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# PREDICTING THE CAREER CRIMINAL: AN EMPIRICAL TEST OF THE GREENWOOD SCALE

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## I. INTRODUCTION

Correctional policy and practice remain in a state of crisis. The treatment of inmates, sentencing policies, prison conditions, justifications for punishment and funding levels have caused debates and dilemmas since the first inmate was put in state penal custody. Only the substance of the debate has changed. Much of the current crisis revolves around the "failure" of rehabilitation programs to affect the rates of recidivism of inmates. Because of this failure, deterrence schemes, as opposed to rehabilitative strategies, have become the primary focus of correctional efforts. At the same time, however, considerable uncertainty exists concerning the deterrent effects of sanctions. While some evidence shows that the certainty of punishment does indeed exert a deterrent effect, no empirical evidence indicates that an increase in the severity of punishment increases its deterrent effect.<sup>1</sup> Furthermore, considerable controversy surrounds the methods employed in those deterrence studies that have been completed.

Amidst the uncertainty about the effect of deterrence and the abandonment of the rehabilitative justifications for intervention, two distinct approaches have emerged. The first approach, a retributive scheme, is designed to provide an alternative rationale for state intervention. Retributivists argue that the curtailment of indi-

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<sup>1</sup> See Logan, *Arrest Rates and Deterrence*, 56 Soc. Sci. Q. 376, 396 (1975); Rowe & Tittle, *Certainty of Arrest and Crime Rates: A Further Test of the Deterrence Hypothesis*, 52 Soc. Forces 455, 459 (1974).

vidual liberty, i.e., imprisonment, can be justified only when it is deserved.<sup>2</sup> Under this theory, people should be punished for their acts and the severity of those acts, rather than for some status or personal characteristics. This approach has led to the adoption of presumptive sentencing schemes in several states, where the penalties are fixed within a limited range of alternatives.<sup>3</sup> Retributivists assert that individuals with similar criminal records who commit similar offenses should receive approximately equal penalties. Thus, retributivist theory underlies the attempt to introduce proportionality in sentencing schemes by ordering penalties relative to the seriousness of the offense, such that the more serious offenses result in the most serious penalties.

An alternative to the retributivist scheme is the selective incapacitation approach. This strategy has a much more limited focus. Selective incapacitation seeks to identify only that small group of offenders who commit a great number of offenses and then to incarcerate them for lengthy periods of time.<sup>4</sup> This approach differs from the retributivist theory because it is not an attempt to justify a system of punishment for all criminals.

Selective incapacitation suggests that a relatively small group of high rate offenders can be readily and accurately identified.<sup>5</sup> If correct, this strategy would serve the dual function of: 1) reducing crime by removing high rate offenders from the streets, and 2) reducing the size of overcrowded prison populations by the use of imprisonment for only the most serious offenders.<sup>6</sup> As such, selective incapacitation appears to have much to offer.

Peter Greenwood has been the primary architect of and spokesman for selective incapacitation.<sup>7</sup> He has proposed a calculus that, he claims, can predict who the chronic offenders are and produce actual estimates of crime reductions that would be achieved through the imprisonment of such persons.<sup>8</sup> To date, though, no large scale replications of Greenwood's proposal have corroborated his theory. Such replications are critical to the adoption of the "career criminal" concept as a guiding principle for the development of policy at the legal, judicial and correctional levels. Without such replications,

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<sup>2</sup> See A. VON HIRSCH, *DOING JUSTICE: THE CHOICE OF PUNISHMENTS* (1980); Morris, *Persons and Punishment*, 52 *MONIST* 475, 476-501 (1968).

<sup>3</sup> See, e.g., OR. REV. STAT. §§ 161.605-.635 (1983).

<sup>4</sup> See Greenwood, *Controlling the Crime Rate Through Imprisonment*, in *CRIME AND PUBLIC POLICY* 251, 262 (J. Wilson ed. 1983).

<sup>5</sup> See *id.*

<sup>6</sup> See *id.*

<sup>7</sup> See generally, P. GREENWOOD, *SELECTIVE INCAPACITATION* (1982).

<sup>8</sup> *Id.* at 47-69.

the predictive validity of the Greenwood Scale remains unknown. This article describes a replication of one component of Greenwood's study using the 1979 Survey of Inmates of State Correctional Facilities.<sup>9</sup>

## II. LITERATURE REVIEW

The development of selective incapacitation has been based on the notion of the "career criminal" or chronic offender. This issue has been of growing importance in criminal justice for several reasons. First, recent evidence indicates that a relatively small number of offenders are responsible for a large portion of serious offenses.<sup>10</sup> Second, the overcrowding of prisons requires more efficient use of prison space. The limited amount of available cell space should be reserved for those offenders who pose the greatest threat to society, in terms of both the seriousness of offenses and sheer number of offenses.

The first premise of selective incapacitation is that a small group of offenders commit a disproportionate amount of crime. This proposition has received widespread support throughout the literature and is perhaps the best supported assumption of the selective incapacitation theory.<sup>11</sup> In a survey of 2,200 inmates in three states (California, Michigan and Texas), Chaiken and Chaiken found that a small group of offenders had committed a large number of offenses.<sup>12</sup> In a study of five California state prisons that included 624 male felons, Peterson identified two groups of offenders.<sup>13</sup> The first group consisted of occasional offenders, while the second group consisted of active adult criminals—career criminals. The latter group comprised only 25% of the sample, but had committed a large proportion of the total number of self-reported offenses.<sup>14</sup> Williams analyzed PROMIS data for 4,703 arrestees and came to the same conclusion, that a small number of offenders accounted for a great number of the total arrests.<sup>15</sup> Another study verified these

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<sup>9</sup> BUREAU OF JUSTICE STATISTICS, U.S. DEP'T. OF JUSTICE, SURVEY OF INMATES OF STATE CORRECTIONAL FACILITIES, 1979. (1979).

<sup>10</sup> See Chaiken & Chaiken, *Crime Rates and the Active Criminal*, in CRIME AND PUBLIC POLICY 11-29 (J. Wilson ed. 1983).

<sup>11</sup> See *id.*; M. PETERSON, H. BRAIKER & S. POLICH, WHO COMMITS CRIMES: A SURVEY OF PRISON INMATES (1981); L. SHANNON, ASSESSING THE RELATIONSHIP OF ADULT CRIMINAL CAREERS TO JUVENILE CAREERS: A SUMMARY (1982); K. WILLIAMS, SCOPE AND PREDICTION OF RECIDIVISM (1978).

<sup>12</sup> See Chaiken & Chaiken, *supra* note 10, at 24.

<sup>13</sup> See M. PETERSON, H. BRAIKER & S. POLICH, *supra* note 11.

<sup>14</sup> *Id.*

<sup>15</sup> K. WILLIAMS, *supra* note 11.

conclusions for juveniles as well.<sup>16</sup> These studies clearly indicate that a relatively small number of offenders account for a disproportionate amount of crime.

A considerable number of studies have attempted to identify specific characteristics associated with the career criminal. The Dangerous Offender Project, conducted in Columbus, Ohio from 1950-1976, compared those persons convicted of murder, aggravated assault or forcible rape to those convicted of robbery. Miller found that persons convicted of robbery were likely to commit more offenses than the other group of offenders.<sup>17</sup> Convicted robbers also had more socially disorganized lives and were more likely to have used narcotic drugs.<sup>18</sup> The other group of offenders committed fewer offenses in every category than the robbery offenders.<sup>19</sup> Other research on the characteristics of criminal careers focused on the length of the career for specific offenses.<sup>20</sup> The variation in the duration of a criminal career was closely linked to the age at which criminal offenses began.<sup>21</sup> The younger the age at which an offender began to commit crimes, the longer the duration of his or her career. In addition, career lengths varied by type, with violent offenders generally having longer careers than property offenders.

In a study of 4,703 defendants, Williams isolated several variables that identified the career criminal.<sup>22</sup> Of particular interest was the offense variable, "property offender." Those persons who committed property offenses were more likely to commit future crimes than those who had committed purely crimes of violence.<sup>23</sup> She also identified age, unemployment and substance abuse as variables highly related to career offending patterns.<sup>24</sup>

Peter Greenwood, however, conducted the best known and perhaps the most controversial study in this area.<sup>25</sup> Based on his own research, as well as that of the Chaikens's study noted above, he recommended a seven variable scale to identify chronic offenders. These seven variables are: 1) a prior conviction for the same offense

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<sup>16</sup> See L. SHANNON, *supra* note 11.

<sup>17</sup> See S. MILLER, S. DINITZ & J. CONRAD, CAREERS OF THE VIOLENT: THE DANGEROUS OFFENDER AND CRIMINAL JUSTICE, 83-108 (1982).

<sup>18</sup> *Id.* at 84.

<sup>19</sup> *Id.* at 84-89.

<sup>20</sup> See A. BLUMSTEIN, J. COHEN & D. NAGIN, DETERRENCE AND INCAPACITATION: ESTIMATING THE EFFECTS OF CRIMINAL SANCTIONS ON CRIME RATES (1982).

<sup>21</sup> *Id.* at 14.

<sup>22</sup> See Williams, *Selection Criteria for Career Criminal Programs*, 71 J. CRIM. L. & CRIMINOLOGY 89, 90-93 (1980).

<sup>23</sup> *Id.* at 93.

<sup>24</sup> *Id.*

<sup>25</sup> See P. GREENWOOD, *supra* note 7.

as charged, 2) incarceration for more than half of the preceding two years, 3) a conviction prior to age sixteen, 4) a commitment to a state juvenile authority, 5) use of narcotic drugs two years prior to present commitment, 6) use of narcotic drugs as a juvenile, and 7) a state of unemployment for more than half the time in the preceding two years.<sup>26</sup> Greenwood contends that this scale allows for the accurate prediction of the "career criminal" or chronic offender.

Several scholars, however, have criticized Greenwood's scale and the data used to generate it. Von Hirsch and Gottfredson have questioned the assumptions and effect of Greenwood's proposals.<sup>27</sup> In particular, they focus on the high number of false positives reported in Greenwood's research.<sup>28</sup> The presence of these false positives, i.e., individuals incorrectly predicted to be chronic offenders, provides perhaps the greatest threat to the implementation of selective incapacitation policies. Von Hirsch and Gottfredson report that false positives were extremely high (56%) in Greenwood's report.<sup>29</sup> They conclude that this level is unacceptably high and fails to show an improvement over other prediction efforts.<sup>30</sup> Additionally, they note that the calculation of the reduction in robberies to be achieved through the adoption of selective incapacitation was, in all likelihood, overestimated. They base this conclusion on the fact that Greenwood's data base drew upon offenders who were incarcerated and were therefore the "unsuccessful" robbers. Von Hirsch and Gottfredson argue that using robbers from the community would provide a more realistic estimate of the number of robberies prevented by the implementation of this policy.<sup>31</sup>

Other critics have assailed the specifics of Greenwood's scale as well as the general concept of selective incapacitation. Cohen<sup>32</sup> and Petersilia<sup>33</sup> both have suggested that an adequate strategy for identifying high rate offenders has not been developed yet. The use of selective incapacitation as a policy awaits further scale refinement and testing, a point underscored by Chaiken and Chaiken.<sup>34</sup> They

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<sup>26</sup> See *Id.* at 50.

<sup>27</sup> See Von Hirsch & Gottfredson, *Selective Incapacitation: Some Queries About Research Design and Equity*, 12 N.Y.U. REV. LAW & SOC. CHANGE 11 (1984).

<sup>28</sup> *Id.*

<sup>29</sup> *Id.* at 5.

<sup>30</sup> *Id.* at 22.

<sup>31</sup> *Id.* at 27.

<sup>32</sup> See J. COHEN, *INCAPACITATING CRIMINALS: RECENT FINDINGS* (National Institute of Justice 1983).

<sup>33</sup> See J. Petersilia, *Career Criminal Research: A Review of Recent Evidence*, in 2 CRIME AND JUSTICE: AN ANNUAL REVIEW OF RESEARCH 321 (N. Morris & M. Tonry eds. 1980).

<sup>34</sup> See Chaiken & Chaiken, *Offender Types and Public Policy*, 30 CRIME & DELINQ. 2, 220 (1984).

estimate that attempts to identify chronic offenders will have unacceptably high (50%) false positive levels.<sup>35</sup>

### III. RESEARCH DESIGN

The purpose of selective incapacitation is to predict which individuals will be chronic offenders so they may be targeted for longer sentences. This study does not examine the likely impact of such a strategy; rather, it is restricted to an analysis of the extent to which one particular scale (the Greenwood Scale) can successfully predict which inmates are chronic offenders.

We chose a sample of prisoners which included people with varying criminal records.<sup>36</sup> The survey consisted of 11,397 interviews with inmates from 215 state correctional facilities. Males and females were sampled separately. This nationwide survey included inmates with records ranging from one to forty incarcerations. This data base constitutes a large representative sample of inmates—a sample well suited to test the validity of the Greenwood Scale. Our goal was to determine whether inmates with a high number of incarcerations, i.e., those prisoners whose criminal records place them in the chronic offender category, are correctly identified by the Greenwood Scale. We were equally interested in determining whether the scale incorrectly classifies as chronic offenders those who have few convictions.

The phrase “correct identification” can mean at least two different things. The first meaning given to this phrase is whether, on average, inmates with higher Greenwood scores have longer criminal records. This type of analysis was used by Greenwood.<sup>37</sup> The question is whether the scale can differentiate categories of inmates characterized by differences in criminal records. In statistical terms, this inquiry constitutes a difference of means test. A second type of analysis that is also appropriate, is whether the scale successfully predicts which inmates are chronic offenders. Success with the first type of test does not necessarily imply success with the second type because a large amount of variance may exist within each Greenwood Scale category. Statistical analysis of variance tests complemented the difference of means tests by enabling us to determine how accurate the scale is in its classification of individual inmates.

We completed our analysis of the predictive power of Greenwood's scale by repeating the analysis for selected crime categories.

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<sup>35</sup> *Id.*

<sup>36</sup> See BUREAU OF JUSTICE STATISTICS, U.S. DEP'T OF JUSTICE, SURVEY OF INMATES OF STATE CORRECTIONAL FACILITIES, 1979 (1979).

<sup>37</sup> See P. GREENWOOD, *supra* note 7.

We used this approach because our sample included a wide variety of criminals. Thus, a scale could be a useful instrument for certain categories of offenses, but not for others. Given that the object of selective incapacitation is to target chronic offenders, it is important to know whether some types of offenders are more readily identified than others. Our limitation in this part of the analysis was sample size. In many specific categories, the number of offenders was too small to permit statistical inference. We sought to overcome this limitation as much as possible by analyzing two broad categories: 1) property offenses and 2) violent offenses. We also examined four specific categories that included relatively large numbers of inmates: 1) murder, 2) robbery, 3) burglary, and 4) larceny.

#### IV. DATA ANALYSIS

##### A. THE GREENWOOD SCALE

Greenwood identifies seven characteristics likely to be associated with the chronic offender.<sup>38</sup> Each of the Greenwood characteristics and the corresponding characteristics used for this analysis are presented in Table 1. The Survey of Inmates of State Correctional Facilities contains information that is conceptually similar, but not always identical, to that used by Greenwood.<sup>39</sup> Therefore, the measures we used sometimes were modified versions of the Greenwood items. Several of our items were more strict than those used by Greenwood, i.e., the criteria for earning a point towards being classified as a chronic offender were more stringent than those used by Greenwood. This observation was true of items two, five, six, and seven in the scale. The result of this modification was fewer false positives, a critical issue in this analysis. Our scoring of the items, however, was identical. Each inmate received a scale score from zero to seven, which represented the number of the characteristics from the scale that applied to that inmate.

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<sup>38</sup> See *supra* note 26 and accompanying text.

<sup>39</sup> The variables we used are close enough to yield a valid test of the Greenwood scale as a policy instrument. Any policy instrument must be robust, i.e., it must not lose a good deal of validity when slight deviations in measurement exist. An instrument that is not robust in this sense is not suitable for applied use because the implementation process inevitably introduces some changes in measures and conditions for application. Thus, if small changes in the measure of Greenwood scale items are sufficient to destroy the validity of the scale, the changes that attend the implementation process also would probably destroy its validity.



TABLE 1  
A COMPARISON OF GREENWOOD AND CURRENT SCALE  
ITEMS

| GREENWOOD SCALE  | CURRENT SCALE  |
|--|--|
| 1. Incarcerated more than one of the two years preceeding most recent arrest   | 1. Incarcerated during the year preceeding current arrest                  |
| 2. A prior conviction for the type of crime that is being predicted            | 2. A prior incarceration for the same type of crime as the current offense |
| 3. Juvenile conviction prior to age 16   | 3. Probation or incarceration prior to age 16                              |
| 4. Commitment to state or federal juvenile facility                            | 4. Prison term served as a juvenile  |
| 5. Heroin or barbituate use in the two year period preceding the arrest        | 5. Heroin or barbituate use in the month before the current offense        |
| 6. Heroin or barbituate use as a juvenile                                      | 6. Heroin or barbituate use on a regular basis as a juvenile               |
| 7. Employed less than half of the two year period preceding the current arrest | 7. Unemployed during the month before the current offense                  |

The purpose of the Greenwood Scale is to distinguish a small group of criminals who commit a large proportion of crime, i.e., the chronic offender, from the rest of the criminal population. Thus, effectiveness of the scale rests on its ability to identify a relatively small group of criminals as chronic offenders. The Greenwood Scale achieves this goal. Table 2 shows the frequency distribution of Greenwood Scale scores of the 10,769 inmates for whom complete data on scale items were available. Only 1,528 inmates, or about 14% of the sample, fall into the 4-7 range identified by Greenwood as the likely chronic offenders. If these 1,528 inmates are in fact the chronic offenders, then the Greenwood Scale will have succeeded in isolating a relatively small group of high rate offenders.

TABLE 2  
FREQUENCY DISTRIBUTION OF THE GREENWOOD SCALE

| GREENWOOD SCALE* | FREQUENCY | PERCENT |
|------------------|-----------|---------|
| Low<br>(0,1)     | 5,663     | 53%     |
| Medium<br>(2,3)  | 3,578     | 33%     |
| High<br>(4-7)    | 1,528     | 14%     |

\*Average Score 1.8

#### B. THE PREDICTIVE POWER OF THE GREENWOOD SCALE

The Greenwood Scale is not an appropriate measure to use in distinguishing between inmates with no prior incarcerations and those with at least one prior incarceration. Because three of the scale items refer to previous incarcerations, inmates with no previous incarcerations can have a maximum scale score of only four. Thus, by scale construction, an inevitable result is that inmates with no prior incarcerations will have lower Greenwood Scale scores than those with at least one prior incarceration. Consequently, the real test of the Greenwood Scale is whether it can differentiate between inmates with one or a few prior incarcerations and those with a history of frequent incarcerations. The analysis that follows, therefore, focuses only on those inmates with at least one previous incarceration.<sup>40</sup>

When we restricted the analysis to inmates with at least one prior incarceration, the Greenwood Scale turned out to be a weak, though statistically significant, predictor of an inmate's criminal record. Table 3 shows the distribution of inmates by Greenwood scores and the number of prior incarcerations. Two results are apparent: 1) inmates with high Greenwood scores tend to be those who have a record of chronic offenses, and 2) considerable variance exists within Greenwood score categories in the number of times an inmate has been incarcerated.

<sup>40</sup> The data set includes 6,218 inmates with at least one prior incarceration and 5,135 inmates who are serving a prison sentence for the first time. Data on the number of prior sentences are available for 5,730 of the 6,218 inmates with prior sentences. Full data on Greenwood scale items are available for 5,753 inmates.

TABLE 3  
GREENWOOD SCORES BY PRIORS FOR INMATES WITH AT  
LEAST ONE PRIOR<sup>1</sup>

|                              |        | PRIORS       |              |              |              |
|------------------------------|--------|--------------|--------------|--------------|--------------|
|                              |        | 1            | 2            | 3            | 4 or more    |
| GREENWOOD SCORE              | Low    | 926<br>(59%) | 345<br>(22%) | 145<br>(9%)  | 158<br>(10%) |
|                              | Medium | 922<br>(35%) | 641<br>(24%) | 415<br>(16%) | 659<br>(25%) |
|                              | High   | 239<br>(17%) | 286<br>(20%) | 251<br>(17%) | 666<br>(46%) |
| Spearman's Correlation: 0.37 |        |              |              |              | N=5,653      |

<sup>1</sup>Numbers in parenthesis are row percentages.

Table 4 lists the average number of incarcerations for each Greenwood Scale score and for each scale score category. The results support Greenwood's conclusion that inmates with high scores, on average, commit more crimes. Those persons in the high Greenwood score range average over twice as many prior incarcerations as those in the low range of scores. At the extremes of the scale, inmates who score seven on the Greenwood Scale average 3.5 times as many priors as inmates with the lowest scale score of zero. These results replicate Greenwood's findings that average crime rates are higher for inmates whose scale scores are higher. Reaching similar results by employing an indicator of criminal career behavior that is different from the one used by Greenwood strengthens the validity of the conclusion that the Greenwood Scale does predict average differences in criminal behavior.

TABLE 4  
 AVERAGE NUMBER OF PRIOR INCARCERATIONS FOR  
 INMATES WITH AT LEAST ONE PRIOR  
 INCARCERATION

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| A. FULL SCALE       |       | Average Number of<br>Prior Incarcerations |
|---------------------|-------|---|
| Greenwood Score     |       |   |
| 0                   |       | 1.7                                       |
| 1                   |       | 1.9                                       |
| 2                   |       | 2.5                                       |
| 3                   |       | 3.0                                       |
| 4                   |       | 3.6                                       |
| 5                   |       | 4.6                                       |
| 6                   |       | 4.5                                       |
| 7                   |       | 6.0                                       |
| B. SCALE CATEGORIES |       |   |
| Low                 | (0,1) | 1.8                                       |
| Medium              | (2,3) | 2.7                                       |
| High                | (4-7) | 4.0                                       |

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The conclusion that those individuals with high Greenwood scores commit more crimes, however, refers only to average crime rates. The reason the Greenwood Scale is a poor predictor is not because it fails to differentiate significant average differences (it does this well), but rather because it fails to predict behavior precisely. The rank-order correlation between Greenwood scores and the number of prior incarcerations reported in Table 4 is only a modest .37. This result indicates the presence of considerable variance within scale categories. Thus, many errors will be made in predicting individual cases.

This variance is important because the scale is intended for use in selective incapacitation policies. The object is to predict chronic offenders so that they may be imprisoned for longer periods of time. In order to implement this policy without major increases in public expenditures, those persons considered to be "non-chronic offenders" supposedly would receive lighter sentences. Both "false positives" and "false negatives" will thus detract from the applicability of the scale.

In order to show the meaning of the relatively low correlations in Table 3, we constructed Table 5, which collapses the Greenwood scores into two categories: 1) persons not predicted to be chronic

TABLE 5  
 PREDICTION OF CHRONIC OFFENDERS BASED ON  
 GREENWOOD SCORES<sup>1</sup>

| PREDICTED<br>BEHAVIOR | ACTUAL BEHAVIOR         |                  | TOTAL |
|-----------------------|-------------------------|------------------|-------|
|                       | Not<br>Chronic Offender | Chronic Offender |       |
|                       | Not<br>Chronic Offender | 2,834<br>(67%)   |       |
| Chronic Offender      | 525<br>(36%)            | 917<br>(64%)     | 1,442 |
| TOTAL                 | 3,359                   | 2,294            | 5,653 |

<sup>1</sup>Numbers in parentheses are row percentages.

offenders (low and medium scores), and 2) persons predicted to be chronic offenders (high scores). Similarly, we divided the subjects' actual crime record into two categories: non-chronic offenders (one or two prior incarcerations), and chronic offenders (three or more prior incarcerations).<sup>41</sup> This test allows us to determine the amount and kind of errors that are made in using the Greenwood Scale to assign inmates to chronic or non-chronic status. Table 5 indicates that over one-third of the inmates who would be targeted for selective incapacitation policies on the basis of their Greenwood Scale scores would not, in fact, be chronic offenders. Furthermore, of the 2,294 actual chronic offenders, the Greenwood Scale scores correctly identified only 917 (40%). If the remaining 60% received lighter sentences as a result of their incorrect classification, the selective incapacitation approach would not necessarily reduce crime. About one-third of the inmates are classified incorrectly by the Greenwood Scale. This error rate is an improvement over what we could guess knowing that 40% of inmates fall into the chronic of-

<sup>41</sup> This division cuts the priors at a favorable point for the Greenwood scale because the highest category predicted to be non-chronic offenders averages under three priors, while predicted chronic offenders average four priors. A second plausible alternative is to raise the cutoff to four priors. The result is a slight drop in the overall error rate of the Greenwood scale (to about 28%). Nevertheless, the Greenwood scale fails to identify 55% of the actual chronic offenders and 54% of those predicted to be chronic offenders are incorrectly identified as such. In other words, the decrease in the "false negative" rate is counterbalanced by a substantial increase in the "false positive" rate. Consequently, the large errors are not a function of an arbitrary cutoff point.

fender category, but it may not be enough of an improvement over random assignments to warrant implementation of this system.

Our preliminary conclusion, based on an analysis of all inmates with at least one prior incarceration, is that the Greenwood Scale successfully predicts differences in the average number of incarcerations, but these average predictions do not precisely predict individual behavior. If the scale was used to target criminals for selective incapacitation, a large number of criminals would be classified incorrectly. This conclusion is preliminary because the tables discussed here do not control for other variables which may be relevant to chronic criminal behavior. Before introducing such control variables, this article will pinpoint some of the problems inherent in the Greenwood Scale.

Table 6 lists the correlations between each Greenwood Scale item and the number of prior incarcerations. We presented both Spearman's Rho and Kendall's Tau-B correlations, as each is suitable for this type of data. The two correlation measures are quite close and, because the sample size is large, provide good estimates of the strength of the association between the variables. All correlations are statistically significant, but many are low. The items farthest removed from legal relevance—drug use, drug use as a juvenile, and unemployment prior to offense—exhibit the lowest correlations with chronic criminal behavior. Yet, the two variables of greatest legal relevance—recent imprisonment and prior incarceration for the same type of offense—are not much better predictors. The strongest correlates of chronic criminal behavior are the two variables concerned with juvenile criminal behavior: 1) conviction as a juvenile, and 2) prison term as a juvenile. Each of these variables is approximately as strong a predictor of the number of prior incarcerations as the entire Greenwood Scale. The fact that the scale derives most of its predictive power from juvenile crime variables raises normative issues concerning use of the scale. Current legal and social norms protect juvenile offenders more than adult offenders. The scale would single out juvenile offenders for the threat of increased punishment for the rest of their lives, thereby treating juvenile offenders more harshly than adults.

TABLE 6  
CORRELATIONS BETWEEN INDIVIDUAL GREENWOOD SCALE  
ITEMS AND NUMBER OF PRIOR INCARCERATIONS

| ITEM                           | SPEARMAN'S<br>CORRELATION | KENDALL'S<br>TAU-B |
|--------------------------------|---------------------------|--------------------|
| 1. Imprisoned in previous year | .15<br>(N=5,710)          | .14<br>(N=5,710)   |
| 2. Same prior offense          | .16<br>(N=5,714)          | .14<br>(N=5,714)   |
| 3. Juvenile Crime              | .32<br>(N=5,730)          | .30<br>(N=5,730)   |
| 4. Juvenile Prison             | .41<br>(N=5,730)          | .39<br>(N=5,730)   |
| 5. Drug Use                    | .05<br>(N=5,695)          | .05<br>(N=5,695)   |
| 6. Juvenile Drug Use           | .09<br>(N=5,693)          | .09<br>(N=5,693)   |
| 7. Unemployed                  | .07<br>(N=5,721)          | .06<br>(N=5,721)   |

Ironically, three-fourths of the successful predictions of the Greenwood Scale come from the category of those who were predicted to be, and actually are, non-chronic offenders. The scale is more successful in predicting those who are not chronic offenders than in predicting those who are. Two-thirds of those predicted to be not chronic offenders are actually not chronic offenders, and the scale correctly classifies 84% of the 3,359 inmates who are not chronic offenders. The irony is that this result suggests that the scale may be better suited for probation and parole purposes than for selective incapacitation policies. In fact, probation and parole boards frequently do consider the kinds of items that are used to form the Greenwood Scale.

#### C. THE IMPACT OF DEMOGRAPHIC AND SOCIOECONOMIC VARIABLES

Several variables may affect the relationship between an inmate's Greenwood Scale score and an inmate's criminal behavior record. Obvious candidates for control variables include age, race, sex and social class. While all of these variables are important as controls, they are not of equal importance in evaluating the Greenwood Scale as an instrument of selective incapacitation policies because they have different causal relationships with respect to crime.

Age is a straightforward measure. Someone can commit more crimes over a longer time span. Therefore, one can reasonably assume that, on average, the number of prior incarcerations will be positively correlated with age. The reason we include age as a control variable is to determine whether the Greenwood Scale scores remain correlated with the number of prior incarcerations, even with controls for the age of the inmate. If the correlation between scale scores and number of priors were to disappear with age controls, it would mean that the original correlation was largely spurious. The existence of a correlation between age and prior incarceration, even with controls for Greenwood Scale scores, does not detract from the validity of the Greenwood Scale. If, for a given Greenwood Scale level, older inmates have committed more crimes than younger ones, one can reasonably hypothesize that this result reflects time differentials. Some of the younger inmates may commit more crimes; hence, over the course of a lifetime, the number of incarcerations of today's youthful offenders may match those of their older cohorts on the Greenwood Scale.

The same argument cannot be made for the remaining control variables. Certainly we want to ensure that the correlation between Greenwood Scale scores and criminal records is maintained with controls for race, sex and social class. A problem arises if these variables retain statistical significance even in the presence of controls for the Greenwood Scale scores and age. Suppose that blacks, on average, have fewer prior incarcerations than whites of the same age and Greenwood score. Two interpretations appear possible. Either blacks commit crimes at the same rate as their white Greenwood score age cohorts, but are less likely than whites to be incarcerated for those crimes; or blacks are simply more likely to score higher on the Greenwood Scale and hence, in a sample with whites, the Greenwood Scale is overpredicting the crime rate of blacks. The first possibility constitutes judicial bias, the second, Greenwood Scale bias. An analogous argument can be made for sex and class differences.

Our data base is insufficient to enable us to determine which type of discrimination might arise; all we have are incarceration records. Therefore, we cannot tell whether one group is incarcerated more frequently than another group with the same average crime level, or whether one group scores lower on the Greenwood Scale than another, again given the same average crime level. Some evidence, however, suggests that racial and social class discrimina-



tion in the administration of justice is not widespread.<sup>42</sup> If this theory is correct, any bias that occurs probably stems from the Greenwood Scale. On the other hand, some studies have found that once women have criminal records, they receive more serious dispositions than men.<sup>43</sup> This development could yield higher average crime rates for women, controlling for Greenwood score levels, as the result of judicial bias. On the basis of our data alone, all we can do is identify possible biases in the use of the Greenwood Scale as a predictor of chronic offenders.

In order to assess the impact of all control variables simultaneously, we used regression analysis. The number of prior incarcerations was used as the dependent variable and Greenwood Scale scores, age, race, sex and income were used as the independent variables.<sup>44</sup> The results appear in Table 7. We coded race and sex as

TABLE 7  
REGRESSION OF NUMBER OF PRIOR INCARCERATIONS ON  
GREENWOOD SCALE SCORES AND CONTROL  
VARIABLES

| Independent Variable | Regression Coefficient | Standard Error | Pr >  t |
|----------------------|------------------------|----------------|---------|
| Greenwood Score      | 0.68                   | .024           | .0001   |
| Age                  | 0.05                   | .004           | .0001   |
| Sex                  | -0.22                  | .097           | .021    |
| Race                 | -0.14                  | .070           | .050    |
| Income               | 0.04                   | .015           | .004    |

$R^2=0.15$

$N=4,901$

dummy (dichotomous) variables with blacks and females coded as "one" on their respective variables. Age is measured directly and income is coded in ten categories from low to high.<sup>45</sup>

<sup>42</sup> See generally J. PETERSILIA, *RACIAL DISPARITIES IN THE CRIMINAL JUSTICE SYSTEM* (1983).

<sup>43</sup> See F. ADLER, *SISTERS IN CRIME* 7 (1975).

<sup>44</sup> Although the dependent variable is not normally distributed, the residuals of Ordinary Least Squares regression approximate a normal distribution. Furthermore, due to the large sample size, Ordinary Least Squares estimators approach their asymptotic properties.

<sup>45</sup> Initially, we used education as an independent variable, but eventually we omitted it because it was not statistically significant.

Our first conclusion is that the regression analysis serves as further confirmation of the results of Tables 3-5. The Greenwood Scale is a statistically significant predictor of an inmate's criminal record. Inmates with higher Greenwood Scale scores are, on average, those who have a history of repeated incarcerations. The results also confirmed our second preliminary conclusion: the Greenwood score is a weak predictor of an inmate's criminal record. The  $R^2$ , which measures the percent of variance in the number of prior incarcerations accounted for by all the variables in the regression equation, is only .15. The  $R^2$ , therefore, indicates that 85% of the variance in an inmate's criminal record remains unexplained. Thus, the Greenwood Scale emerges again as: 1) successful in predicting average differences in criminal behavior, and 2) incapable of predicting individual cases without a very large amount of error. The extremely low correlation coefficient is a clear indicator of the weak predictive ability of the Greenwood Scale.

Furthermore, all control variables emerge as statistically significant on the usual .05 cutoff criterion. As we noted earlier, this result poses no problems as far as age is concerned.<sup>46</sup> For the remaining variables, however, this result means that some bias is present. Within the same Greenwood score and age categories: 1) blacks have fewer prior incarcerations than whites, 2) women have fewer prior incarcerations than men, and 3) the poor have fewer prior incarcerations than those of higher socio-economic classes. If the probability of incarceration for a crime is the same for all social categories, then the use of the Greenwood Scale to target chronic offenders will be biased against women, blacks and those of lower socio-economic groups.

#### D. THE PREDICTIVE POWER OF THE GREENWOOD SCALE FOR SELECTED CRIME CATEGORIES

The Greenwood Scale was developed to predict high rate offenders among predatory street criminals, such as robbers and burglars. The above analysis is not restricted to any particular crime, but rather includes in the sample only inmates with at least one prior incarceration. These inmates are classified in up to four of seventy-eight specific crime categories, ranging from murder to disorderly conduct. Given the wide range of crimes, the possibility exists that the Greenwood Scale emerges as a weak predictor due to the heterogeneity of the sample. A reasonable question is whether

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<sup>46</sup> See the text following subheading C., The Impact of Demographic and Socioeconomic Variables, for the complete discussion of age as a control variable.

the scale is a better predictor for more narrowly defined classes of offenders.

To answer this question, we analyzed the Greenwood Scale for all categories of offenders that included a large enough number of persons to permit reasonable statistical inferences. These categories included two broad groups—violent offenses and property offenses—and four specific groups—murder, robbery, burglary and larceny.

We determined that the scale is about as accurate in predicting chronic offenders within crime categories as it was for the full sample. Table 8 presents regression analysis results for all six subsamples. The regression coefficients on the Greenwood Scale score

TABLE 8  
REGRESSION ANALYSIS RESULTS FOR CRIME SUBSAMPLES

|                    | Regression<br>Coefficient:<br>Greenwood<br>Scale | Regression<br>Coefficient:<br>Age | Regression<br>Coefficient:<br>Income | R <sup>2</sup> * |
|--------------------|--|-----------------------------------|--------------------------------------|------------------|
| Violent Offenders  | .66  | .04                               | .04                                  | 0.14             |
| Property Offenders | .76  | .08                               | .07                                  | 0.17             |
| Murder             | .60  | .03                               | n.s.                                 | 0.11             |
| Robbery            | .68  | .07                               | n.s.                                 | 0.14             |
| Burglary           | .71  | .08                               | .07                                  | 0.18             |
| Larceny**          | .76  | .08                               | n.s.                                 | 0.17             |

\*R<sup>2</sup> are based only on predictors statistically significant at the .05 level or better.

\*\*For larceny, race emerges as a statistically significant predictor (Beta = -.42).

range from .60 to .76 and are all statistically significant at the .001 level. Even with controls, inmates with higher Greenwood Scale scores average a higher number of prior incarcerations.<sup>47</sup> This result holds for all crime categories. On the other hand, the R<sup>2</sup> values range from .11 to .18, indicating that the bulk of the variance in the number of priors remains unexplained. Thus, a large amount of variance exists in criminal records within scale categories, and scale predictors will have a large amount of error. To illustrate this idea more concretely, we constructed tables similar to Table 5 for violent and property offenses (not shown). For violent offenders, 40% of

<sup>47</sup> We ran regressions with additional controls for sex and race. Except in the case of larceny, these variables did not emerge as statistically significant predictors. Regression coefficients reported in Table 8 are based on equations that include only statistically significant variables.

those predicted to be chronic offenders are not actually chronic offenders. For property offenders this number drops to 38%. The false negative rates are 54% for violent offenders and 47% for property offenders. In short, the basic conclusions for the full sample hold for all subsamples as well: 1) the scale succeeds in predicting average differences in the number of prior incarcerations, and 2) the scale is an inaccurate predictor of individual cases.

The major difference between the crime subsamples and the full sample occurs in the statistical significance of both control variables and individual scale items. This difference is probably a result of decreased sample size because the coefficients on both control variables and scale items run consistently in the expected direction. In the larger subsamples—violent offenders and property offenders—*income* emerges as statistically significant as do individual scale items, but *race* and *sex* are no longer significant.<sup>48</sup> In the smaller specific crime subsamples, most control variables are not significant, although *income* is significant for the burglary sample and *race* is significant for the larceny sample. Some individual scale items also emerge as insignificant. Current drug use is not significant for any of the four specific crime subsamples and unemployment is not a significant predictor for either murder or larceny, although it is significant in the case of robbery and burglary. The weakest correlates do not retain statistical significance in the smaller samples.<sup>49</sup>

## V. SUMMARY AND CONCLUSIONS

Our analysis yields several results that are consistent both across statistical techniques and for different sub-samples. These results are:

1. Inmates with higher Greenwood Scale scores average a higher number of prior incarcerations.
2. Predictions of individual cases are highly inaccurate. A large variance exists in the number of priors within Greenwood Scale categories.
3. Certain items in the Greenwood Scale are better predictors than others. Whether an inmate spent time in prison as a juvenile emerges as the best predictor. Most of the variance in prior incarcerations explained by the scale can be explained by this single item.

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<sup>48</sup> For both violent and property offender samples, the average number of prior incarcerations for blacks is lower than for whites in the same Greenwood scale category. Similarly, the average number of prior incarcerations for women is lower than for their male Greenwood counterparts.

<sup>49</sup> Juvenile prison incarceration consistently emerges as the best predictor of the number of priors and is statistically significant in all crime subsamples.

On the other hand, the drug use and unemployment variables are very weak predictors.

4. The Greenwood Scale is not a better predictor for some crime categories than it is for others. The first three conclusions hold for both property and violent offenders as well as for the full sample and, as near as we can determine given sample size problems, for particular kinds of violent crimes and property crimes as well.

These conclusions gain additional force from the fact that they hold for a large, randomly sampled, nationwide data set. Two conclusions in particular seem reasonably well established. We established that: 1) the scale succeeds in placing inmates in categories that differ according to average number of prior incarcerations, and 2) it predicts individual cases with a high error rate.

These two conclusions raise important questions in the area of judicial philosophy. The first question concerns the use of certain kinds of variables to predict average differences in the behavior of different classes of prisoners. The second concerns the use of predicted differences in average behaviors to sentence individual criminals.

Chronic offenders and lower rate offenders do differ, on average, according to several characteristics. This observation does not mean, however, that such characteristics ought to have legal standing. Rather, this observation raises several issues that ultimately must be answered in normative terms. One issue is whether *a priori* limits should exist for the kinds of variables that may be used for their ability to categorize criminals. For example, Greenwood rules out such variables as sex and race on the grounds that they are beyond an individual's control, and hence should not be held against an individual in sentencing policy.<sup>50</sup> The other side of the argument is that failure to include such variables may result in bias against some groups on the basis of other statistically relevant variables. For example, we found that blacks tend to score higher on Greenwood Scale items than whites with similar criminal records. The scale items, thus, overpredict the criminal records of blacks. If scale items are used in sentencing criminals, is it fair to sentence blacks as severely as whites, knowing that scale items are biased against blacks?

Attributes beyond an individual's control are not the only variables that may be unethical to use in predicting average behavior. Behavior that is illegal, but not a direct manifestation of the crime

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<sup>50</sup> See P. GREENWOOD, *supra* note 7, at 48.

charged i.e., drug use, also may provide a weak justification for harsher sentences. Many people might agree to the imposition of mandatory drug rehabilitation programs on the user, but this scenario differs substantially from the imposition of longer prison sentences. The use of juvenile behavior items adds a different dimension to this problem. Under current norms, children are afforded more protection than adults, both by society and the legal system. If we turn around and impose much harsher penalties on juvenile offenders by increasing the probability of severe punishment later in life, we violate these norms. Finally, the Greenwood Scale contains one item—unemployment—that refers to a perfectly legal, albeit unfortunate, condition. This condition may be due to a lack of skills, recession, incompetence, or other factors. Normally, we think of the loss of income as punishment enough, if we find the condition worthy of punishment at all. On what ethical grounds do we then increase the severity of punishment for the unemployed?

The questions raised above can be condensed into one issue: even if we can predict average criminal records, other considerations may mandate that we forego using this predictive ability in sentencing criminals. Current legal norms sanction the use of past criminal behavior in predicting future behavior or as a justification for increased punishment. The Greenwood Scale items would considerably extend the kinds of variables used, though not, as noted above, without limit. This extension raises ethical questions that go beyond the actuarial question of whether the variables used are in fact good predictors.

The actuarial question, however, remains a separate issue. The second conclusion we reached is that the Greenwood Scale is a weak predictor. In other words, many people whom the scale would predict to be chronic offenders on the basis of their scale scores would not, in fact, be chronic offenders. Similarly, the scale would dismiss many offenders who would, in fact, be chronic offenders. The issue then becomes what level of accuracy must a scale possess in order to justify its use in determining individual sentences based on average statistics. This issue may be clarified by examining two extreme cases: 1) that of perfect prediction and 2) that of worthless prediction. The former occurs when the scale accurately classifies each case; the latter occurs when the scale is no better than random predictions based on knowledge of the mean of the "dependent variable" (in this case, number of prior incarcerations). In the first case, if we consider predictions based on legally extraneous variables to be legitimate, the use of aggregate statistics to sentence individuals presents no problems. In the second case, the use of aggregate sta-

tistics to sentence individuals amounts to random sentencing. Such a scheme is probably socially unacceptable. Furthermore, even if such a scheme was socially acceptable, a cheaper and more efficient way to reach the same results could be achieved through the use of random numbers tables. This practice might seem absurd, yet it is no different from using a prediction scale that accounts for none of the variance in the dependent variable.

The question then becomes one of drawing a line. Do we only need to know that Criminal *A* is more likely than Criminal *B* to be a chronic offender in order to increase his punishment, or must we also know that there is a better than even chance that Criminal *A* will be a chronic offender? Or must we be able to say that it is highly likely that Criminal *A* will be a chronic offender? On the other side of the coin, do "false negatives" matter? These questions again raise issues concerning standards of justice. The use of predictions of future behavior based on average characteristics of classes of criminals inherently involves two departures from currently accepted legal norms. First, current sentences would be based on predicted future (as well as past criminal) behavior. Second, criminals with the same legal record, in terms of current and past offenses, may receive very different sentences not on the basis of extenuating circumstances, but rather by the chance element in the process. This second phenomenon occurs to some extent under current practices, but norms probably operate in the direction of reducing randomness.

The idea of selective incapacitation has several attractive features. Given the existing crime rate and the social cost of incarceration, selective incapacitation could, in theory, reduce the crime rate without a concomitant increase in taxpayer expense. Alternative methods of reaching the same result, however, which do not involve radical departures from existing legal norms, may be available. One possibility would be to combine lighter sentences (or alternatives to prison) for relatively minor first time offenders with a sentence structure that is increasingly severe for repeated offenders. This scheme would not enable us to protect society from the future offender; on the other hand, such preventive detention comes at the cost of violating certain legal and ethical norms. Consequently, we must investigate thoroughly the impact on crime rates of possible alternatives to selective incapacitation before seriously considering implementation of selective incapacitation policies.