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PATIENT VARIABLES AS PREDICTORS OF LENGTH OF PSYCHIATRIC HOSPITALIZATION

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ABSTRACT

PATIENT VARIABLES AS PREDICTORS OF
LENGTH OF PSYCHIATRIC HOSPITALIZATION

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This research examined the relationship of individual differences to length of stay among patients at a small psychiatric hospital. Subjects were 665 admissions to two acute treatment units. A proposed model of patient variables independently predictive of length of stay comprised these elements: the availability of a suitable social niche, chronicity/dependency, severity of dysfunction, and treatment alliance. Measures intended to represent these factors included aspects of the patient's social and psychiatric history, current diagnosis and legal status, and for a subset of subjects, symptom ratings (n=110) and records of types of medications received in hospital (n=262). A five-point length of hospitalization scale was used as the criterion.

Of the 14 measures selected to represent the four elements of the model, all but one correlated with the criterion in the expected direction. However, the patterns of relationships between the predictors and the criterion and among the predictors did not in general support the conceptual model. Regression analyses were used to determine which of the measures made meaningful independent

contributions to the prediction of length of stay. Patients who were married, had no previous psychiatric hospitalization, were not diagnosed schizophrenic and did not receive anti-psychotic medication, and were not legally committed were found to have briefer stays. Contrary to expectations, patients for whom aggressive action was among the behaviors which precipitated hospitalization had shorter stays.

In order to highlight the impact of individual differences on length of stay, a deviation from expected length of stay measure was defined. This deviation measure was based upon the lengths of stay of other patients discharged near the time of a subjects discharge. The computed deviation from expected length of stay did not produce the expected higher correlations with predictors.

Hypotheses that measures would have differential predictive power for subgroups differing on sex, legal status or diagnosis proved correct in only one case. Anti-psychotic medication was more predictive of length of stay for non-schizophrenic patients.

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INTRODUCTION

The Problem

Psychiatric hospitalization is an enormously costly intervention. The collective financial cost of inpatient treatment is massive, and changing economic circumstances make this cost increasingly difficult to sustain. For psychiatric patients and their families hospitalization is a major and sometimes devastating life disruption. Clearly, it is desireable to understand the factors governing length of hospitalization. Past research tells us that length of stay can be manipulated by changes in hospital policies and goals and that many patient characteristics show small relationships to length of stay. But still we cannot adequately explain why one patient's stay is short and another's long, much less consistently predict length of hospitalization.

The objective of the current study is to work toward a clinically useful means of anticipating a given individual's length of stay. A simple conceptual model will be presented relating patient specific data to length of hospitalization. The system of patient influences upon length of stay is assumed to include several types of data: social history, psychiatric history, current diagnosis, psychiatric state at admission, and legal status of admission. A second assumption is that certain predictors will be more or less powerful depending on the patient's sex, diagnosis, or legal status. Finally, it is hoped that

variation in unit-wide influences on length of stay can be taken into account, thereby putting patient specific influences into sharp relief. The plan of this study is to (1) propose a simple model of patient variables which influence an individual's length of hospitalization, (2) identify measures relatively accessible to the clinician which tap these variables, (3) test the model, (4) specify groups of patients for whom certain measures may be especially predictive, (5) attempt to highlight patient influences on length of stay by accounting for variance in length of stay due to changes in unit parameters.

Background

In the past thirty years there have been major changes in the nature of psychiatric hospitalization. In the early 1950's admission to a psychiatric unit regularly meant a stay of years, sometimes an entire life, in hospital. Treatment consisted primarily of custodial care, and the spirit of these institutions was darkly pessimistic. Professionals began to realize that the institutions themselves were damaging to those who were "institutionalized"-- deprived of what social skills and resources they did have. When "anti-psychotic" medications were developed, they brought new possibilities for control of symptomatic behavior, and new kinds of effectiveness and efficiency. Some of the most extreme and distressing aspects of psychotic decompensation could readily be reduced or eliminated. Of equal importance, the change brought about by the new medications included a new basis for optimism and enthusiasm among the treatment staff and administration of psychiatric hospitals, many of which had become filled warehouses of

hopeless and more or less dysfunctional patients.

Because of the adverse effects and stigma associated with psychiatric institutionalization, the increased demand for accountability for mental health funds, and the symptom controlling qualities of the new anti-psychotic medications, policies about the role of the psychiatric hospital changed. The mental health system became more community based, and the function of the hospital shifted to providing brief, intensive intervention. With the recognition that psychiatric patients could survive outside the hospital, large scale efforts were begun to empty the hospitals. Brevity of hospitalization became a key measure of success of intervention, and considerable research was done related to this issue.

REVIEW OF LITERATURE

Research on length of hospitalization can be considered in three parts. In one kind of study, investigators sought features of hospitals or units within hospitals which were associated with short hospitalization and rapid turnover. Other studies were designed to test the effect of changes in the hospital instituted to reduce length of hospitalization and increase patient turnover. These two groups of studies, focused on length of stay as an aggregate phenomenon, will be examined briefly. In the third kind of research, patient characteristics were studied to determine what about the patient led to brief in hospital stays. Since it is this research that lays the foundation for the current study, it will be covered in detail. I will now review and summarize these areas of investigation, then argue that relevant questions concerning length of hospitalization remain unanswered, cite the reasons for this, and indicate how the present study can help answer these questions.

Variance in Length of Stay Across Hospitals

The first group of studies sought to discover why some hospitals or units within hospitals had, on the average, much shorter patient stays and more rapid turnover of patients than others, a fact observed by Jenkins and Gurel (1959) and Gurel (1966). The former study, in addition to documenting this variability, found that smaller hospitals

and hospitals with higher staff-patient ratios were more effective in that their patients more rapidly achieved discharge without relapse within ninety days (first significant release or FSR).

Ullman's (1967) study of schizophrenics in VA hospitals confirmed and refined the findings of Jenkins and Gurel. Ullman examined the records of thirty VA hospitals using two criteria of efficacy: the percentage of patients who began a 90 day admission free period (first significant release or FSR) within nine months of admission; and the percentage of patients in residence for two years or more. For all age groups and marital status categories, and across varying patient-staff ratios, smaller hospitals had proportionately more FSR discharges by the ninth month of hospitalization. Also, rate of FSR discharge was higher and percentage of patients with stays longer than two years lower for hospitals with higher staff-patient ratios, regardless of hospital size.

Linn (1970) used ward observation and ratings, plus staff interviews and questionaires in a study linking features of the hospital environment to rates of discharge at twelve state hospitals. The hospitals were ranked on variables falling into four sets: average patient characteristics (age, physical disability, mental status performance); hospital characteristics (size, staffing, ward atmosphere, ward facilities); hospital policies and programs (staff control, treatment programs, staff involvement with patients); and patient activity and behavior (interaction, visiting, tidiness). These variables were rank-order correlated with rankings of rate of discharge. Discharge rates proved not to be related to average patient variables, quality of living conditions, hospital rules or hospital policies.

Variables which did appear to be associated with discharge rates were small size, more visitors, higher staff-patient ratio, greater staff involvement, and more staff-patient interaction.

In a study of 39 VA hospitals which had decentralized their organization and adopted a unit system, Ellsworth, Dickman and Maroney (1972) sought to find hospital characteristics related to productivity as indicated by turnover rates and numbers of long-term residents. More productive hospitals were smaller, had a higher ratio of social workers to patients, had a higher percentage of patients on autonomous units which provided all treatment for their patients, and had special placement programs; they also evidenced competition between unit staffs and had more applied research.

Moos and Schwartz (1972) used seven large wards in a VA hospital to link patient and staff perceptions of the treatment environment to release rates. The instrument used was the ward atmosphere scale developed by the senior author. They found that wards with higher release rates were percieved by patients as having a more practical orientation and more staff control; staff percieved these efficient wards as having less emphasis on spontaneity. Palmer and McGuire (1973) found an association between the number of staff observed talking with patients and longer stays in hospital across fifteen wards of a state hospital. The studies of Palmer and McGuire, Moos and Schwartz, and Linn (cited above) taken together imply that increased social activity on the ward leads to shorter stays only when the interactions are pragmatic and goal directed.

Kirschner (1982) conducted a study in which length of stay data for six university-affiliated psychiatric inpatient units in general hospitals and one private psychiatric hospital were examined. There appeared to be an interaction between diagnosis and unit policy, the ranking of unit efficiency being different for schizophrenics, affective disorders, character disorders and neuroses. The directors of these units met with Kirschner to discuss the characteristics of a unit with brief length of stay. The factors they concluded to be important were major decisions made by a medical director, ready access to aftercare, and little difficulty paying for aftercare services. The directors emphasized that the treatment philosophy of the medical director could outweigh the other factors. The role of centralized authority in shortening hospitalization time is implied also in Palmer and McGuire's (1973) finding that on units where staff members representing more disciplines led groups, stays were longer.

Blackburn (1972) offered the observation, based on his informal study of twelve hospitals, that ward staffs differ in their criteria for discharge of patients. When decision makers are more inclined to take risks, hospital stays are shorter. Other factors he cited as related to turnover rates are management policies and pressures, competition between hospital units, admission and transfer policies, and availability of aftercare programs. These observations are not backed by hard data, but they are sensible if not compelling.

The extent and pattern of anti-psychotic medication use has been shown to influence length of hospitalization. Burhan's (1969) study of

the effect of drug treatment in length of hospitalization involved the selection of random groups. The treatment of one group emphasized the use of medication during inpatient and followup treatment. The followup treatment of the experimental group was intensive, patients meeting weekly for three months, then biweekly for three months with the same therapist who directed the patient's treatment in hospital. The medication-emphasizing experimental group had shorter inpatient stays (mean 14.8 days) than the controls (37.7 days). Certainly the influence of the intensive use of medication in this study is confounded by the special efforts at continuity of care, but still the study suggests the expedience of well-managed medication. In a similarly suggestive study, Schooler, Goldberg, Boothe, and Cole (1967) found that (non-randomly selected) patients given a placebo instead of medication remained in hospital longer than patients receiving the standard medication treatment. Palmer and McGuire (1973) reported a correlation of $r=-.48$ ($p<.05$) between amount of drugs used and median days of hospitalization for fifteen wards of a state hospital. Harrow, Tucker, and Bromet (1969), however, found no relationship between treatment with phenothiazines or drug treatment in general and length of hospitalization for 125 schizophrenics. The authors note, however, that in their study patients not recieving medication were less delusional and exhibited less bizarre behavior than others.

Ward parameters such as those cited in the preceding discussion could be expected to vary not only across hospital wards, but across time for a single ward. Two studies (Fairweather, Simon, Gebhard, Weingarten, Holland, Sanders, Stone, and Reahl, 1960; May and Tuma,

1964) offer data in support of the idea that shifts in discharge criteria may correlate with changes in average length of hospitalization. Another example of shifts over time of within-ward parameters proving to be associated with length of stay is provided by Adams (1961), whose study suggests that bed availability is a factor in discharge decision making.

The studies described above were correlational efforts to link features of hospitals or units of hospitals to variation across the facilities (or across time within a facility) in length of hospitalization and turnover rates. Based on these studies, an image of a high turnover, brief stay hospital can be sketched. The hospital is small and well staffed. There is a committment among staff to minimizing patients time in hospital. Decision-making is centralized and bureaucratic hang-ups are infrequent and readily dispatched. Medication is effectively utilized in the control of symptoms, its administration knowledgeably monitored and rapidly stabilized. There is a great deal of social activity and social involvement for staff, patients, and visiting family and friends. This involvement is enhanced by the fact that the patients are treated entirely on the ward by the same ward staff. Staff keeps a rein on ward behavior, suppressing spontaneous but potentially disruptive patient behavior, and steering patient activity into pragmatic activity geared to encouraging basic social skills and to preparation for leaving hospital. Those professional staff who serve as the liaison between the hospital and the community (or family), usually social workers, are present in adequate numbers. Moreover, these professionals utilize, and develop if need be,

placement systems which expedite the patient's transition from hospital to community. And finally, the hospitals confidence in early discharge is enhanced by the expectation of continuity in the treatment regime worked out in hospital.

Manipulation of Length of Stay

The second major group of studies, involving manipulation of length of stay, further demonstrates the influence of decision-making parameters on length of psychiatric hospitalization. An important non-experimental study was conducted by Mendel (1966). Patients who were assigned to shorter stay units were found to have fared as well as or better than their long-stay cunterparts. Although the study was somewhat inconclusive because assignment to treatment length was not independent of psychopathology, it did raise interest in the prospects for the successful manipulation of hospital practices. Rhine and Masterson (1971) demonstrated the feasibility of short stays for most patients when they discharged eighty percent of their patients after an average of 7.5 days. Only one-fourth of these patients were schizophrenic, however, and of the twenty percent who were transferred elsewhere for longer treatment, most were schizophrenics.

Experimental manipulation of release policies has been attempted in several studies aiming to compare the outcome of short versus long hospitalization. In these studies, patients are randomly assigned to treatment of a certain length, the short stay group often receiving special treatment procedures. The Northwest Washington Hospital Community Pilot Project (Dieter, Hanford, Hammel, and Lubach, 1965;

Gove, 1965; Hanford, 1965) was able to limit 95% of its experimental group to a median stay of 21 days, compared to a median stay of 52 days for the control group. Burhan's (1969) experimental cohort averaged 14.8 days in hospital, and the controls averaged 37.7. Herz, Endicott, and Spitzer (1975) limited two experimental groups of patients to eleven days in hospital (one group recieving day treatment), while controls remained for 60 days. Mattes, Rosen, and Klein (1977) kept their experimental group in hospital three months, controls staying six months. Finally, Glick and Hargreaves (1979) conducted a study in which the experimental group was hospitalized for 21 to 28 days, the control group for 90 to 120 days.

The experimental (short-stay) groups, often with special in hospital and/or follow-up treatment regimes, achieved results equal to or better than control (long-stay) groups as indicated by follow-up information. More sophisticated studies, however, seem to indicate that shorter hospitalization is better for certain patients and not for others. What is most relevant here is the possibility of alteration of length of hospitalization by fiat. Clearly, hospital policies can have a major influence on length of hospitalization, and where special efforts are made, briefer stays can be accomplished with responsible treatment for most patients. Previous research at the site of the current study proves this observation to be a relevant one. Stoffelmayr and Moreas (Note 1) found that the average length of stay for patients on two admission units of the same hospital differed significantly: 46 days on one unit, 29 days on the other (n=612, t=5.27, p<.001). (Some of the subjects in that study are included in the current study.)

Patient Characteristics as Predictors of Length of Stay

Individual differences among patients are a third source of variability of length of hospitalization examined by researchers. Patient characteristics found to be related to length of stay are discussed below under these headings: demographic data, social competence, psychiatric history, judgements of psychopathology and diagnosis, symptoms and mental status, dangerousness to self or others, voluntary and involutary admission, social circumstances and resources, and completeness of hospital record.

Demographic Data.

Naturally, demographic variables such as age at admission, race and sex have been considered. Altman, Angle, Brown, and Sletten (1972) used a computerized data system to find relationships between variables routinely measured and long versus short hospitalization. Their study covered all patients admitted to the Missouri state hospitals between 1966 and 1969, a total of 5743 patients. They found a slight tendency (r=-.08, p<.01) toward shorter hospitalization for patients in the 30 to 50 year old age group, but no association of membership in any other age group with length of hospitalization. Faden and Taube (1977) examined length of hospitalization of discharges during 1975 from a representative sample of non-federal general hospital inpatient units (193 hospitals). Their results regarding age were similar to those of Altman et al.: the median length of hospitalization for those between 18 and 44 was 10 to 11 days, between 45 and 65 about 14 days, under 18 about 17 days, and 65 and over about 18 days. Because of the size of

the sample, this association was significant but obviously small and non-linear. Gove and Fain (1975) divided 224 state hospital admissions into five length of stay categories and six age at admission categories. They reported a gamma statistic (here similar to a correlation but for ordinal data) of .14 (no significance level reported) reflecting the association between the variables. Munley, Devone, Einhorn, Gash, Hyer and Kuhn (1977) found a stronger relationship between length of stay and age. Their subjects were 202 VA hospital admissions, and they found a correlation of r=.31 (p<.01) between age and length of hospitalization. This larger positive correlation is understandable given the tendency for VA hospitals to serve middle-aaged and older patients. Clum (1975) found an opposite result (r=-.29, n=119) with a group of private hospital admissions. Although the author did not report the distribution of age in his sample, his inference that younger patients stayed longer because they lacked family responsibilities suggests that his subjects were mostly middle-aged and younger. If that was the case his findings are consistent with those cited above, despite the apparent dissimilarity.

The results of several other studies suggest that the relationship between age and length of hospitalization is mediated by diagnosis. Watson (1968) reported a correlation of r=.34 (p<.05) between age and length of stay for 100 non-psychotic VA hospital patients. He did not report non-significant correlations, but by inference the magnitude of the correlation for schizophrenic patients must have been less than r=.15. Harrow, Tucker and Bromet (1969) reported a negative correlation (r=-.22, p<.05) between age and length of hospitalization for 125

schizophrenic admissions to a private psychiatric hospital. Bromet, Harrow and Kasl (1974) found a large negative correlation (r=-.66, p<.01) for a small (n=33) group of private hospital schizophrenic patients, and a smaller, positive correlation (r=.25) for a group (n=44) of non-schizophrenics.

These studies taken together suggest that there is a small association between age at admission and length of hospitalization but that it is non-linear and moderated by diagnosis. Levine, Weiner and Carone (1978) have pointed out that medical illness has a complicating and lengthening influence on psychiatric hospitalization. Also, organicity (as discussed below) has been shown to be associated with longer hospitalization. Both medical complications and organic dysfunction can be expected to be more frequent in older patients, and perhaps these are among the reasons older patients stay longer. Differences in the age and diagnosis distribution of subjects in studies could account for some of the variability of findings. When very young patients are hospitalized, it often marks the beginning of especially serious schizophrenic trouble; this might in part account for the longer length of hospitalization among young patients. On the other hand, non-schizophrenics in mid-life with family and work ties and responsibilities may constitute a large proportion of the apparently short-staying young-adult and middle-aged group. The usually unreported sample distributions of age, diagnosis and social responsibilities may be keys to the different correlations between age and length of stay reported in different studies.

Several investigators have looked for a possible association between gender and length of stay. Altman et al. (1972) found that women had longer stays (r=.11, p<.01). Faden and Taube (1977) similarly found that the median stay for women (12.6 days) was slightly longer than that for men (11.1 days). Raskin and Golob's (1966) study of 138 first admission schizoprenics from nine hospitals produced a contrary finding, that men stayed in hospital longer (r=.23, p<.01; computed from F-ratio). However, Harrow, Tucker and Bromet (1969) found no relationship between gender and length of hospitalization among 125 schizophrenic patients. Similarly, Gove and Fain (1975) found a minimal (r=.04) tendency for men to stay longer. In summary, it appears that male schizophrenic patients stay longer in hospital on first admission than do female schizophrenic patients, but that the overall tendency is for women to remain in hospital slightly longer.

Two large studies found significant but small correlations between race and length of hospitalization. Altman et al. (1972) reported that non-whites tended to stay longer in state hospitals than did whites (r=.06, p<.01). Faden and Taube (1977) also found that in non-federal public hospitals non-whites stayed longer (median = 8.8 days) than whites (median = 7.8 days). However, their study showed that the reverse was true in non-federal non-public institutions, where whites (median = 13.9 days) stayed longer than non-whites (median = 11.9 days).

Social Competence.

Several studies support the idea that better work performance and more education are associated with shorter hospitalization. Altman et al. (1972) reported a correlation of $r=-.16$ ($p<.01$) between having a job prior to admission and length of hospitalization. Turner and Zabo (1968) examined data collected on 213 schizophrenic patients drawn from a county psychiatric case register. These investigators used as a dependent measure the patient's longest single hospitalization during a three to six year period beginning when the patient first appeared on the register. They found relationships between longest single hospitalization and both regularity of employment ($r=-.27$, $p<.01$) and occupational prestige ($r=-.27$, $p<.01$). Munley et al. (1977) noted a similar correlation between regularity of employment and length of hospitalization ($r=-.19$, p not reported) for 181 VA hospital patients. Johnston and McNeal (1967) found that a good work record or having a job waiting at discharge was associated with short hospitalization, but specific statistics were not presented.

Altman et al. (1972) reported that more education was associated with shorter stay for 5743 patients in their study ($r=-.11$, $p<.01$). Turner and Zabo (1968) found that the length of a patient's longest single hospitalization over a period of several years similarly correlated ($r=-.11$, p not reported) with educational level. Harrow et al. (1969) found negligible relationship between education and length of hospitalization ($r=.03$, n.s.) for 125 schizophrenic patients, but they reported a stronger though still not significant correlation ($r=-.13$) between education of the head of the household and the patient's length

of stay. Raskin and Golob's (1966) study of 138 schizophrenic patients indicated an association between higher social class (middle class and above versus working class and below, as indicated by father's occupation and education) and longer hospital stay (r=.25, p<.01). The results observed for social class, education and work performance suggest that not education or fortunate background but job competence and responsibilities are associated with brevity of hospital treatment.

Numerous studies have considered the relationship between marital status and length of stay, as shown in Table 1. Because the use of varied measures (for both marital status and length of stay) did not appear to influence the results, the particular measures were not specified in the table. Note first the consistency with which marital status (or having been married) is associated with brief hospital stay. The one exception is the non-schizophrenic sample of Bromet, Harrow and Kasl (1974). When this result is considered with the results of Fulton and Lorei (1967) and Altman et al. (1972), it appears that the association of marriage and length of hospitalization is not as strong for non-schizophrenic as for schizophrenic populations. Gender also seems to be a moderator variable; studies with less than 100% male subjects reported smaller correlations. This is consistent with the finding of Farina, Garmezy, Zalusky and Becker (1962) that marriage is a more important prognostic indicator for male than for female schizophrenic patients. In summary then, being (or having been) married augurs briefer hospital stays, especially for male or schizophrenic patients.

Table 1

Correlations between Marital Status and Length of Hospitalization

Study	n	Males	Schizophrenics	r
Turner & Zabo (1968)	213	100%	100%	.27
Chapman, Day & Burstein (1961)	106	100%	100%	.59
Fulton & Lorei (1967)	192	100%	70%	.37
Harrow, Tucker & Bromet (1969)	125	47%	100%	.23
Bromet, Harrow & Kasl (1974)	33	?	100%	.62
Garfield & Sundland (1966)	65	0%	100%	.28
Altman, Angle, Brown & Sletten (1972)	5743	59%	25%	.18
Gove & Fain (1975)	224	?	?	.33
Bromet, Harrow & Kasl	44	?	0%	-.01
Lindemann, Fairweather, Stone & Smith (1959)	454	100%	?	?[a]
Johnston & McNeal (1964)	668	100%	?	?[a]

Note. Positive correlation indicates that married status is associated with short stay.

[a]Pearson correlation not recoverable; association of married status with short stay significant at $p<.001$.

These data do not tell to what extent the association of marital status and length of hospitalization is due to the pressures of marital responsibilities and to what extent it is due to generally better functioning among those who have achieved married status. However, it is reasonable to assume that both influences are involved. For example, Altman et al. (1972) found an association between number of children and brevity of stay (r=.11, p<.01). On the other hand, Harrow, Tucker and Bromet (1969) found a correlation between comfort with opposite sex as a teenager and short hospital stay in a sample of 75 schizophrenic patients (r=.29, p<.05). Bromet, Harrow and Kasl (1974) also found such an association, stronger for schizophrenic patients (r=.52, p<.01) than others (r=.31, n.s.). Cancro and Sugarman (1968) used the Phillips scale of premorbid social functioning, and found a correlation of r=.36 (p<.01) with length of stay dichotomized at six months.

Patients with better social functioning broadly measured have been shown to have shorter hospitalizations. Lindemann et al. (1959) found an association (p<.001, no chi-square reported) between clinically judged "degree of incapacity" and trichotomized length of hospitalization. Their sample included 457 VA hospital admissions. In 1961, Zigler and Phillips published a study employing their social competence scale and several outcome measures, including length of stay. Their scale includes age, intelligence, education, occupation, employment history and marital status. They dichotomized both the social competence scores and length of hospitalization and found an association of r=-.13 (calculated from the reported chi-square, p<.025).

Turner and Zabo (1968) related modified Phillips and Zigler social competence scale scores to longest continuous hospitalization during a fixed time span. They found an association of r=-.32 (computed from an F statistic, p<.005) for their sample of 213 male schizophrenic patients. Most recently, Marsh, Glick and Zigler (1981) related the Phillips and Zigler social competence scale to length of stay trichotomized on a sample of 381 state hospital males. Their results were consistent with those of the previous studies (r=-.28 computed from F statistic, p<.06).

Several other studies examining length of stay have used prognostic scales as predictors. These scales are related to social competence measures in that they always tap, at least in part, premorbid social functioning. In addition, however, they include a variety of other factors such as course of illness, type of onset, positive and negative symptoms and other features thought to be clinically relevant. Correlations between these multiple-factor indices and length of hospitalization tend to be larger than correlations of social competence measures and length of hospitalization. For example, Chapman et al. (1961) report a correlation of r=.38 (p<.001) between the Elgin prognostic scale (high scores incicate poor prognosis) and length of stay of more or less than nine months (n=106 schizophrenic patients). Garfield and Sundland (1966) looked at the Elgin, Phillips, and Kantor prognostic scales as correlates of length of hospitalization (more or less than one year) and found them to yield comparable results (r=.49, .50, .55 respectively) on a small (n=65) sample of schizophrenic patients.

Without a doubt, social competence measures and prognostic scales tap something of relevance to length of hospitalization. However, it seems possible that, given the changes in the role of the psychiatric hospital, the predictive power of these measures may be less than it has been. Variation in length of stay was formerly talked about in units of years and months; today the units may be weeks or days. It is a generally relevant caveat that, lacking current studies, variables which differentiated a six month from an 18 month stay may not predict differences of less than a month. This caution may especially apply in the case of prognostic scale studies, where frequently poor prognosis predicted very long hospitalization, but good prognostic signs did not equally predict brief stays in hospital.

Psychiatric History.

A patient's history of psychiatric admissions has been shown in several studies to be related to length of hospitalization. The very large (n=5743) study by Altman et al. (1972) included a correlation of r=.20 (p<.01) between percentage of time in hospital prior to admission and length of stay of more or less than 90 days. The authors also reported a similar association between having no previous admissions and brevity of hospitalization (r=-.19, p<.01). Gove and Fain (1975) found that, for their sample of 224 state hospital patients, length of stay broken into five categories correlated with previous days of hospitalization in six categories (r=.27, p<.01). Watson (1968) looked for a relationship between months of past hospitalization and time in hospital until first significant release (FSR), and found r=.15 (p< .05,

n=300) for his sample of 300 VA patients. The consistent evidence provided by these three studies is corroborated by Johnston and McNeal's (1967) study of clinical judgement. Clinicians who were accurate predictors anticipated long stays for those with extensive past hospitalization and brief stays for patients with no previous hospitalization.

Two studies show that hospital policy or characteristics of the sample can affect the observed relationship between past hospitalization and length of stay. Harrow, Tucker and Bromet (1969) found no relationship between these measures (r=.01). However, the 125 schizophrenic patients in their sample had consistently little or no previous hospitalization: 60% were first admissions, another 25% had only one previous admission and less than 5% had three or more admissions. This restriction in the range of chronicity could be expected to obscure correlations with past hospitalizations. Munley *et al*. (1977) were puzzled by the negative correlation they found between number of past hospitalizations and length of stay (r=-.10, p<.05, n=181 VA hospital patients). They noted that the predicting measure was not duration but number of previous hospitalizations, and suggested that this result reflected a revolving door phenomenon-- a large proportion of the patients had many but brief hospital stays.

Judgements of Psychopathology and Diagnosis.

When a patient arrives at a psychiatric hospital, the treatment staff make judgments about the patient's psychopathology. Greenley's (1972) study looked at the association between length of stay broken into five categories and psychiatrists' judgements of degree of psychopathology. Using a non-parametric statistic (gamma), which measures extent of association much as the Pearson correlation does, he found a substantial degree of association of length of stay with judged psychiatric impairment (gamma=.44, $p<.01$, $n=63$) and with judged need of hospitalization (gamma=.53, $p<.001$, $n= 63$). Greenley found no relationship between severity of psychiatric symptoms and length of stay, but noted that the symptom measure, designed to be a psychiatric screening tool, might not have been refined enough to make distictions among hospitalized psychiatric patients. Gove and Fain (1975) related a four-point severity of psychopathology scale (none, distressed, disorganized or disruptive, both disorganized and disruptive) to length of stay broken into five categories using a sample of 224 state hospital patients. They found psychopathology to be substatially related to length of stay (gamma=.33, significance level not reported). Ellsworth and Clayton (1959) related two kinds of global assessment to length of hospitalization (more or less than six months), employing a sample of 78 VA hospital patients. One measure was a psychopathology scale, a sum of ratings on 17 "relatively independent" symptom areas; it correlated $r=.21$ (n.s.) with length of stay. The other measure was a behavioral adjustment score, the sum of ratings on affect, cooperation and communication (a high score being favorable). This measure bore a

stronger association to length of stay (r=-.41, p<.01). Another study relating global assessment of psychopathology to length of stay, Doherty (1976), found no association between these variables. However, the author pointed out that neurotic patients were discharged rapidly and treated as outpatients and that schizophrenic patients tended to be swiftly transferred to another treatment setting. This drastic reduction of range of psychopathology renders their finding of no relationship quite expectable.

More routinely, psychiatric judgements are made in the form of diagnoses, and a number of studies have considered the association between diagnosis and length of stay. Marsh, Glick and Zigler (1981) placed patients in groups according to their length of hospitalization (less than 15 days, between 15 and 90 days, more than 90 days) and according to diagnosis (schizophrenia, affective disorder, psychoneurosis, character disorder). They found a significant association between these two variables (contingency coefficient=.34, computed from chi-square, p<.005, n=831 males). Of the four diagnostic groups, schizophrenic patients had the longest stays, those diagnosed to have personality disorders the shortest. Kirshner (1982) reported comparable results, noting that schizophrenic patients had the longest stays (median=33.8 days), followed by patients with affective disorder (28.5 days), neurosis (15.5 days) and personality disorder (12.5 days). Sample size and summary statistics were not reported. Lindemann *et al.* (1959) examined the relationship of diagnosis to length of stay. The published results of this study of 447 patients included only the significance of the overall chi-square (p<.001) and the probabilities of

long hospitalization (more than 90 days) for each diagnostic group. Of the psychotic group, 78% had long stays; of those in the organic, neurotic and character disorder groups, 39%, 30% and 10% respectively had long stays. Some studies compared length of stay for patients diagnosed schizophrenic with that of all other diagnostic groups taken together. Fulton and Lorei (1967) found that a schizophrenic diagnosis was associated with longer hospitalization (r=.27, p<.05) for their sample of 192 VA hospital patients. It should be noted that the median length of stay for these patients was long by today's standards (27 weeks). Harrow et al. (1974) also found that a schizophrenic diagnosis was associated with a long stay, 16.2 weeks compared to 10.9 weeks for non-schizophrenics (t=3.87, p<.01, n=101).

The data presented thus far consistently indicate that patients considered schizophrenic have the longest stays followed in order of decreasing length of stay by other psychotic patients, patients with organic problems, neurotics patients and patients with personality disorders. Some data, however, do not support this picture. Wood, Rakusin and Morse (1962) reported that, for their sample of 50 VA patients, diagnosis (psychoneurotic reaction, psychotic reaction or personality disturbance) showed no relationship to the length of inpatient stay. The authors report, however, that this patient group was selected to be suitable for psychotherapeutic treatment on an open ward, and that the staff attempted to establish diagnosis independent of the level of psychopathology. The result seems to have been a sample with a narrow range of impairment but still representing a broad diagnostic spectrum. This study raised the question whether it is not

diagnosis itself which influences length of hospitalization but the extent of psychopathology or level of social functioning, usual correlates of diagnosis.

Faden and Taube (1977) reported that, based on their extensive sampling of non-federal general hospital psychiatric inpatient units, diagnosis was the major determinant of length of stay. Their results also show that the relationship may be complex and mediated by other variables. Note first that the median length of stay for all subjects was 12 days, indicating that the psychiatric units that were studied evidenced rather rapid turnover. The authors found for private hospitals a pattern of association between diagnosis and length of hospitalization very similar to that suggested by the studies discussed above. Specifically, the order of diagnoses by length of hospitalization was: schizophrenia (17.5 days), other psychoses (16.2), childhood disorders (15.9), depressive disorders (15.3), organic brain syndromes (14.9), personality disorders (11.7), neuroses (11.0),alcohol disorders (7.8) and drug disorders (6.3). But the pattern for public hospitals was quite different. The median stay for all patients in the public hospital (8.1 days) was only 60% as long as that of patients in private hospitals (13.5 days). Among the public hospital patients, patients with a diagnosis of schizophrenia or other psychoses had shorter stays (8.7 and 9.3 days) than patients with a diagnosis of depressive disorder, neurosis or childhood disorder (10.5, 13.2 and 22.9 days). Caution should be used in making general inferences because these data are based on psychiatric units of (non-federal) general hospitals. The goals and approaches of the units represented in this

study may bear a very complicated relationship to those of psychiatric or federal hospitals. Psychiatric units in general hospitals might specialize in treating patients whose trouble has a medical etiology, for example, or keep certain patients only until transfer to a psychiatric hospital becomes possible. The main reason for citing this study by Faden and Taube is to demonstrate the interaction of hospital type and diagnosis in relation to length of stay.

More information suggesting that the relationship between diagnosis and length of stay varies from context to context is offered by Kirshner (1982). He reported that seven inpatient units in general hospitals had very different orderings of diagnoses by length of stay: acute schizophrenia, major affective disorder, character disorder and neurosis were each, for at least one unit, the diagnosis associated with the longest stay in hospital. A discussion of this fact among the unit directors suggested several factors which might contribute to the diagnosis-unit interaction: type (public or private) of institution, staffing patterns, availability of outpatient alternatives, theoretical orientation and treatment goals, referral patterns and milieu type.

A few studies have found particular diagnoses to be relevant to length of hospitalization, notably, alcoholism and organicity. Altman et al. (1972) found a correlation of $r=-.25$ ($p<.001$) between alcoholism diagnosis and length of hospitalization for a very large state hospital sample ($n=5743$). Lindemann et al. (1959) reported that, for their cohort of 449 VA hospital patients, only 37% of those with an alcoholism diagnosis had a stay of more than 90 days, compared to 65% of those without an alcoholism diagnosis (chi-square not reported, $p<.001$).

Johnston and McNeal (1967) indicated that successful predictors among clinicians used alcoholism as an indicator of brief (less than three month) hospitalization. These data can readily be seen to reflect the common use of brief hospitalization for drying out.

Organicity has been identified with long inpatient stays in some of the studies mentioned above which considered a broad range of diagnoses. In addition, Altman et al. (1972) reported a correlation of $r=.25$ ($n=5743$, $p<.001$) with hospitalization longer than 90 days.

Symptoms and Mental Status.

Several studies have looked at symptoms and features of mental status as predictors of length of stay. Eskey and Friedman (1959) found that among 200 hospitalized psychiatric patients those rated to have no or only minimal thought disturbance had shorter hospitalizations than those rated to have definite to extreme thought disorder ($t=2.39$, $p<.02$). Similarly, Harrow, Bromet and Quinlan (1974) related thought disorder scores from protocols to length of stay, finding greater disturbance of thought to be associated with longer stay ($r=.22$, n.s.) for 101 admissions. Altman et al. (1972) reported that the presence of judgement problems correlated with longer hospitalization ($r=.18$, $p<.001$) in a sample of 5743 inpatients.

Altman et al. (1972) also found social withdrawal and apathy to be associated with longer hospital stays ($r=.21$, $p<.001$). Johnston and McNeal (1967) reported that the most accurate clinician judges of length of stay used withdrawal as an indicator of long stay. However, the implications of social withdrawal for length of stay may depend on from

whom the patient is withdrawing and the type of illness. Bromet, Harrow and Tucker (1971) published data relating nurses' ratings of how much time patients spent socializing with other patients. This measure should be differentiated from those just mentioned which were clinical judgements based on patient behavior in an interview with a professional. Bromet et al. found that for patients diagnosed schizophrenic more time spent socializing with other patients was associated with longer hospitalization (r=.15, n.s., n=125). An opposite relationship was observed for diagnosed depressives (r=-.14, p<.05, n=171). The investigators imply that it is florid, disorganizing symptomatology which reduces patient to patient interaction as measured here. Such distress and disorganization appear to be good prognostic signs for patients diagnosed schizophrenic, but poor signs for those diagnosed depressive.

This kind of interaction holds for other aspects of the clinical picture as well. For example, turmoil at the time of admission augurs shorter stays for schizophrenic patients and longer stays for depressive patients. The data come from Harrow et al. (1971). Disorientation correlated negatively with length of stay for schizophrenic patients (r=-.20, n.s., n=123) but positively for depressive patients (r=.21, p<.01, n=171). Similarly, anxiety at admission correlated negatively with length of stay for schizophrenic patients (r=-.13, n.s.) but positively for depressive patients (r=.16, p<.05). The presence of anxiety was found to have a small degree of association (r=-.06, p<.001) with shorter stays by Altman et al. (1972), whose sample was broadly representative of diagnostic groups. More distress and more florid

symptomatology in general may be associated with shorter stays for schizophrenic patients. For example, Harrow, Bromet and Quinlan (1974) found hallucinations to be predictive of briefer stays for schizophrenic patients (r=-.27, p<.05, n=123). These findings are consistent with the notion that acute and distressing symptomatology is a good prognostic sign for schizophrenic patients.

In addition, the presence of neurotic sympomatology has been shown by Bromet *et al*. (1971) to be associated with shorter hospitalization for schizophrenic patients but not for depressive patients. This pattern obtained for obsessions (r=-.37 for 125 schizophrenic patients, p<.05; r=-.04 for 171 depressive patients, n.s.), phobias (r=-.41, p<.01; r=.07, n.s.) and hypochondriasis (r=-.35, p<.05; r=-.02, n.s.). Moreover, depressive features were shown to have different implications for length of stay for the two diagnostic groups. More depressed mood correlated positively with length of hospitalization for depressive patients (r=.23, p<.01), but negatively for schizophrenic patients (r=-.08, n.s.); The presence of excessive guilt showed little predictive ability for depressives (r=.02, n.s.) but predicted brief hospitalization for schizophrenic patients (r=-.17, n.s.). However, Altman *et al*. (1972) offer data which seem to imply that signs of severe depression are associated with long hospitalization for psychiatric inpatients as a whole. Specifically, they report a correlation of r=.12 (p<.001) between psychomotor retardation and length of stay.

At this point, the data relating global psychopathology, diagnosis and specific symptoms to length of stay can be summarized. In general, the greater the extent of psychopathology globally judged, the longer

the hospitalization. Also, the more serious the diagnosis, the longer the stay. At the level of gross diagnostic categories, such labels seem to reflect the general extent of dysfunction (with schizophrenic diagnosis indicating the most severe difficulty). However, because hospital units differ in goals and policies, this relationship does not hold for all hospitals. Finally, specific symptoms (such as thought disorder) which are generally associated with more severe psychopathology or more serious diagnoses have been shown to predict longer stays in hospital. Some symptoms (such as depression or disorientation) suggest relatively longer or shorter hospitalization depending on the diagnostic context. Altogether, when interactions (diagnosis-hospital policy and symptom-diagnosis) are taken into account, data on psychopathology, diagnosis and symptomatology are consistent in their relation to length of hospitalization.

Dangerousness to Self or Others.

Dangerousness to self and dangerousness to others are regularly criteria for psychiatric commitment, so it is reasonable to examine the relationships of suicidal and assaultive behavior to length of hospitalization. Gove and Fain (1975) related a three point suicide scale (1 = no suicidal threats or behavior, 2 = suicide threats, 3 = suicide attempts) to a five-point length of stay scale. They found a substantial tendency (gamma=-.38, $p<.05$) for suicidal individuals to have shorter stays. Their sample included 210 state hospital patients. Greenley (1972) reported a similar finding with a sample of 125 records of state hospital patients. He looked at the relationship between

"suicidal tendencies" and a five-point length of hospitalization scale, and reported a significant association (gamma=-.32, $p<.05$). However, he also noted that this relationship disappears within diagnostic groups, and that most of the suicidal patients were in the least disturbed groups (neuroses and transient situations adjustments). Munley et al. (1977) conducted a study on a sample that included few of these less serious diagnoses (more than 70% of the 181 VA patients were psychotic) and found a minimal association between history of suicidal behavior and length of stay ($r=.07$. n.s.). Bromet et al. (1971) considered schizophrenic and depressive patients separately, and looked at the relationship between "thoughts about suicide" and length of stay. Among schizophrenic patients, suicidal thoughts were associated with shorter stays ($r=-.15$, n.s., $n=125$), but among depressive patients, such thoughts were associated with longer stays ($r=.21$, $p<.05$, $n=171$). Thus it appears that suicidal thoughts and actions may be a good prognostic sign for certain diagnostic groups but a poor sign for others, and that they may be confounded with severity of dysfunction in their association with length of hospitalization. Suicidal thoughts and actions seem to offer little as predictors of length of stay.

Two studies which related assaultive behavior to length of stay found a slight tendency for assaultive patients to have longer stays. Gove and Fain (1975) used a three-point assaultive behavior scale (1 = no assaultive threat or behavior, 2 = threats of assaultive behavior, 3 = assaultive behavior) which correlated with a five-point length of stay scale (gamma=.18, no significance level reported, $n=224$ state hospital patients). Greenley (1972) related a similar five-point length of stay

scale to whether a patient was assaultive, destructive or homicidal ("dangerousness"), finding a small association (gamma=.10, n.s., n=125 state hospital patients). The same study also looked at psychiatrists' judgement of "potential dangerousness" as a predictor of length of hospitalization and found a smaller association (gamma=.05, n.s., n=59).

Voluntary and Involuntary Admission.

The legal status of a patient at admission has been found to correlate with length of stay. Altman et al. (1972) found that legal commitment was associated with longer stays (r=.25, p<.001, n=5743) and voluntary status with shorter stays (r=-.23, p<.001). Munley et al. (1977) found a similar association between history of previous commitment and length of stay (r=.24, p<.05, n=202 VA patients). Stoffelmayr, Roth and Parker (Note 2) considered the average length of stay for voluntary patients and two groups of involuntary patients (those who were eventually committed and those who changed to voluntary status). The committed group differed significantly (p<.001) from the other groups. Those who initally came to the hospital as voluntary patients and those who switched to voluntary status had shorter stays (38.1 days, n=220 and 37.6 days, n=88, respectively) than committed patients (59.3 days, n=95). (Some of the subjects in that study are included in the present study.) Several other studies examined variables that may be associated with legal status at admission. For example, Doherty (1976) found that patients who were more compliant with regard to treatment unit expectations had shorter stays (specific correlation not reported (n=55 private hospital patients). It seems

reasonable to speculate that such compliance might be more likely in voluntary patients than committed patients. Committed patients are also more likely to be deemed legally incompetent. Lindemann et al. (1959) found that for their sample of VA patients (n=457), 88% of the legally incompetent were in the hospital more than 90 days, but only 33% of the legally competent had stays of 90 days or more (p<.001, chi-square not reported).

Social Circumstances and Resources.

Another variable that has been shown to be relevant to length of stay is the living situation of the patient prior to entering the hospital. Altman et al. (1972) found that patients transfering from another psychiatric hospital tended to have longer stays (r=.25, p<.001), as did patients arriving from a controlled living situation (r=.17, p<.001).

The extent to which the patient's family is available as a supportive resource has been shown to relate to length of hospitalization. Gove and Fain (1975) rated families' wish to help the patient on a three point scale and found that patients with more involved and supportive families had shorter inpatient stays (gamma=-.39, no significance level reported, n=224 state hospital patients). Greenley (1972) asked the closest available relative of each patient whether he or she wanted the patient to be in the hospital. The patient's actual length of stay tended to be longer when the answer was yes (gamma=.78, p<.001, n=80). Wood et al. (1962) found that patients whose families were more involved with them had shorter stays (n=50, no

correlation reported). Also, Johnston and McNeal (1967) found that clinicians who were accurate predictors of length of hospitalization used lack of interest on the part of the family as an indicator of long hospitalization.

Completeness of Hospital Record.

Finally, the completeness of a patient's record has been shown to be correlated with length of stay. Altman et al. (1972) reported correlations between missing data and length of stay (from $r=.14$ to $r=.18$, $p<.001$), with the variation apparently depending on which data were missing.

Summary of Literature Reviewed

An exploration of the relationship between patient characteristics and length of psychiatric hospitalization must acknowledge that powerful forces outside the individual patient which bear on length of stay. Hospital units vary widely in how long their patients tend to stay. Moreover, changes in policies or circumstances on a particular unit may cause changes in the average length of stay of its patients. Many features of units which have a bearing on the unit average length of stay have been identified: hospital size, staffing ratio, goals, decision making procedures, patterns of interaction between staff and patients as well as within those groups, and the efficacy of the unit's connections with aftercare and placement services. The influence of hospital unit parameters on patients' time in hospital has been demonstrated further by studies in which average length of stay has been

manipulated by making changes in hospital policies and procedures.

Individual differences among patients have also been shown to influence length of stay. Though length of stay can apparently be controlled by changes in ward parameters, patient-specific data stand out in the process of clinical planning. Some of the patient variables found to bear on length of stay are age, sex, race, work history, education, marital status, interest and involvement of immediate family, measures of social competence, previous hospitalization, assessed level of psychopathology, diagnosis, assaultiveness and involuntary status. None of these patient variables has proven to be an especially powerful predictor, and many seem related to length of stay primarily under certain circumstances (e.g., especially for patients diagnosed schizophrenic).

The studies of patient specific influences on length of stay, though numerous, do have some collective failings. No study proposes a conceptual model intended to organize the various aspects of patient specific influences on length of stay. Moreover, most of the studies consider certain variables in isolation. Past studies have tended not to identify sub-populations for which certain indicators might be especially predictive. Finally, the studies of patient features do not try to take into account powerful sources of variance at the unit level which might obscure variance related to patient influences.

THE CURRENT STUDY

This study examines the relationship of patient variables to the patient's length of hospitalization. At a small university-affiliated state hospital, data were collected about who the patient was, what his social and psychiatric history had been and under what circumstances he entered the hospital. I now propose a simple conceptual model of individual differences among patients which influence length of hospitalization, then indicate how the data might relate to the model. Correlations of the relevant measures with length of stay are presented. Regression analysis is used, first to determine whether each measure makes an independent contribution to the prediction of length of psychiatric hospital stay, then to identify the measures which are relatively stronger predictors and of more practical import. Hypotheses that relationships of certain patient characteristics to length of stay vary by gender, diagnosis or legal status are tested. The utility of separate prediction models for subgroups is considered. Next, an alternate criterion, intended to have less variance due to unit-wide trends is defined and correlated with the predictors. Finally, relationships to length of stay of some measures not in the model are noted.

A Model Relating Patient Variables to Length of Stay

I will now describe a model of how patient characteristics might bear on length of stay and indicate how this model would be reflected in relationships with the study measures. I suggest that the length of time a patient spends in a psychiatric hospital is a function of these four patient-specific variables: available niche, chronicity/dependency, severity of illness and treatment alliance. These factors are not entirely independent because social competency broadly conceived bears on each of them.

When a patient has an available responsible social niche, he has someplace to go, someplace he needs to be. If the patient has a family, home or job he is eager to return to, he will be motivated to leave the hospital as soon as possible. If his family and boss want him to resume his roles in their spheres, they will support his speedy discharge. In sum, it matters whether the patient and important others in his life believe that, as soon as the patient's functioning is adequate, there is a better place for him to be than in the hospital. In addition, when a patient has a suitable place to which to return, there will be no delays while placement is arranged. Support for this position comes from numerous studies cited above showing the association between job and marital history and length of stay. In addition, Davis, Dinitz and Pasamanick (1974) found that effective role involvement was a correlate of success in alternative treatment for schizophrenic patients.

The second factor in the model is chronicity/dependency. The more extensive a patient's past periods of hospitalization have been, the

more likely it is that a new episode of hospitalization will be long. Note that extensive periods of psychological trouble do not necessarily mean long hospital stays. But when a patient becomes dependent on the hospital, and on mental health services in general, long hospitalizations do become the rule. Research showing the relationship between previous hospitalization and length of stay has been detailed above.

Third, the patient's ability to form a treatment alliance with the hospital has a bearing on duration of stay. A patient demonstrates this ability when he uses the hospital effectively to help him regain adequate functioning despite the the upsetting and often coercive aspects of the experience. The patient must be able to recognize and comply with certain social requirements in order to avoid struggles which prolong hospitalization, such as refusing to agree to treatment when it is inevitable or causing a stir on the ward which alienates the staff and brings a repressive response. Studies indicating that committed legal status is associated with longer stays have been reviewed earlier. Davis et al. (1974) also noted a relationship between successful alternative treatment for schizophrenics and a cooperative attitude on the patient's part.

Finally, the severity of psychological dysfunction has a direct relationship to length of hospital stay. It is reasonable to expect that acute (however florid) trouble in a context of a more or less undisturbed life would result in brief hospitalization. More profoundly extensive disturbances, however, do not allow for quick recovery of well-being and independent functioning. Trouble of this sort is often

labeled schizophrenia. Data showing that severity of psychological trouble is related to length of stay were examined above.

The factors just described are hypothetical abstractions. There are no pure measures of them. In making predictions about the data, the abstract model must be fitted roughly to imperfect measures. However, though it would be desireable to make a more direct test of the model, predicted and verified relations of available measures to length of stay are of great practical interest.

Study Measures Related to the Model

The existence of an available niche will be indicated by measures sugesting current responsible social involvements. Both measures reflecting this factor are expected to show a stronger relationship to length of stay for patients between 30 and 50 years of age, when life responsibilities tend to be the greatest. One measure is whether the patient is currently married, which may reflect a more compelling pull from the hospital for women than men, given the typical distribution of family responsibilities. The other measure, currently self-supporting, on the other hand, seems likely to imply an inducement to return to the community for men and women equally.

Whether a patient has had any previous hospitalizations and how many a patient has had are logical indices of chronicity and dependency on psychiatric institutions. Measures of hospitalization duration may be better indicators of institutional dependency, but have the disadvantage of being less reliable because the data are harder to collect. The influence of this sort of dependency should be easier to

discern among patients who choose to be in the hospital. Patients who are committed may have long stays but this is probably not due to dependency (Stoffelmayr, Roth and Parker, Note 2).

The best indicator of severity of dysfunction available in this study may be a diagnosis of schizophrenia. Among schizophrenic patients, a high level of emotional withdrawal is a further indication of pervasive psychological trouble (Bromet, Harrow and Tucker, 1971). On the other hand, indicators of psychotic process reflect relatively serious trouble among patients not diagnosed schizophrenic (Bromet et al, 1971). In this study, high ratings of thought disorder and the use of anti-psychotic medication are considered indicators of psychotic process.

The inability to form a treatment alliance is indicated by committed legal status, which reflects a patient's unwillingness to accept hospital treatment. The injection of anti-psychotic medication in a hospital setting almost always means that oral medication was refused, and therefore suggests a failure of treatment alliance. A patient whose admission was partly the result of aggressive behavior might be expected to be resistant to treatment. Finally, the higher a patient is rated on hostility/uncooperativeness, the poorer we might expect his treatment alliance to be.

Variation in Hospital Influences on Length of Stay

It is clear from the literature reviewed above that aspects of the hospital itself can be powerful influences on a patient's length of stay. Past research at the site of the present study (Stoffelmayr and

Moreas, Note 1) has shown that the average length of stay for patients discharged varies from month to month. This variation might be in part due to changes in the decision-making staff and changes in hospital policy as well as to certain parameters of the ward such as staffing levels and availability of beds. The effect of such influences is to blur or mask the impact of patient characteristics on length of stay. If an expected length of stay could be defined for a given unit and time period, then a deviation score (actual length of stay less expected length of stay) might reflect more robustly the impact of patient characteristics on length of stay. A feasible way of computing such an expected value is to average the lengths of stay of patients discharged from the same unit at about the same time. If this expected length of stay does reflect systematic hospital influences on length of stay, then the difference score should correlate more highly with the predictors described above than does the patient's actual length of stay.

Specific Hypotheses

Below are detailed specific expectations of the data based on the past research on patient characteristics and length of stay and the model suggested earlier. Variables expected to correlate with length of hospital stay are listed by categories according to this model. Also indicated are the expected sign of the correlation and any conditions which might bear on the magnitude of the association.

A. Available Niche (correlations negative)

   1. Being currently married, especially for women, especially between 30 and 50 years old
   2. Being currently self-supporting, especially between 30 and 50 years old
   3. Living with conjugal family, especially for women, especially between 30 and 50 years old

B. Chronicity/Dependency (correlations positive)

   1. Any previous hospitalization
   2. Number of past hospitalizations, especially for voluntary patients
   3. Total duration of past hospitalization, especially for voluntary patients

C. Severity of Dysfunction (correlations positive)

   1. Schizophrenia diagnosis
   2. High thought-disorder rating, especially patients without schizophrenic diagnosis
   3. Use of anti-psychotic medication, especially for patients without schizophrenic diagnosis
   4. High emotional withdrawal rating for patients with schizophrenic diagnosis

D. Inability to Form Treatment Alliance (correlations positive)

   1. Committed legal status
   2. Aggressive action associated with admission
   3. High hostility/uncooperativeness ratings

4. Use of injected anti-psychotic medication

E. Deviation from Expected Length of Stay

A patient's expected length of stay will be computed as the average length of stay of patients discharged during a four week interval centered on a patient's discharge date. This expected value will be understood as being a function of varying policies and circumstances on the ward. The difference between a patient's length of stay and his expected length of stay will correlate more highly with the predictors listed above than will the patient's actual length of stay.

F. Prediction Model

1. Predictors from each of groups A, B, C and D will contribute to the prediction of length of stay independently of the other three groups.

A list of all variables used in the model, showing numbers of subjects, means and standard deviations can be found in the Appendix, Table A.

METHOD

Setting

This study was conducted at a small university-affiliated state hospital serving a population of about 600,000. Both voluntary and involuntary patients were admitted. The hospital consisted of three wards. Two of these were admission and treatment wards, to which patients were haphazardly assigned. The third was a convalescent ward. The subjects in this study included only patients who were discharged from one of the two admission wards.

Subjects

The 665 subjects of this study include patients discharged from the two admission units described above (48% from one unit, 52% from the other). Data were collected during two periods, from January 28, 1978 to February 28, 1979 and from February 1, 1980 to September 30, 1980. Special efforts were made to insure completeness and accuracy of data. All measures were obtained for all subjects except for data collected only on subsets of the sample (medication data, n=262; symptom ratings, n=110).

The mean age of these subjects was 34.4 years. Subjects ranged from 17 to 91 years of age, but 80% were between 18 and 50 years. About half (52%) were male. By far the majority of the subjects were white (82%); 17% were black and 1% other minorities. With regard to social class: 15% had Hollingshead-Redlich codes of 1, 2 or 3; 24% had H-R

codes of 3 or 4; and 61% had H-R codes of 6 or 7. The mean level of education was 11.6 years, with 63% having completed high school and 11% having completed college. Only 17% were currently self-supporting, but 79% had at some time held some kind of job. Twenty-one percent were currently married, but 54% had at some time been married.

The subjects represented a wide range of psychiatric histories. Sixteen percent were first admissions, 54% had three or fewer hospitalizations, and 84% had eight or fewer hospitalizations. In terms of duration of past hospitalization, 50% had three months or less, 76% a year or less, and 86% two years or less.

Voluntary admissions made up 45% of the sample. Twenty-one percent were committed and another 15% who came to the hospital involuntarily signed-in voluntarily when given the opportunity to do so. The remaining 19% include mostly patients who were transferred, who were on a continuing order, and patients who were not certified. More than half (56%) of the subjects were diagnosed schizophrenic. Eighteen percent were diagnosed as having an affective disorder. The mean length of stay was 33.5 days, 12% staying two days or fewer, 26% seven days or fewer, 63% thirty days or fewer, and 82% sixty days or fewer.

The unit of analysis in this study is the admission, not the individual. Some patients are represented more than once in the sample, some as many as four times. A total of 514 different individuals are represented in the data.

Measures

A listing of all measures in this study, including sample sizes, means and standard deviations, is found in the Appendix, Table A and Table B.

Criterion measure.

The criterion measure used in this study is a rescaling of the actual number of days a patient spent in the hospital. There were two reasons for rescaling this measure: first, to reduce the influence of very long hospitalizations on correlations; second, to group patient stay lengths into qualitatively meaningful categories. The categories were: 1 or 2 days (12%), 3 to 7 days (14%), 8 to 30 days (37%), 31 to 60 days (19%), more than 60 days (18%). This rescaled measure of length of stay correlated very highly with actual length of stay (r=.79).

Adjusted criterion measure.

As acknowledged above, changes in hospital ward parameters can influence the ward average length of stay powerfully. It was also noted that average length of stay varied over time on the units on which the the study was conducted. In order to highlight the patient specific influences on length of stay, I thought it desireable to take into account variation in unit-wide influences on length of stay. The average length of stay of patients discharged during a given period of time was taken as an indication of prevailing unit pressures toward longer or shorter hospitalizations. Using this logic, I computed an alternative, adjusted criterion measure. First, it was necessary to compute the average length of stay for patients discharged from a

patient's unit during the period from two weeks prior to the patient's discharge data to two weeks after it. This average was taken as an estimate of the prevailing unit tendency toward long or short stay and was subtracted from a patient's actual length of stay. The resulting difference was intended as an indicator of patient-specific influences on length of stay.

Demographic data and social circumstances.

Data about a patient's social history and present social circumstances were taken either from the patient's hospital record or from a social history addendum. These addenda were compiled by graduate student research assistants primarily through patient interviews, though data were obtained from family members or other sources when necessary. Some measures, though not involved in the specific hypotheses of this study, are noted because of their potential relevance.

The patient's age at the time of hospitalization, sex and race were recorded. Because only 1% of the sample was neither caucasian nor black, the race measure was simplified to white or non-white. Two measures represented marital history: whether the patient was currently married and whether he or she had ever been married. Two distictions served as a rudimentary work history: whether the patient was currently self-supporting and whether the patient had ever held a job of any kind. Also included were the number of years of education and a Hollingshead-Redlich occupation status code. (For married women who were never employed, the husband's occupation code was used.)

It was noted whether a patient had relatives living in the area as well as the patient's current living arangements. The categories of

living arrangements were: living in a controlled environment (e.g., half-way house or hospital), living alone, living with parents, living with conjugal family, and living with other family members or friends.

History of psychiatric trouble.

Measurement of past psychiatric difficulties was based primarily on past hospitalization: whether a patient had any past hospitalizations, how many hospitalizations, and total duration of past hospitalizations. Also available were data on whether a patient had any history of suicide attempts, aggressive actions or arrests.

Features of the current hospitalization.

Most patients' legal status fell into one of three categories: (1) brought to the hospital involuntarily and subsequently committed, (2) brought to the hospital involuntarily but agreed sign in voluntarily, and (3) came to the hospital voluntarily. Also reported were whether the patient had been suicidal or aggressive toward persons or property during the events leading up to the admission. Psychiatric diagnostic judgements about the patient were recorded for the most important categories: schizophrenia, major affective disorder (manic), and major affective disorder (depressed).

The occurrence of two kinds of in-hospital events, having visitors and being secluded, was noted. Seclusion was defined as locking a patient alone in an empty room by order of a physician. This was done when a patient was a danger to himself or others or when a patient was very disturbing to other patients or to staff. Whether a patient had visitors was recorded only during the first of the two data collection periods. Of the 403 patients of that period, 72% had visitors.

Medication data were compiled from the pharmacist's records only during the second period of data collection. Of the 262 patients in the second data collection period, there were pharmacy medication records for 189. Of the 73 for whom there was no medication data in the pharmacist's records, 37 were in the hospital only one or two days and only 26 were in the hospital more than a week. These 73 patients were assumed to have received no medication. In this study, only whether or not a patient received a certain kind of medication was considered. Types of medication included were: anti-psychotic medication, injected anti-psychotic medication, lithium, anti-depressant medication, anti-anxiety agents, and sedatives.

Symptom ratings.

A subset of the study patients was rated on the Brief Psychiatric Rating Scale or BPRS (Gorham and Overall, 1961; Overall and Gorham, 1962). This assessment device consists of sixteen 7-point subscales with well-defined anchor points, and intended for use as a comprehensive yet efficient index of major symptom characteristics. Hedlund and Vieweg (1980) summarized the results of 25 BPRS factor analyses reported in eight articles. A variety of large samples and types of analysis were represented. A structure of four factors of three items each was found to be consistent across the studies, though some analyses included an additional factor or additional items within a factor. The four factors and their regularly included items were: Thinking-Disorder (conceptual disorganization, hallucinatory behavior, unusual thought content); Withdrawal/Retardation (emotional withdrawal, motor

Table 2

Confirmatory Analysis of BPRS Factors

	Factors			
	A	B	C	D
A. Thinking-Disorder	-	.18	.20	.53
Conceptual disorganization	.61	.18	.20	.47
Hallucinatory statements	.60	.20	.09	.40
Unusual thought content	.64	.08	.21	.46
B. Withdrawal/Retardation	-	-	.38	.31
Emotional withdrawal	.17	.60	.25	.28
Motor retardation	.15	.62	.34	.26
Blunted affect	.14	.68	.37	.23
C. Anxious Depression	-	-	-	.22
Anxiety	.26	.25	.56	.34
Guilt feelings	.20	.21	.50	.11
Depressive mood	.02	.44	.54	.09
D. Hostility/Uncooperativeness	-	-	-	-
Hostility	.50	.10	.10	.70
Suspiciousness	.41	.37	.37	.51
Uncooperativeness	.42	.29	.09	.64

Note. Where an item is correlated with its own factor, the item is not included in the factor score.

retardation, blunted affect); Anxious Depression (anxiety, guilt feelings, depressive mood); Hostility/Uncooperativeness (hostility, suspiciousness, uncooperativeness).

Confirmatory factor analysis showed these factors to correspond well to the factor structure of patient ratings done in this study. The results of this analysis are summarized in Table 2. The correlations of

items with the sum of the other items in the factor (item-total correlations) for each of the four factors are uniformly high, and the correlations of the items with other factor totals are consistently smaller. The factors are clearly not orthogonal, but this is consistent with clinical expectations. For example, it is not surprising that Withdrawal/Retardation correlates substantially with Anxious Depression.

Some additional symptom rating items were available which fit two of the clusters. Three items were added to the Thinking Disorder factor (disorientation, distractibility, hallucinatory behavior) and one item was added to the Anxious Depression factor (helplessness/hopelessness). Also, a conceptually meaningful fifth factor appeared in the symptom ratings on further analysis. This factor, Mania, comprises four items: grandiose statements, excitement, elated mood, hyperactivity. The added items and new factor are included in the factor analysis summary in Table 3. The factor structure as shown in this table was used in the current study. The standard score coefficient alpha for each of the five factors was quite respectable: Thinking-Disorder, .88; Withdrawal/Retardation, .79; Anxious Depression, .79; Hostility/Uncooperativeness, .78; Mania, .79.

Symptom ratings were made by non-professional ward staff after being trained by graduate assistants. Weekly ratings were made of each patient during the second data collection period. Only a patient's first rating was used in this study. For this reason no direct reliability test was available. However, the validity of the ratings might be inferred from the fact that the expected factors were replicated in the ratings. Efforts were made to insure that each

Table 3

Factor Structure of BPRS Ratings

	Factors				
	A	B	C	D	E
A. Thinking-Disorder	-	.29	.21	.51	.48
Conceptual disorganization	.72	.18	.15	.47	.51
Hallucinatory statements	.69	.20	.05	.40	.36
Unusual thought content	.62	.08	.15	.46	.43
Disorientation	.67	.37	.27	.37	.20
Distractibility	.68	.31	.27	.35	.45
Hallucinatory behavior	.72	.23	.12	.37	.34
B. Withdrawal/Retardation	-	-	.38	.31	-.17
Emotional withdrawal	.26	.60	.25	.28	-.16
Motor retardation	.25	.62	.33	.26	-.10
Blunted affect	.21	.68	.39	.23	-.16
C. Anxious Depression	-	-	-	.19	.05
Anxiety	.32	.25	.59	.34	.20
Guilt feelings	.22	.21	.52	.11	.17
Depressive mood	.11	.44	.64	.09	-.09
Helplessness/hopelessness	.03	.29	.65	.07	-.11
D. Hostility/Uncooperativeness	-	-	-	-	.36
Hostility	.45	.10	.08	.70	.39
Suspiciousness	.42	.37	.35	.51	.19
Uncooperativeness	.40	.29	.05	.64	.32
E. Mania	-	-	-	-	-
Grandiose statements	.49	-.07	.08	.33	.47
Excitement	.47	-.06	.13	.47	.67
Elated mood	.29	-.23	-.07	.09	.60
Motor hyperactivity	.22	-.17	.03	.23	.68

Note. Where an item is correlated with its own factor, the item is not included in the factor score.

patient was rated within 48 hours of admission, but the cooperation of the non-professional ward staff could not always be enlisted. Only ratings completed within seven days of admission were used in this study. Some patients were never rated at all, usually because the patient's stay was very brief. A total of 110 initial ratings of patients met these criteria.

Plan of Data Analysis

First, correlations of individual predictors with the criterion will be examined. Any measures which do not correlate significantly with the criterion will be dropped from the analysis at that point. Identification of measures serving as effective predictors will proceed as follows. Each potential predictor will be entered last in a regression including all the other predictors. If the entry of the measure into the regression is statistically significant ($p<.05$), it will be included in the next step. At this point, the chosen predictors will be entered into a regression equation, the order of entry being determined by the size of the partial correlation with the criterion. These regression analyses will be done first for the set of predictors on which there are data on all subjects. If any measures based on a subset of the sample prove to have significant correlations with the criterion, they will be tested for contributions independent of the measures tested on the whole sample. If any show a statistically significant contribution to prediction beyond that of the already identified predictors, they will be included in a regression in which order of entry is statistically determined. This method of analysis is

understood to be conservative.

Then, hypotheses about differential prediction within subgroups will be tested. Correlations of the predictor with the criterion will be converted to Fisher z-scores and compared by t-test. Statistically significant results will be considered in terms of any implications for using a different prediction model for different subgroups.

Next, the alternative criterion described earlier will be correlated with several of the stronger predicting measures. These correlations will be compared with the correlations of the primary criterion with the same predictors. The differences between the correlations of predictors with the alternate and primary criteria will be tested for statistical significance by converting the correlations to Fisher z-scores and comparing by t-test. If the alternate criterion does in fact correlate more highly with these individual predictors than does the primary criterion, the alternate criterion will be regressed on the set of identified predictors.

Finally, correlations of the criterion with measures available in the study but not involved in the prediction model will be presented.

RESULTS

Predicted Correlations with Length of Hospitalization

Table 4 shows the correlations with length of hospitalization of the measures specified in the model described above. (The matrix of correlations among predictors is in the Appendix, Table C.) At this point, measures which show negligible association with length of stay or which are demonstrably redundant will not be included in further testing of the prediction model.

The measures intended to tap the availability of a social niche each correlated with length of stay in the expected direction and, though the correlations were small, each was statistically significant. Living with conjugal family, becaused it proved to be almost completely redundant with being currently married (r=.86, p<.001), will not be included in further testing of the model.

Whether a patient had been previously hospitalized at all stood out as the best representative of the chronicity/dependency variable (r=.18, p<.001). Each of the past hospitalization measures was associated with length of stay in the expected direction, but the sizes of the relationships were surprizingly small for number of past hospitalizations (r=.10, p<.01) and duration of past hospitalization (r=.04, n.s.).

Measures thought to reflect severity of dysfunction all correlated in the expected direction. However, the two symptom ratings

Table 4

Correlations of Model Predictors with
Length of Psychiatric Hospitalization

Measure	Correlation	
Available Niche		
Currently married	-.12***	
Currently self-supporting	-.09**	
Living with conjugal family	-.07*	
Chronicity/Dependency		
Any previous hospitalization	.18***	
Number of previous hospitalizations	.10**	
Total months of previous hospitalization	.04	
Severity of Dysfunction		
Schizophrenia Diagnosis	.25***	
Thought-disorder rating	.13	(n = 110)
Emotional withdrawal rating	.04	(n = 110)
Received anti-psychotic medication	.48***	(n = 262)
Treatment Alliance		
Committed legal status	.40***	
Aggressive action associated with admission	-.21***	
Hostility/uncooperativeness rating	.14	(n = 110)
Received injected anti-psychotic medication	.38***	(n = 262)

Note. n = 665 unless otherwise indicated.

* p<.05
** p<.01
*** p<.001

(thought-disorder and emotional withdrawal) proved to be relatively weak predictors of length of hospitalization (r=.13, n.s. and r=.04, n.s., respectively). Comparatively more powerful as predictors of length of stay were schizophrenia diagnosis (r=.25, p<.001) and having received anti-psychotic medication (r=.48, p<.001). These two measures will be included in the prediction model. Because the medication data are available for only a subset of the total sample, two models will be considered in parallel: one based on the whole sample but not using the medication data, the other based on a subset of the sample but including the medication data.

Of the measures considered under treatment alliance, three of the four measures correlated with length of stay in the expected direction, committed legal status showing the strongest relationship (r=.40, p<.001). Patients who received injected anti-psychotic medication had longer stays (r=.38, p<.001). Both of these measures will be considered in further testing of the predictive model. Patients rated as more uncooperative, as expected, had longer hospitalizations, but this relationship was relatively weak (r=.14, n.s.) and this measure will not be included in further analysis. Of all the hypotheses tested, only the relationship of length of stay with aggressive action associated with admission was found to be opposite the direction expected (r=-.21, p<.001). This variable cannot be considered an indicator of lack of capacity for a treatment alliance but will be entered into the prediction model to determine if it makes a unique contribution.

To summarize this section, all but one of the posited length of stay predictors correlated with the criterion in the expected direction.

The measures showing relatively strong assosciation within each variable group will be included in further examination of the prediction model. These measures are: currently married, currently self-supporting (available niche); any previous hospitalization (chronicity/dependency); schizophrenia diagnosis, recieving anti-psychotic medication (severity of dysfunction); committed legal status, recieving injected anti-psychotic medication (treatment alliance). Aggressive action (toward persons or property) associated with a patient's admission did correlate substantially with the criterion, but not in the expected direction.

Regressions on Length of Hospitalization

Each of the measures just identified as potential predictors will be tested to see if it makes a statistically significant independent contribution to multiple correlation with length of hospitalization. This was done by entering each into a regression on length of stay after all the others had been entered. Of the measures collected on all subjects, only four proved to make a statistically significant ($p<.001$) unique contribution to the prediction of length of hospitalization: any previous hospitalization, schizophrenia diagnosis, committed legal status, and aggressive action associated with admission. These four measures were entered into the regression on length of stay summarized in Table 5. In this regression, variables were entered in order of size of partial correlation with the predictor at each step. Although each measure makes a statistically significant contribution, the last variable entered (any previous hospitalization) makes a small

Table 5

Summary of Regression on Length of Hospitalization
Using Predictors Available on All Subjects

Step	Variable Entered	F to Enter	R	Partial Correlations between Variables not in Equation and Criterion COMM	AGGR	SCHZ	PREH	Order of Partial
0				.40	-.21	.25	.18	0
1	Committed Legal Status (COMM)	127.2*	.40*		-.25	.23	.18	1
2	Aggressive Action Associated with Admission (AGGR)	44.6*	.46*			.22	.18	2
3	Schizophrenia Diagnosis (SCHZ)	35.0*	.50*				.14	3
4	Any Previous Hospitalization (PREH)	13.8*	.52*					

* $p<.001$

substantive contribution. The next to last variable entered (schizophrenia diagnosis) makes a small contribution to the prediction of length of stay. The important predictors appear to be committed legal status (the strongest), aggressive action associated with admission and schizophrenia diagnosis.

The process just described was repeated on a subset of subjects on whom medication data had been collected (n=262). The two measures being tested were received anti-psychotic medication and received injected anti-psychotic medication. These two measures were entered last into regressions including any previous hospitalization, schizophrenia diagnosis, aggressive action associated with admission, and committed legal status. Only received anti-psychotic medication made a statistically significant independent contribution to predicting the criterion beyond that made by the other measures combined. Received anti-psychotic medication was then entered into a regression with the four predictors from Table 5, order of entry determined again by partials. This regression is summarized in Table 6. Anti-psychotic medication and committed legal status were found to be about equal in predictive power and stronger than the other predictors. Aggressive action associated with admission was the next best predictor, followed by schizophrenia diagnosis, which made a small unique contribution. Any previous hospitalization failed to make even a statistically significant unique contribution to the regression.

Differential Prediction of Length of Stay by Subgroup

Tables 7 and 8 summarize the findings regarding hypothesized differences between correlations of measures with length of hospitalization for certain subgroups. These differences were compared by t-test after the correlations were converted to Fisher z-scores. Only one pair of correlations proved to be different at a statistically significant level. The difference by subgroup in prediction of length

Table 6

Summary of Regression on Length of Hospitalization
Including Anti-Psychotic Medication Measure

Step	Variable Entered	F to Enter	R	Partial Correlations Between Variables not in Equation and Criterion APMD	COMM	AGGR	SCHZ	PREH	Order of Partial
0				.48	.46	-.36	.31	.19	0
1	Anti-Psychotic Medication (APMD)	79.0*	.48*		.41	-.29	.19	.10	1
2	Committed Legal Status (COMM)	52.2*	.60*			-.33	.18	.07	2
3	Aggressive Action Associated with Admission (AGGR)	32.0*	.66*				.21	.08	3
4	Schizophrenia Diagnosis (SCHZ)	11.5*	.68*					.06	4
5	Any Previous Hospitalization (PREH)	.8	.68*						

* $p<.001$

of stay occurred for the measure received anti-psychotic medication. As hypothesized, the correlation with length of hospitalization for patients diagnosed schizophrenic was smaller than that for other patients ($r=.26$ and $r=.60$; $t=3.390$, $df=663$, $p<.002$). Since presence or

Table 7

Differential Prediction of Length of Psychiatric Hospitalization by Subgroups: Social Niche Measures

Measure	Correlations by Subgroup			
	Sex		Age	
	Female	Male	Mid-life	Other
Currently married	-.08 n=319	-.17 n=346	-.10 n=253	-.14 n=412
Currently self-supporting	-.09 n=319	-.09 n=346	-.09 n=253	-.09 n=412
Living with conjugal family	-.09 n=319	-.06 n=346	-.09 n=253	-.05 n=412

Note. None of the differences between subgroup correlations were statistically significant.

absence of the schizophrenia diagnosis is already an element of the predictive model, it does not seem necessary to form separate models for patients diagnosed schizophrenic.

Alternative Measures of Length of Hospitalization

In Table 9 are correlations of several predictors with some alternative measures of length of psychiatric hospitalization. The first criterion measure listed, days in hospital rescaled, is the primary criterion measure for this study. As anticipated, this measure correlates more highly with the predictors than does the actual number of days a patient spent in the hospital. Table 9 also includes

Table 8

Differential Prediction of Length of Psychiatric Hospitalization by Subgroups: Chronicity/Dependency and Severity of Dysfunction Measures

Measure	Correlations by Subgroup			
	Legal Status		Diagnosis	
	Voluntary	Other	Schizophrenia	Other
Number of previous hospitalizations	.03 n=297	.18 n=368		
Duration of previous hospitalizations	.01 n=297	.07 n=368		
Thought disorder rating			.14 n=64	.10 n=46
Emotional withdrawal rating			.07 n=64	-.08 n=46
Received anti-psychotic medication			.26* n=147	.60* n=115

Note. Significance levels are for differences between subgroup correlations.

* $p<.002$

information on two deviation-from-expected-stay measures. The expected stay for a patient was defined as the average stay of patients discharged from the same unit within two weeks before or after the patient's discharge. A deviation measure was computed using this value (days in hospital less expected stay). As exemplified by the data in Table 9, this deviation measure did not, as hoped, correlate more highly

Table 9

Correlations of Alternate Criterion Measures with Several Predictors

Criterion Measures	Predictors		
	Schizophrenia Diagnosis	Any Previous Hospitalizations	Involuntary Legal Status
DH (rescaled)	.25	.18	.40
DH	.17	.14	.29
DH - ES	.14	.11	.28
DH (rescaled) - ES (rescaled)	.22	.15	.37

Note. DH refers to days in hospital; ES refers to expected stay.

with patient-specific measures than did the criterion based solely on a patient's time in hospital. When the deviation measure was created from rescaled length of stay data, it correlated more highly with predictors than did the unscaled deviation measure, but not as highly as with rescaled days in hospital. A square-root transformation of days in hospital was also tried in constructing a deviation from expected stay measure, but this also failed to show enhanced relationships to predictors. The rescaled version of days in hospital remains the best (that is, most predictable) of the criterion measures.

Correlations with Length of Stay of Measures not in the Model

Some patient-specific data were collected which were not included in the model. These data include demographic, social history, living arrangement, medication, diagnosis, symptom rating, admission circumstance and in-hospital event measures. Correlations of these measures with length of hospitalization are shown in Tables 10 and 11.

Of the demographic measures only social class showed even a modest significant correlation with length of stay (r=-.09, p<.01), indicating that higher SES patients tended to stay longer than lower SES patients. Several social history measures proved to be significantly associated with length of hospitalization: ever worked (r=-.13, p<.001); ever married (r=-.09, p<.01); relatives in the hospital area (r=.29, p<.001); ever arrested (r=.19, p<.001); history of assaultive or destructive behavior (r=.08, p<.05). Of types of living arrangements at the time of hospitalization, only living with parents had a statistically significant correlation with length of stay (r=.10, p<.01).

Patients who received any of the medications listed in Table 11 tended to stay longer in hospital: anti-depressant medication (r=.16, p<.01); lithium (r=.21, p<.001); anti-anxiety medication (r=.24, p<.001); sedative medication (r=.25, p<.001). Personality disorder diagnosis proved to be weakly associated with shorter stays (r=-.07, p<.05). Non-paranoid schizophrenia diagnosis correlated more strongly with length of hospitalization than paranoid schizophrenia diagnosis (r=.19, p<.001; r=.09, p<.01). The additional symptom ratings and admission circumstances presented in Table 11 showed negligible

Table 10

Correlations of Demographic, Social History and Living Arrangement Measures with Length of Psychiatric Hospitalization

Measure	Correlation
Demographic Data	
Sex (male)	.05
Race (non-white)	-.01
Age	.00
Social Class (Hollingshead-Redlich) (n = 646)	-.09**
Social History Data	
Education (n = 657)	.06
Worked (ever)	-.13***
Married (ever)	-.09**
Relatives in the hospital area	.29***
Arrested (ever)	.19***
Assaultive or destructive of property (in past)	-.11**
Suicidal (in past)	.08*
Living Arrangements at Time of Hospitalization	
Alone	.00
With parents	.10**
With friends or family (not spouse or parent)	.06
In hospital or half-way house	.03

Note. n = 665 unless otherwise noted.

* $p<.05$
** $p<.01$
*** $p<.001$

relationship to length of stay. Two types of in-hospital events were substantially associated with length of stay: being secluded (r=.29, $p<.001$) and being visited (r=.34, $p<.001$).

Table 11

Correlations of Medication, Diagnosis, Symptom Rating, Admission Circumstance and In-hospital Event Measures with Length of Psychiatric Hospitalization

Measure	Correlation
Medications received (n = 262)	
Anti-depressant	.16**
Lithium	.21***
Anti-anxiety	.24***
Sedative	.25***
Diagnoses (n = 665)	
Affective disorder	.03
Personality disorder	-.07*
Schizophrenia (non-paranoid)	.19***
Schizophrenia (paranoid)	.09**
Symptom Ratings (n = 110)	
Anxious depression	.01
Mania	.03
Admission Circumstances (n = 665)	
Suicidal action involved	.04
Voluntary legal status	-.02
Switched from committed to voluntary legal status	.06
In-hospital Events	
Patient secluded (n = 665)	.29***
Patient was visited (n = 403)	.34***

* $p<.05$
** $p<.01$
*** $p<.001$

DISCUSSION

Anti-psychotic medication, intended as a measure of severity of dysfunction implying psychotic process, was the most powerful predictor of length of psychiatric hospitalization. The diagnosis of schizophrenia, also an intended measure of severity of dysfunction, made a small independent contribution to the prediction of length of stay. Committed legal status, a proposed treatment alliance measure, made a substantial independent contribution to prediction of the criterion. A key finding was the relatively small influence of past hospitalization on length of stay. Marriage and employment measures made no independent contribution to the prediction of length of stay. One result contrary to an hypothesis--aggressive action associated with admission correlated negatively with length of stay--suggested an unanticipated patient-specific influence on length of stay.

The results do not validate the proposed conceptual model for three reasons. First, in the cases of social niche and chronicity, the measures selected to represent the variable made little or no independent contribution to the prediction of the criterion. Second, each of the measures intended to represent a variable should have comparably large correlations with the criterion. This was not the case in this study; rather, measures of the same variables had unanticipatedly differing correlations with the criterion. Third, the correlations among predictors grouped under the same variable were

consistently small. This means that the measures do not form a cohesive, stable representation of a construct. While it is possible that better measurement might alleviate the second and third of these problems, the results of this study are best interpreted in terms of measures rather than variables. Still, the data do not invalidate all aspects of the model, and it might be argued that the data support the ideas that severity of dysfunction and treatment alliance are relevant constructs.

The combined results of the study imply that a psychiatric hospital can function rationally in responding to acute psychological life disruptions. That is, how long a patient remains in hospital was a function of illness but not a function of dependency or social adaptiveness.

The import of past hospitalizations for the prediction of length of psychiatric hospital stay was not supported. A patient's number of past hospitalizations and total time previously hospitalized proved to have very meager relationships to length of stay. Of the measures of past hospitalization, whether a patient had any previous hospitalizations had the strongest relationship to length of stay. This measure, however, is clearly less reflective of chronicity or dependency than number or duration of previous hospitalizations. Therefore, the correlation of whether a patient had any previous hospitalization with length of stay does not appear to imply that chronicity/dependency is a meaningful predictor of length of stay. Moreover, whether a patient had any previous hospitalization contributed nothing uniquely to the prediction of length of stay when anti-psychotic medication was included. This may

be in part because patients who had been hospitalized previously were more likely to be psychotic, which accounts for some of the common variance between whether a patient had any previous hospitalization and length of stay.

It was hypothesized that past hospitalization would predict length of stay better for voluntary patients than others. This was not found to be the case. The logic of the hypothesis was that dependency would be a more potent determinant of length of stay for those who chose to be in the hospital. This negative finding also argues against the idea that institutional dependency influenced length of stay among the subjects in this study.

The results concerning past hospitalization seem to reflect a change in the role of the psychiatric hospital, since previous research found stronger relationships between chronicity measures and length of stay. As the role of the hospital becomes more clearly one of response to acute psychological disruption, the time a patient spends in hospital becomes less a function of the patient's institution dependency. Rather, the patients' dependency on social institutions is played out in other arenas such as a convalescent ward or a half-way house. What might have been one continuous long stay twenty years ago may today be several brief stays, the patient relying on family or other agencies to a greater extent between crises.

The data do support the hypothesis that psychotic process is a factor in determining the length of stay. Whether a patient received anti-psychotic medication was interpreted in this study as an indicator of psychosis. This measure proved to be the strongest of all the

predictors of length of stay. Understood in this way, this result suggests that how long a patient stays in hospital is dependent on the seriousness of the acute disturbance.

An alternative or additional inference is possible, however. It could be that the medication itself causes patients to have longer stays. The fact that the thought-disorder rating, a possible indicator of psychotic process, showed only modest association to length of stay appears to support this inference. However, these ratings could be very high for a confused, disoriented patient who was not psychotic. Moreover, the thought-disorder rating correlated much more highly with the hostility/uncooperativeness rating than with anti-psychotic medication. It is possible that, as the ward staff made their thought-disorder ratings, behavior that was troublesome had more salience than behaviour that was psychotic. Finally, at the site of the study it did not appear to me that the medication of patients retarded their movement toward discharge.

The low correlation of thought-disorder ratings with anti-psychotic medication does raise a problem of interpretation. The difficulty is that there is no direct confirmatory evidence in this study that psychosis can be inferred from the use of anti-psychotic medication. Another possibility is that this kind of medication was used to control behaviors which were aberrant or uncomfortable for the staff. If that had been the case, however, the correlation of staff percieved hostility/uncooperativeness with anti-psychotic medication would have been high. In fact, that correlation was very small (r=.10, n.s.). Moreover, patients with aggressive action associated with admission were

less likely to receive anti-psychotic medication than other patients. If such medication had been used for behavior control, these patients would seem obvious candidates. The proportion of patients receiving anti-psychotic medication who are actually psychotic could be determined by a study of the circumstances under which anti-psychotic medication is given.

The diagnosis of schizophrenia had a substantial correlation with length of stay, but made only a small contribution to prediction of length of stay independent of anti-psychotic medication. Patients diagnosed schizophrenic are likely to be psychotic and, by definition, to have had enduring psychological trouble. The results of the study suggest that chronic need for treatment and poor social adaptation (both correlates of the schizophrenia diagnosis) are not strongly associated with length of stay. It follows that schizophrenia diagnosis would not contribute a great deal to the prediction of length of stay independent of whether the patient was psychotic.

The emotional withdrawal symptom rating, which reflects serious trouble inasmuch as it implies longstanding psychological difficulty, showed negligible relationship to length of stay. This is consistent with findings suggesting that chronicity of psychological trouble does not bear strongly on length of stay for a hospital such as that in which the study took place.

As expected, anti-psychotic medication predicted length of stay more powerfully for non-schizophrenic patients than for schizophrenic patients. This can be readily understood in light of the fact that non-schizophrenics are less likely to be psychotic. Consequently, the

fact that a patient is psychotic adds more predictive information when the patient is not schizophrenic.

The hypothesis that social role measures would make an independent contribution to prediction of length of stay was not supported. One measure, whether a patient was living with his conjugal family, proved to be almost completely redundant with whether the patient was currently married. Consequently the living arrangement variable was dropped from further consideration. Being currently married and currently self-supporting had small correlations with length of hospitalization but made no unique contribution to prediction. This is a surprising result for several reasons. Correlations of marital status and work history with length of stay reported in previous studies tended to be higher. Moreover, it seems reasonable to expect current marital and work status to represent the adaptive social abilities of a patient, which might influence the duration of a patient's hospital stay. Finally, the idea remains compelling to me that social roles which are meaningful to a person would exert a pull away from the role of patient.

One reason for not finding this expected result may have been that the percentages of patients currently married and currently self-supporting were small (21% and 17%, respectively). These lop-sided distributions reduce the predictive power of these measures in relation to a more or less normally distributed variable. It may be that the number of subjects who actually have social roles that are well-defined, meaningful and satisfying is small, so that the variable can only make a small contribution to the prediction of length of stay. An alternative possibility is that among the patient population, there exist many

degrees of role involvement and many degrees of "pull" out of the hospital. If this is the case, then a more differentiated measure might predict length of stay better. Such a measure might employ scales defining degrees of role involvement in work, family and other social connections.

Another reason the impact of patients' role involvement proved to be less than anticipated may be that today's more efficient hospital regimes respond less to the motivations and preferences of the patient than to the realities of psychosis and the inability of a patient to function outside the hospital.

The anticipated stronger prediction of length of stay by the social role variables within middle-aged and female subgroups was not found. However, if a more powerful measure of social role involvement proved to have a stronger relationship to length of stay than those used in this study, the hypothesized subgroup differences might be found.

Legal committment was strongly associated with length of stay. The contribution of legal commitment to the prediction of length of stay was largely independent of the other predictors. Therefore, it appears that committed patients do not remain in hospital longer because they are more ill. I contend that their longer stays are at least in part due to their unwillingness to cooperate in achieving the goals of the hospitalization. These patients might delay in providing useful information, deny consent for hospital staff to contact family, reject prescribed medication, or refuse to participate in treatment activities. In such a situation, the reactions of the staff might further slow the patient's treatment, their frustration reflected in a passive, waiting

stance, especially since committed patients are legally held in the hospital.

Stoffelmayr et al. (Note 2) found, at the site of the current study, that committed patients were not more dangerous to self or others, nor less able to care for their basic needs, than other patients. They did differ in that they exhibited more inappropriate behavior in private (at home). This suggests that they may have been committed as a way of ridding the family of the discomfort of their unsettling behavior. Patients committed for these reasons would understandably not want to cooperate in their "treatment". Still, their uncooperativeness could lead to longer stays because of staff's reaction. The question remains unresolved what proportion of committed patients are committed for reasons other than treatable mental illness.

In the interpretation of the finding that committed patients have longer stays, an aspect of the mechanics of the hospital system must also be taken into account. A committed patient must wait at least a few days for his case to come to court. This means that committed patients never stay only one or two days, a fact which must account for part of the association of committed legal status and length of stay.

The pathways through which legal committment influences length of stay appear to be several. The consequences of patients' failure to cooperate in treatment remain, in my view, the major factor. However, a study examining reasons for committment and need for treatment, staff responses to committed patients, and systemic influences on the duration of the stays of committed patients might be necessary to sort out the

impact of the various factors.

Receiving anti-psychotic medication by injection did not make a contribution to prediction beyond that made by receiving anti-psychotic medication by any route. The problem appears to be, not that patients who receive injections are resistant to treatment so much as that they are psychotic.

Hostility/uncooperativeness ratings had a small, statistically non-significant correlation with length of stay. This correlation was in the expected direction, and thus offers some support to the idea that a cooperative patient may leave the hospital sooner.

One measure was found to have a substantial relationship to length of hospitalization opposite the direction expected. Aggressive action associated with admission was expected to reflect a non-cooperative and non-compliant disposition, which would make a treatment alliance harder to form. By the logic of the model, these patients would have longer stays in hospital. In fact, patients who were aggressive in their actions leading up to admission had shorter stays. This association was almost entirely independent of the other predictors.

Some understanding of this finding may follow from the view that mental hospitals serve not only disturbed individuals but the society as a whole. A psychiatric hospital, especially a state psychiatric hospital, can be seen as a place where both the disturbed and the disturbing are segregated from the society at large. Individuals who had aggressive action associated with admission were less likely to require anti-psychotic medication and less likely to voluntarily enter the hospital compared to other patients. Possibly these patients were

in the hospital because they were troublesome and deviant more than because they were mentally ill. Not being as sick as the other patients, the would not stay as long. To the extent that this reasoning applies, the hospital seems rational in its operation: if a patient is hospitalized for reasons other than serious mental illness, his stay is relatively brief.

That these patients are less ill, however, only partially explains the observed shortness of their stays. There must be other reasons because the relationship of aggressive action associated with admission to length of stay is for the most part independent of the anti-psychotic medication measure. A key to the shorter stays of these patients may be that they are very active people. It appears, based on their aggressive actions, that they react to stress with action. They would be unlikely to settle into the hospital, but rather would fight to avoid confinement. A piece of information supporting this inference is that they are less likely to have relatives living in the area. This means these patients are likely to have moved away from their families. Their social mobility, even if they are transient drifters, is a sign of activity.

There is yet another possible reason for patients with aggressive action associated with admission to have shorter stays. When patients frighten the staff or are extremely noncompliant, they are sometimes moved to other facilities. This may be especially probable if the patients are not psychotic and cannot be justifiably sedated with anti-psychotic medication.

As stated above, the results do not in general validate the proposed model of patient specific variables bearing on length of stay. Chronicity/dependency did not appear to be a factor influencing length of psychiatric hospital stay. Past hospitalization told little about length of stay except that those with no past history of psychiatric hospitalization had somewhat shorter stays. However, this relationship was much reduced when anti-psychotic medication was partialed. Measures intended to reflect severity of dysfunction were found to be predictive of length of hospitalization. The seriousness of the acute disturbance seems most important in this regard, though the diagnosis of schizophrenia makes a small independent contribution. However, the relationships among the measures chosen to represent severity of dysfunction were not strong enough to indicate that they constituted a unitary construct. Measures intended to reflect social niche did not contribute to the prediction of length of stay in this study, but with more refined measurement this variable might prove more relevant. In the case of this construct, the failure of the measures to correlate highly may well be due to the existence of independent marriage and work subfactors. One measure intended to represent the failure to form a treatment alliance made a substantial independent contribution to the prediction of the criterion. However, the measure this inference is based upon is committed legal status, and other factors associated with committment probably affect length of stay also. Based on the relationship of aggressive action associated with admission to length of stay, an action orientation might be considered as an addition to the

model of predictive patient-specific variables. In summary, from the results of this study we might cautiously infer a rather simple model of patient influences on length of stay in similar acute treatment facilities. Patients tend to have short stays if (1) they are not so acutely disturbed as to require anti-psychotic medication, and (2) they can accept treatment as deemed necessary by the hospital staff. A third variable, action orientation, should be considered in future research.

The attempt to find an alternate criterion measure which would be less a function of unit-wide influences on patients' time in hospital was not successful. Whether the patient's length of stay and the unit average stay were rescaled or transformed to square roots, the difference score did not show stronger association to patient variables than did the primary criterion measure. I had assumed that the average length of stay for patients discharged over a given period would reflect the policies toward length of stay operating during that period. If this were true, then there would be a correlation between a patient's length of stay and the average length of stay for the period of his discharge. In fact, such an association exists only when a very few patients are discharged during a period. For example, when the average length of stay for the unit is based on six or fewer discharges, the correlation of the average length of stay with the length of stay of a patient discharged during that period is very high (r=.87). On the other hand, for the 81% of subjects for whom the current unit average length of stay was based on at least ten discharges, the correlation was very small (r=.07). I conclude that shifting policies did not account for variation in the unit average length of stay of patients over the

course of the study. Rather, these unit average variations must have had to do with circumstances not uniformly influencing individual patients' lengths of stay.

A few findings regarding measures not in the model merit mentioning. Demographic measures, including sex, age, race, social class and education showed little relationship to length of stay. Measures reflecting social competence, whether the patient had ever been married or ever held a job, also had little bearing on length of stay. These results offer indirect support for the idea that the hospital responds primarily to illness rather than to the patient's age, sex, social class, race or social functioning.

Each of the types of medication considered was associated with longer hospital stays. However, the correlations of the use of anti-depressants, lithium, sedatives and anti-anxiety agents with length of stay were at most half the size of the correlation of anti-psychotic medication with length of stay. This too suggests that the hospital functioned as though its primary objective was to respond to psychotic episodes.

An interesting incidental finding was that patients who had no relatives living in the area had shorter stays. I offer two possible reasons for this. First, the twenty-five percent of patients who had no relatives in the area had no one to shelter them from social reactions to aberrant behavior. When deviant individuals upset citizens, they might well be hospitalized. However, aberrant behavior does not always imply mental illness, so these patients are soon discharged. Second, patients without relatives to turn to may behave deviantly, seeking to

be admitted, when times are hard for them. Again, unfortunate circumstances and deviant behavior are not treatable in the same way psychosis is treatable, and these patients are discharged relatively quickly.

Considerable attention is being paid to the question of whether psychiatric hospitalization could not be replaced by more cost-effective interventions (Kiesler, 1982). If there is a justifiable role for mental hospitals, it is in the treatment of acute psychological dysfunction. The results of this study suggest that the units where this study took place effected this role. Time in hospital was much more strongly related to psychosis than to social skills deficits or institutional dependency. Tasks of building social abilities or sustaining a marginal individual were apparently left to other agencies for the most part.

What conclusions can be drawn for a clinician working on an acute treatment unit, assuming that an objective is to minimize patients' time in hospital? First, interventions should be aimed at resolving psychosis, and should be applied diligently, as soon as possible after admission. Second, this approach should be taken even if the patient has a history of dependency on social institutions or poor social adaptation. These problems can be dealt with on an outpatient basis or in another residential setting. Third, every effort should be made to enlist the patient's cooperation and avoid commitment.

The generalizability of the results of this study is limited to those small hospitals or units of hospitals which specialize in the treatment of acute episodes of psychological trouble. Many hospitals or

units within hospitals serve long-term maintenance or treatment functions. The determinants of length of stay in these institutions may bear little relation to those of acute treatment facilities.

Summary

This research examined the relationship of individual differences to length of stay among patients at a small psychiatric hospital. Subjects were 665 admissions to two acute treatment units. A proposed model of patient variables independently predictive of length of stay comprised these elements: the availability of a suitable social niche, chronicity/dependency, severity of dysfunction, and treatment alliance. Measures intended to represent these factors included aspects of the patient's social and psychiatric history, current diagnosis and legal status, and for a subset of subjects, symptom ratings (n=110) and records of types of medications received in hospital (n=262). A five-point length of hospitalization scale was used as the criterion.

Of the 14 measures selected to represent the four elements of the model, all but one correlated with the criterion in the expected direction. However, the patterns of relationships between the predictors and the criterion and among the predictors did not in general support the conceptual model. Regression analyses were used to determine which of these measures made meaningful independent contributions to the prediction of length of stay. Patients who were married, had no previous psychiatric hospitalization, were not diagnosed schizophrenic and did not receive anti-psychotic medication, and were

not legally committed were found to have briefer stays. Contrary to expectations, patients for whom aggressive action was among the behaviors which precipitated hospitalization had shorter stays. The pattern of relationships among measures was somewhat different from that found in past studies and the difference was interpreted as being reflective of the changed role of then psychiatric hospital.

In order to highlight the impact of individual differences on length of stay, a deviation from expected length of stay measure was defined. This deviation measure was based upon the lengths of stay of other patients discharged near the time of a subjects discharge. The computed deviation from expected length of stay did not produce the expected higher correlations with predictors.

Hypotheses that measures would have differential predictive power for subgroups differing on sex, legal status or diagnosis proved correct in only one case. Anti-psychotic medication was more predictive of length of stay for non-schizophrenic patients.

APPENDIX

Table A

Means and Standard Deviations of Model Measures

	Measure	n	Mean	Standard Deviation
	Length of Hospitalization (rescaled)	665	3.18	1.22
1	Currently married	665	.21	.41
2	Currently self-supporting	665	.17	.37
3	Living with conjugal family	665	.20	.40
4	Any previous hospitalization	665	.84	.37
5	Number of previous hospitalizations	665	4.26	4.41
6	Total months of previous hospitalization	665	17.43	51.49
7	Schizophrenia diagnosis	665	.56	.50
8	Thought-disorder rating	110	2.25	1.57
9	Emotional withdrawl rating	110	1.95	1.33
10	Received anti-psychotic medication	262	.55	.50
11	Committed legal status	665	.20	.40
12	Aggressive action associated with admission	665	.63	.48
13	Hostility/uncooperativeness rating	110	2.52	1.76
14	Received injected anti-psychotic medication	262	.30	.46

Table B

Means and Standard Deviations of Predictors not in the Model

Measure	n	Mean	Standard Deviation
Sex (female = 1; male = 2)	665	1.52	.50
Race (white = 1; non-white = 2)	665	1.21	.55
Age	665	34.43	13.08
Social class (Hollingshead-Redlich)	646	5.38	1.72
Education	657	11.58	2.79
Worked (ever)	665	.79	.41
Married (ever)	665	.54	.50
Relatives in the hospital area	665	.75	.44
Arrested (ever)	665	.20	.40
Assaultive or destructive (in past)	665	.68	.47
Suicidal (in past)	665	.22	.42
Living alone	665	.25	.44
Living with parent(s)	665	.22	.41
Living with other relatives or friends	665	.17	.38
Living in hospital or half-way house	665	.14	.35
Received anti-depressant medication	262	.03	.16
Received lithium	262	.15	.35
Received anti-anxiety medication	262	.04	.20
Received sedative medication	262	.41	.49
Affective disorder	665	.18	.38
Personality disorder	665	.04	.19
Schizophrenia (non-paranoid)	665	.30	.46
Schizophrenia (paranoid)	665	.26	.44
Anxious depression rating	110	1.65	1.12
Mania rating	110	1.94	1.29
Suicidal action involved in admission	665	.09	.29
Voluntary legal status	665	.45	.50
Switched from committed to volunatry status	665	.15	.36
Patient secluded	665	.23	.42
Patient was visited	403	.72	.45

Table C

Correlations Among Predictors

	1	2	3	4	5	6	7	8	9	10	11	12	13
2	11*												
	665												
3	86*	11*											
	665	665											
4	-11*	-08	-06										
	665	665	665										
5	-13*	-13*	-11*	43*									
	665	665	665	665									
6	-10*	-11*	-10*	15*	16*								
	665	665	665	665	665								
7	-22*	-15*	-16*	20*	19	06							
	665	665	665	665	665	665							
8	-03	-02	-04	03	-09	02	06						
	110	110	110	110	110	110	110						
9	10	-08	12	-12	-20	-08	15	19					
	110	110	110	110	110	110	110	110					
10	-11	00	-08	20*	12	-05	32*	20	-04				
	262	262	262	262	262	262	262	110	110				
11	-03	-12*	-01	04	01	05	10*	21	-01	24*			
	665	665	665	665	665	665	665	110	110	262			
12	-01	01	-02	-01	-02	02	-06	-03	-06	-23*	04		
	665	665	665	665	665	665	665	110	110	262	665		
13	-07	-11	-05	22	-08	04	18	50*	25*	10	16	01	
	110	110	110	110	110	110	110	110	110	110	110	110	
14	-08	00	-04	07	08	-10	16*	21	02	58*	36*	-22*	26
	262	262	262	262	262	262	262	110	110	262	262	262	110

Note. Key to predictor numbers is in Table A. Sample size is specified below each correlation.

*$p<.01$

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