Brit. J. Psychiat. (1974), 125, 60–64

Predicting Offender-Patients' Reconvictions

By CLIVE PAYNE, SARAH McCABE and NIGEL WALKER

In 1963–4 the Oxford University Penal Research Unit managed to collect information about 90 per cent of the offender-patients who were admitted to N.H.S. and Special Hospitals under hospital orders made by criminal courts: this cohort has been described in *Crime and Insanity*, Vol. II, by Walker and McCabe (1973). One of the by-products of the follow-up of these offender-patients was a rough and ready scoring system for predicting reconvictions (within a two-year follow-up) of 456 offender-patients who were allowed to leave hospital within a year of admission. A prediction system can be used to assist human decision-making (though it should not be a substitute for it)* and can also be used to assess the efficacy of measures —such as after-care—by seeing whether individuals with equal predicted reconviction-rates do better with than without the measure (Mannheim and Wilkins, 1955).†

Mr. Payne was interested in finding out whether a more sophisticated prediction formula could be devised by using the logistic method described by Dyke and Patterson (1952), with improvements suggested by Theil (1970) and Goodman (1972). The method is specially designed for examining the effects of a number of independent qualitative variables upon a criterion variable which is expressed as a proportion and has certain technical advantages over more traditional methods, as explained by Cox (1970).

The original sample of 456 'first-year leavers' was refined by excluding:

(i) a few eldery 'first-timers'; that is, a rather unusual group aged 41 or older with no previous known convictions or hospital admissions;

(ii) another rather unusual group consisting of a few women with previous prison or borstal experience totalling 19 months or more; it had already been observed that they had an extremely high probability of reconviction, and their inclusion might have been the explanation of Walker and McCabe's finding that, unlike virtually all 'penal' samples, the first-year leavers showed no tendency for women to have lower reconviction-rates;

(iii) offender-patients who had achieved legal freedom by absconding for the necessary period. If a prediction formula is to assist in deciding when to discharge a patient or whether to make arrangements for after-care there is no point in including patients who do not wait for such decisions!

This left 334 first-year leavers. They included, however, 82 men and women who had been readmitted to hospital voluntarily or compulsorily during the two-year follow-up *without being reconvicted first*. If included they would lead to the counting as 'not reconvicted' of some individuals who *would* have been reconvicted but for their admission, and would thus weaken the predictive efficiency of the model. On the other hand, re-admission without reconviction should normally be regarded as a better outcome than reconviction, whether or not followed by re-admission. The final calculations were therefore performed twice, including and excluding this group, with interesting results (see below).

The independent variables taken into account had been chosen as being: (i) more or less 'hard' (although diagnoses are to some extent 'soft'); (ii) of the kind likely to be known to or easily

* The logic and ethics of following or disregarding predicted probabilities in decision-making are discussed by Walker (1971).

† Used in this way it amounts to a sophisticated matching technique.

https://doi.org/10.1192/bjp.125.1.60 Published online by Cambridge University Press

ascertainable by psychiatrists before they have to take the decision to discharge or make special efforts to arrange after-care. For example, previous convictions were used in preference to 'months in previous penal custody' because the former can be ascertained from the police, whereas the latter involves calculation and sometimes special inquiry. It can be said right away that, as with ordinary penal samples, this variable proved the most powerful predictor. As Table I shows, if a first year leaver had been convicted before the offence which led to his hospital order his chances of being convicted yet again during the two years after discharge were at least twice his chances if he had had a clean record; and if he had six or more previous convictions his chances were four times as great.

The next most powerful was the type of 'current' offence, i.e. the one which had led to the hospital order. If the offence had involved dishonesty—whether by theft, fraud, burglary or robbery—the offender-patient's probability of reconviction was two and a half times greater than if it had been of some other kind (e.g. violence, sexual molestation, vagrancy, public disturbance). This was interesting, because the original beta-coefficient analysis had suggested that the type of current offence was only weakly associated with reconviction (Walker and McCable, op. cit.).

A rather poor third was the diagnostic grouping. For this purpose it was found best to form three groups*: (i) all diagnoses in which the predominant disorder had been labelled 'schizophrenic'; (ii) all in which subnormality, psychopathic disorder or its equivalents had been the main element; (iii) all other diagnoses, mostly involving affective labels. The schizophrenic offender-patients had the lowest probability of reconviction, the subnormal or psychopathic the highest. But when those who had been re-admitted to hospital without reconviction were excluded, the diagnosis ceased to be a significant predictor, largely because schizophrenics were strongly represented in the excluded group. In other words, schizophrenics' probabilities of reconviction are lowest largely because they tend to be re-admitted either before committing another offence or without being prosecuted for it.

On the other hand, excluding this group *improved* the predictive power of the logistic model even more than had been expected. Walker and McCabe, relying largely on a beta-coefficient analysis, had estimated that the 'predictability' of reconvictions amongst first-year leavers was only moderate ($R^2 = 0 \cdot 26$ for

* For the purposes of the logistic method it is advisable to use fairly coarse groupings of the variables, since this leads to more stable estimates of the observed cell proportions (see Table II). Thus previous convictions were subdivided into Nil/1–5/6+, types of current offence into dishonest/other, diagnostic group into schizophrenic/subnormal or psychopathic/other. Trials showed that other or more numerous sub-divisions would not have improved the model.

TABLE I

Ratios between reconviction probabilities ("pr")

If the first-year leaver had	his *pr* was	*If the first-year leaver had*
1–5 previous convictions	1·9 × the *pr*	no previous convictions
6+ previous convictions	3·9 × the *pr*	no previous convictions
6+ previous convictions	2·0 × the *pr*	1–5 previous convictions
been admitted for a dishonest current offence	2·6 × the *pr*	been admitted for a current offence of some other kind
been diagnosed as subnormal or psychopathic	2·0 × the *pr*	been diagnosed as schizophrenic
been diagnosed as affective etc.	1·4 × the *pr*	been diagnosed as schizophrenic
been diagnosed as subnormal or psychopathic	1·3 × the *pr*	been diagnosed as affective, etc.

https://doi.org/10.1192/bjp.125.1.60 Published online by Cambridge University Press

men, 0·45 for women).* With the logistic model, however, the predictability was strikingly high ($R^2 = 0·74$)* and even higher when the 'merely re-admitted' group were excluded ($R^2 = 0·83$.*

It is important to note that the ratios between the respective probabilities of reconviction seem to be more or less independent of each other. For example, the ratios for numbers of previous convictions are more or less the same whatever the type of current offence and whatever the diagnosis, and *vice versa*. Sometimes it is necessary to construct a model so as to take into account interactive relationships, in which the size of the ratios varies with the other important variables. In this case, however, a simple 'additive' model proved adequate to describe the relationships.

Table II shows the success with which this simple additive model discriminates if all three variables (previous convictions, type of current offence and diagnosis) are used in combination. It subdivides the 334 first-year leavers into 18 categories, in which substantial percentages of the sample have reconviction-probabilities as different as 25 per cent or less at one extreme and 70 per cent or more at the other. This 'polarization' of a substantial fraction of the sample is one indication of the success of the model. Another is the goodness of fit between the actual (unbracketed) reconviction percentages of each category and those which the model predicts (in brackets). The predicted and actual reconviction percentages are gratifyingly close, especially where schizophrenics and subnormals or psychopaths are concerned.

* R^2 does not mean quite the same thing when derived from beta-coefficients and from a logistic model, but it gives a rough indication of the improvement (see Goodman, 1972).

TABLE II

Reconviction percentages of first-year leavers†

Convictions previous to hospital order	Type of offence leading to hospital order	Predominant diagnosis	Percentages reconvicted within two years of leaving (% predicted by logistic model in brackets)	Numbers (=100%)
None	Dishonest	Schizophrenic	25·0 (28·4)	8
		Subnormal of psychopathic	70·0 (43·6)	10
		Affective or other	0·0 (36·5)	3
	Other	Schizophrenic	13·3 (13·0)	45
		Subnormal or psychopathic	25·0 (22·7)	20
		Affective or other	0·0 (17·9)	11
1–5	Dishonest	Schizophrenic	41·7 (43·1)	24
		Subnormal or psychopathic	50·0 (59·7)	22
		Affective or other	42·9 (52·4)	7
	Other	Schizophrenic	24·1 (22·4)	58
		Subnormal or psychopathic	35·3 (36·0)	34
		Affective or other	42·1 (29·5)	19
More than 5	Dishonest	Schizophrenic	75·0 (60·5)	16
		Subnormal or psychopathic	70·0 (75·0)	10
		Affective or other	69·2 (69·0)	13
	Other	Schizophrenic	25·0 (36·8)	24
		Subnormal or psychopathic	50·0 (53·2)	6
		Affective or other	75·0 (45·9)	4
				334

† Excluding the categories described in the text.

https://doi.org/10.1192/bjp.125.1.60 Published online by Cambridge University Press

The residual category of other diagnoses suffered both from heterogeneity and from smaller numbers. Thus, so far as schizophrenics, subnormals and psychopaths are concerned, a very simple predictive formula seems a real possibility.

Several points must be made, however. In the first place, the model is better at picking out low-risk groups than high-risk groups: 134 out of the 334 in the sample fell into sub-divisions with a 25 per cent *or lower* reconviction-probability, whereas only 10 had probabilities of 75 per cent (these were all subnormal or psychopathic individuals with dishonest current offences and six or more previous convictions). The remaining 190 fell into categories with middle-range probabilities: a phenomenon which seems to be shared by all penal samples (Simon, 1971). As a means, therefore, of identifying individuals whose discharge might be delayed prediction methods are unlikely to be of much use. But the decision to discharge is not the only one within the hospital's power: the effort to arrange after-care is equally important. Walker and McCabe's finding that efforts at after-care made a significant difference to reconviction-rates was unambiguously confirmed by this analysis, and proved true of even the high-risk groups. A table of this kind can therefore be used as a rational basis for selecting individuals for after-care where resources make it impossible to provide this for all.

On the other hand, as a prediction formula the logistic model, like Walker and McCabe's original scoring system, has still to be validated on another sample of first-year leavers. (It was tried on Walker and McCabe's sample of *second*-year leavers, but was much less powerful in this case, because these were clearly drawn from a population with different characteristics: they included markedly more young patients, subnormals, dishonest offenders and offenders previous convictions.) The authors will be glad to supply further information to anyone who is in a position to attempt a validation.

Finally, the variables which did *not* prove useful predictors must be mentioned. Surprisingly, neither sex nor age did, although in ordinary penal samples being male and being young are strongly associated with reconviction. Other variables which were also useless as predictors were previous hospital admissions, time at liberty before the current offence, number of short-term jobs, and whether the individual was an immigrant or not. A composite variable—whether employed and/or living at home at the time of the current offence—had some predictive value when applied to individuals with no previous convictions: this was the only definite interactive relationship observed. Some of these variables, however, might well prove useful predictors of re-admission to hospital, which is certainly associated with the number of previous admissions. Our concern in this paper, however, has been with the prediction of reconviction, since our sample consisted of patients admitted as a result of convictions.

Summary and Discussion

A logistic analysis of Walker and McCabe's follow-up data for hospital order patients who are allowed to leave within a year of admission suggests a simple prediction model which is promising enough to call for validation on similar samples. As with ordinary penal samples, the number of previous convictions and type of current offence are powerful predictors of reconviction, but a puzzling difference from ordinary penal samples is the negligible predictive power of sex and age. The diagnosis is a useful predictor only if those patients who are re-admitted without being reconvicted are included in the sample. The probable explanation of these findings is: (i) that hospital orders are used to deal with patients whose 'way of life' involves frequent petty dishonesties, either because they have been reduced to it by their handicaps or because they belong to a subculture in which dishonest acquisition is not strongly disapproved of; and (ii) that the schizophrenic hospital order case has a greater chance than others of being re-admitted to hospital either before he gets into further trouble with the law or without prosecution when he does. The analysis confirms the importance of efforts to arrange after-care, expecially for high-risk groups.

https://doi.org/10.1192/bjp.125.1.60 Published online by Cambridge University Press

References

Cox, D. R. (1970) *The Analysis of Binary Data*. London: Methuen.

Dyke, G. & Patterson, H. (1952) Analysis of factorial arrangements when the data are proportions. *Biometrica*, **8**, 1–12.

Goodman, L. A. (1972) A modified multiple regression approach to the analysis of dichotomous variables. *American Sociological Review*, **37**, 28–66.

Simon, F. H. (1971) *Prediction Methods in Criminology*. London: H.M.S.O.

Theil, H. (1970) On the estimation of relationships involving qualitative variables. *American Journal of Sociology*, **76**, 103-154.

Mannheim, H. & Wilkins, L. T. (1955) *Prediction Methods in relation to Borstal Training*. London: H.M.S.O.

Walker, N. D. (1971) *Crimes, Courts and Figures*. Penguin.

—— & McCabe, S. F. (1973) *Crime and Insanity in England*, Vol. II. Edinburgh University Press.

Clive Payne, *Senior Research Officer, Research Services Unit, Nuffield College, Oxford, OX1 1NF*

Sarah McCabe, *Senior Research Officer, Oxford University Penal Research Unit, St. Cross Building, Manor Road, Oxford*

Nigel Walker, *Wolfson Professor of Criminology and Director of the Institute of Criminology, 7 West Road, Cambridge, CB3 9DT*

(*Received 28 August 1973*)

https://doi.org/10.1192/bjp.125.1.60 Published online by Cambridge University Press