Recidivism in Medication-Noncompliant Serious Juvenile Offenders With Bipolar Disorder

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Objective: To determine whether the recidivism rate varies for adolescent serious juvenile offenders with bipolar disorder in response to compliance with antimanic medication.

Method: Probation records were reviewed for all adolescents (N = 31) released during a 1-year period (April 1, 1993–March 31, 1994) from a county juvenile corrections treatment facility who had DSM-III-R bipolar disorder, were stabilized on medication, and had agreed to continue treatment at an adolescent psychiatry clinic. New offenses and probation violations committed during the 12-month period after release were tallied. These recidivism records were then compared with medical records to ascertain whether these acts were committed while subjects were on (taking) or off (not taking) medication.

Results: The number of serious offenses (felonies and misdemeanors) was significantly reduced while subjects were on medication (4 offenses in 2992 days) versus off medication (39 offenses in 6108 days) ($p < .0001$). The off-medication rate of offending was 4.8 times higher than the on-medication rate. Probation violations were also significantly reduced while subjects were on medication ($p < .001$).

Conclusion: Compliance with prescribed antimanic medication can markedly decrease recidivism in serious juvenile delinquents with bipolar disorder.

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Mood disorders are frequently recognized in juvenile offender populations.[1] Using Research Diagnostic Criteria,[2] Chiles et al.[3] found that 23% of delinquents had depression, sufficiently serious in some cases to warrant intermittent lifetime treatment. McManus et al.[4] reported a high number of severely mentally ill youths, many with major affective disorders, among a cohort of serious youth offenders evaluated by structured interviews using DSM-III and Research Diagnostic Criteria. Using the Diagnostic Interview for Children and Adolescents[5] and other data, Myers et al.[6] evaluated 25 youths found guilty of homicide. They reported multiple psychiatric diagnoses, some of which were mood disorders. Interestingly, no diagnoses of bipolar disorder were found in the latter group. Abram et al.[7] found unexpectedly high comorbid psychiatric diagnoses in a detention cohort.

We wished to determine if mood-disordered serious juvenile offenders, who were stabilized on (taking) medication in a correctional setting, would maintain their gains upon return to their community and whether success or failure would be related to medication compliance. This study was not designed to study treatment compliance but rather the impact of treatment compliance on recidivism.

Our study did not focus on a behavior or a response to a specific medication. Unlike the studies by Sheard et al.,[8] Campbell et al.,[9,10] Cueva et al.,[11] Steiner et al.,[12] and others, this study was not intended to focus primarily on aggression (with or without conduct disorder). Although a study of this nature was recommended by McManus et al. in 1984,[4] we believe this to be the first such report in medical or correctional literature of behavioral response to medication in serious youth offenders with affective disorders.

METHOD

Subjects

The subjects (Table 1) were adolescent males and females recently released from the Hennepin County Home School (Minneapolis, Minn.), a 160-bed residential treatment facility for serious juvenile offenders operated by the Hennepin County Department of Community Corrections. Study subjects reflected the general population of committed youth. As shown in Table 1, half of the com-

Table 1. Demographic Data for Serious Juvenile Offenders With Bipolar Disorder Who Were Committed to a Juvenile Corrections Treatment Facility

Subject	Gender	Age, y	Race	Commitment Offense	Months in Study	Reason for Leaving Study[a]	Home
1	F	17	H	Assault/theft	12		OoC
2	M	17	C	Criminal sexual conduct	12		OoC
3	M	17	C	Burglary	12		Mpls
4	M	17	C	Criminal sexual conduct	5	DfP	Mpls
5	M	17	M	Assault	12		Mpls
6	M	15	AA	Vehicle theft	12		Mpls
7	M	15	AA	Criminal sexual conduct/weapons	12		Mpls
8	M	18	M	Burglary	4	DfP	Mpls
9	M	18	C	Kidnapping	6	CoC	Sub
10	M	17	C	Burglary/vehicle theft	12		Sub
11	M	14	C	Burglary/weapons	5	CoC	Mpls
12	F	16	AA	Theft	12		Sub
13	M	16	C	Property damage	12		Mpls
14	F	15	AA	Assault	12		Mpls
15	M	16	NA	Theft	9	CoC	Mpls
16	M	16	C	Aggravated robbery	3	CoC	Sub
17	M	17	C	Vehicle theft	9	DfP	Sub
18	M	16	AA	False imprisonment	12		Mpls
19	F	15	C	Burglary	12		Sub
20	M	17	C	Narcotics	12		Sub
21	M	16	C	Terroristic threats/property damage	12		Sub
22	M	18	C	Assault	8	DfP	Sub
23	M	17	AA	Vehicle theft	3	CoC	Sub
24	M	17	AA	Assault	10		Mpls
25	M	15	AA	Vehicle theft	12		Mpls
26	F	18	AA	Shoplifting	4	DfP	Mpls
27	M	15	C	Property damage	12		Sub
28	M	15	AA	Robbery	10	DfP	Mpls
29	M	16	M	Criminal sexual conduct	12		Mpls
30	M	16	AA	Criminal sexual conduct	12		Sub
31	F	14	M	Narcotics	12		Sub

[a]Empty cells denote juveniles who remained in the study for a full year.
Abbreviations: AA = African American, C = Caucasian, CoC = remanded to State of Minnesota Commissioner of Corrections, DfP = dismissed from probation, H = Hispanic, M = mixed, Mpls = Minneapolis, NA = Native American, OoC = out of county, Sub = suburb.

mitment offenses were against property, the other half against persons. Staff from the Hennepin County Medical Center (HCMC) Department of Psychiatry provided psychiatric evaluation and treatment services. Referrals for psychiatric evaluation and treatment came from the court, probation officers, treatment staff, medical staff, teachers, or family. Some youths were self-referred. Reasons for referral included suicidal ideation, sleep problems (especially persistent insomnia), hyperactivity, somatic complaints, anergy, headache, tearfulness, confusion, rage, or a request for management of previously prescribed medication. All subjects attended a full-time, on-site Setting VI special education school where each student had an Individual Education Plan. Many were designated as learning disabled or as having an emotional or a behavior disorder.

Following evaluation, youths with diagnosed mood disorders were offered treatment with medication. Those voluntarily accepting medication (only with parent or guardian consent) were initially seen by a psychiatrist weekly and then every 2 to 4 weeks after stabilization. They received daily doses under the supervision of experienced nurses. Serum lithium, valproate, carbamazepine, and nortriptyline concentrations were monitored to optimize dosage and guide treatment. Some patients expressed intent to continue medication following release and were provided with medication to take home, funding assurance so that outpatient treatment would not be a fiscal burden, and a follow-up appointment at HCMC with the treating physician. Arrangements were not made for follow-up care with another psychiatrist. There is but 1 mention in any probation file of an alternate physician provider, and the HCMC medical record notes a request for information for that youth from the psychiatrist at the private long-term psychiatric hospital where she was treated late in her time in the study period. The reviewers could find no evidence that other subjects received follow-up mental health services elsewhere.

For this study, we examined the records of all mood-disordered youth treated with medication and released in the 12-month period from April 1, 1993, to March 31, 1994. From this group (N = 36), we selected all who met the following criteria: (1) a diagnosis of bipolar disorder by DSM-III-R[13] criteria during Hennepin County Home School assessment, (2) a satisfactory clinical response to antimanic medication (and, when indicated, concurrent antidepressants) during incarceration, and (3) an agree-

Table 2. Behavioral Classifications of Serious Juvenile Offenders With Bipolar Disorder[a]

Classification	Inclusive Behaviors
No-show	Failing to appear for a hearing; is often indicative of more serious attitude or control issues and a major cost to many systems
Absenting/escape	Gone from home or a court-ordered residence for overnight or longer
Truancy	Absence from class without permission. Usually only notated when an ongoing, repetitive behavior
Use/possession of drugs/alcohol	Includes urinalysis positive for drugs. Failure to appear for a scheduled urinalysis is regarded as "positive." In this population, drugs of choice were usually alcohol and marijuana
Medication overdose	Either intentional or accidental
Suicide attempts	All attempts without regard to "seriousness"
Major medical trauma	Related to deviancy, eg, gunshot wounds, stabbings, lacerations (treated at HCMC)
Driving-related	Behaviors that could have been charged as criminal offenses, eg, driving without a license, "high-speed chase," driving while intoxicated. Does not include matters routinely handled by traffic court, eg, speeding, illegal turn
Property offenses	Burglary (property), but not robbery (person), regardless of the amount of loss
Offenses against persons	All nonsexual assaults, robberies, terroristic threats, and all weapon offenses (including use of replicas)
Sex offenses	All sexual misconduct reports including indecent exposure, rape, and obscene messages (including phone calls) Does not include consensual sexual behavior even if disapproved by a parent unless there is an aspect of violation of law or court orders
Other	Includes disorderly conduct (N = 2), blatant refusal to comply with a court-ordered treatment program (N = 3), failure to keep contact with probation officer (N = 2), giving false information to legal authorities, including use of an alias (N = 3), isolated curfew violations (N = 4), or failure to appear for work consequence. While it is assumed that this cohort produced multiple similar behaviors in this period, these were mentioned in the record as serious or frequent enough to have egregious consequences for the youth (eg, arrest, loss of placement, issuance of a warrant, or return to court or detention)

[a]The offenses are ranked in order of increasing severity. Within each classification, each incident was counted only once and put in only 1 category. Behaviors that seemed to fit more than 1 category were scored at the more serious level with regard to public safety. For example, driving while intoxicated was classified as a driving offense rather than as substance abuse, as the on-the-road threat was deemed more important than the use of a mood-altering chemical.
Abbreviation: HCMC = Hennepin County Medical Center (Minneapolis, Minn.).

ment at the time of discharge to (a) continue medication as prescribed and (b) attend follow-up appointments at HCMC. This study was approved by the Human Subjects Research Committee of HCMC, the Bureau of Community Corrections of Hennepin County, and the Juvenile Court Bench of Hennepin County.

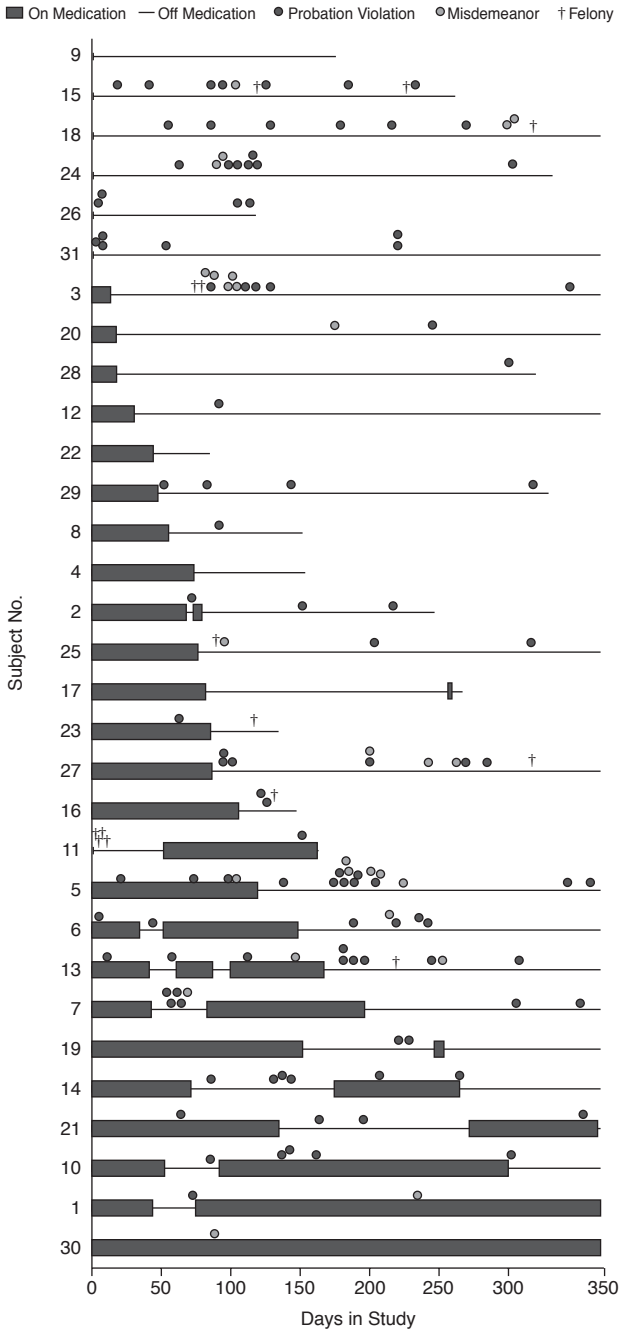
After review of 36 records, 31 patients met all selection criteria. The 5 excluded were patients who had a diagnosis of major depression (N = 2) or stopped antimanic medication before release (N = 3). Antimanic medications were lithium carbonate (N = 31), valproate (N = 6), or carbamazepine (N = 1). Antidepressants were nortriptyline (N = 10), sertraline (N = 3), and bupropion (N = 4). Most youths remained in the study for 1 year. Youths dismissed from probation or remanded to another jurisdiction before the study year was completed ended participation at that time, since reliable information was no longer available.

Data Collection

Legal. Legal information was obtained by examining each subject's official file maintained by juvenile probation departments. This file contains all initial and progress reports from the probation officer to the court, court orders, summaries of court involvement, police reports, detention admission records, social histories, psychiatric and psychological reports, log notes by the probation officer, telephone records, letters from probationers and their families, and reports from placement facilities. Two reviewers (L.F.D. and S.W.T.) independently studied each file and recorded all criminal and/or violation behavior noted during a 1-year period from the date of release from the Hennepin County Home School. Reports by a responsible parent, treatment professional, program or facility, the police, or a probation officer were considered credible. Unsubstantiated peer reporting was not considered credible. Discrepancies between reviewers were reconciled by rechecking source records until complete agreement was reached. Each offense was classified in terms of legal severity (charged as a felony, charged as a misdemeanor, or a probation violation, including uncharged felonies and misdemeanors). Offenses were then combined with behaviors that were not legal offenses to create a second, broader classification of recidivist behaviors (Table 2). Robins[14] observed an increased incidence of medical trauma in deviant youths, and we also recorded these phenomena.

Medical. Medical records were reviewed after the probation files were reconciled so that reviewers would not be aware of medication usage while reviewing the legal file. Medical information was obtained by inspection of records maintained by HCMC and augmented, when necessary, by supplemental clinic charts. Each chart was studied to discern the last date a subject was on medication at a therapeutic level. Where data were inconclusive, this date was determined by 1 or more of the following: (1) last nurse-supervised medication administration, (2) last clinic visit during which compliance was confirmed by clinical

Figure 1. Subject-Specific Time Periods On or Off Medication in Serious Juvenile Offenders With Bipolar Disorder



findings, (3) last recorded blood level, or (4) last prescription refill. Two days were then added to this date to allow for presumed "washout" of medication effect, although medication use may have actually continued beyond this date. Where information suggested that dosage compliance was imperfect, the patient was nevertheless deemed "on medication" unless there was significant evidence to the contrary, such as observation of numerous missed doses or subtherapeutic levels on lab tests. For patients off medication long enough to reach a presumed "zero" blood level, the restarting date assigned for "on medication" was 5 days after the first restarting dose.

Table 3. Recidivist Offenses by Medication Compliance or Noncompliance in Serious Juvenile Offenders With Bipolar Disorder

Offenses	No. While On Medication (2992 days)	No. While Off Medication (6108 days)	Offense Ratio[a]
Felonies	1	14	6.9
Misdemeanors	3	25	4.1
Probation violations	15	93	3.0
Felonies and misdemeanors	4	39	4.8
All offenses	19	132	3.4

[a]Number of offenses committed off medication/total off-medication days divided by number of offenses committed on medication/total on-medication days.

Statistical Analysis

To assess the effectiveness of medication, each offense was classified as an on-medication offense (committed when the patient was taking medication) or an off-medication offense (committed when the patient was not taking medication). If more than 1 offense occurred during a single day, each offense was counted separately. The occurrence of multiple offenses and the apparent lack of medication carryover effect precluded the use of survival analysis to examine the data. Patients were free to choose to remain on medication, to discontinue medication, or to resume medication at any time during the study period. This resulted in unequal, subject-specific time periods on (taking) medication and off (not taking) medication (Figure 1). Simple counts of offenses occurring on medication versus off medication would therefore be biased. To adjust for the unequal, subject-specific number of days spent on or off medication, calculations were made of on-medication offense rate (total offenses committed while on medication divided by total number of days on medication) and off-medication offense rate (total offenses committed while off medication divided by total number of days off medication) for each subject. The offense rates were then compared on a within-subject basis using the Wilcoxon matched-pair, signed-rank test (with Bonferroni correction for multiple comparisons). The level of statistical significance was set at $p < .05$.

RESULTS

Rate of Recidivism

During the study period, 31 patients stayed on medication for a total of 2992 days and were off medication for a total of 6108 days (Table 3). They were on medication a mean of 34% of the study days (mean ± SD = 96 ± 95

Figure 2. Medication Compliance and Felonies, Misdemeanors, and Probation Violations in Serious Juvenile Offenders With Bipolar Disorder

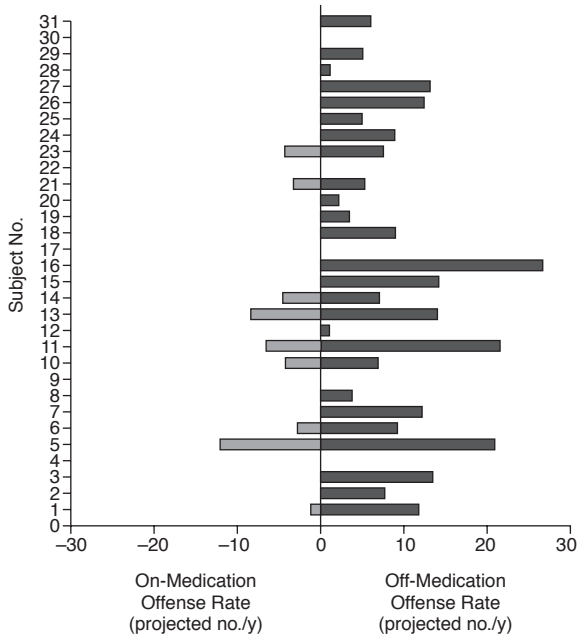
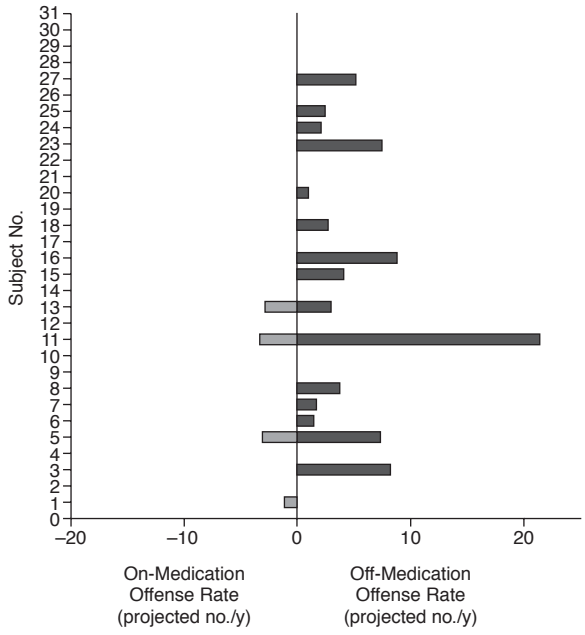


Figure 3. Medication Compliance and Felonies and Misdemeanors in Serious Juvenile Offenders With Bipolar Disorder



days) and were off medication a mean of 66% of the study days (mean ± SD = 197 ± 111 days). Length of time on medication varied from a few days to a year, and no typical pattern emerged (Figure 1). The on-medication offense rate and the off-medication offense rate were compared within subjects using the Wilcoxon matched-pair signed-rank test (Figure 2). A significantly lower offense rate was found for the on-medication condition ($p < .001$). Overall, 1 offense was committed every 157 days (19 offenses in 2992 patient days) while on medication versus 1 offense every 46 days (132 offenses in 6108 patient days) while off medication (Table 3). Since each subject contributed an on-medication offense rate and an off-medication offense rate, offense rate comparisons do not include the 1 juvenile who remained on medication throughout the study period and committed 1 offense (a misdemeanor). The very low offense rate of this juvenile is consistent, however, with these findings.

On-medication offense rates were also significantly lower when calculated for charged crimes (combined felonies and misdemeanors) ($p < .001$) (Figure 3). Overall, 1 crime was committed every 748 days (4 offenses in 2992 patient days) while on medication versus 1 crime committed every 157 days (39 offenses in 6108 patient days) while off medication (Table 3), ($\chi^2 = 28.2$, df = 1, $p < .0001$). On-medication offense rates were significantly lower for felonies alone ($p < .05$). Overall, 1 felony was committed every 2992 on-medication days versus 1 every 436 off-medication days. On-medication offense rates were significantly lower for misdemeanors ($p < .05$). Overall, 1 misdemeanor was committed every 997 on-medication days versus 1 misdemeanor every 244 off-medication days. On-medication offense rates were significantly lower for probation violations ($p < .001$). Overall, 1 probation violation occurred every 199 on-medication days versus 1 violation every 66 off-medication days.

On-medication offense rate was not correlated with age (Spearman rho = –0.08) or with percentage of time on medication (i.e., an index of subject compliance) (rho = –0.05). Off-medication offense rate was negatively correlated with age (rho = –0.38, $p < .05$). Age was negatively correlated with the number of felonies (rho = –0.39, $p < .05$) and with the number of probation violations (rho = –0.45, $p < .01$), but not with number of misdemeanors (rho = –0.21).

Time on Medication

While all patients were stabilized on medication prior to release from custody, Figure 1 shows that several remained on medication only briefly after being released. This raised the possibility that these subjects did not remain on medication long enough during the study period to estimate the true on-medication offense rate. To test this possibility, we made separate offense rate comparisons restricting the sample to subjects who were on medication longer than 6 weeks (N = 20). For this restricted sample, the number of days on medication was not significantly different from the number of days off medication (Wilcoxon test, nonsignifi-

cant). The results were unaffected. On-medication offense rates remained significantly lower than off-medication rates of offense (Wilcoxon test, $p < .001$) for subjects on medication at least 6 weeks. The mean ± SD number of days on-medication for this group was 127 ± 74 days, with 159 ± 90 days off medication. On medication offense rate never exceeded the paired off-medication offense rate for any patient.

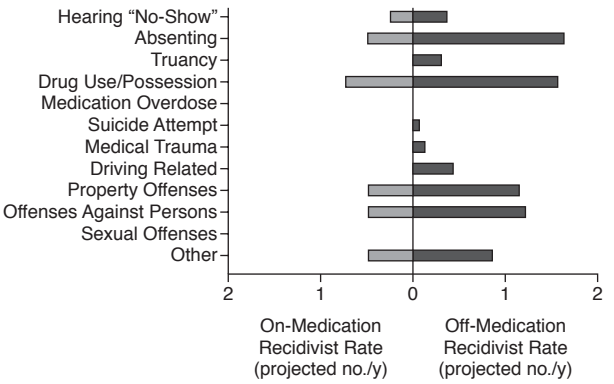
We questioned if the length of time on medication during the incarceration period prior to entering the study might affect reoffense behavior after release. Lithium was the only medication with a sufficient number of subjects for this analysis. Time on lithium treatment prior to the study was compared with a number of variables reflecting behavior during the study. Spearman correlation coefficients were computed for this variable with number of felonies (rho = –0.29), number of misdemeanors (rho = 0.09), number of probation violations (rho = –0.16), number of offenses on medication (rho = 0.02), and number of offenses off medication (rho = –0.14). None of these correlations was significant. The number of lithium days before the study was not significantly correlated with the number of days on medication during the study (rho = 0.09). Thus, prerelease time on medication is not a good predictor of postrelease study period compliance or behavior. This finding is similar to those reported by Peters et al.,[15] who noted that any discontinuation of lithium in bipolar patients greatly increased the likelihood of recurrent affective symptoms, and that abrupt discontinuation further increased the likelihood of relapse.[16]

Recidivist Behaviors

Comparing recidivism rates by behavioral categories produces results consistent with the findings reported above (Figure 4). In all categories where probation violations occurred, the number of recidivist behaviors committed while patients were noncompliant markedly exceeded the 66% expected given the 1/3:2/3 ratio of on- and off-medication days. In 4 categories (truancy, suicide attempts, major medical trauma due to deviancy, and driving-related offenses), 100% of the behaviors were committed while subjects were off medication. In the remaining 6 categories with any reported instances, recidivist behaviors committed while subjects were off medication ranged from 75% to 87%.

Comparing numbers of subjects who reoffended produced clear differences. While off medication, 15 of 31 subjects (48%) committed offenses that were subsequently charged as either misdemeanors or felonies. While on medication, 4 of 31 subjects (13%) committed such offenses. Of these 4, 3 committed these offenses both on and off medication. When probation violations are added, the distinction remains: while off medication, 26 of 31 subjects (84%) committed such offenses compared with 8 of 31 subjects (26%) on medication. All 8 of these subjects committed offenses both on and off medication. Seventeen subjects committed offenses only while off medication, never while on medication. Only 1 subject committed an offense on medication but not when off medication. These behavioral comparison figures were derived by direct count and are consistent with the offense rate analysis.

Figure 4. Medication Compliance and Recidivist Behavior Classifications of Serious Juvenile Offenders With Bipolar Disorder



Relationship Between Medication Cessation and Reoffending

If medication cessation and reoffending were not related, a random occurrence of these events would be expected. However, in the 29 instances where both reoffending and medication cessation occurred within 21 days (but not on the same day), cessation of medication preceded the reoffense in 90% of the instances (26 of 29) (binomial test, $p < .001$).

DISCUSSION

Our data demonstrate that serious juvenile offenders with bipolar disorder have a lower offense rate when they are compliant with psychiatric medication. A higher offense rate occurs when medication is stopped prematurely. This finding extends to offenses and behaviors of all types and severity levels, although the rise in rate becomes more pronounced with the most serious offenses (Table 3).

These findings cannot be accounted for as aggression abatement in response to lithium. In contrast, the studies by Sheard et al.[8] and Campbell et al.[9,10] focused on aggressive behavior (in delinquent/conduct disordered children for Campbell, in adolescents for Sheard) and excluded those with mood disorders. Our study patients were required to have a mood disorder. A history of aggression was not a criterion for inclusion. None of our subjects was referred for psychiatric services due to aggressive behavior. Although many of our subjects had prior evaluations

resulting in diagnoses of disruptive disorders, the requisite clinical findings were rarely part of the presenting referral problem and rarely remained present during treatment. We considered if geographic or racial factors might account for the outcome (Table 1). Subjects were fairly evenly distributed, with slightly more than half coming from the city of Minneapolis and the rest from suburbs. Outcome was essentially no different for either group. The study group generally reflected the racial composition of the population of the correctional facility as a whole. We found no evidence that this is an "inner-city" or a minority issue.

Perhaps some youth with better outcomes had been on medication for a longer period of time during incarceration and thus were better stabilized by the time of release. Accordingly, these results might reflect more sustained improvement in ability to effectively utilize the many treatment opportunities available at the correctional facility. Puig-Antich[17] surmised that successful pharmacologic treatment of comorbid major depression in conduct-disordered youth would result in the normalization of the conduct pattern or at least an improved amenability to other psychosocial interventions. Since prerelease medication history failed to predict postrelease compliance or postrelease behavior, this assumption cannot be supported by our data.

Nonpharmacologic factors such as stronger family support, community pressure for or against psychiatric services,[18] better moral development, or advancing age[19,20] might have influenced the findings if the study group had been compared with a control group. Our subjects, however, were compared with themselves. With 1 exception, all subjects were on medication for some days and off medication for others. It would be difficult to support an assumption that sociologic and demographic factors changed sufficiently during the study period to account for behavioral changes shown by the subjects.

The impact of noncompliance appears clear, viz., that cessation of medication without medical consent results in an increase in criminal and violation behavior. It is unclear why youths stopped medication even when subsequent behavioral deterioration came at great personal expense. It is also unclear whether drug discontinuation preceded the return of clinical symptoms or if recrudescence of symptoms prompted medication noncompliance. Our data cannot resolve these issues.

Many of our subjects had prior evaluations with diagnoses of conduct disorder, a presumed static condition. During treatment, the requisite clinical findings rarely remained present but returned when treatment was discontinued prematurely. Puig-Antich[17] and Sheard et al.[8] observed similar phenomena. Lewis et al.[21] noted the lack of specificity of the diagnosis of conduct disorder and its focus on external behaviors. In decrying use of this term, Lewis argued that patients thus diagnosed, upon closer evaluation, often presented symptoms of treatable neuropsychiatric conditions. These same issues were raised with our data and suggest that a DSM-IV diagnosis of "conduct disorder, adolescent-onset type" may, in some cases, be secondary to a primary mood disorder. In DSM-III-R, this hierarchical notion was acknowledged with the caution: "The irritability and antisocial behavior often seen in Bipolar Disorder in children or adolescents can erroneously be considered symptoms of Conduct Disorder."[13p55]

This distinction is obscured in DSM-IV with the diminution of hierarchical ranking and the directive to list all diagnoses for which minimal criteria can be found. Thus, a previous diagnosis of conduct disorder is to be listed on Axis I, even if criteria apparently were only subsequent to a mood disorder and were no longer present after successful treatment of that condition. The presence of a conduct disorder diagnosis often prompts dismissal of the designated youth as unable to respond to psychiatric intervention. Refinement of diagnostic assumptions might lead to more optimistic interventions.[22]

A 1995 Minnesota state agency study[23] reported that 76% of the juvenile males and 41% of the juvenile females released from the Hennepin County Home School in 1991 had further delinquency petitions or adult arrests within the succeeding 2 years (juveniles released from the Sex Offender Program had a much lower rate at 36%). These data were similar to recidivism rates for juveniles released from all Minnesota residential facilities and for comparable programs nationwide.[24] In contrast, our subjects rarely reoffended when medication compliant, producing 80% fewer offenses than when they were off medication. The opinion that psychiatric treatment is ineffective, too expensive, or both appears unfounded in this population of serious juvenile offenders.

Drug names: bupropion (Wellbutrin and others), carbamazepine (Carbatrol, Tegretol, and others), lithium (Eskalith, Lithobid, and others), nortriptyline (Pamelor, Aventyl, and others), sertraline (Zoloft).

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