Surveying Prison Environments

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ABSTRACT

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There are primarily two approaches to measuring organizational properties such as climates: the subjective or psychological approach and the objective or structural approach. Previous organizational climate studies have generally relied on either one approach or the other, but not both, in a single analysis. This paper advocates the use of a statistical methodology for assessing prison institution climates which makes use of both objective and subjective climate measures. The proposed methods rely on recent developments in 1)the ANCOVA model with contextual effects which separates total aggregated variable relationships into individual and organizational level components and 2) structural equation models for the simultaneous analysis of longitudinal data from several cohorts.

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INTRODUCTION

Organizational environments are comprised of interactions between physical, psychological, and social elements. Through the perceptions of organization members, these events result in what have been conceptualized as environmental climates. It has been suggested by some (e.g., Schneider, 1975) that an organizational environment has as many climates as it has meaningful combinations of interactive elements. Since people perceive events (interactions among organizational elements) in related sets, it makes intuitive sense to attach meaning to them.

In organizational environment research, “climate” has been conceptualized in a variety of ways. For example, Zald (1960) studied the climate of “interpersonal relations" between staff, between inmates, and between staff and inmates in juvenile correctional facilities. Coleman (1961) and Michael (1961) studied the impact of various high school climates on academic achievement. Street (1965) examined the climate of "deprivation and degradation" in juvenile correctional facilities. Aiken and Hage (1966) and Miller (1967) evaluated the relationship between organizational structure and the climate of alienation. Moos (1975) researched the climate of "relationships," “personal development and growth,” and "system maintenance and system change" in psychiatric treatment programs, juvenile and adult correctional facilities, and a host of other environments.

Schneider et al., (1980) studied the "service" climate of banks; and Zohar (1980) evaluated the "safety" climate of industrial organizations. More recently, Zeitz (1983) has utilized statistical methods which are new to the study of organizational environments in order to assess the relationship between the "morale" climate and job satisfaction.

There are, in general, two approaches to measuring organizational properties such as climates: the "subjective" (also referred to as "psychological" or "process") approach in which responses are collected from individual members of organizations and then aggregated to yield measures of organizations as a whole, and the "objective" (also referred to as "organizational" or "structural") approach wherein organizational level information is gleaned from organizational records (Pennings, 1973).[1] Most research has relied exclusively on either the subjective or objective approach, although there have been some exceptions (e.g., James and Jones, 1976; Jones and James, 1979; Lincoln and Zeitz, 1980; and Zietz, 1983). None of these studies, however, dealt with the measurement of prison

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[1]The subjective approach to measuring organizational properties can result in two types of organizational properties: emergent group atmospheres--the effects of which are variously referred to as structural (Blau, 1960), contextual (Lazarsfeld and Menzel, 1961), or compositional (Davis, 1961) and stem from interactions between the individuals within the higher level unit (the institution in this case), and aggregrate traits--which are characteristics of the individuals in the higher level unit, most frequently averages or ratios of these individual level properties within each higher unit. The objective approach results in global properties--characteristics which are not based on aggregations of individual properties but, rather, directly describe the higher level unit as a whole (Lazarsfeld and Menzel, 1961). All three of these organizational properties (emergent group atmosphere, aggregate traits and global properties) are generically referred to as collective level data, in contrast to individual level data. Table 1 displays the relationship between the data collection method (subjective and objective), the unit (i.e., level) of data collection or analysis (individual or collective), and the type of data obtained. Table 2 presents some examples of collective measures relevant to the study of prison climates. The measures are categorized by the manner in which they are derived.

climates.

The purpose of this paper is to discuss the development of a comprehensive survey instrument for the assessment of prison institution climates and to suggest appropriate statistical methods for assessing issues of validity and reliability and for the study of prison climate processes. These models are specified at both collective and individual levels.

BACKGROUND

In using either the subjective or objective approach, one might be interested in addressing the relationship between institutions--a comparative analysis of institutions based on an institutional unit of analysis. On the other hand, one might also be interested in determining the influence of institutional factors on individual behavior[2]. Frequently, however, it is difficult or impossible to obtain objective institutional level measures of some issues. This is particularly true when one is interested in unobservable phenomena such as collective perceptions (e.g., safety or morale). Conversely, it is also difficult or impossible to obtain objective individual level measures of some issues. Again, this is particularly the case for behaviors which are unobservable (e.g., the number of inmates deterred from committing a particular behavior due to, say, increased surveillance; the change in perceptions of violence due to some policy intervention; or the number of staff members considering employment outside the BOP). Thus, it is sometimes

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[2]The analysis of this sort of multiple level data (i.e., the analysis of individual level data which includes data collected at some higher level) is typically called contextual analysis. A recent and relevant example of this analytic approach by Pool and Regoli (1983) describes the causal relationships involved in occurrences of violence in juvenile facilities.

necessary to measure phenomena at a level other than the one we desire to analyze (e.g., an individual level when a research problem requires an analysis of institutions, or vice versa). Furthermore, it may not be possible to measure all of the issues required by the research question at the same level. Analyses incorporating these kinds of multiple level data can be problematic.[3]

SUBJECTIVE CLIMATE ASSESSMENT

Although there has been a great deal of development in subjective climate assessment research in general (for an overview of some of this research, see Schneider (1983)), the developments in the area of corrections have been more reserved. Developments are limited primarily to works by Street (1965 and 1966), Wood et al. (1966), Jesness (1968), Eynon (1971) and Moos (1975). Moreover, the previous instruments developed to assess the social climates of correctional institutions were essentially designed for use in juvenile treatment programs. Moos' instrument for assessing correctional climates stems from modifications to the instrument he developed primarily for use in psychiatric facilities (the Ward Atmosphere Scale). While Moos' instrument also seems to be predominantly concerned with the assessment of a treatment milieu in juvenile facilities, it has been adopted and extensively utilized in adult correctional facilities as well.

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[3]These are problems due to aggregation bias in cross-level inferences (also called the ecological fallacy (Robinson, 1950)). Some relatively recent methodological innovations permit the statement of these sorts of multiple level models with more confidence that the model's parameter estimates are unbiased. Furthermore, in the event that the estimates are biased, the methods permit an unambiguous dissection of the aggregated (institutional level) and individual level components of the relationship stated in the model (Firebaugh, 1978; Lincoln and Zietz, 1980; and Zeitz, 1983).

In discussing the earlier work in correctional climate assessment by others, Moos characterized their efforts as either too narrow in focus (in the number of dimensions measured) or, in the case of Street's work, too practical in orientation. Moos' goal in developing the Correctional Institutions Environment Scale (CIES) was to create an instrument which would be applicable to both inmates and staff and which would provide information on a broad range of dimensions characteristic of the social environments of correctional facilities.

The dimensions (subscales) that comprise each of the social climate scales which Moos and his colleagues have developed for different social milieus (e.g., psychiatric hospitals, industrial settings, etc.) were, according to Moos, empirically derived and resulted in three general categories or dimensions useful in describing the climates of a variety of environments. Moos (1975) concludes that there is evidence (which he does not present) that indicates that all social environments can be conveniently categorized into three dimensions: 1) relationship, 2) personal development, and 3) system maintenance and system change. In the correctional scale he produced, each of these three dimensions is comprised of a separate set of three of the following subscales: involvement, support, expressiveness, autonomy, practical orientation, personal problem orientation, order and organization, clarity, and staff control. Recent analyses by Wright and by Saylor et al., (discussed below) pose a serious challenge to the validity of these assertions by Moos.

In surveying the history of climate assessment research in the field of corrections, we find that the CIES is by far the most pervasive instrument yet developed. Nevertheless, it appears that widespread use of the CIES in adult facilities may be due to the paucity of any alternative climate instruments than to the appropriateness of the CIES.[4]

The CIES is designed to maximize between institution or between-unit variance assuming that the institutions or units being compared differ in treatment philosophy or effectiveness (1975, pp. 38, 46-47, 324 and 335) This does not seem to be the kind of application that practitioners of adult correctional facilities are interested in because most of these adult facilities do not have different treatment programs to compare.[5] Moreover, this sort of comparative analysis can result in somewhat dysfunctional competition oriented toward improving the institution's score on the scales without concomitant changes in the environment. Furthermore, it seems that neither the Bureau of Prisons (BOP), nor the American Correctional Association (ACA) Committee on Standards, are particularly interested in comparing institutions to one another or to some established normative profile (the basic inherent design of the Moos approach). Organizational administrators appear to be more interested in comparing an assessment of an institution's climates to some common sense understanding--a benchmark arrived at through their correctional experiences--of what a particular type of institution ought to look like. This suggests that any assessment of climates needs to be measured in a known metric, one that is derived directly from experiences in prison environments (e.g.,

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[4]A more recent instrument, Toch's Prison Preference Inventory (1977), was developed for adult correctional institutions; however, the instrument is designed to provide a measure of the individual's sentiments toward his environment and not to assess perceived social climates per se. Even so, the eight hypothetical environmental concerns (privacy, safety, structure, support, emotional feedback, social stimulation, activity, and freedom) are substantively relevant to this discussion.

[5]Philosophical changes in the past decade have taken corrections far away from the ideological underpinnings of a treatment model, even if the scale was found to be valid.

counts of things). Additionally, a pragmatic climate instrument will be useful in research applications as a control mechanism. That is, as a means of controlling for (discounting) pre-existing differences in institutions in order to allow for evaluations of program or policy implementations in multiple institutions.

TESTING THE VALIDITY OF THE CIES MEASURES

In applications of the CIES, the support for the presumed dimensional structure appears to be mixed. Moos reports findings achieved during the construction of the instrument which suggests that he had taken a considerable amount of care in its development. Moos' associates have also obtained findings which support the scales' utility (Moos, 1975). In an analysis of a subset of the data collected by Moos' associates, Wenk and Halatyn, Duffee (1975) found reasonably good differentiation among six institutions in Connecticut. These differences supported his hypothesized ordering of these facilities based on what he knew about their objective characteristics. Several other studies by Wright (1980), Wright and Boudouris (1982), Saylor and McGrory (1980), and Saylor and Vanyur (1983) provide little support for the dimensional structure posited by Moos. One potential explanation for these varied findings might be the differences in the populations tested. Moos' findings are, for the most part, based on surveys conducted at juvenile facilities while the findings reported by the other researchers are based on surveys of adult facilities. Furthermore, the studies conducted by Wright and Saylor were oriented toward assessing the accuracy of the presumed dimensionality whereas Duffee took the dimensionality of the items for granted and used the scales in a manner which was consistent with their intended utilization. That is, he compared several facilities in order to determine whether the relative differences in their CIES scores could be predicted from what was known about the characteristics of the facilities .

OBJECTIVE CLIMATE ASSESSMENT

The use of subjective methods of gathering measures of organizational properties is shared by most social scientists interested in the study of organizations. The use of objective methods, on the other hand, is more frequently seen in the economic, management, and sociological fields. Although the use of these methods allows one to perform comparative analyses among the units of analysis (institutions), it does not always allow one to decipher whether these influences are due to individual level or organizational level processes.

Applications of this method of measuring organizational properties in corrections can be traced to early studies of correctional institutions such as Cressey's (1958) comparison of the unstated organizational goals of two prisons, Grosser's (1960) discussion of the role of prisons as social service organizations, or the comparative analyses of juvenile correctional institutions which resulted from the study directed by Vinter and Janowitz (1959; Zald, 1960; and Street, 1965).

More recent (and more quantitative) applications of this approach to the study of prisons at an institutional level have been prepared by Burt (1981) and Greenfeld (1983). The American Correctional Association Committee on Standards has also proposed the use of objective measures to assess institutional climates. Burt and the ACA proposal also recommend the use of subjective information as well. Burt proposed the use of the CIES for this purpose while the ACA does not suggest a particular instrument but does present some examples of the kinds of issues which should be collected at an individual level. A combination of both the objective and subjective methods of the sort proposed by Burt and by the ACA Committee seems to present the most realistic approach to the assessment of institutional climates.

<u>CONSTRUCTION OF AN ALTERNATIVE INSTRUMENT FOR ASSESSING PRISON CLIMATES</u>

Although at least some of Moos' individual items appear concrete in nature, he presumably preferred to discount the distinctions among issues by organizing and combining them into more abstract concepts. Additionally, Moos was concerned about constructing an instrument that is applicable to both inmates and staff.

Nonetheless, during the construction of the subjective component of our alternative instrument, we have made every effort not to contrive the content and wording of items to force them to be applicable to both inmate and staff, risking that such contrivances would not be appropriate to either group. Consequently, there are separate questionnaires for each of the two groups, though there is considerable overlap in the instruments where it has been appropriate.

Our interest in developing a pragmatic climate instrument was greatly facilitated by the previous endeavors of the ACA committee on standards, and by the proposals by Burt and by Greenfeld. As with these previous developments, practical concerns guided our selection of issues and construction of the survey items. Furthermore, we tried to maintain parallel subjective and objective issues.

Our intent was to develop an instrument that would address a broad range of issues of concern to prison management. Our intent was not to develop an instrument that would lend itself to routine administration through the identification of items to be used in the construction of pre-defined indices, fearing that the result would be the creation of another set of scales (such as CIES) which produce nebulous numbers. Rather we attempted to produce a reservoir of items applicable to the measurement of a variety of prison climates. In this respect one might find this survey analogous to the NORC General Social Survey. Therefore, we made no presumptions regarding the application of the instrument nor have we concerned ourselves with how one might make use of any of the individual items on the survey. Many of the items are very practical in nature and may be useful only in a descriptive univariate manner. Other items will be useful in multivariate models of climate processes. We feel that the particular manner in which the items are used is best left to the discretion of the investigator since their utility is dependent on an investigator's purpose in administering the instrument. Nevertheless, for convenience in administration of the instrument, we have grouped the items into sections. Each section contains measures of several types of climates which seemed to us to be related. We do not think that other investigators should feel compelled to retain this particular grouping of items since their application might warrant a different arrangement of the items or possibly only some subset of the items we have provided.

The questionnaires (appendices A and B) consist of a socio-demographic section and four climate content sections. Except for the socio-demographic section, which we assumed would be administered to each respondent, the four substantive sections were designed to be administered either independent of one another or in any combination of subsets.[6]

We have paid special attention to the relationship between the subjective climate issues and the individual's level of perception. Items on the questionnaire survey are constructed to reflect these levels of perception; that is, items which make sense only at an individual level or only at a collective level are addressed only at that level. Issues which make sense at multiple levels, on the other hand, are addressed by items at both an individual level and a collective level.

If we were to obtain only objective data at an institutional level ("global" variables) our analyses would be limited to an organizational level. Although we could, under some circumstances, make statements about the individual members of the institutions, based on the analysis of these, global effects, this would not always be the case (Goodman, 1953, 1959 and Lazarsfeld and Menzel, 1961). Some recent methodological developments (Firebaugh, 1978) will make it easier to determine when it would be appropriate to make these cross-level inferences (i.e., statements about the behavior of individuals based on the analysis of institutional data), but this procedure is only applicable to aggregated not global data. Conversely, if we were to collect only individual level data (either subjective, as Moos has done, or objective) we might not feel certain that aggregations of the individual level data (to institutional

[6]The instruments were designed with keypunch instructions on the form itself in order to provide some uniformity in the structure of the data. For those interested in maintaining the same format (by administering one or more of the content sections intact) we can provide an SPSSX (SPSS/PC) program to assist in the definition and analysis of their data. A modified version of the survey suitable for administration in state facilities is available on request.

levels) in reality represents institutional level processes. This is precisely the problem which Firebaugh (1978) and Lincoln and Zeitz (1980) address with the use of ANCOVA. By collecting both objective and subjective data, we will be better able to explore the processes involved in the etiology of climates.

Utilizing models containing subjective data at multiple levels of analytic units (i.e., both individual level data and institutional level data obtained through the aggregation of individual level measures) will allow us to conduct our analyses at an organizational level with more confidence in the assumption that these aggregated measures do, in reality, represent organizational processes. The analytic methods we have selected will also allow us to include data obtained directly at the institutional level via the objective methods (global effects) in the same analyses. Analyzing subjective and objective data in this way will, most importantly, allow us to assess the relationships between various climates (defined subjectively) while taking into consideration whatever the objective information has to offer our understanding of the process.

This multilevel approach will allow us to study the relationships between institutional climates and the organizational and individual contributions to these relationships. Thus, while this approach could ultimately provide institutional climate indicators for each institution surveyed (which could be compared to some benchmark, to another institution, or used in the course of program and policy evaluation research) in the same manner as the CIES, in contrast to the CIES it will also provide information which will lead to an understanding of the processes that contribute to the formulation, maintenance, and change in institutional climates.

Three models will be introduced to provide both evaluative (an assessment of reliability and validity) and explanatory information about the instrument and the nature of prison climate processes. Two general models for assessing issues of reliability and validity are specified at an individual level of analysis and a general explanatory model designed to assess prison climate processes is specified at an institutional (aggregate) level of analysis. Although our climate survey instrument has been pilot tested at two medium security federal prisons (and each institution was surveyed on two different occasions), the data available are too limited to estimate the models presented.

RESEARCH DESIGN AND METHODOLOGY FOR ASSESSING ISSUES OF RELIABILITY AND VALIDITY

In social science research it is often not possible to directly measure some events or concepts although it might be necessary to represent them in some way in order to carry out one's research. Generally, however, it is possible to obtain some measures that are directly related to (or caused by) the unmeasurable phenomenon. For example, it may be possible to discern different levels of job morale at different institutions or at the same institution at different points in time, but one cannot directly obtain a measure of it due to its multifaceted nature. One could nevertheless obtain an indication of the nature of job morale by administering a questionnaire which probes issues one believes are related to this climate. Responses to these well chosen questions could be useful indicators of the concept of job morale. Using two or more of these questionnaire items as multiple indicators of job morale one could specify models designed to explore or explain some aspect of this climate.

Since these items are not a direct measure of the phenomenon under study, it would be useful to know the extent to which these questionnaire items accurately represent the actual phenomenon and moreover how reliably they make this representation. This concern addresses two, fundamental properties of empirical measurement -- validity and reliability.

The notion of validation is process specific. Consequently, it is not possible to provide one specific validity assessment which is applicable to every situation. Validation research involves an interpretation of data arising from a specific procedure (Cronbach, 1971). Hence, one does not validate an instrument itself, but rather the instrument in relation to the particular purpose for which it is being used (Carmines and Zeller, 1979). The general measurement models described below will allow for an assessment of reliability and validity with respect to one's application of this prison climate survey.

The model displayed in figure l is designed to assess the internal reliability (internal consistency) and validity of data obtained via the climate instrument based on the assumptions of classical test theory (Lord and Novick, 1968) and the concept of parallel measures incorporated therein. Measures are defined as parallel if (among other characteristics which we will not discuss) they have equal true scores and equal error variances. This means that the measures are in reality identical and that any differences observed are completely due to random error in the observation of these items. This random error factor is added onto each true score resulting in the observed value of that particular measure. The random error may be due to, for example, the way in which the data were obtained (in this case either a questionnaire survey or a survey of institutional records).

The reliability of a measure is an estimate of the degree to which repetitions of the same procedure yield similar results. There are several forms of repetition: over time, over individuals, and over different indicators of the same concept (that is, different ways of measuring the same phenomenon). The model in figure 1 is concerned with the last form of repetition -- the extent to which different parallel indicators (represented by squares in figure 1) of some unmeasured phenomenon (represented by the circles in figure 1) are consistent in terms of the direction and strength of their interrelationships and their relationships with other (non-parallel) measures with which one would expect them to covary. This is a constrained factor model which specifies the measurement of indirectly observed (latent) constructs one is interested in investigating. If one has judiciously chosen the indicator variables based on sound theory or experience and can obtain a reasonable fit of this model to the data, then it would appear plausible that the observed measures are indicators of the unobserved phenomenon and that they provide an indirect measure of that phenomenon.

One’s choice of parallel measures (indicators) for this model should be determined by 1) one’s intended purpose in administering the climate survey, 2) the corresponding constructs (the unobserved or indirectly measured concepts one is interested in representing in the analysis), and 3) the fit of the measurement model displayed in figure 1. One should, therefore, select indicator variables based on one’s understanding of the construct of interest and then use the measurement model of figure 1 to empirically test the veracity of one’s assumption that these observed items are indicators of the unobserved variable one is interested in analyzing.

The procedure detailed in figure l also supplies information about the concurrent criterion related validity of the climate measures. The validity of a measure is an estimate of the extent to which it measures what it is purported to measure. Stated differently, validity is an indication of a measure’s appropriateness.

Validity and reliability are not unrelated. A measure can be reliable but yet not valid; however, an unreliable measure cannot be valid. This is demonstrated mathematically by the fact that the square root of a measure’s reliability sets the upper limit of the level of its criterion related validity. That is, a correlation between a parallel measure and some other non-parallel measure cannot exceed the square of the parallel measure’s reliability (See Carmines and Zeller, 1979 and Zeller and Carmines, 1980; for an introductory overview of reliability and validity assessment.) One result of low reliability due to measurement error is, consequently, an attenuation in the estimated correlation between variables so afflicted. The measurement model in figure 1 provides estimates of disattenuated correlations. In order to accomplish this, estimates of indicator (observed variable) reliability are used to correct the estimated correlations among true (indirectly measured) variables for unreliability due to random measurement error; yielding estimates of what the correlations between the true variables would be if they were measured perfectly. The disattenuated correlations are represented in the figure by the curved double headed arrow connecting the two climate constructs.

A second measurement model presented in figure 2 allows for an assessment of the construct validity (convergent and discriminant validities) of climate measures by specifying the sources of nonrandom measurement error due to the methods used to exact the data. This is accomplished via the multitrait - multimethod (MTMM) matrix proposed by Campbell and Fiske (1959). Those interested in applications of this model should also consult Alwin (1974) and Althauser (1974) for an overview of the different explicit and implicit assumptions one must make about the nature of the method variance (nonrandom error) and the implications these assumptions have for interpretations derived from their application.

In this diagram, C_i, i=1 to 4, represent the indirectly measured climate constructs (traits) of interest, and M_j, j=1,2, represent the nonrandom measurement effects due to the method by which the data were obtained. The nonrandom measurement effects, M_j, are incorporated in c_{ij}, i=l to 4, and j=1,2, the observed indicator variables of each trait obtained using each of the methods. The c_{ij} might, for example, represent measures obtained from the questionnaire survey of individuals. The different methods of measuring a single concept might be several estimates of counts of some incidents (say different types of violence) on one hand and several Likert scales (ordinal responses based on gradations of qualitative statements, e.g., a scale containing statements ranging from strongly agree to strongly disagree) also assessing one's perceptions of violence on the other hand. The influence of the method on the observed variable is indicated by the path (arrow) from M_j to c_{ij}, and an estimate of the magnitude of this influence is interpreted as the correlation between the type of method and the observed variable. The influence (correlation) of the unmeasured traits on the observed variables are indicated by the paths from C_i to c_{ij}. The u_k, k=l to 8, represent other unknown sources of error in the observed variables which are presumed to be random and unique to that particular variable, as well as error due to the measure's unreliability.

Campbell and Fiske established the following set of criteria for assessing convergent and discriminant validity within the MTMM matrix: 1) the validities (represented in figure 2 by the arrows between C_i and c_{ij}) should be significantly different from zero and sufficiently large to encourage further examination of validity -- this is evidence of convergent validity, 2) the validity for a variable (the correlation between the observed indicator variable c_{ij} and the trait C_i) should be higher than the correlation between that indicator and any other variable having neither trait nor method in common -- this is evidence of discriminant validity, 3) a variable should correlate higher with an independent effort to measure the same trait than it does with variables intended to measure other traits via the same method.

The information obtained from model 1 is a subset of the information available from the specification of model 2. Model 2, however, provides a more rigorous examination of the measurement model with respect to the issues of validity and reliability. Although model 2 provides more information regarding the appropriateness of the observed indicator variables vis-a-vis the traits they are purported to measure, it is also more demanding because it requires that one obtain observed indicators of each trait by more than one type of data collection method. We have presented both models because the demands of model 2 may not always be met if one is relying only on the items available in the questionnaires in appendices A and B.

Nevertheless, it should be possible to specify the measurement model of figure 1 in most instances.[7]

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[7]Both of the measurement models presented above as well as the third model which follows can probably be most easily specified using one of three statistical programs: Lisrel (Joreskog and Sorbom, 1983), Mils (Schoenberg, 1982), or BMDP EQS (BMDP, 1984).

ANALYTIC METHODS FOR AN EXPLANATORY MODEL OF PRISON CLIMATES

The final model is intended to provide a general framework for specifying a variety of explanatory analyses, dependent upon one's interest. There are two possible analytic strategies which could be employed in an explanatory research design. A trend study wherein measures are obtained from successive samples of (not necessarily the same) individuals at several points in time, or a panel (also called longitudinal) design in which the same or similar measurements are obtained on the same unit of analysis (e.g. an individual, living unit, institution, or perhaps geographical region) at two or more points in time. The trend design is useful when one is simply interested in determining how much a single measure has changed in a population over time and not in the reasons for changes that occur among any specific individuals. Alternatively, a panel design allows for an analysis of variations between the units at any single point in time (cross-sectional analysis), and of differences in patterns of change between units over time (a longitudinal analysis of the contemporaneous and lagged effects of a change in one measure on another measure).

An analysis of data collected at a single institution at multiple points in time necessarily requires an individual unit of analysis because there would be no variation to examine at an institutional level. While it is possible to employ a panel design with this type of intra-institutional analysis, a trend design is more plausible since the panel design would be difficult to accomplish in a prison environment (since it would require measures on the same individuals at successive points in time). In an analysis of multiple institutions at multiple points in time, an inter-institutional analysis, the institution is a feasible unit of analysis and a panel design an acceptable analytic strategy.

The explanatory model presented below is a longitudinal study of institutional units of analysis (an inter-institutional design) concerned with an exploration of the processes involved in prison climate change over time.[8] Figure 3 displays a generic path model of the expected relationships among the three types of data elements described earlier: global (G), structural or contextual (S), and aggregate (A). The first numeric subscript represents the panel number, that is, sequential number of the occasion on which the survey was administered. The proposed design requires three administrations of the survey at intervals indicated by time t and t+m where m represents some number of months. Subscripts c and i represent the specific type of climate being modeled and the institution from which the scores were obtained, respectively. The subscript c can, but does not necessarily, represent the same type of climate throughout the model. That is, the model might, for example, be used to assess the stability of a single type of climate over time, in which case subscript c would represent the same climate throughout the model, or it might be used to assess the impact of one type of climate on another, in which case the subscript c would not represent the same climate throughout that specific model.

The model depicted in figure 3 specifies a lagged causal relationship between the types of data elements with respect to

[8]The vicissitudes of organizational climates are presumably due to fluctuations in the elements that comprise the organizational complement. An appropriate research design to study this kind of dynamic process, therefore, is one which takes time into consideration. The type of design we have proposed allows one to observe the processes involved in the stability or change in some phenomena. (For a more thorough discussion of panel designs or the analyses of panel data, see Markus (1979), Kessler and Greenberg (1981) or Joreskog and Sorbom, (1979)).

one or more specific types of climates. Although one might expect to observe the contemporaneous associations, no effects of this kind are specified in the model because the causal nature of these relations is unclear (i.e., are the contextual effects caused by the aggregated effects or vice versa, are they both caused by the global effects, or is the nature of the relationship defined by some other process). The path coefficients depicted in figure 3 -- the estimated effects of one measure on another denoted by the connecting lines between the subscripted letters –- are partial regression coefficients. This means that the estimated coefficients of the autoregressive components (the paths linking the same type of climate indicator at different points in time, for example S_{1ci} with S_{2ci} and S_{3ci}) and the cross-lagged components (the paths linking different types of climate indicators at different points in time, for example A_{2ci} with S_{3ci}) of the model are controlled for the other effects in the model. Hence, the effects of the cross-lagged measures, are discounted from the estimation of the autoregressive effects and vice versa. This allows us to estimate the stability of specific types of climates over time or the lagged or contemporaneous influence of one type of climate on another.

Following Alwin's (1976) elaboration of Hauser's (1971) path analytic specification of an analysis of covariance model designed to dissect the variance in aggregated measures (means computed on distributions of individual scores) into individual and contextual effects, Lincoln and Zeitz (1980) demonstrate the validity and utility of organizational level analysis via aggregate data. The model in figure 3 employs Lincoln and Zeitz's strategy for obtaining organizational properties from aggregate data through the separation of individual and structural effects. The concept of a structural (contextual) effect assumes that data collected at an individual level have been grouped into some meaningful categories (e.g. based on program involvement, living unit, institution, or region) and the individual responses have been summarized (aggregated) on the basis of these groups. For the purpose of contextual analysis in general, the aggregate figures can be means, standard deviations, ratios or any other meaningful summary statistic. For this specific application the summary statistic is limited to estimates of the group means.

A structural effect is presumed to exist if some individual level (dependent) measure displays a net association with the group mean on a predictor variable while controlling for the individual scores on that predictor variable. This can be expressed in the following regression equation:

$$Y = a + b_{yx}.\bar{x} + b_{y}\bar{x}.x + e$$

where y is the dependent individual level measure showing an association, $b_{yx}.x$ is the effect of the individual level predictor scores on the dependent measure when controlling for the effects of the group means of this same predictor variable (i.e., the individual level effect within groups), and $b_{yx}.x$ is the effect of the group means of the predictor variable on the dependent variable when controlled for the individual level scores (i.e., the group level effect). In this context Alwin demonstrates that the contextual effect is the difference between the group level effect and then individual level effect within groups. As Lincoln and Zietz show, this difference also measures the extent to which an analysis of group level processes is warranted by one’s data. (For a more detailed discussion of this modeling strategy as well as an applied example, see Lincoln and Zeitz, 1980).

The modeling strategy portrayed in model 3 enables an investigator to ascertain whether statistical relationships arise from organizational level or individual level causal processes. Moreover, the analytic approach permits one to directly introduce global variables as well as additional aggregate variables. Lincoln and Zeitz's extension of Alwin's and Hauser's work in the context of the general model in figure 3, allows any relationship in which both the dependent and the independent variables are expressed as means (averages derived from individuals' responses) to be partitioned into its organizational and individual level components.

SUMMARY AND CONCLUSION

Our purpose has been to develop 1) a reservoir of questionnaire items which purportedly measure prison climates in a subjective manner, 2) a list of plausible objective prison climate indicators, and 3) statistical methods useful in exploring and explaining prison climate phenomena. The questionnaires were constructed as a single instrument (i.e., one for staff and one for inmates) and include keypunch and data field instructions. To facilitate the administration and analysis of the questionnaire a computer program, written in a popular and widely available statistical package (SPSSX and SPSS/PC), is available to define the data structure. The instruments were also produced in such a way as to allow for an administration of only some of the sections of the questionnaire if that is desirable. In order to make the instrument as transportable as possible, we have also produced versions which are suitable for administration outside the Federal Bureau of Prisons. Furthermore, we described two models which explore the validity and reliability and the questionnaire items, and an analytic method which integrates both the subjective and objective types of data into a comprehensive explanatory model of various prison climates.

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