood Cliffs, N.J.: Prentice-Hall, 1977.
- Cox, V.C., Paulus, P.B., McCain, G., & Schkade, J.K. Field research on the effects of crowding in prisons and on offshore drilling platforms. In J.R. Aiello & A. Baum (Eds.), Residential crowding and design. New York: Plenum, 1979.
- D'Atri, D.A. Psychophysiological response to crowding. Environment and Behavior, 1975, 7, 237-252.
- D'Atri, D.A., & Ostfeld, A.M. Crowding: Its effects on the elevation of blood pressure in a prison setting. Preventative Medicine, 1975, 4, 550-566.
- Freedman, J.L. Crowding and behavior. San Francisco, CA: Freeman, 1975.
- Freedman, J.L. Reconciling apparent differences between the responses of humans and other animals to crowding. Psychological Review, 1979, 86, 80-85.

- Levy, L., & Herzog, A.N. Effects of population density and crowding on health and social adaptation in the Netherlands. Journal of Health and Social Behavior, 1974, 15, 228-240.
- McCain, G., Cox, V.C., & Paulus, P.B. The relationship between illness complaints and degree of crowding in a prison environment. Environment and Behavior, 1976, 8, 283-290.
- Mechanic, D. Stress, illness, and illness behavior. Journal of Human Stress, 1976, 2, 2-6.
- Megargee, E.I. The association of population density, reduced space, and uncomfortable temperatures with misconduct in a prison community. American Journal of Community Psychology, 1977, 5, 289-298.
- Nacci, P.L., Teitelbaum, H.E., & Prather, J. Population density and inmate misconduct rates in the federal prison system. Federal Probation, 1977, 41, 26-31.
- Paulus, P.B. Crowding. In P.B. Paulus (Ed.) Psychology of Group Influence. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1980.
- Paulus, P.B., Cox, V.C., McCain, G., & Chandler, J. Some effects of crowding in a prison environment. Journal of Applied Social Psychology, 1975, 5, 86-91.
- Paulus, P.B., McCain, G., & Cox, V.C. Death rates, psychiatric commitments, blood pressure, and perceived crowding as a function of institutional crowding. Environmental Psychology and Nonverbal Behavior, 1978, 3, 107-116.
- Ray, D.W. The effects of high density in a juvenile correctional institution. Unpublished doctoral dissertation, George Peabody College for Teachers, 1978.
- Rogers, M., Devandra, D., & Reich, P. The influence of the psyche and the brain on the immunity and disease susceptibility--A critical review. Psychosomatic Medicine, 1979, 41, 147-164.
- Saegert, S. High density environments: Their personal and social consequences. In A. Baum & Y. Epstein (Eds.), Human responses to crowding. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1978.
- Smith, D.L. Adult male suicide in the correctional setting. Unpublished masters thesis, Sam Houston State University, 1977.

APPENDIX A

Data Collection Forms

1. Questionnaires
2. Background and Medical Forms
3. Informed Consent Forms
4. Crowding Tolerance Task

NAME \_\_\_\_\_ NUMBER \_\_\_\_\_

In this questionnaire you will be asked to use several rating scales. Below is an example of how these scales are used. This particular example involves rating today's weather.

Example: Today's Weather

Good	_____ X _____	:	_____	:	_____	Bad
Cold	_____	:	_____ X _____	:	_____	Hot
Comfortable	_____	:	_____	:	_____ X _____	Uncomfortable

In this example someone has checked the blanks to indicate that he thinks that today's weather is pretty good, neither hot nor cold, but very uncomfortable.

All of the questions below will be like the example. The more strongly you feel that the word at one end of the scale (good, cold, etc.) describes how you feel, the closer you should place your check mark toward that end of the scale.

The room, cubicle, cell, or dormitory in which you live.

Good	_____	:	_____	:	_____	Bad
Unattractive	_____	:	_____	:	_____	Attractive
Right number of people	_____	:	_____	:	_____	Too many people
Unpleasant	_____	:	_____	:	_____	Pleasant
Well Arranged	_____	:	_____	:	_____	Poorly Arranged
Uncomfortable	_____	:	_____	:	_____	Comfortable
Quiet	_____	:	_____	:	_____	Noisy
Uncrowded	_____	:	_____	:	_____	Very Crowded

Each pair of words below describes a feeling. You may generally feel more one way than the other. So, for each pair put a check mark to show how you have felt most of the time this past week. The more strongly you feel that the word at the end of the line describes how you feel, the closer you should place your check mark toward that end of the line. Please take your time.

This past week most of the time I felt

Relaxed	_____ : _____ : _____ : _____ : _____ : _____	Bored
Wide-Awake	_____ : _____ : _____ : _____ : _____ : _____	Sleepy
Happy	_____ : _____ : _____ : _____ : _____ : _____	Unhappy
Tough	_____ : _____ : _____ : _____ : _____ : _____	Weak
Satisfied	_____ : _____ : _____ : _____ : _____ : _____	Unsatisfied
Stimulated	_____ : _____ : _____ : _____ : _____ : _____	Relaxed
Important	_____ : _____ : _____ : _____ : _____ : _____	Unimportant
Tense	_____ : _____ : _____ : _____ : _____ : _____	Calm
In control of my situation in this institution	_____ : _____ : _____ : _____ : _____ : _____	Not in control of my situation in this institution
In control over others in this institution	_____ : _____ : _____ : _____ : _____ : _____	Not in control over others in this institution

Questionnaire

NAME \_\_\_\_\_ NUMBER \_\_\_\_\_ BIRTHDATE \_\_\_\_\_

1. How much more time do you expect to serve?

\_\_\_\_\_

2. Date arrived at institution

\_\_\_\_\_

3. Have you ever been in prison before? If yes, where and for how long?

Prison or Jail

How Long

_____	_____
_____	_____
_____	_____

4. Job assignment in this prison

\_\_\_\_\_

5. Level of custody at this prison

\_\_\_\_\_

6. Listed below are prison activities. Do you do any of them? How many times a week?

<u>Activities</u>	<u>Yes</u>	<u>Times Per Week</u>
Sports	_____	_____
Religious	_____	_____
Clubs	_____	_____
Education	_____	_____
Other	_____	_____

Questionnaire - Continued

7. Do you have any trouble sleeping?

Never \_\_\_\_\_ Occasionally \_\_\_\_\_ Often \_\_\_\_\_

8. Do you have problems with headaches?

Never \_\_\_\_\_ Occasionally \_\_\_\_\_ Often \_\_\_\_\_

9. As a child did you live in a small town of 30,000 or less or a large city?

\_\_\_\_\_

10. As an adult have you lived most of your life in a small town of 30,000 or less or a larger city?

\_\_\_\_\_

11. While you were growing up how many people, including yourself, lived in your home?

\_\_\_\_\_

12. How would you rate your home life while you were growing up?

Excellent \_\_\_\_\_ Good \_\_\_\_\_ Fair \_\_\_\_\_ Poor \_\_\_\_\_ Very Poor \_\_\_\_\_

13. How much time do you typically spend talking to people

A great deal \_\_\_\_\_ Quite a bit \_\_\_\_\_ A little \_\_\_\_\_ Very Little \_\_\_\_\_

14. Father: Occupation \_\_\_\_\_ Did he complete High School? \_\_\_\_\_

15. Mother: Occupation \_\_\_\_\_ Did she complete High School? \_\_\_\_\_

16. What are some things that bother you most about your housing conditions?

17. If you had to choose, what would you say bothers you most, too many people in your cell or too little space in your cell?

Check one: Too many people \_\_\_\_\_

Questionnaire - Continued

18. How much choice do you think you have about where you live in this prison?

A whole lot \_\_\_\_\_ A lot \_\_\_\_\_ Pretty Much \_\_\_\_\_ A little bit \_\_\_\_\_ Not at all \_\_\_\_\_

19. How much choice do you think you have about whom you live with in this prison?

A whole lot \_\_\_\_\_ A lot \_\_\_\_\_ Pretty much \_\_\_\_\_ A little bit \_\_\_\_\_ Not at all \_\_\_\_\_

20. How much say do you think you have in how this prison is run?

A whole lot \_\_\_\_\_ A lot \_\_\_\_\_ Pretty much \_\_\_\_\_ A little bit \_\_\_\_\_ Not at all \_\_\_\_\_

21. How much choice do you have over whether you can do the recreational activities you like to do in this prison?

A whole lot \_\_\_\_\_ A lot \_\_\_\_\_ Pretty much \_\_\_\_\_ A little bit \_\_\_\_\_ Not at all \_\_\_\_\_

22. What type of housing would you prefer in your unit?

Open dormitory \_\_\_\_\_ Double Cell \_\_\_\_\_ Single cell \_\_\_\_\_

INSTITUTION \_\_\_\_\_

NAME \_\_\_\_\_ NUMBER \_\_\_\_\_ RACE \_\_\_\_\_

BIRTH DATE \_\_\_\_\_ OFFENSE \_\_\_\_\_ COMM. DATE \_\_\_\_\_

EXP. FULL TERM \_\_\_\_\_ EXP. GOOD TIME \_\_\_\_\_

ELIG. PAROLE \_\_\_\_\_

SAT \_\_\_\_\_ BETA \_\_\_\_\_ GRADE COMPLETED \_\_\_\_\_

NUMBER OF PRIOR COMMITMENTS \_\_\_\_\_

MMPI SCORES: D \_\_\_\_\_ SI \_\_\_\_\_ ES \_\_\_\_\_ DO \_\_\_\_\_ ST \_\_\_\_\_

HOUSING HISTORY

DISCIPLINARY HISTORY

MEDICAL HISTORY

INFORMED CONSENT FORM

This study is being conducted by Drs. Paul Paulus, Garvin McCain, and Verne Cox who are psychologists from The University of Texas at Arlington. The study is designed to determine the best kind of housing for a prison setting. One objective is to obtain information which can be used in institutional design. We would like you to take several brief tests that will measure your housing preferences. We would also like to obtain a blood pressure reading as an index of your physiological response to your housing. In addition we would like your permission to examine some of your records, including medical and psychological records. Participation in this study will involve no discomfort or risk.

I, \_\_\_\_\_, understand the purpose of the study entitled \_\_\_\_\_

as explained above, and I consent to participate in the study and to permit the Bureau of Prisons institutional staff to release the information in my records, including psychological and medical records, to the researchers for the purposes of the study. My consent is voluntary and I understand that all information will be handled in the strictest confidence and that my participation will not be individually identifiable in any reports. I further understand that there is no penalty or prejudice of any kind for not participating in the study.

\_\_\_\_\_  
(Signature)

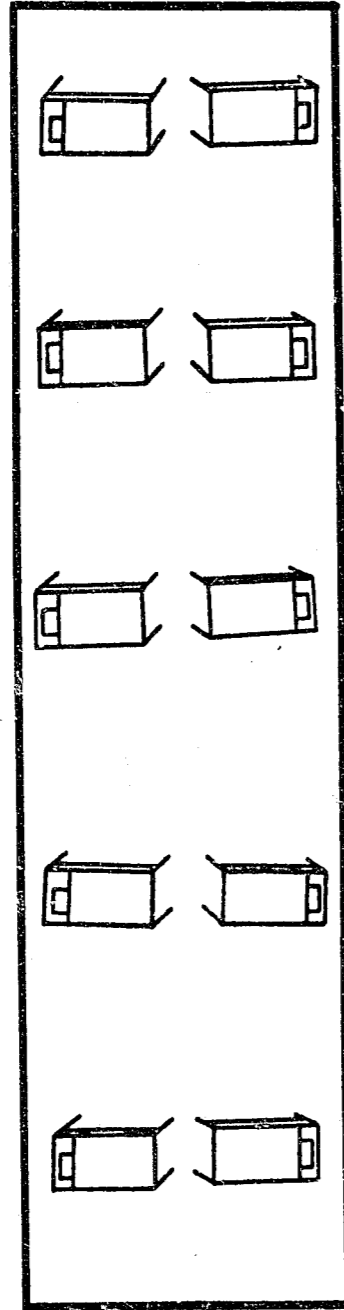
\_\_\_\_\_  
(Register No.)

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
(Date)

A-4



Crowding Tolerance Task

**END**