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Categorizing Temporal Patterns of Arrest in a Cohort of Adults with Serious Mental Illness

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Abstract

Temporal patterns of arrest among mental health systems' clientele have not been well explored. This study uses "trajectory analysis," a methodology widely employed by criminologists exploring patterns of desistance in offending, to examine patterns of criminal justice involvement in a cohort of mental health service recipients. Data for this study are from a statewide cohort of individuals who received services from the Massachusetts Department of Mental Health in 1991 (N=13,876) and whose arrests were followed for roughly 10 years. Zero-inflated Poisson trajectory analysis applied to cohort members having two or more arrests identified five trajectories with widely varying arrest patterns. Analysis of differences in the composition of the five trajectory-based groups revealed few between-group differences in members' demographic and service use characteristics, while certain offense types were disproportionately prevalent among particular trajectory-based groups. The implications of these findings for understanding criminal justice involvement in this population and the utility of the trajectory model for system planning are discussed.

Background

Persons with serious mental illness are at significant risk for involvement with the criminal justice system. In a recent Massachusetts study, nearly 30% of a cohort of public mental health service recipients followed for roughly 10 years experienced at least one arrest, and among young cohort members, those between 18 and 25, the rate was 50%.¹ Analyses of national data reinforce this point, indicating that persons with severe mental illness are 1.5 times more likely to be jailed than admitted to a psychiatric hospital.² Efforts to reverse this trend have been substantial; in many locales across the nation, mental health and criminal justice agencies have collaborated in developing a range of prevention and diversion interventions, including a host of jail diversion mechanisms,³ specialized court sessions for defendants with mental illness,⁴ and re-entry services targeting the unique needs of individuals with serious psychiatric disorders returning to their communities following a period of incarceration.⁵

In an effort to improve the outcomes of persons with mental illness who have been involved with the justice system, standard evidence-based practices have been tailored to meet the special needs of these “forensically involved” individuals. These efforts have produced the most recent mental health system interventions for this population, in the form of Forensic Assertive Community Treatment (FACT) and Forensic Intensive Case Management (FICM) teams.⁶

Reviews of the outcomes of these efforts have not been encouraging. Even when highly touted evidence-based practices, such as Assertive Community Treatment, are specially recast as FACTs to address the needs of the so-called “forensic client,” justice system recidivism continues at a disappointing rate.^{2,7} Among the factors likely contributing to these outcomes are some of the assumptions underlying these programs' design, in particular the tendency of mental health providers and policy makers to ignore the criminal offending and recidivism patterns of justice-involved individuals with mental illness, focusing instead on clinical and service modalities aimed at reducing the psychiatric and substance abuse problems that are believed to be the main contributor to criminal justice involvement^{8,9} and to the lackluster performance of some re-entry programs.⁵

An issue often overlooked in this discussion is that instances of arrest experienced by persons with serious mental illness often are not simply a single episode but may instead be part of a larger pattern of criminal justice involvement spanning several years and possibly varying in intensity over that time. This fact is reflected in data from re-entry programs, which report serving the same individuals multiple times, as they cycle through periods of arrest, incarceration, re-entry, and rearrest,⁶ and reinforced by data from a 10-year longitudinal study of criminal justice involvement among mental service recipients, which found that 68% of those with any arrest were arrested more than once, and a small number of persons experienced at least one arrest in each of the calendar years during which the cohort was observed, with a maximum of 71.¹

Understanding the temporal patterning of multiple arrests among offenders with mental illness has the potential to inform the development and implementation of diversion and other services at the interface of the mental health and criminal justice systems. To date, however, no such efforts have been undertaken. This paper demonstrates an approach to identifying such patterns, drawing on “trajectory analysis,” a methodology that has been used by criminological researchers to study long-term patterns of offending.^{9–11}

This paper pursues two goals: the first is to describe the patterns of criminal justice involvement exhibited by a cohort of persons with serious mental illness over a multi-year period; the second is to demonstrate the utility of this modeling approach as a tool for

categorizing arrest patterns exhibited by members of this population and, thus, better targeting needed services for them.

With a few exceptions (see Davis et al.^{12,13}), trajectory analysis has not been applied in mental health services research. For this reason, it is appropriate to review its history and underlying concepts. The technique originates within the developmental criminology community, whose members examine questions such as whether persons who become involved with the justice system as juveniles continue to offend as adults (i.e., “persist,”) or desist from offending. Illustrative examples of such work include research conducted by Sampson and Laub^{14,15} and Nagin and Land.¹¹ Their research addresses two fundamental questions: First, what are the overall levels and patterns of desistance and persistence as individuals mature into adulthood? Second, in what ways do groups displaying different patterns differ from one another on key theoretically based or other factors?

Trajectory analysis was developed to address these questions, first by identifying mathematically a set of patterns that illustrate trends in persistence and desistance over time, and second by identifying groups of individuals displaying those trends in a way that would allow group membership to be modeled. In the latter respect, trajectory analysis, at least within the framework advanced by Nagin,⁹ has much in common with cluster analysis, in employing iterative algorithms to converge on a mathematically optimal solution—i.e., the number of groups that best fits the data. However, unlike cluster analysis, where individual characteristics of the unit of analysis are the basis for group membership, the groups identified with trajectory analysis include members' behaviors, such as criminal justice involvement patterns or other behaviors exhibited over an observation period, which are the most similar to one another. As with cluster analysis, group membership can be modeled as a function of predictor variables.

The present study applies the properties of trajectory analysis outlined above to identify such patterns in a large cohort of adults receiving services from a public mental health agency and to determine what service recipient characteristics and offense patterns, if any, differentiate the trajectory-based groups. Information from this analysis has the potential to inform the development of new programs that would better identify the people that would benefit from particular types of interventions at critical times along their life courses.

Methods

Sample and data

Mental health system data—This study examines temporal patterns of arrest in a cohort of individuals aged 18 and over receiving either inpatient, case management, or residential programming services from the Massachusetts Department of Mental Health (DMH) between July 1, 1991, and June 31, 1992, and followed roughly 10 years. (More detail on this study is available in a paper by Fisher and colleagues.¹) In this cohort, the 10-year prevalence of arrest was 27.9%; 3,856 individuals experienced at least one arrest during the period. However, the logic of this analysis dictates that subjects need to have experienced at least two of the events of interest (in this case, arrest). (Other trajectory analysis applications, it should be noted, include subjects with only one or, in some cases, no events. This is particularly true of many age-focused developmental studies.) Using these criteria, this model was estimated for the subsample of cohort members with two or more arrests during the 10-year observation period ($N=2,623$). Also, because the focus of this study is on arrest patterns among mental health service recipients observed for a 10-year period, not whether individuals persist in or desist from offending over specific segments of their lifespan, as would be the case for an analysis grounded in a developmental criminology

framework, all cohort members with two or more arrests were included in the analysis, regardless of age.

Cohort characteristics

The cohort ($N=13,876$) was identified using data from electronic files maintained by the DMH. These data included basic demographic data (gender, age, and race (“white/non-white”)) and service use data. For ease of interpretation, the age variable was split into six groups (18–25, 26–32, 33–40, 41–47, 48–54, and 55 and over) based on the members' age in 1991, the year the cohort was identified. Data on diagnosis were also examined, but were incomplete and not included in the analyses. Because all individuals in the cohort had met criteria for receiving DMH services, including a diagnosis of a severe and persistent mental illness, it can be assumed that all individuals have been diagnosed with a serious psychotic or affective disorder, in addition to having a history of hospitalization and demonstrated functional deficits. In the first year of observation, 40% were Medicaid beneficiaries, suggesting that many cohort members were poor and disabled by their mental illness.

Data on involvement in two key services, residential programming and case management, were also included for the first year of the observation period. The residential programming available at that time included a range of services, from intensively staffed programs to supported housing. Data that would allow differentiation across service models were not available. In the period spanning the beginning of the observation period, the case management approach in use by DMH was not an assertive community treatment model. Information on DMH hospital use was not provided directly, but the number of cohort members experiencing only state hospital use (i.e., not residential or case management services) could be inferred from these data.

Arrest data

Data on arrest were obtained from the Criminal Offender Record Information (CORI) system maintained by the Massachusetts Trial Court. CORI data include information on all court arraignments in Massachusetts's district and superior courts (but not those in other states or in federal court), and include dates of arraignment and charges. Elements of individual identifiers common to both data sets were used to construct a variable allowing DMH client data and CORI data to be merged and a longitudinal data set to be constructed and then de-identified.

Offense variable construction

More than 100 different offense charges were identified in the CORI data. In order to reduce the range of offenses to a manageable number, a classification schema was devised and imposed on the offense roster. (Additional details of this process are provided in Fisher et al. 1) The resulting nine categories were used in comparing the trajectory-based groups derived from the data. The offenses subsumed under these categories are shown in Table 1, along with the percentage of the cohort experiencing at least one arrest for an offense within each category.

Issues with “time at risk” for arrest; the “immortal time bias” problem

Persons observed in longitudinal analyses may differ with respect to their time at risk for the outcome of interest. Ideally, one can measure and adjust for such time periods in comparing individuals or groups of individuals. The data available for this study do not allow adjustment for time “not at risk” for arrest, leaving us open to what has been termed “immortal time bias.”¹⁶ Sources of such bias here include hospitalization and incarceration. Hospitalization is not always completely incapacitating with respect to arrest, since

individuals can engage in illegal behaviors and be arrested while hospitalized, on grounds passes, or visiting in the community but not formally discharged.

Incarceration is a larger issue. Adjusting for time incarcerated requires true beginning and end dates for the period of confinement, which are not included in the CORI data. Sentencing data are included, but interpreting them and associating them with an actual period of time is extremely difficult. When sentences were imposed, these would, in some cases, be “split” between “community time” and incarceration, and in some cases, the sentence would include “time served” (which is not measurable) or could be partially suspended. Additionally, even if a start date and sentence length were specified, duration may not be reliable. Correctional inmates may, for example, be released early for so-called “good time,” or conversely, have their sentence extended for infractions occurring while incarcerated. Additional data from correctional settings, which were not available for this analysis, would be necessary to reliably estimate the duration of spells of incapacitation among these arrestees. Finally, some individuals are denied bail or have their bail revoked prior to trial. This period is not included in the CORI data.

A particular concern in the present study is that some of the temporal patterns identified by the trajectory analysis could have been influenced by individuals being found guilty of serious charges early in the observation period and removed from further risk of arrest due to extended periods of incarceration. In order to assess this potential, the prevalence of serious offenses over the first 2 years was examined for all trajectories to determine whether certain of the derived trajectories were disproportionately affected by this factor.

Human subjects

This study was reviewed and approved by the Institutional Review Board of the University of Massachusetts Medical School and by the Massachusetts DMH's Central Office Research Review Committee. Access to the CORI data was provided after review of the study by the Massachusetts Trial Court's Criminal History Systems Board, which oversees all use of CORI information.

Statistical analysis

Trajectory analysis: a methodological overview—Trajectory analysis is based on a semi-parametric, group-based modeling strategy.^{9–11} Technically, trajectory modeling draws on a mixture of probability distributions that are suitably specified for describing the kinds of data encountered in studies of phenomena such as arrest. This approach is complementary to other well-established methods for analyzing developmental trajectories, including the hierarchical modeling techniques described by Bryck and Raudenbusch¹⁷ and the latent growth curve modeling attributed to Muthen.¹⁸ The trajectory modeling approach utilized here, referred to as the “zero-inflated Poisson” (ZIP) method, is appropriate for data such as the ones examined in this study, which include more zeros than assumed under the standard Poisson distribution assumption. ZIP models have been widely employed in research on antisocial and criminal behaviors, which tend to display the kinds of patterns described as not fitting a Poisson distribution.¹⁰

The ZIP model technique derives a final set of trajectories through an iterative process that attempts to reduce the value of the model's negative log-likelihood. Convergence is considered to have been reached when successive iterations fail to achieve significant reductions in the log-likelihood's value. Once trajectories and their associated groups' members are identified, between-group comparisons of member characteristics can be assessed using bivariate or multivariate analytic techniques.

Earlier, similarities between group-based trajectory analysis and cluster analysis were noted, including the opportunities presented by both approaches to compare the features of individuals within the various empirically derived groups.

Results

Subsample characteristics

Demographic factors—As shown in Table 2, the subsample of individuals with two or more arrests differs from the overall cohort and from the larger subsample of persons arrested once. Most notable is the increased proportion of males and individuals designated “non-white.” The age distribution of the subsample with at least one arrest and the secondary sample with two or more arrests is skewed toward younger age categories.*

Service use factors—Also as shown in Table 2, the majority of the sample received case management services in the first year of the observation period, which may have terminated at a later point, as is the case with residential program use, which involved less than half of cohort members. As mentioned earlier, the service use data did not specify inpatient use. It could be determined, however, that, as shown in Table 2, 28% ($N=3,863$) of the individuals in the sample received only inpatient treatment (i.e., neither residential services nor case management). The number receiving inpatient as well as these community-based services was likely higher, but not measurable with these data. The proportion who received only inpatient services was higher among individuals with at least one arrest (39.3%).

Trajectories—SAS's PROC TRAJ used with these data achieved convergence on the 86th iteration, yielding a five-trajectory solution. Graphs of these trajectories are shown in Figure 1. The y axis of these graphs represents the average number of arrests per year; values on the x axis indicate the year within the observation period.

One immediately obvious point evident from the data in Figure 1 is that the ZIP algorithm does not seek to apportion cases equally among the groups it derives. Groups are identified in a way that the iterative process finds to be the best fit to the observed data. Thus, as indicated, group II ($N=1,062$) is more than ten times larger than group V ($N=92$). As will be discussed, however, these size differences do not reflect differences in groups' substantive importance.

The five trajectories reflect substantially different patterns of offending. Trajectories II and III represent groups whose arrest patterns are essentially “flat,” changing little over the observation period. As shown in Figure 1, trajectory I, which includes 29.6% of the cohort, describes a group having averaged one arrest in the first year, declining to less than one per year thereafter. Group II (39.9%), stable through the period, averaged one arrest every 2 years. Group III (15.1%) is similarly stable, averaging roughly one arrest per year. Group IV (11.1%) and group V (4.5%) show evidence both of greater intensity of arrest early on and of “desistence”; group IV averages two arrests per year early in the period, but then declines; and group V begins with an average of well over three arrests per year and declines to an average of just over one per year by the end of the period.

*The cohort having at least one arrest featured greater proportions of males, persons who were younger, and persons who had been identified as “non-white.” Given the importance of demographic factors in offending, this relationship was explored further. Two logistic regression models incorporating age as a continuous variable, race and gender were developed, one predicting “any arrest” and another “two or more.” In the first, adjusting for gender and age, race (white/non-white) was not a significant predictor ($B=-0.078$, Wald statistic=-2.292, d.f.=1, $p=0.130$). However, in the second, predicting two or more arrests, the adjusted effect of white race was highly significant ($B=-0.143$, Wald statistic=7.206, d.f.=1, $p=0.007$). In this model, the adjusted odds ratio for the race variable showed that white persons in the cohort were significantly less likely to experience multiple arrests over the period (OR=0.867, 95%CI 0.780, 0.962). In both models, the effects of being male were highly significant with ORs of roughly 2.4 in each model.

Between-group differences—Bivariate analyses were conducted to assess the relationship between cluster membership and demographic, service use, and offense-type characteristics. Chi-square analyses found no significant between-trajectory group differences with regard to gender, age group, or service use. The distribution of offenses for which cohort members were arrested at least once during the period did differ across groups, however. Four offense categories were found in significantly different proportions across groups: misdemeanor crimes against persons, “sex-related” crimes (excluding forcible rape and including mainly charges associated with prostitution), “drug-related” offenses, and assault and battery on a police officer.

Misdemeanor crimes against persons, a category which includes minor domestic violence, simple assault, threatening behaviors, and restraining order violations, were disproportionately less common in groups I and IV, while present in close to expected rates among groups II and V. In group III, which comprises just under 13% of the sample, 17.42% had at least one arrest on one of these charges ($\chi^2=12.48$, d.f.=4, $p=0.0163$).

Arrests on sex-related charges were also disproportionately distributed ($\chi^2=11.31$, d.f.=4, $p=0.0233$). Persons in groups III, IV, and V had higher than expected rates of arrest in this category; categories I and II had rates at or below the expected proportion under the assumption of an equal distribution of individuals arrested on these charges.

The groups also differed with respect to the representation of individuals with drug-related arrests ($\chi^2=9.9827$, d.f.=4, $p=0.0407$). The most pronounced deviation was observed with respect to group V; while including only 3.5% of the sample, this group included 6.9% of the individuals with at least one drug-related offense. Finally, the rates of assault and battery on a police officer were disproportionately high in groups I, II, and V, but disproportionately low in groups II and IV ($\chi^2=12.54$, d.f.=4, $p=0.0138$).

Persons with at least one arrest in any of the other categories, including felony crimes against persons, both misdemeanor and felony property crimes, and the range of “crimes against public order,” were distributed across groups in a manner that roughly approximated a basic proportional distribution. In fact, with the exception of the disproportionate distribution of the offense categories described above, the trajectory-based groups exhibited significant within-group diversity with respect to offense types. This heterogeneity is demonstrated in Table 3, which shows the percentage of each group having at least one arrest in the various offense categories.

Distortion of trajectories by long sentences—As noted earlier, the time individuals spent incarcerated and, thus, “not at risk” for arrest could not be measured directly with the CORI data. As an alternative, an assessment was made of the prevalence of charges lodged against members of the various trajectory-based groups to determine whether some groups, such as that associated with trajectory I, which exhibited low levels of activity over the period after an initial arrest, might include a large number of arrestees with felony or other charges serious enough to result in long spells of incarceration or denial of bail and, thus, removal from risk of arrest. Four five-by-two tables (i.e., trajectory group by occurrence/non-occurrence of an arrest) were constructed examining relationships between trajectory group membership (I–V) and an arrest in the first 2 years of the observation period for one of three felony types: crimes against persons and property and drug offenses. Significant chi-squares were observed for two, felony violence ($\chi^2=10.555$, d.f.=4, $p=0.032$) and felony property crime ($\chi^2=12.721$, d.f.=4, $p=0.013$). Adjusted standardized residuals (ASRs) for the cells in these tables were examined to identify which cells were the chief contributors to the significant chi-squares. (A cell's ASR is equal to the difference between its observed frequency and the frequency expected under a proportional distribution of cases in which the

two variables are unrelated, divided by its estimated standard error. ASRs have a mean of zero and a standard deviation of one, and are expressed in standard deviation units.¹⁹ In this analysis, attention was directed to cells in tables with significant chi-squares having ASRs having absolute values greater than 2.0.).

In these two tables, cells with ASRs in this range were identified for group V only, (ASRs=3.0 for felony crimes against persons and 2.2 for felony property). This was not, it should be noted, the group of major concern in this regard. These arrests might have been a factor in the desistance displayed by that group, whose members, nonetheless, showed considerable criminal justice involvement over the period. This indirect approach to assessing the effects of spells of incapacitation or “immortal time bias” suggests that early arrests followed by long periods of incarceration were not more prevalent among groups showing lower intensity of arrest during the observation periods, although the true effects of incarceration periods cannot be determined from the available data.

Discussion

Limitations and caveats

In viewing these data, a number of factors must be kept in mind. One general issue has to do with the generalizability of the experiences of a cohort identified in 1991. All longitudinal studies suffer to some extent from the fact that a group identified and followed for a significant period of time may cease to resemble the cohort one would obtain using similar criteria in the contemporary service and policy environment. While this is unavoidable, it is nevertheless a factor to consider when viewing data from such studies, including this one.

Some potential period and cohort effects arising from this issue should be considered. Of particular relevance to this study is the fact that some of its observation period predates the widespread adoption of jail diversion programs in Massachusetts. Some of the arrests recorded in these data, particularly those associated with misdemeanor offenses, might not have occurred in an era when diversion was more common. This could in turn lead to a cohort effect, whereby some individuals would have had less exposure to the criminal justice system and to the sequelae of criminal justice involvement, which in some cases may result in additional episodes of arrest.

An additional issue related to generalizability is the fact that, like cluster analysis, group-based trajectory analyses are highly “sample-specific”—i.e., the solutions they produce are highly determined by features of the samples on which they are based. Using representative samples from well-defined populations helps to ensure that the groups described in any particular study are similar to ones that would likely be produced with a similar population. Nonetheless, the membership of groups drawn from different populations will be affected by a host of unmeasured factors. The patterns shared by group members, the members' characteristics, and the relative sizes of the groups are likely to differ. Parallel analyses using samples from different jurisdictions would be useful in determining how much between-population variability exists in the trajectories of arrestees with mental illness.

Drawing inferences from trajectory analysis

Offending among persons with mental illness is a much discussed but poorly understood issue. As mentioned earlier, the temporal aspects of offending have been examined only to the extent that recidivism is used as a measure of effectiveness for some programs. The analyses presented here are arguably significant in two ways, one with respect to their findings and the other with respect to the method employed and its potential usefulness to mental health administrators.

As was noted earlier, the use of trajectory analysis in this study represents a departure from its usual application, which typically involves examining changes in offending patterns associated with maturation and other developmental and lifespan issues among individuals who are of roughly the same age and stage of maturation. By including all cohort members in this analysis, irrespective of age, the focus is shifted from life span issues to temporal patterns of arrest, allowing examination of the ways in which individuals in different age groups are distributed across trajectory-based groups. As these data indicate, when adults of all ages are included, age is a surprisingly weak correlate of group membership. Maturation, nonetheless, clearly plays a role. Among the groups displaying the most intense levels of arrest early in the observation period, groups IV and V both showed significant levels of desistance, although, in the case of group V, to a level of activity that could still be considered problematic.

These data can also be viewed in the context of what is generally known or believed about the criminal justice involvement of individuals with serious and persistent mental illness. Considerable attention is given in this area's literature to low-level "misdemeanants," whose offenses fall into the categories described here as "crimes against public order." While these offenses were quite prevalent, the data in Table 2 indicate that other, more serious, offenses were also common across all trajectory groups.

Some of the patterns discerned here raise greater concerns than others. In particular, group V, while small, displays offending patterns that should raise concerns for administrators of mental health programs. Group V members were decidedly more likely to have at least one drug-related arrest as well as an arrest for one of the offenses denoted here as "sex crimes," which include mainly offenses related to "sex for hire." Moreover, this group showed some reduction in arrest activity over the period, but did not achieve total desistance. As has been discussed elsewhere, the relationship between these two types of offending in the overall cohort is a strong one, as is the case in the general population.²⁰ This group's members display offending and underlying behavioral patterns that raise significant public health, public safety, and mental health service management issues. The behavior patterns leading to arrests in this group place individuals at risk for HIV-AIDS and other illnesses associated with drug use and multiple sex partners. In addition, as was noted in another study, some of the drug offenses subsumed by this category are ones that can block access to public housing, employment, and other entities vital to rehabilitative and community support efforts. This group, and their temporal offending patterns, arguably warrants further scrutiny.

The effects of service use

These data also suggest that service involvement may not have strong preventive effects. The important details of service use are not measured well enough in these data to support definitive statements regarding this relationship, but it is clear from the fact that involvement early in the observation period—a time which appears to be predictive of the pattern to be displayed in the ensuing years—does not discriminate between those groups characterized by low levels of offending, such as groups I and II, and those, such as the individuals in group V, who averaged five arrests in the first year. Further research, with more finely tuned measures of service involvement, is needed to sort out the effects of these services, but it should be pointed out that these findings are consistent with those that lack a relationship between service use and criminal justice.²

Possible directions for future research on trajectories

A number of questions are raised by these findings that would make appropriate foci for future research. The administrative data used in this analysis offer little opportunity to

expand on the discussion of the observed trajectories. Future efforts should combine administrative data with other, more comprehensive clinical and socioenvironmental data to obtain a broader view of factors that shape the observed trajectories. Having described a set of temporal patterns, the next step is to identify factors that better differentiate between the trajectory-based groups. Such research might reveal factors associated with the persistence/desistence patterns seen in group IV, for example, or circumstances surrounding the infrequent arrests of persons in groups I and II. The heterogeneity of charges in these groups suggests that situational factors associated with arrest may vary substantially across individuals. Learning how these differ from factors associated with arrests among groups with greater arrest intensity (e.g., persons in groups IV and V) might reveal useful information about offending in this population.

Also of interest is the question of what differences might be observed between the trajectories identified in this cohort and a demographically similar cohort of persons without serious mental illness. At the heart of this question is a second, more fundamental one: Are persons with mental illness involved with the justice system susceptible to the same risks for arrest as offenders in the general population, or is the effect of mental illness so profound that those with psychiatric disorders differ significantly in their risk for justice system involvement from those without such disorders? Answering this question is a daunting task; the cohort of mental health service users studied here was easily identified by its service system involvement in a particular year, and its members represent a well-defined population with known characteristics. A comparable study of persons without mental illness would require that investigators identify a cohort of comparable offenders who could be shown not to have major mental illness but who share similar social environments and economic statuses. A strategy such as that employed by Erickson, Rosenheck, and colleagues,²¹ who examined offending among veterans with and without mental illness discharged from inpatient units, offers a promising strategy in this respect.

If a study such as this were to be undertaken, one essential factor to be considered would be the ubiquitous issue of substance abuse and criminal activity.²² A recent study using two waves of data from the National Survey on Drug Use and Health showed that the relationship between serious mental illness and non-violent and drug offending is completely mediated by substance abuse.²³ This is not surprising; data compiled by the Bureau of Justice Statistics indicate that 83% of state and federal prisons inmates surveyed in 1991 (when the cohort in the present study was identified) reported having used drugs at some point in their lives, and 32% reported being under the influence drugs and 37.2% alcohol at the time they committed the offenses for which they were convicted.²⁴

How might substance abuse have affected these trajectories and the groups based on them? Substance abuse was not directly measured in these data, unfortunately. However, given the high prevalence of drug and alcohol abuse among the general population of persons with serious mental illness, it might be assumed that it was high in this cohort as well (although it was not specifically measured). One of the cohorts, group V, included a disproportionate number of individuals arrested on drug charges. Unpublished data from a program in Massachusetts indicate that roughly 80% of persons with serious mental illness convicted on drug charges met criteria for substance abuse. In this group, the use of illicit substances, more than the use of alcohol, might have played an etiologic role in their offending patterns.

Implications for Behavioral Health

Trajectory analysis has been successfully used by criminologists seeking to understand the patterns of desistence and persistence in offending and in testing sociological and criminologic theories pertaining to lifespan correlates of these phenomena. It has not been

employed widely for other purposes, particularly with respect to persons with mental illness. The analysis presented here suggests that the criminal justice involvement of adults with serious mental illness is played out in different patterns over time. This knowledge should be useful in discussions about diversion and other programs, and the methodology itself, while analytically somewhat complex, perhaps, may prove to be a useful tool for administrators of forensic mental health systems and others charged with planning services for this population. It is also hoped that describing temporal patterns of criminal justice involvement among persons with mental illness will stimulate further research focused on discerning factors that promote or inhibit desistance from offending in this population.

Trajectory analysis as a tool for planning

Apart from defining discrete temporal patterns of offending among persons with mental illness, this study has utility for administrators with respect to the methodology employed and its potential use as a planning tool. The groups identified here were displaying discernibly different arrest patterns in the first year of the observation period, which, if identified, could be targeted for specialized and timely interventions. It is important to keep in mind that, unlike trajectory-based groups identified for age cohorts, whose members are at a similar developmental stage, the cohorts described here are, in a sense, 10-year “snapshots” taken from what, in some instances, are larger arrest careers. From the perspective of administrators, however, person-level developmental features may be less important than aggregate patterns displayed by the larger clientele they serve. In that context, what can be learned from these trajectories is that a group of individuals, regardless of its members' ages, who, in a given year, have a particular number of arrests, are likely to display a particular pattern going forward over a 10-year period. For example, one of the groups (group V) includes persons who, in the first “observation year,” experienced a high rate of arrest, and then show a trend toward desistance over time, but still not to a level that would be considered desirable. This group, the smallest of the ones identified in this analysis, might well be the focus of intensive prevention efforts. Others, such as group I, which averages less than one arrest per year, might be less of a concern for mental health and criminal justice officials. As this suggests, trajectory analyses might provide administrators with predictive information about the type and size of agency clientele with justice involvement, helping them determine what patterns are cause for concern and where resources might most effectively be targeted.

Trajectory-defined groups as planning populations for mental health criminal justice collaboration

The larger issue raised by these and other data describing the criminal justice involvement of persons with mental illness suggest that addressing the needs of this population will require continuing collaborative efforts between mental health authorities, police, and correctional officials, as well as probation and other community correctional agencies. These efforts need to incorporate substance abuse treatment, as well as interventions that assist individuals in coping with a range of socioenvironmental risk factors that elevate their risk for both initial and re-offending.

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Number of Arrests over 9.5 years Five Group ZIP Model

2 or More ARRESTS over 9.5 years

Figure 1.
Trajectories obtained for the subsample of cohort members with two or more arrests

Table 1**Summary and classification of charges lodged against cohort members**

Felony crimes against persons: Murder; non-negligent manslaughter; forcible rape; robbery (including armed robbery); aggravated assault and battery (a) with a dangerous weapon, (b) against a person over 65, (c) against a disabled person, (d) to collect a debt
Misdemeanor crimes against persons: Domestic violence (not resulting in a charge of "Serious Violent Crime"); simple assault; simple assault and battery; threatening/intimidation; indecent sexual assault (i.e., not rising to the legal definition of forcible rape), violation of a restraining order.
Assault and battery on a police officer
Felony property offenses: Burglary; larceny of an item worth more than \$500; welfare fraud; receiving stolen property; uttering (passing bad checks); breaking and entering; arson; motor vehicle theft
Misdemeanor property offenses: Theft/shoplifting of an item worth less than \$500; malicious destruction of property
Crimes against public order: Being a disorderly person; disturbing the peace; setting a false alarm; bomb hoax; trespassing; consuming alcohol in a public place (violation of "open container law").
Crimes against public decency: Offenses related to "sex for hire" (soliciting sex, prostitution, "being a common night walker"); indecent exposure; lewd and lascivious behavior.
Drug-related offenses: Possession of a controlled substance; possession with intent to distribute, distribution or manufacture of, or trafficking in a controlled substance; conspiracy to violate <i>Controlled Substance Act</i> .
Motor vehicle offenses: Operating (a) without a license, or (b) without compulsory insurance, or (c) so as to endanger; attaching plates illegally; leaving the scene of an accident; driving while intoxicated

Table 2

Characteristics of the study cohort, the subset of members with at least one arrest, and of the subsample used in the trajectory analysis (percent distribution)

	Total Cohort (N=13,816)	Persons with at least one arrest (N=3,856)	Persons with two or more arrests (N=2,623)
Gender			
Male	56.2	72.6	75.9
Female	43.8	27.4	24.1
Age in 1991			
18–25	8.3	15.3	14.9
26–32	15.8	24.9	24.4
33–40	22.3	27.6	28.7
41–47	20.5	19.1	19.3
48–54	14.3	8.9	10.0
55 and older	18.8	4.3	2.7
Race			
White	82.2	78.5	76.6
Non-white	17.8	21.4	23.4
Year 1			
Service use			
State hospital only ^a	28.0	39.3	39.4
Residential program	28.7	19.8	28.3
Case management	67.1	59.0	65.6
Medicaid beneficiary	40.4	39.5	36.5

^aThese individuals were recorded as having received inpatient treatment only. Only inpatient episodes on DMH-operated facilities are included in this figure

Table 3

Percentage of each trajectory group's membership with at least one arrest in the following offense categories

Trajectory group						
	I	II	III	IV	V	Total
Offense category	N=875	N=1,062	N=339	N=258	N=92	N=2,626 ^a
Crimes against persons						
Felony	20.8	22.5	24.2	20.2	27.2	22.1
Misdemeanor	10.9	13.0	17.1	10.1	17.4	12.7
Assault & battery on a police officer	6.1	3.8	6.5	3.5	9.8	5.06
Property offenses						
Felony	15.9	16.1	18.3	14.7	20.6	16.3
Misdemeanor	14.1	11.4	13.9	10.5	14.1	12.6
Public order	20.9	18.8	21.2	16.7	22.8	19.8
Public decency ("sex-related")	5.1	6.4	8.0	8.1	13.0	6.6
Drug-related	8.0	8.9	9.4	7.4	17.4	8.8
Motor vehicle	12.8	14.3	14.8	8.5	12.0	13.2
Total	33.2	40.4	12.9	9.8	3.5	100.0

^aPercentages do not sum to 100 because individuals typically have been charged with offenses in more than one category.