EXTENDING SOCIAL DISORGANIZATION THEORY: A MULTILEVEL APPROACH TO THE STUDY OF VIOLENCE AMONG PERSONS WITH MENTAL ILLNESSES*

ERIC SILVER
The Pennsylvania State University

Prior studies of violence among individuals with mental illnesses have focused almost exclusively on individual-level characteristics. In this study, I examine whether the structural correlates of neighborhood social disorganization also explain variation in violence. I use data on 270 psychiatric patients who were treated and discharged from an acute inpatient facility combined with tract-level data from the 1990 U.S. Census. I find that living in a socially disorganized neighborhood increased the probability of violence among the sample, an effect that was not mediated by self-reported social supports. Implications for future research in the areas of violence and mental illness are discussed.

Research on the social ecology of crime and violence has shown consistently that rates of violence vary across nations and, within a single nation, across different communities and neighborhoods. Yet, we know relatively little about how the ecological characteristics of communities influence the violent behavior of particular individuals. Indeed, we know even less about the role of neighborhood characteristics in determining the violent behavior of individuals with mental illnesses. To help fill this void, this study draws on the social disorganization perspective and, in particular, the seminal works of Faris and Dunham (1939) and Shaw and McKay (1942), to develop a theoretical framework for understanding the violent behavior of a sample of individuals with mental illnesses who were recently treated and discharged from an acute psychiatric inpatient facility. The basic premise of this study is that neighborhood characteristics account for variation in the violent behavior of individuals with mental illnesses that is not explained by their individual-level characteristics.

* Support for this research was provided by a Research Fellowship grant (541475-55023) from the National Consortium on Violence Research, a program of the National Science Foundation, and by the MacArthur Foundation's Research Network on Mental Health and the Law. Special thanks go to Steven Messner, Henry J. Steadman, Scott J. South, Edward P. Mulvey, and John Monahan for providing insightful comments on earlier drafts, and to D. Wayne Osgood for helpful statistical advice.
VIOLENCE AND MENTAL ILLNESS

From the formulation of the first statutes governing civil commitment to the asylums of the early nineteenth century to roughly the mid-1960s, the focus of civil commitment law remained unchanged: Persons who were in need of mental health treatment could be involuntarily committed to treatment settings. By the mid-1960s, the appropriateness of this paternalistic approach to mental health treatment was called into question and the concept of risk of harm to others came to occupy a pivotal role in both civil and criminal aspects of mental health law (Appelbaum, 1997). Thus, evidence bearing on the relationship between mental illness and violence remains crucial in debates concerning the continued use of the dangerousness standard to justify legal policies governing the handling of individuals with mental illnesses within the mental health and criminal justice systems.

Research on the violent behavior of individuals with mental illnesses has taken two approaches. The first has been to look for evidence of an association between mental illness and violence by comparing the rates of violent behavior of mentally ill and nonmentally ill samples. Following this approach, studies using both official arrest and self-report data to measure violence have found an association with mental disorder that cannot be explained away by inadequate sampling or measurement, or by demographic and ecological controls (for a review, see Monahan, 1992).

For example, using data from the National Institute of Mental Health’s Epidemiological Catchment Area surveys (Robins and Regier, 1991), Swanson et al. (1990) estimated the prevalence of violence among members of the general population with and without diagnosed mental disorders. Swanson et al. (1990) found that (1) the one-year prevalence of violence for individuals with major mental disorder, including schizophrenia, major depression, and bipolar disorders, were 12.7%, 11.7%, and 10.7%, respectively—more than five times the 2.1% rate for persons without mental disorder; (2) the one-year prevalence of violence among persons with a diagnosis of alcoholism was 24.6%, almost 12 times the rate for persons with no mental disorder; and (3) the one-year prevalence of violence for persons who met the criteria for a drug abuse/dependence diagnosis was 34.7%, more than 16 times the rate for persons with no mental disorder. These associations held when age, gender, and socioeconomic status were controlled.

A more recent study by Steadman et al. (1998) underscores the importance of substance abuse in the relationship between mental disorder and violence. Using data from the MacArthur Violence Risk Assessment Study, Steadman et al. compared the rates of community violence (as measured by self-report, arrest records, and collateral informants) of discharge psychiatric patients with those of nonpatients (i.e., nonmentally disordered
individuals) living in the same neighborhoods as the patients. Steadman et al. found that (1) the 10-week prevalence of violence among patients without symptoms of drug or alcohol abuse ranged from 4.0% to 5.7% over the one-year follow-up period, and was statistically indistinguishable from the 3.3% prevalence of violence found among the nonpatients (also without symptoms of substance abuse); (2) substance abuse significantly raised the prevalence of violence in both the patient and nonpatient samples; and (3) whereas 22.0% of the patients with substance abuse problems had engaged in at least one violent act immediately after discharge from the hospital, 11.1% of the nonpatients had done so, a statistically significant difference.

Together, these studies provide strong evidence that mental disorder increases the risk for violence in the community, particularly among individuals with disorders involving substance abuse/dependence. However, despite a well-documented association, the causal pathways that produce the relationship between mental disorder and violence remain unclear (Mulvey, 1994; Hiday, 1997). In addition, although mental illness clearly is a risk factor for community violence, the absolute risk of harm to the public at the hands of the mentally ill is small because of the rareness of mental disorder in the general population (Robins and Regier, 1991).

The second approach to the study of violence and mental illness relies on statistical prediction methods to identify risk factors for violence that can be used by mental health clinicians to predict the future dangerousness of individuals with mental illnesses—a task that they are often asked by courts to perform (Monahan and Steadman, 1994). The risk factor approach has produced several actuarial violence risk assessment tools for assessing dangerousness (Monahan et al., 2000; Quinsey et al., 1998; Steadman et al., 2000; Webster et al., 1997). Specific risk factors for violence include previous violence, substance abuse, psychopathy, relationship instability, employment problems, personality disorder, impulsiveness, anger, and lack of social support.

Notably absent from the extensive body of risk factor research are measures reflecting the neighborhood contexts within which individuals with mental illnesses live. With rare exceptions (Silver, 2000; Silver et al., 1999), risk factor studies have focused almost exclusively on individual-level characteristics. This is due, in part, to the difficulty of collecting relevant social context measures and, in part, to the belief that the risk for violence among individuals with mental illnesses is individually determined. From the standpoint of violence risk assessment, this focus is reasonable because the data available in clinical settings typically are gathered through face-to-face diagnostic interviews and case record reviews, which tend to emphasize individual attributes. However, from the standpoint of understanding why persons with mental illness commit
violent acts, limiting the range of explanatory variables to individual descriptors does not seem justifiable.

A recent study by Silver et al. (1999), which used the same data set on which the current study is based, is noteworthy as the first risk factor study to include a measure of the poverty rates of the census tracts in which psychiatric patients lived after treatment. Using this contextual measure, Silver et al. found a significant association between concentrated neighborhood poverty (measured as census tracts with a greater than 30% poverty rate) and the violent behavior of discharged psychiatric patients. Although this finding suggests the importance of assessing contextual conditions, as well as individual characteristics when predicting risk for violence, Silver et al. concluded that “it remains for future research on violence risk to more fully elaborate the theoretical underpinnings of an ecological approach, and to incorporate a wider variety of theoretically derived dimensions and indicators of the neighborhood context” (p. 251). The current study seeks to answer this call.

THEORETICAL FRAMEWORK

A CONTEXTUAL APPROACH TO VIOLENCE AND MENTAL ILLNESS

Chicago School researchers Faris and Dunham (1939) were among the first to propose that neighborhood-level factors are important in determining outcomes related to mental illness. Faris and Dunham identified and mapped (as rates per 100,000 population) the preadmission neighborhood locations of more than 30,000 psychiatric patients treated in public and private psychiatric hospitals in Chicago during the two-year period between 1930 and 1931. Faris and Dunham found that: “High rates of insanity appear to cluster in the deteriorated regions in and surrounding the center of the city, no matter what race or nationality inhabits that region” (p. 35). They interpreted this result as indicating that urban areas characterized by high levels of social disorganization were also those with high rates of “mental disorganization.” Faris and Dunham argued that the “confused, frustrated, and chaotic” expressions of behavior often exhibited by individuals with mental illnesses resulted, in part, from their location in socially disorganized neighborhoods.

Although Faris and Dunham (1939) did not explicitly focus on the violent behavior of persons with mental illnesses, it is a straightforward extension of their theoretical argument to hypothesize that part of this complex of “confused, frustrated, and chaotic” behavior might include acts of violence. Yet, since the publication of their work in 1939, and despite a long line of research linking neighborhood social disorganization to rates of crime and violence among the general population, researchers have not
SOCIAL DISORGANIZATION

attempted to assess the relevance of neighborhood-level factors for explaining the violent behavior of persons with mental illnesses.

SOCIAL DISORGANIZATION THEORY AS A FRAMEWORK FOR UNDERSTANDING THE VIOLENT BEHAVIOR OF PERSONS WITH MENTAL ILLNESSES

Over the past several decades, a revised social disorganization model has emerged as one of the most frequently researched explanations of the association between disadvantaged neighborhood conditions and criminal behavior (Sampson and Lauritsen, 1994). Specifically, social organization has been conceptualized as the ability of a community to realize the common values of its residents and to maintain effective social controls (Bursik, 1988; Kornhauser, 1978; Sampson, 1988), an interpretation that builds on the approach taken in the seminal work of Shaw and McKay (1942).

This view of social disorganization is grounded in what has been termed the systemic model (Kasarda and Janowitz, 1974; Sampson, 1988), in which the local community is viewed as a complex system of friendship and kinship networks and formal and informal associational ties rooted in family life and ongoing socialization processes. The structural dimensions of the systemic model have been operationalized in terms of the prevalence and interdependence of social networks in a community—both informal (e.g., density of friendship ties and acquaintanceship) and formal (e.g., organizational participation) and in the extent of collective supervision that a community directs toward local problems (Bursik and Grasmick, 1993; Sampson and Groves, 1989). More recently, collective efficacy (e.g., the willingness of local residents to intervene informally in neighborhood activities to promote public order) has been suggested as a significant mediating factor explaining differential violence rates across neighborhoods (Sampson et al., 1997).

The appropriateness of social disorganization theory for understanding the violent behavior of individuals with mental illnesses is perhaps more relevant today than it was in the earlier part of this century. Prior to the 1960s, individuals with mental illnesses had access to, and were likely to be treated in, “total institutions,” which kept them out of communities (Goffman, 1961). Today this is no longer the case. Policies of deinstitutionalization implemented in the United States since the 1960s have reduced significantly the number of persons who could be admitted long-term to state and county psychiatric hospitals (U.S. Surgeon General, 2000). As a result, individuals with mental illnesses currently reside in communities where psychiatric care is provided, as needed, and when available by acute care, community-based mental health facilities.

To assert that social disorganization is a relevant explanatory framework
for understanding the violent behavior of individuals with mental illnesses is not to suggest that the neighborhood dynamics involved in the informal control of the mentally ill are phenomenologically equivalent to those of the nonmentally ill general population. In this regard, the following factors seem relevant. First, the stigma that the general public typically attaches to mental illness and, in particular, the perception that the mentally ill are dangerous (Link et al., 1999) may raise the threshold for direct intervention by potential guardians who would attempt to control the behavior of mentally ill individuals. Second, the belief that mentally ill persons are best “handled” by family members (Estroff and Zimmer, 1994) or by officially sanctioned experts, such as the police (Teplin, 1984), may further decrease the likelihood of direct intervention by potential guardians. Thus, in order to safeguard the neighborhood environment against the potentially disruptive behavior of mentally ill residents, potential guardians are likely to seek out family members, friends, or other designated experts as sources of intervention and control. Clearly, such an indirect intervention strategy would depend for its success on the degree of interpersonal cohesion and social organization in the neighborhood.

In extending social disorganization theory to account for variation in the violent behavior of individuals with mental illnesses, I suggest that, just as residents of socially organized neighborhoods are likely to act as guardians in attempting to control the behavior of teenaged peer groups, so too are such residents motivated to control the threatening or otherwise disruptive behaviors of persons with mental illnesses. The primary difference in these control efforts lies in the means by which control is exerted. Whereas guardians may be more likely to intervene directly to control the behavior of teenaged peer groups (i.e., by suggesting that they stop engaging in a certain behavior at a certain location), the framework outlined here suggests that, because of the stigma associated with mental illness, the same guardians will be more likely to exercise control indirectly by appealing to neighborhood-based social networks that contain more proximal links to the mentally ill individual.

THE MEDIATING ROLE OF SOCIAL SUPPORT AND THE CAPACITY FOR COMPASSIONATE ACTION INHERENT IN THE NEIGHBORHOOD

The social disorganization literature to date has paid a great deal of theoretical attention to the role of informal social control in shaping the behavior of neighborhood residents (Sampson and Lauritsen, 1994). However, as Cullen (1994) points out, far less attention has been given to the importance of social disorganization in conditioning the availability of social supports. Lin (1986:18) defines social support as the “perceived or
actual instrumental and/or expressive provisions supplied by the community, social networks, and confiding partners." This definition suggests clearly that social support operates on two different social levels: In addition to individual-level support derived from confiding individuals, such as a spouse or best friend, social support operates as an emergent property of the communities in which individuals reside (see Cullen, 1994), a property that I refer to here as the capacity for compassionate action inherent in the neighborhood.

The ameliorative effects of residing in a community with a high capacity for compassionate action (i.e., where supportive relationships are readily available) may be especially important to individuals with mental illnesses who, because of their mental illnesses, may require periodic assistance from fellow residents. Specifically, the functional limitations that individuals with mental illnesses may possess (i.e., in terms of communication, employment, and travel) may constrain their abilities to maintain extensive social networks. Persons with mental illnesses have been shown to exhibit many of the individual-level characteristics known to be associated with a limited geographic range of social ties, including financial and material dependence and unstable employment (Campbell and Lee, 1990; Estroff and Zimmer, 1994).

To the extent that residents with mental illnesses must rely on a particular neighborhood's capacity for compassionate action to access needed supports, their vulnerability to the levels of social disorganization within the neighborhood is heightened. As a result, the social supports received by individuals with mental illnesses may be especially constrained in disorganized neighborhood environments where support networks are weak. For example, in socially organized communities with a high capacity for compassionate action, residents may be more likely to provide assistance, either directly or indirectly, to a person with mental illness who shows visible signs of decompensation (i.e., deteriorated mental condition). To the extent that this occurs, mentally ill individuals may be more likely to receive treatment for their symptoms and other needed supports, thereby reducing the risk that they will commit a violent act.

Although this conceptualization of social support as a mediating mechanism suggests measurement of support networks at both the community- and individual-levels; measures of community-level support networks are not available in the current study. Thus, this study does not have a direct measure of the capacity for compassionate action inherent in the neighborhood. Rather, the study relies on a measure of individual-level social support (i.e., the number of persons perceived by individual subjects as providing various types of positive emotional support when needed) to assess the role of social support as a mediating mechanism in the relationship between neighborhood conditions and violence. Specifically, social
support was assessed by asking subjects to name specific individuals on whom they rely in times of need, share their problems with, consider to be important people in their lives, and share special occasions with, such as holidays. Supporters could include family, friends, acquaintances, or mental health professionals. A count of the total number of unique supporters is used to measure the level of support available to individual patients.

DATA, MEASURES, AND STATISTICAL PROCEDURES

PSYCHIATRIC PATIENT SAMPLE

The primary data source for this study is the MacArthur Foundation’s Violence Risk Assessment Study (Steadman et al., 1998). Between 1992 and 1995, the MacArthur Study sampled admissions from the Western Psychiatric Institute and Clinic (WPIC), a university-based, acute psychiatric inpatient facility located in Pittsburgh, Penn. To be eligible for participation in the study, patients had to be acute (i.e., short stay) civil admissions, between the ages of 18 and 40, English-speaking, White or African American, and have a hospital chart diagnosis indicating the presence of a major mental disorder (i.e., schizophrenia, schizophreniform, schizoaffective, depression, dysthymia, mania, brief reactive psychosis, delusional disorder, alcohol or drug abuse or dependence, or a personality disorder).

The mean length of hospitalization for subjects treated at WPIC was 20 days (the median was 15 days), consistent with hospitalization lengths of patients admitted to psychiatric facilities in the United States (Rouse, 1998). In addition, of the 391 subjects who were enrolled in the MacArthur study after being admitted to WPIC, only 2 were subsequently removed from the sample because they had been hospitalized for too long (i.e., greater than the project-defined cutoff of 145 days). Further, the mean length of stay of 20 days for the 270 subjects in this study was similar to the mean length of stay of 23 days for all patients admitted to WPIC during the three-year period in which these data were collected.

The fact that the patients examined here were drawn from a population of acute-stay psychiatric inpatients must not be taken as an indication of a lack of severity of mental illness among them. Specifically, although subjects tended to be released rather quickly after admission, they also tended to require repeated admissions for psychiatric problems. Of the 270 subjects in this study, 75.6% had experienced at least one prior admission to an inpatient psychiatric facility, and 30% had experienced four or more prior admissions.

Hospital data collection was conducted in two parts: an initial interview
to obtain a wide array of background data, and a second interview by a
research clinician (M.S.W.-level) to confirm the subject’s hospital chart
diagnosis and to administer several other clinical scales. All subjects were
asked for written informed consent to participate in the study. Five
attempts were made to reinterview enrolled subjects in the community
(approximately every 10 weeks) over the one-year period after discharge
from WPIC. Using the same interview schedule, interviewers also spoke
with a collateral informant, i.e., the person who was most familiar with the
patient’s behavior and functioning in the community through direct con-
tact. Collateral informants were nominated by patients during each fol-
low-up interview. If the collateral nominee did not have at least weekly
contact with the subject, the interviewer suggested a more appropriate
person based on a review of the subject’s social network data. Collateral
informants were most often family members (47.1%), but they were also
friends (22.0%), professionals (16.1%), significant others (11.8%), or
others (e.g., coworkers, 3.0%). All subjects and collateral informants were
paid for each completed interview.

Official records provided a third source of information about the
patients’ behavior in the community. If a patient was readmitted to a psy-
chiatric facility and gave approval for release of information, the hospital
was contacted to obtain information regarding the rehospitalization,
including dates of hospitalization, diagnosis, and reasons for admission.
Arrest records for all patients were requested at the end of the one-year
follow-up.

Of the 4,069 patients admitted to WPIC between 1992 and 1995, 2,532
met the study’s eligibility criteria. A total of 629 patients were approached
to participate in the study. The refusal rate was 33.2% (N = 209). Twenty-
ine patients who agreed to participate were discharged before the hospi-
tal interview could be completed. The final sample given a hospital inter-
view was 391, of whom 314 completed the first follow-up interview.
Postdischarge census tract locations were identified for 270 of these 312
subjects. There were no significant differences in terms of sex, age, race,
or admission diagnosis between enrolled subjects who did not complete
the first follow-up interview (N = 79) and those who did (N = 312). Nor
were there any significant differences between subjects for whom postdis-
charge neighborhood location was known (N = 270) and those for whom it
was not known (N = 42).

INDIVIDUAL-LEVEL MEASURES

A large number of individual-level risk factors are available in the Mac-
Arthur Risk Assessment data (Monahan et al., 2000). For the purpose of
this analysis, individual-level risk factors were selected if they had strong
bivariate associations with patient violence (i.e., gender, substance abuse
disorder, anger, impulsiveness, paranoid personality disorder, psychopathy, and violent arrest history), or if they might be related to the systematic selection of patients into different types of neighborhoods (i.e., socioeconomic status, employment status, marital status, length of residence, degree of symptomatology, and race). The inclusion in this analysis of potent individual-level predictors of violence allows for a stringent assessment of the net effect of the neighborhood context. The inclusion in this analysis of individual-level control variables related to the systematic selection of patients into neighborhoods mitigates against the possibility that observed effects are caused by cross-level misspecification (i.e., selection bias). A summary description of the specific measures included is provided in Table 1.

Note that "length of residence" refers to the number of months subjects lived at the addresses where they had been living at the time of the hospital admission, whereas the census tract locations used to identify the characteristics of the patients' neighborhoods refer to the postdischarge residence. The systemic theory of urban structure suggests that the longer individuals live in a particular location, the stronger will be their ties to other individuals in the neighborhood (Sampson, 1988). Thus, it is important to establish a link between the predischarge and postdischarge neighborhood locations. Unfortunately, data on the predischarge addresses of subjects were not available in the current study; thus, the predischarge census tract locations could not be determined. However, the zip codes corresponding to subjects' predischarge addresses were recorded.

A comparison of subjects' predischarge zip codes to their postdischarge census tract locations revealed that of the 270 subjects in this study, 207 (76.7%) were discharged into census tracts that overlapped with the zip code area of the predischarge address. This high rate of subjects discharged into the same zip code area from which they came lends credence to the use of the variable "length of residence" as an indicator of the length of time that subjects lived in their postdischarge neighborhoods. However, because of the theoretical importance of this issue vis-à-vis systemic theory, the "length of residence" variable was modified so that subjects who were discharged to addresses that did not overlap with the zip code area of the predischarge address were given a value of zero. This modification ensures that subjects discharged to different neighborhoods than those from which they came are not considered in the analysis as having a substantial residential tenure. A total of 63 cases were changed to zero; the Pearson correlation between the unmodified and modified "length of residence" measures was .96 (p < .001). The modified "length of residence" variable is used in the analyses presented below.

Descriptive statistics for each of the individual-level measures described
### Table 1. Individual-Level Measures

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>$1 = \text{Male}; 0 = \text{Female}$</td>
</tr>
<tr>
<td>Age</td>
<td>Number of years between birth and target hospitalization</td>
</tr>
<tr>
<td>Race</td>
<td>$1 = \text{African American}; 0 = \text{White}$</td>
</tr>
<tr>
<td>Marital Status</td>
<td>$1 = \text{Married or living with someone as if married at the time of hospital admission}$</td>
</tr>
<tr>
<td>SES</td>
<td>Weighted combination of education and occupation</td>
</tr>
<tr>
<td>Employment Status</td>
<td>$1 = \text{Employed either full or part time at the time of admission to the hospital}$</td>
</tr>
<tr>
<td>Length of Residence (modified)</td>
<td>Number of months resided at address where subject lived at the time of the hospital admission. Coded 0 for subjects discharged to addresses outside of the zip code area of the preadmission address.</td>
</tr>
<tr>
<td><strong>Clinical Factors</strong></td>
<td></td>
</tr>
<tr>
<td>Substance Abuse Diagnosis</td>
<td>$1 = \text{Yes}; 0 = \text{No}$</td>
</tr>
<tr>
<td>Anger</td>
<td>16-item Behavioral Subscale of the Novaco Anger Scale (NAS) [Novaco, 1994]. Cronbach's alpha = .89.</td>
</tr>
<tr>
<td>Impulsiveness</td>
<td>12-item Non-Planning Subscale of Barratt Impulsiveness Scale (BIS) [Barratt, 1994]. Cronbach's alpha = .63.</td>
</tr>
<tr>
<td>Degree of Symptomatology</td>
<td>18-item Brief Psychiatric Rating Scale (BPRS). Cronbach's alpha = .71.</td>
</tr>
<tr>
<td>Paranoid Personality Disorder</td>
<td>$1 = \text{Yes}; 0 = \text{No}$ [Structured Interview for DSM-III-R Personality (SIDP-R)].</td>
</tr>
<tr>
<td>Psychopathy</td>
<td>12-item Hare Psychopathy Checklist: Screening Version (PCL:SV). Coded $1 = \text{Probable/Definite Psychopath}$ for subjects scoring higher than 12 out of a possible 24 points; $0 = \text{Not}$. (See Hart et al., 1995). Cronbach's alpha = .89.</td>
</tr>
<tr>
<td>History of Violence</td>
<td>$1 = \text{Any prior adult arrests for serious crimes against persons}; 0 = \text{No such history [measured from official arrest data]}</td>
</tr>
<tr>
<td>Social Support</td>
<td>Number of positive emotional supporters [instrument developed by Estroff and Zimmer (1994)]</td>
</tr>
<tr>
<td>Time at Risk</td>
<td>The total length of the follow-up period (in days) less any days spent in a psychiatric hospital or jail/prison</td>
</tr>
</tbody>
</table>
above are provided in Table 2. Overall, the characteristics of the sample are comparable to those reported in prior studies of psychiatric patient samples (Barratt, 1994; Estroff and Zimmer, 1994; Novaco, 1994; Swartz et al., 1998). The mean five-category SES score of 1.7 (S.D. = 1) suggests a tendency for patients to fall at the lower end of the SES range, a result that is consistent with much prior research (for a review, see Dohrenwend, 1990).

Table 2. Psychiatric Patient Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>(S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (0/1)</td>
<td>55.2%</td>
<td></td>
</tr>
<tr>
<td>Age (in years)</td>
<td>30.4</td>
<td>(6.2)</td>
</tr>
<tr>
<td>African American (0/1)</td>
<td>33.7%</td>
<td></td>
</tr>
<tr>
<td>Married or Live as Married (0/1)</td>
<td>32.6%</td>
<td></td>
</tr>
<tr>
<td>SES (5 category)</td>
<td>1.7</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Employed (0/1)</td>
<td>41.5%</td>
<td></td>
</tr>
<tr>
<td>Length of Residence (in Months)</td>
<td>38.2</td>
<td>(71.4)</td>
</tr>
<tr>
<td>Clinical Factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance Abuse Diagnosis</td>
<td>32.6%</td>
<td></td>
</tr>
<tr>
<td>Anger</td>
<td>29.5</td>
<td>(7.2)</td>
</tr>
<tr>
<td>Impulsiveness</td>
<td>24.0</td>
<td>(7.9)</td>
</tr>
<tr>
<td>Degree of Symptomatology</td>
<td>36.0</td>
<td>(8.7)</td>
</tr>
<tr>
<td>Paranoid Personality Disorder</td>
<td>17.4%</td>
<td></td>
</tr>
<tr>
<td>Psychopathy</td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>History of Violent Arrests</td>
<td>23.3%</td>
<td></td>
</tr>
<tr>
<td>Social Support</td>
<td>5.5</td>
<td>(2.1)</td>
</tr>
<tr>
<td>Time at Risk</td>
<td>141</td>
<td>(25)</td>
</tr>
</tbody>
</table>

PATIENT VIOLENCE

Questions about violence were adapted from the Conflict Tactics Scale,

1. Five of these variables contained missing data: SES (1 case), anger (1 case), impulsiveness (7 cases), psychopathy (17 cases), and paranoid personality disorder (34 cases). For the nondichotomous measures (SES, anger, and impulsiveness), missing data were handled using mean-substitution. For the dichotomous measures (psychopathy and paranoid personality disorder), mode-substitution was used to maintain the original metric of the measure. To ensure that observed results were not confounded by these missing data substitutions, all multivariate analyses were run, including indicator variables coded as 1 for those cases for which missing values were substituted (and 0 for all others). In no instance did the models, including the missing data indicators, yield substantively different results than did the models without the indicators. Therefore, for clarity of presentation, models without missing data indicator variables are shown.
as expanded by Lidz et al. (1993). Subjects and collaterals each were asked whether the subject had been involved in a violent incident during the past 10 weeks. Violent acts included acts of battery that resulted in physical injury, sexual assaults, assaultive acts that involved the use of a weapon, or threats made with a weapon in hand. Only the most serious act for each discrete incident was coded. Incidents of child discipline without injury were excluded. Inter-rater reliability for the violence measure was assessed by having nine interviewers independently code five videotaped interviews with subjects. A high degree of inter-rater reliability was achieved in the gathering of the violence measures (Cohen’s kappa = .93).

Violent acts reported by any of three data sources—subject self-report, collateral report, or official records—were reviewed by a team of trained coders to obtain a single reconciled report of violence. This triangulation of information sources was accomplished by having two coders independently review each case in which a violent act was reported by any of the information sources. For most violent incidents (approximately 90%), the coding rules were applied without difficulty. In the small number of instances (less than 10%) in which discrepancies arose between the information sources, coding was discussed and resolved through group meetings involving senior members of the project until a single reconciled report of the violent act was determined (detailed coding rules are available from the author).

The current study examines violence, coded as a dichotomous measure, that occurred during the first 20 weeks after discharge from WPIC. Although data on violence are available over a one-year period after hospital discharge, the current study focuses on the initial 20-week period because it is for that period that the census tract locations of patients are known. Assessment of contextual effects beyond this period are problematic because subjects may change residences, thereby jeopardizing the validity of the contextual measure. Further, the 20-week risk period represents the time during which postdischarge violence rates were at their highest; a majority (62.8%) of the subjects who committed a violent act during the one-year follow-up had done so by the end of this 20-week period (Steadman et al., 1998).

In constructing the violence measure, only violent incidents that occurred prior to a subsequent rehospitalization or incarceration were counted as valid incidents. This criterion resulted in the exclusion of two recorded violent incidents because they occurred after the subject had been rehospitalized. For all cases, a variable indicating the number of days at risk for violence in the community was computed. As reported in Table 2, the mean number of days for which subjects were at risk of committing a violent act during the follow-up period was 141 (S.D. = 25). Of the 270
discharged patients in this study, 33 (12.2%) committed at least one act of violence toward others during the 20-week period after hospital discharge.

NEIGHBORHOOD CONTEXT

Most people regard their neighborhood as larger than one block but smaller than an entire sector (i.e., the North side of a city) (Lee and Campbell, 1997). Census tract boundaries lie between these two extremes and are drawn to encapsulate relatively homogeneous populations in terms of demographic and economic characteristics. Although census tracts are imperfect operationalizations of neighborhoods (Tienda, 1991), they come closer than any commonly available geographic entity in approximating the usual conception of a neighborhood (South and Crowder, 1997). Using census tract identifiers, patient records were matched to census tract records from the 1990 U.S. Census to create a multilevel analysis file consisting of both neighborhood- and patient-level characteristics.

The specific neighborhood measures examined here include neighborhood poverty (i.e., percentage of all persons in households with income below the federal poverty level and percentage of households that have public assistance incomes), neighborhood wealth (i.e., mean household wages and percentage of families with income greater than $50,000 per year), neighborhood family structure (i.e., percentage of families headed by a female), neighborhood employment (i.e., adult unemployment rate and percentage of employed persons with executive or managerial positions), neighborhood residential stability (i.e., percentage of residents who lived in the same housing unit five years earlier), neighborhood racial/ethnic composition (i.e., percentage of neighborhood residents who are African American and percentage of neighborhood residents who are foreign-born), and neighborhood housing stock (i.e., percentage of housing units that are vacant).

These census tract measures, of course, are not direct indicators of neighborhood social disorganization processes; rather, they reflect key structural conditions suggested by a long line of theorists as exogenous causes of social disorganization. Therefore, conclusions drawn from this study regarding the effects of neighborhood-level social disorganization must be inferred from the effects of these structural antecedents, because direct measures of the social disorganization process operating at the neighborhood level are not available from the U.S. Census. Overall, the 270 patients in this study were discharged to 145 census tracts in the Allegheny County, Penn., region.
STATISTICAL PROCEDURES

An important statistical issue that arises in multilevel analyses is that regression residuals within macrolevel units may be correlated, thereby violating the assumption of independent observations that underlies standard regression-based techniques. Although statistical methods such as hierarchical linear modeling (HLM) (Bryk and Raudenbush, 1992) are available to deal with this issue, the current study does not use HLM because 89 of the 145 census tracts into which patients were discharged (61.4%) contained only one discharged patient. That is, for almost two-thirds of the macrolevel units, there is no within-unit variation. The fact that so many subjects are unique in terms of their census tract location minimizes the risk that observed results are affected by compositional similarities within macrolevel units. Therefore, a standard logistic regression model is used to analyze patient violence contextually.

RESULTS

THE LIVING ARRANGEMENTS OF DISCHARGED PSYCHIATRIC PATIENTS

Contrary to the belief that mentally ill individuals reside in government-run supervised living facilities, our data show that 80.3% of subjects lived at home (i.e., in a private house or apartment) at the time of their first follow-up interview in the community (approximately 10 weeks after the date of discharge), 8.9% of subjects resided in supervised living arrangements with direct access to the community, 4.8% were being treated at a psychiatric facility, and 3% were living in a homeless shelter or on the street. Of those living at home, 55.1% reported living with relatives, 20.8% reported living with friends, and 22.7% reported living alone.

THE NEIGHBORHOODS IN WHICH DISCHARGED PSYCHIATRIC PATIENTS LIVE

Table 3 compares the types of neighborhoods into which patients were discharged to the types of neighborhoods in which the general population of Allegheny County, Penn., resided in 1990. (Allegheny County includes most of the areas into which it was at least theoretically possible for treated patients to have been discharged.) Such a comparison provides perspective in terms of how different the neighborhood contexts of this sample of discharged patients are from those of the general population. The figures in the “Psychiatric Patient” column are means weighted

---

2. This observation was confirmed by estimating a random-intercepts HLM model, treating the individual-level predictors as fixed effects. Results indicated no significant residual variation across the neighborhood units ($\chi^2 = 86.3, df = 138, p > .5$).
according to the actual distribution of the 270 patients within the 145 census tracts; the figures in the "General Population" column are weighted according to the actual distribution of the 1,334,196 individuals counted by the 1990 Census as residing within the 467 census tracts of Allegheny County, Penn.

Table 3. Comparison of Psychiatric Patient and General Population Neighborhoods

<table>
<thead>
<tr>
<th>Neighborhood Characteristic</th>
<th>Psychiatric Patients (N = 270)</th>
<th>General Population (N = 1,334,196)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Poverty</td>
<td>24.4</td>
<td>11.7</td>
</tr>
<tr>
<td>% Public Assistance</td>
<td>14.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Mean Household Wage</td>
<td>$28.7k</td>
<td>$37.0k</td>
</tr>
<tr>
<td>% High Income Families</td>
<td>21.4</td>
<td>29.2</td>
</tr>
<tr>
<td>% Female-Headed Households</td>
<td>31.7</td>
<td>18.7</td>
</tr>
<tr>
<td>% Unemployed</td>
<td>12.0</td>
<td>6.9</td>
</tr>
<tr>
<td>% Exec/Managerial Jobs</td>
<td>10.3</td>
<td>12.8</td>
</tr>
<tr>
<td>% Residentially Stable</td>
<td>57.0</td>
<td>65.3</td>
</tr>
<tr>
<td>% Vacant Dwellings</td>
<td>10.5</td>
<td>6.3</td>
</tr>
<tr>
<td>% African American</td>
<td>31.2</td>
<td>11.2</td>
</tr>
<tr>
<td>% Foreign-Born</td>
<td>5.1</td>
<td>3.1</td>
</tr>
</tbody>
</table>

*a Figures represent the average neighborhood characteristics for the patient and general population samples.

*b The "General Population" figures include all persons measured by the 1990 U.S. Census with Allegheny County, Penn.

Table 3 indicates clearly that patients treated and discharged from WPIC tended to live in more disadvantaged neighborhoods than did the general population of Allegheny County. Although these results may be confounded by selection processes favoring the treatment of lower SES patients at WPIC (a public psychiatric hospital), the pattern of results is, nonetheless, consistent with prior studies reporting an association between mental illness and low SES in the general population (Dohrenwend, 1990). Two processes have been offered as explanations for this association: social stress and social selection. The social stress explanation holds that rates of mental disorder are higher among lower SES persons because of the greater environmental adversity they experience, which facilitates mental disturbance among them. The social selection explanation argues that rates of mental disorder are higher among the lower social classes because persons with mental disorders “drift” downward or fail to increase their SES, because of an inability to remain economically productive.
Despite several decades of research, consensus regarding the relative merits of the social drift and social stress explanations for the SES-mental disorder relationship has not been found (Dohrenwend, 1990).

Nonetheless, in light of the association observed in Table 3, it is crucial that controls for socioeconomic status and the severity of mental disorder be in place in the analyses presented below, because each may influence the neighborhood locations of patients. In addition, it is important to note that to the extent that discharged psychiatric patients tend to reside in more disadvantaged neighborhoods, this study of patient violence may encounter restricted variability in the measures of neighborhood context, thus resulting in an underestimation of the neighborhood effects.

PRINCIPAL COMPONENTS FACTOR ANALYSIS

A considerable degree of intercorrelation was found among the 11 neighborhood measures used to represent structural antecedents of the social disorganization process. Out of a total of 55 bivariate correlations, 45 were statistically significant and 11 showed bivariate correlations above .70. To solve this multicollinearity problem, we followed the recommendation of Land et al. (1990) and factor analyzed the census tract measures to reduce them to a smaller number of underlying dimensions.

The principal components factor analysis of these data (using oblique rotation) showed the poverty-related variables to be highly associated, loading on the same factor (eigenvalue = 6.2, explained variance = 56.6%). This factor was dominated by high factor loadings for public assistance (.92), female-headed households (.91), poverty rate (.87), unemployment rate (.87), percent African American (.81), high income (−.80), vacant dwellings (.76), managerial employment (−.75), and mean household wage (−.73). The label “neighborhood disadvantage” is used to describe this factor. A second factor, labeled “neighborhood mobility,” consisted of residential stability (factor loading = −.90) and percent foreign-born (factor loading = .86), and obtained an eigenvalue = 1.8 (explained variance = 16.4%).

PSYCHIATRIC PATIENT AND NEIGHBORHOOD CHARACTERISTICS

Next, I examined whether mentally ill individuals with particular risk

---

3. The factor solution obtained using a Varimax rotation (i.e., forcing the factors to be orthogonal) was virtually identical to the oblique rotation solution described above (i.e., in terms of factor loadings, number of factors identified, and explained variance). Thus, the oblique rotation solution is presented, allowing the underlying factors to correlate modestly ($r = −.06, p = .49$).
factor characteristics tended to reside in particular types of neighborhoods. Table 4 presents Pearson correlations between the patient characteristics and neighborhood factor scores. These bivariate associations are important for two reasons. First, they represent the first systematic attempt to relate individual-level risk factors for violence among persons with mental illnesses to the neighborhood environments in which they live. Second, they yield results largely consistent with what is expected based on prior research and theory using nondisordered samples.

Table 4. Pearson Correlations Between Patient and Neighborhood Characteristics

<table>
<thead>
<tr>
<th>Patient Characteristic</th>
<th>Neighborhood Disadvantage</th>
<th>Neighborhood Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (0/1)</td>
<td>.03</td>
<td>.06</td>
</tr>
<tr>
<td>Age</td>
<td>.15*</td>
<td>.01</td>
</tr>
<tr>
<td>African American (0/1)</td>
<td>.66***</td>
<td>-.13*</td>
</tr>
<tr>
<td>Married/Live as Married (0/1)</td>
<td>.02</td>
<td>-.20**</td>
</tr>
<tr>
<td>SES (5 category)</td>
<td>-.15*</td>
<td>.04</td>
</tr>
<tr>
<td>Employed (0/1)</td>
<td>-.24***</td>
<td>-.08</td>
</tr>
<tr>
<td>Length of Residence</td>
<td>-.07</td>
<td>-.24***</td>
</tr>
<tr>
<td>Substance Abuse d/o (0/1)</td>
<td>.32***</td>
<td>-.07</td>
</tr>
<tr>
<td>Anger</td>
<td>.21**</td>
<td>-.13*</td>
</tr>
<tr>
<td>Impulsiveness</td>
<td>.05</td>
<td>.09</td>
</tr>
<tr>
<td>Degree of Symptomatology</td>
<td>.07</td>
<td>.03</td>
</tr>
<tr>
<td>Paranoid Personality Disorder (0/1)</td>
<td>.19**</td>
<td>.03</td>
</tr>
<tr>
<td>Psychopathy (0/1)</td>
<td>.31***</td>
<td>-.12*</td>
</tr>
<tr>
<td>History of Violent Arrests (0/1)</td>
<td>.29***</td>
<td>-.09</td>
</tr>
<tr>
<td>Social Support</td>
<td>-.23***</td>
<td>-.07</td>
</tr>
</tbody>
</table>

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

For example, the strong correlation between patient race and neighborhood disadvantage is consistent with recent research on residential segregation (Massey and Denton, 1993), and the significant association between neighborhood disadvantage and individual substance abuse and violence histories is consistent with the results of Anderson’s (1990) ethnographic research. The significant negative correlations among individual SES, employment status, and neighborhood disadvantage is consistent with human capital models of residential attainment (Logan et al., 1996). Further, the negative correlation between social support and neighborhood
disadvantage is consistent with Cullen's (1994) suggestion that neighborhood social disorganization fosters individual social isolation by undermining supportive relationships. Finally, the strong correlation between neighborhood residential mobility and individual length of residence is consistent with the systemic model depicted by Kasarda and Janowitz (1974) and Sampson (1988).

Somewhat surprising are the negative associations found between the Neighborhood Mobility factor and levels of anger and psychopathy among discharged patients, given the positive associations between these patient characteristics and the Neighborhood Disadvantage factor. However, an examination of the bivariate associations between the Neighborhood Mobility factor and the census tract measures used as inputs in the factor analysis suggests that high-mobility neighborhoods in these areas of Allegheny County also tend to score as less disadvantaged on a number of dimensions. For example, high-mobility neighborhoods tend to have fewer families receiving public assistance income \( (r = -.21, p < .001) \), have lower unemployment rates \( (r = -.14, p < .05) \), and contain a smaller proportion of African-American residents \( (r = -.17, p < .01) \). Thus, the negative associations between anger and psychopathy and neighborhood mobility are not inconsistent with the positive associations found between these individual-level measures and neighborhood disadvantage.

**BIVARIATE ASSOCIATIONS WITH VIOLENCE**

As a backdrop to the multivariate models that follow, unstandardized logistic regression coefficients (betas) and odds ratios for each predictor variable and violence are displayed separately in Table 5. As shown, male gender, African-American racial status, substance abuse disorder, anger, impulsiveness, paranoid personality disorder, psychopathy, history of violent arrests, and neighborhood disadvantage were all found to be significantly associated with violence. No significant associations with violence were found for age, SES, employment status, length of residence, degree of symptomatology, and neighborhood mobility. Nor, in contrast to the theoretical framework outlined above, was the extent of social support available to individuals associated with lower levels of violence.\(^4\) It is particularly interesting to note that whereas the Neighborhood Disadvantage

---

4. One reason for the lack of association between social support and violence might have been that social support is a factor in the decision to release a psychiatric patient from treatment. To the extent that patients with viable support networks were more likely to be released to the community, sampling discharged patients may have inadvertently controlled for much of the significant variation in support. However, this methodological artifact is not supported by the data. First, as shown in Table 4, we observe a significant association between residence in a disadvantaged neighborhood and social support \( (r = -.23, p < .001) \), a result that would not be likely if a significant
factor was significantly related to violence, the individual SES measure was not. This finding raises important questions about the use of individual SES as a proxy measure for a patient’s neighborhood setting when assessing violence risk.

Table 5. Bivariate Associations with Patient Violence

<table>
<thead>
<tr>
<th>Variables</th>
<th>BETA</th>
<th>Odds Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (0/1)</td>
<td>1.04</td>
<td>2.84*</td>
</tr>
<tr>
<td>Age</td>
<td>-0.03</td>
<td>0.97</td>
</tr>
<tr>
<td>African American (0/1)</td>
<td>0.99</td>
<td>2.70**</td>
</tr>
<tr>
<td>Married/Live as Married (0/1)</td>
<td>0.91</td>
<td>2.48*</td>
</tr>
<tr>
<td>SES (5 category)</td>
<td>-0.16</td>
<td>0.85</td>
</tr>
<tr>
<td>Employed (0/1)</td>
<td>-0.24</td>
<td>0.78</td>
</tr>
<tr>
<td>Length of Residence</td>
<td>-0.003</td>
<td>0.997</td>
</tr>
<tr>
<td>Drug Disorder (0/1)</td>
<td>1.20</td>
<td>3.30**</td>
</tr>
<tr>
<td>Anger</td>
<td>0.07</td>
<td>1.07**</td>
</tr>
<tr>
<td>Impulsiveness</td>
<td>0.06</td>
<td>1.06*</td>
</tr>
<tr>
<td>Degree of Symptomatology</td>
<td>-0.005</td>
<td>0.995</td>
</tr>
<tr>
<td>Paranoid Personality Disorder (0/1)</td>
<td>1.52</td>
<td>4.55***</td>
</tr>
<tr>
<td>Psychopathy (0/1)</td>
<td>1.75</td>
<td>5.74***</td>
</tr>
<tr>
<td>Prior Violent Arrests (0/1)</td>
<td>1.19</td>
<td>3.28**</td>
</tr>
<tr>
<td>Social Support</td>
<td>-0.15</td>
<td>0.86</td>
</tr>
<tr>
<td>Neighborhood Mobility</td>
<td>-0.30</td>
<td>0.73</td>
</tr>
<tr>
<td>Neighborhood Disadvantage</td>
<td>0.51</td>
<td>1.66***</td>
</tr>
</tbody>
</table>

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

MULTIVARIATE MODELS

Does neighborhood social disorganization contribute to models predicting violent behavior among discharged psychiatric patients over and above the effects of known individual-level risk factors and control variables? To address this question, all of the individual-level risk factors and control variables were entered into a logistic regression equation. Social Support was not entered at this time, because its role as a mediating factor is amount of the variability in social support had been controlled. Second, the correlation between the length of hospitalization at WPIC and the number of social supporters was −.01 (p = .84), a result that does not support the hypothesis that release decisions were contingent on available social supports. Taken together, these data indicate that social support is not a key factor influencing the discharge of acute psychiatric patients into the community and that the variability in social supports was not substantially truncated by the data collection procedures of the study.
assessed below. The purpose of entering these measures first into the equation was to allow the individual risk factors and control variables to explain as much of the variation in patient violence as possible before assessing the main effects of the neighborhood factors.

Model 1 of Table 6 shows that when all of the individual-level risk factors and control variables were entered into the logistic regression equation together, only psychopathy and spouse/partner had significant positive main effects on patient violence. The positive effect found for psychopathy is consistent with much prior research on patient violence in which psychopaths have tended to exhibit higher rates of violence than have nonpsychopaths (Hart et al., 1995). The positive effect of being married (or living with someone as if married) on the occurrence of violence is consistent with current knowledge about the targets of violence by persons with mental illnesses (Estroff and Zimmer, 1994; Steadman et al., 1998). Specifically, when individuals with mental illnesses act out violently, they tend to target family members and other known individuals. Hiday (1997) interprets this pattern of violence as reflecting the propensity for individuals with mental illnesses to be involved in “tense situations,” as direct caretakers attempt to monitor and control their behavior. This pattern of domesticity in the targets of violence of individuals with mental illnesses may also be a function of the high degree to which individuals with mental illnesses are in direct contact with family and friends, caused, in part, by the avoidance of such individuals by the general public (Link et al., 1999).

Several of the individual-level risk factors that were significantly related to violence at the bivariate level (Table 5) were not significant when examined in the multivariate logistic regression equation (Table 6, Model 1). These variables were male, African American, drug disorder, anger, impulsiveness, paranoid personality disorder, and prior violent arrests. Thus, over and above the effects of psychopathy and spouse/partner, these variables did not contribute significantly to the prediction of patient violence during the first 20 weeks after discharge. However, note that the positive effects of male and paranoid personality disorder approached statistical significance ($p = .06$ and $p = .07$, respectively). In general, there appears to be a fair amount of overlap in these individual-level risk factors’ associations with violence.

Model 2 of Table 6 indicates that adding the Neighborhood Disadvantage factor yielded a significant improvement in explained variation in the occurrence of patient violence over and above the effects of the individual-level risk factors and control variables already in the model. Model 3 of Table 6 indicates that adding the Neighborhood Mobility factor did not significantly increase the amount of variation in violence explained. No significant cross-level interactions (i.e., between individual- and neighborhood-level variables) were observed in these data.
Table 6. Unstandardized Coefficients (Beta) and Odds Ratios (OR) from Logistic Regression

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
<th>Model 4</th>
<th></th>
<th>Model 5</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (0/1)</td>
<td>0.96</td>
<td>2.61</td>
<td>0.99</td>
<td>2.68</td>
<td>0.99</td>
<td>2.68*</td>
<td>1.02</td>
<td>2.78*</td>
<td>0.98</td>
<td>2.67</td>
</tr>
<tr>
<td>Age (in years)</td>
<td>-0.04</td>
<td>0.69</td>
<td>-0.05</td>
<td>0.95</td>
<td>-0.04</td>
<td>0.96</td>
<td>-0.05</td>
<td>0.95</td>
<td>-0.52</td>
<td>0.95</td>
</tr>
<tr>
<td>African American (0/1)</td>
<td>-0.15</td>
<td>0.86</td>
<td>-0.90</td>
<td>0.41</td>
<td>-0.16</td>
<td>0.85</td>
<td>-0.93</td>
<td>0.39</td>
<td>-0.90</td>
<td>0.41</td>
</tr>
<tr>
<td>Married/Live as Married (0/1)</td>
<td>0.95</td>
<td>2.58*</td>
<td>1.00</td>
<td>2.72*</td>
<td>0.86</td>
<td>2.36*</td>
<td>0.92</td>
<td>2.50*</td>
<td>0.92</td>
<td>2.51*</td>
</tr>
<tr>
<td>SES (5 categories)</td>
<td>0.07</td>
<td>1.07</td>
<td>0.10</td>
<td>1.10</td>
<td>0.08</td>
<td>1.09</td>
<td>0.11</td>
<td>1.12</td>
<td>0.09</td>
<td>1.10</td>
</tr>
<tr>
<td>Employed (0/1)</td>
<td>-0.08</td>
<td>0.93</td>
<td>0.63</td>
<td>1.06</td>
<td>-0.12</td>
<td>0.88</td>
<td>0.008</td>
<td>1.008</td>
<td>0.06</td>
<td>1.06</td>
</tr>
<tr>
<td>Length of Residence</td>
<td>-0.003</td>
<td>.998</td>
<td>-0.003</td>
<td>.997</td>
<td>-0.003</td>
<td>.997</td>
<td>-0.004</td>
<td>.997</td>
<td>-0.003</td>
<td>.997</td>
</tr>
<tr>
<td>Drug Disorder (0/1)</td>
<td>0.70</td>
<td>2.00</td>
<td>0.67</td>
<td>1.96</td>
<td>0.67</td>
<td>1.95</td>
<td>0.65</td>
<td>1.91</td>
<td>0.63</td>
<td>1.88</td>
</tr>
<tr>
<td>Anger</td>
<td>0.05</td>
<td>1.06</td>
<td>0.04</td>
<td>1.04</td>
<td>0.05</td>
<td>1.05</td>
<td>0.03</td>
<td>1.04</td>
<td>0.03</td>
<td>1.03</td>
</tr>
<tr>
<td>Impulsiveness</td>
<td>0.02</td>
<td>1.02</td>
<td>0.03</td>
<td>1.02</td>
<td>0.02</td>
<td>1.02</td>
<td>0.03</td>
<td>1.03</td>
<td>0.03</td>
<td>1.03</td>
</tr>
<tr>
<td>Degree of Symptomatology</td>
<td>-0.04</td>
<td>0.97</td>
<td>-0.03</td>
<td>0.97</td>
<td>-0.03</td>
<td>0.97</td>
<td>-0.02</td>
<td>0.98</td>
<td>-0.03</td>
<td>0.97</td>
</tr>
<tr>
<td>Paranoid Personality Disorder (0/1)</td>
<td>0.85</td>
<td>2.32</td>
<td>0.83</td>
<td>2.30</td>
<td>0.90</td>
<td>2.47</td>
<td>0.90</td>
<td>2.46</td>
<td>0.90</td>
<td>2.46</td>
</tr>
<tr>
<td>Psychopathy</td>
<td>1.26</td>
<td>3.52*</td>
<td>1.20</td>
<td>3.31*</td>
<td>1.18</td>
<td>3.26*</td>
<td>1.12</td>
<td>3.08*</td>
<td>1.16</td>
<td>3.20*</td>
</tr>
<tr>
<td>Prior Violent Arrests (0/1)</td>
<td>-0.21</td>
<td>0.81</td>
<td>-0.22</td>
<td>0.81</td>
<td>-0.20</td>
<td>0.82</td>
<td>-0.23</td>
<td>0.80</td>
<td>-0.25</td>
<td>0.78</td>
</tr>
<tr>
<td>Time at Risk</td>
<td>.090</td>
<td>1.01</td>
<td>.007</td>
<td>1.007</td>
<td>.009</td>
<td>1.009</td>
<td>.007</td>
<td>1.007</td>
<td>.008</td>
<td>1.008</td>
</tr>
<tr>
<td>Neighborhood Disadvantage</td>
<td>—</td>
<td>—</td>
<td>0.50</td>
<td>1.65*</td>
<td>—</td>
<td>—</td>
<td>0.51</td>
<td>1.66*</td>
<td>0.48</td>
<td>1.62</td>
</tr>
<tr>
<td>Neighborhood Mobility</td>
<td>—</td>
<td>—</td>
<td>-0.20</td>
<td>0.82</td>
<td>-0.22</td>
<td>0.81</td>
<td>-0.21</td>
<td>0.81</td>
<td>-0.21</td>
<td>0.81</td>
</tr>
<tr>
<td>Social Support</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.08</td>
<td>—</td>
<td>0.92</td>
</tr>
<tr>
<td>Nagelkerke (pseudo) $R^2$</td>
<td>.28</td>
<td>.31</td>
<td>.29</td>
<td>.32</td>
<td>.32</td>
<td>.32</td>
<td>.32</td>
<td>.32</td>
<td>.32</td>
<td>.32</td>
</tr>
<tr>
<td>$\chi^2$ Model Improvement (df)</td>
<td>43.58 (15)**</td>
<td>4.24 (1)*</td>
<td>0.77 (1)</td>
<td>48.65 (17)**</td>
<td>0.47 (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$.
** $p < .01$.
*** $p < .001$. 
To assess whether social support mediates the effect of neighborhood characteristics on patient violence, the coefficients representing the effects of the neighborhood factors on patient violence were observed before and after introducing the social support measure to the equation. The results are reported in Models 4 and 5 of Table 6. As shown, the size of the coefficients associated with the Neighborhood Disadvantage and Neighborhood Mobility factors remained virtually unchanged when social support was introduced to the equation, despite a slight change in the p-value associated with the Disadvantage factor from $p = .040$ to $p = .052$.

In summary, although at the bivariate level neighborhood disadvantage was found to be negatively related to the number of social supporters available to patients (as predicted by Cullen [1994]) and positively related to patient violence (as predicted by social disorganization theory), the effect of neighborhood disadvantage on patient violence was not substantially mediated by the level of social support available to individual subjects.

Finally, as an illustration of the magnitude of the association between neighborhood disadvantage and patient violence, the multivariate logistic regression equation shown in Model 4 of Table 6 was used to compute predicted probabilities of patient violence at varying levels of neighborhood disadvantage. For illustrative purposes, the individual-level measures and the Neighborhood Mobility factor score were first arbitrarily fixed at their respective mean values. Then, the Neighborhood Disadvantage factor score was made to vary from a low of two standard deviations below the mean value for all patients to a high of two standard deviations above the mean, moving in single standard deviation units.

The resulting predicted probability values for each of the five levels of Neighborhood Disadvantage are presented in Table 7. As shown, the probability of violence for discharged patients residing in the lowest disadvantage condition was predicted at .02, indicating that for every 100 patients discharged to such neighborhoods, 2 would be expected to engage in violence. By contrast, the probability of violence for discharged patients residing in the highest disadvantage condition was .19; that is, for every 100 patients discharged to such neighborhoods, 19 would be expected to engage in violence. Thus, moving from the lowest to the highest neighborhood disadvantage condition resulted in a ninefold increase in the risk of patient violence.

THE RELATIVE IMPORTANCE OF NEIGHBORHOOD-LEVEL FACTORS

In the majority of empirical studies that find significant neighborhood
Table 7. Predicted Probabilities of Violence from Logistic Regression Equation at Varying Levels of Neighborhood Disadvantage

<table>
<thead>
<tr>
<th>Neighborhood Disadvantage</th>
<th>Predicted Probability of Violence*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2 S.D. Below Mean</td>
<td>.02</td>
</tr>
<tr>
<td>-1 S.D. Below Mean</td>
<td>.04</td>
</tr>
<tr>
<td>Mean</td>
<td>.07</td>
</tr>
<tr>
<td>1 S.D. Above Mean</td>
<td>.12</td>
</tr>
<tr>
<td>2 S.D. Above Mean</td>
<td>.19</td>
</tr>
</tbody>
</table>

* All other predictor variables fixed at their respective mean values.

effects, such effects are generally much smaller than are the effects of individual and family characteristics. To assess the relative importance of individual- and neighborhood-level characteristics in these data, the pseudo-$R^2$s from models 1 and 4 in Table 6 were compared, revealing that four percentage points out of a total pseudo-$R^2$ of 32% was uniquely attributable to the Neighborhood factors. Second, to ascertain the amount of variation uniquely attributable to the individual-level risk factors, these variables were added to a separate logistic regression model controlling for the Neighborhood factors (not shown). Upon adding the individual-level variables, the pseudo-$R^2$ increased from 9% (i.e., the total amount of variation explained by the Neighborhood factors alone) to 32%, indicating that the individual-level predictors accounted for a total unique contribution of 23%. This leaves 5% (32%–[23% + 4%]) as shared variation.

Although computationally simple, these estimates make a crucial point: Although neighborhood disadvantage was found to contribute significantly to the prediction of patient violence, the effects of neighborhood accounted for far less of the explained variation than did the individual-level predictors (unique pseudo-$R^2 = 4\%$ versus 23%). In addition, these analyses showed that a good amount of the explained variation in patient violence (5% out of a total pseudo-$R^2$ of 32%) is shared by both individual- and neighborhood-level factors, suggesting that studies of patient violence that neglect to specify neighborhood-level factors run the risk of overstating the explanatory power of individual-level predictors.

**DISCUSSION**

Social disorganization theory suggests that neighborhoods high in social disorganization are less able to exert informal social control over residents and, as argued above, provide less opportunity for residents to obtain
needed social supports. Accordingly, it was hypothesized that psychiatric patients discharged into socially disorganized neighborhoods would be more apt to engage in violence against others than would those discharged into less disorganized neighborhoods. The results of this study provided substantial support for this hypothesis. Most importantly, patients discharged into disadvantaged neighborhoods were significantly more likely to commit violent acts than were those discharged into less disadvantaged neighborhoods. This finding held after controlling for known individual-level risk factors and control variables.

In considering this core finding, it is important to note that this study of Pittsburgh neighborhoods found neighborhood disadvantage to consist not only of indicators of economic deprivation (i.e., poverty, income, and occupational structure), but also to include such measures as the percentage African American in the neighborhood and the percentage of households that were female headed. This factor structure differs from the theory of social disorganization originally formulated by Shaw and McKay (1942), in which socioeconomic deprivation and population heterogeneity were treated as distinct dimensions affecting the social disorganization process. However, the factor structure obtained here is consistent with more recent presentations of social disorganization theory, in which it has been suggested that the structural conditions underpinning the social disorganization process have changed since the theory of social disorganization was developed in the 1930s (Sampson and Lauritsen, 1994; Warner and Pierce, 1993). Specifically, it has been observed that in today's disorganized communities, racial composition, family disruption, and socioeconomic disadvantage correlate so highly that they cannot be separated empirically (Massey and Denton, 1993; Miles-Doan, 1998; Sampson and Lauritsen, 1994; Wilson, 1987).

Further, this study found no evidence that neighborhood residential mobility increased rates of violence among discharged patients, thus providing additional evidence that structural changes have occurred in the underlying factors related to social disorganization since the inception of the theory. Warner and Pierce (1993:507) suggest that today's socially disorganized neighborhoods appear to be "neighborhoods of last resort, neighborhoods where people remain, perhaps not because they choose to, but because they have no other choice." Thus, neighborhood mobility appears to be a less relevant factor in explaining crime and violence within today's socially disorganized neighborhoods than perhaps it once was. This finding suggests that census variables commonly used to measure low levels of guardianship, such as residential mobility and percent foreign-born, are not universally applicable. To better understand the control mechanisms operating within today's disorganized communities, future
research efforts must focus on obtaining a more extensive array of measures of control than those currently available from census data. In addition, future research must evaluate the extent to which these findings regarding a lack of association between neighborhood mobility and patient violence generalize beyond this Pittsburgh sample to other locations and time periods.

In interpreting the finding that a relatively small amount of explained variation in patient violence is attributable to neighborhood conditions, it is important to note that only two dimensions of the neighborhood context derived from census data (i.e., disadvantage and mobility) were compared with more than a dozen individual-level predictors. To what extent this same pattern of results would occur if a more theoretically exhaustive array of neighborhood factors had been available (i.e., including the strength and interconnectedness of neighborhood social networks, collective efficacy, neighborhood rates of crime and violence, etc.—each of which is featured in the social disorganization literature) cannot be determined from these data. It is reasonable to expect, however, that with a more theoretically exhaustive set of neighborhood-level factors, the amount of variation in patient violence accounted for (i.e., relative to individual-level predictors) would increase. Such an analysis, however, must await future research.

In terms of the mediating role of social support, results indicated that neighborhood disadvantage was negatively related to the number of social supporters available to patients, thus providing support for Cullen’s (1994) notion that neighborhood social disorganization constrains the amounts of social support available to individuals. However, the effect of neighborhood disadvantage on patient violence was not substantially mediated by the amount of social support available to individual patients.

One implication of this finding is that, contrary to the theoretical argument put forth in this study, social support is inconsequential as a mediating factor in the relationship between neighborhood conditions and patient violence. However, caution is advised in accepting this interpretation for two reasons. First, this study was not able to measure the strength of neighborhood-level social support networks (i.e., the capacity for compassionate action inherent in the neighborhood), but rather, it relied on a measure of individual supports as a proxy. Yet, it is conceivable, given current communication technology, that some proportion of the support reportedly provided to individuals with mental illnesses came from persons located outside of the neighborhood boundaries. Unfortunately, the residential locations of social supporters cannot be determined from these data. Thus, the measure of support used here may not have adequately tapped into the viability of social support networks rooted in the ecology of the neighborhood, a type of support that may be crucial for understanding
the relationship between social disorganization and violent behavior. To address this issue, future research should attempt to measure the geographic span of the social support networks of individuals with mental illnesses to determine the extent to which they are rooted in the neighborhood environment (Wellman, 1979).

Second, by measuring the number of individuals self-reported (i.e., perceived) by subjects as providing support, this study may not have tapped into other types of support that may be influential in protecting against violence. Specifically, it may be that the types of assistance provided in neighborhoods with strong social support networks are subtle to the point of being invisible to the person with mental illness. For example, a neighbor may notice a person with a mental illness acting in an odd or disruptive way, and may then contact a family member, who subsequently shows up at the scene to talk to the person and take him or her home. Although this type of support may have indirectly prevented the mentally ill person's behavior from escalating to violence, it is at the same time a type of support (rooted in the ecology of the neighborhood) that may go unnoticed by the subject and, thus may not become included in self-reported counts of available social supporters.

This distinction between individual-level and aggregate-level measures of social support coincides with a network analytic approach to assessing social relationships. Network analysis is based on the assumption that the structural properties of social networks represent emergent social phenomena that cannot be reduced to the measurement of individuals' perceptions of network relations, but must be measured directly in terms of the interconnectedness of supportive human relations. Therefore, before discounting the relevance of social support as a mediating factor in the relationship between social disorganization and violence, future studies must pay more attention to developing better measures of social support networks operating at both the individual and neighborhood levels. Only then may we obtain a complete understanding of the mediating roles of supportive social relationships and the capacity for compassionate action inherent in the neighborhood.

CONCLUSION

In this study, as with all research aimed at relating contextual factors to individual-level outcomes, the problem of selection bias must always be considered as an alternative interpretation. People choose where to reside on the basis of factors (especially SES, but also other unmeasured and unmeasurable ones) that may be related to the behavior in question. To
what extent the relationship between neighborhood disadvantage and violence is determined by factors related to the systematic selection into disadvantaged neighborhoods of individuals and families who are prone to violence (because of a lack of financial or emotional resources) is not known. However, the significance of neighborhood disadvantage, holding constant individual-level measures, such as SES and employment status that may contribute to neighborhood selection, certainly supports an interpretation of the neighborhood disadvantage effect as a contextual effect.

Finally, in suggesting that neighborhood conditions affect the violent behavior of persons with mental illnesses, this study does not take the position that mental illness is unimportant as a cause of violence; nor does the study seek to contradict the neurobiological foundations on which many mental illnesses are believed to rest. Rather, this study follows Hiday (1997:412) in taking the position that "neurobiological factors may be the origin of severe mental illness; but social factors affect its course, manifestations, and connections to violence."

REFERENCES

Anderson, Elijah
1990 Streetwise: Race, Class, and Change in an Urban Community. Chicago, Ill.: University of Chicago Press.

Appelbaum, Paul S.

Barratt, Ernest S.

Bryk, Anthony S. and Stephen W. Raudenbush

Bursik, Robert J.

Bursik, Robert J. and Harold G. Grasmick

Campbell, Karen and Barratt Lee
Cullen, Francis T.

Dohrenwend, Bruce P.
1990 Socioeconomic status (SES) and psychiatric disorders. Social Psychiatry and Psychiatric Epidemiology 25:41–47.

Estroff, Sue E. and Catherine Zimmer

Faris, Robert E. L. and H. Warren Dunham
1939 Mental Disorders in Urban Areas: An Ecological Study of Schizophrenia and Other Psychoses. Chicago, Ill.: University of Chicago Press.

Goffman, Irving

Hart, Stephen D., David N. Cox, and Robert D. Hare

Hiday, Virginia A.

Kasarda, John and Morris Janowitz

Kornhauser, Ruth

Land, Kenneth C., Patricia L. McCall, and Lawrence E. Cohen

Lee, Barrett A. and Karen E. Campbell

Lidz, Charles W., Edward P. Mulvey, and William Gardner

Lin, Nan

Link, Bruce G., Jo C. Phelan, Michaelene Bresnahan, Anne Stueve, and Bernice A. Pescosolido
Logan, John R., Richard Alba, Thomas McNulty, and Brian Fisher  
1996 Making a place in the metropolis: Locational attainment in cities and  

Massey, Douglas S. and Nancy A. Denton  
Cambridge, Mass.: Harvard University Press.

Miles-Doan, Rebecca  
1998 Violence between spouses and intimates: Does neighborhood context  

Monahan, John  
1992 Mental disorder and violent behavior: Perceptions and evidence. American  

Monahan, John and Henry J. Steadman  
1994 Violence and Mental Disorder: Developments in Risk Assessment.  
Chicago, Ill.: University of Chicago Press.

Monahan, John, Henry J. Steadman, Paul S. Appelbaum, Pamela C. Robbins,  
Edward P. Mulvey, Eric Silver, Loren H. Roth, and Thomas Grisso  
2000 Developing a clinically useful actuarial tool for assessing violence risk.  

Mulvey, Edward P.  
1994 Assessing the evidence for a link between mental illness and violence.  
Hospital and Community Psychiatry 45(7):663–668.

Novaco, Raymond W.  
1994 Anger as a risk factor for violence among the mentally disordered. In  
John Monahan and Henry J. Steadman (eds.), Violence and Mental  
Disorder. Chicago, Ill.: University of Chicago Press.

Quinsey, Vernon L., Grant T. Harris, Marnie E. Rice, and Catherine A. Cormier  
American Psychological Association.

Robins, Lee N. and Darrel A. Regier  

Rouse, Beatrice A.  
1998 Substance Abuse and Mental Health Statistics Source Book. Washington,  

Sampson, Robert J.  
1988 Local friendship ties and community attachment. American Sociological  

Sampson, Robert J. and W. Byron Groves  
1989 Community structures and crime: Testing social disorganization theory.  

Sampson, Robert J. and Janet L. Lauritsen  
1994 Violent victimization and offending: Individual-, situational-, and commu-  
nity-level risk factors. In Albert. J. Reiss and Jeffrey A. Roth (eds.),  
Understanding and Preventing Violence. Vol. 3. Washington, D.C.:  
National Academy Press.
SOCIAL DISORGANIZATION

Sampson, Robert J., Stephen W. Raudenbush, and Felton Earls

Shaw, Clifford R. and Henry D. McKay

Silver, Eric

Silver, Eric, Edward P. Mulvey, and John Monahan

South, Scott J. and Kyle D. Crowder


Swanson, Jeffrey W., Charles E. Holzer, Vijay K. Ganju, and Robert T. Jono

Swartz, Marvin S., Jeffrey W. Swanson, Virginia A. Hiday, Randy Borum, Ryan Wagner, and Barbara J. Burns

Teplin, Linda A.

Tienda, Marta

U.S. Surgeon General

Warner, Barbara D. and Glenn L. Pierce
1993 Reexamining social disorganization theory using calls to the police as a measure of crime. Criminology 31:493–517.
SILVER


Eric Silver is Assistant Professor of Crime, Law, and Justice, and Sociology at the Pennsylvania State University and a member of the NSF’s National Consortium on Violence Research. His research focuses on the relationship between violence and mental illness and the role that social and contextual factors play in this relationship. Since 1994, he has served as Senior Data Analyst for the MacArthur Foundation’s Violence Risk Assessment Study, a large-scale study of risk factors for violence among discharged psychiatric patients. He has co-authored numerous articles in the area of violence and mental illness and violence prediction. Direct correspondence to Eric Silver, Department of Sociology, 211 Oswald Tower, University Park, PA, 16802.