Predicting violent crime among drug-using inmates: The Addiction Severity Index as a prediction instrument

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Purpose. The purpose of the present study is to explore whether the Addiction Severity Index (ASI) can be used to predict violent crime among drug-using inmates. The association between substance abuse and violent crime among drug-using inmates was also evaluated.

Methods. The participants were male, drug-using inmates (N = 178) of two Dutch penitentiaries. In a prospective study, discriminant analysis was applied to explore which variables distinguish between participants with and without violent crime during a two-year follow-up period after detention. Predictive validity of demographic variables, criminal history variables and ASI variables were assessed. DSM-III classifications, measured by the DIS, were compared with ASI variables on their predictive validity.

Results. Overall correct classification of violent crime varied between 82% and 93%. Information from the ASI in addition to demographic variables and the criminal past of a detainee clearly improved the overall correct classification of participants committing violent crime, and the percentage of variance explained. Compared to DIS diagnoses, ASI variables explained 19% more variance. Apart from the ASI severity rating for criminal past, the number of years of regular cocaine use, and the age at which cocaine use started, were major contributors of the ASI's predictive power.

Conclusions. The ASI is a useful instrument for the prediction of violent crime among drug-using inmates. The ASI-based assessment of drug use can indicate a risk of violent crime. Further research is needed into the processes involved in this predictive power, as well as into the circumstances in which drug use induces violent crime. This may lead to the prevention of violent crime in this particular group of inmates. The prediction of violent crime has received increased attention in recent years because of ongoing increasing violent crime. Prisons are overcrowded and more arrestees are being released into the community than ever before (Teplin, McLelland, & Abram, 1993). Blackburn (1993) distinguishes three possible reasons for undertaking research on prediction: first, to identify high-risk groups on the basis of early antecedents of later criminal behaviour, with the intent of providing preventive services; secondly, to examine the results of attempts at prediction for possible explanations of criminal behaviour; and thirdly, the outcomes of prediction research may be of use in criminal justice decision-making (e.g. incarceration vs. release decisions).

There is a difference between the clinical prediction and statistical prediction of violent crime. The clinical prediction of violent crime is generally based on factors related to the individual, the situation and previous crimes. Statistical prediction is based on the evaluation of information obtained by using standardized assessment instruments. In other words, the clinical method is based on more subjective measures and the statistical method on more objective measures. Comparison of the outcomes of clinical vs. statistical methods in virtually every decision-making situation, moreover, generally shows statistical prediction to be more accurate than expert clinical judgment (Gottfredson, 1987; Lidz, Mulvey, & Gardner, 1993).

While the clinical prediction of violent crime has proved to be poor (Steadman, 1987), Mulvey and Lidz (1995) observe that the statistical prediction of dangerousness is also in need of improvement. In his review, Monahan (1988) concludes that the range of predictor variables has been very narrow, and has often included no more than simple diagnosis or demographic information. Furthermore, the patient samples have been very restricted, usually only to institutionalized males with a prior history of violence. Recent studies, however, have been aimed at the selection of variables that are, either singly or in combination with others, promising for the prediction of violent crime in particular (Rice & Harris, 1992; Rice, Harris, Lang, & Bell, 1990; Steadman *et al.*, 1993).

Recently, there has been a strong and growing interest in developing risk scales for improving the accuracy of risk assessment and violence prediction (Borum, 1996). A recent study involving the PCL-R and the HCR-20 shows that these newly developed instruments are successful in predicting violent crime among mentally disordered offenders (Strand, Belfrage, Fransson, & Levander, 1999).

Little attention has been paid to the role of substance abuse in the prediction of violent crime among drug-using inmates. Alcoholism and other types of drug abuse seem to be associated with violent behaviour (Monahan, 1993; Phil & Peterson, 1993). Abram (1989) and Teplin *et al.* (1993) used the Diagnostic Interview Schedule (NIMH-DIS; Robins, Helzer, Croughan, & Ratcliff, 1981) to operationalize drug and alcohol abuse and found that neither mental disorders nor alcohol and drug abuse were reliable predictors of violent crime. In the light of earlier research showing the use of alcohol in particular to play a significant role in violent offences, Abram (1989) concluded that the way in which the use of alcohol was operationalized may account for the non-correlation in their research. Not so much alcoholism, but intoxication either during or immediately prior to the commission of a crime may be a better predictor of violence. Also, in contrast to the literature,

other drug disorders were not predictive of violent crimes in the studies by Abram and Teplin *et al.* This led Abram to again suggest that the drug-violence relationship reported in the literature may be associated with usage around the time of the crime and not a lifetime drug disorder *per se.* Alternatively, Gandossy, Williams, Cohen, and Harwood (in Abram, 1989) have argued that only certain types of drug use may be linked to violent crime. For example, the use of cocaine appears to be quite prevalent among prison detainees (Johnson & Wish, 1987; Peters, 1993; Wexler, Lipton, & Johnson, 1987). A review of the literature shows use of cocaine not to be employed as a variable in the prediction of violent crime as yet. It is also possible that the correlation between alcohol, drug use and violent crime is an artefact of the association of alcohol and drug use with a third variable, such as an antisocial personality disorder (see Abram, 1989).

In this context, the Addiction Severity Index (ASI; McLellan, Luborsky, Woody, & O'Brien, 1980) seems to be an appropriate instrument. The ASI is a semistructured interview to assess problem severity in seven areas that commonly affect substance abuse: medical condition, employment problems, alcohol use, drug use, delinquency, family and social problems, and psychiatric conditions. Other features of the ASI are as follows: (1) the severity of the problems in each individual area is estimated; (2) each problem area consists of an objective section and a subjective self-rating section; (3) the severity rating provides a direct measure of the need for treatment; (4) the ASI can be easily adapted to measure problem severity on the day of committing an offence; and (5) the ASI can easily be adapted for use as a follow-up instrument.

The main research questions in the present study were as follows: Does the ASI appear to be useful for the prediction of violent crime among drug-using inmates? And does substance abuse predict violent crime among drug-using inmates?

Method

Procedure

The study was conducted in two Dutch penitentiaries: the HVB in Rotterdam and the DOC in Doetinchem. The study has two occasions of measurement:

to Pre-measurement. In the periods March-December 1990 and April-August 1991, all drug-using detainees entering the two aforementioned penitentiaries were approached to take part in the study. On the wards of these penitentiary institutions only drug users with a long history of drug use are incarcerated; thus, the participants of this study have been screened for drug use previously.

The detainees were informed about the procedure, the researchers and the methods that would be used. It was also emphasized that the data would be anonymous and that their cooperation would in no way influence their detention. Within a period of four weeks after admission, a series of oral and written measures were taken outside the regular programme of activities (see below). The interviews were conducted by two, specially trained psychologists and took an average of two hours.

t1 Follow-up measurement. In the period January-April 1993, the respondents' violent crime was examined. With the cooperation of the Ministry of Justice, the relevant violent crime data could be gathered from two judicial sources (see below).

Sample

During the pre-measurement, 178 drug-using male detainees were interviewed. Mean age was 30 years (SD = 5.6), 46% of the respondents were non-Dutch, and the level of education was low. Most families of origin were characterized by multiple problems.

The prevalence of addiction problems appeared to be high on a lifetime basis (93.8%, N = 167; NIMH-DIS) and also in the 6 months pre-measurement (82%, N = 146; NIMH-DIS). All respondents were drug users. On average, regular drug use started at 19 years of age (SD = 5.2) and continued for 6.4 years (SD = 4.3). Multi-drug use prevailed. Most respondents considered heroin their drug of choice (43.8%, N = 78), while cocaine was the drug of choice for 34.8% (N = 62). Among the respondents 56.2% (N = 100) once had a DSM-III Axis-1 disorder (NIMH-DIS). In this case, mood, anxiety and/or schizophrenic disorders were involved. With regard to the respondents' criminal pasts, most of them appeared to have committed an offence in the period two years prior to premeasurement (98.8%, N = 166) and many had spent one or more days in detention prior to current detention (85.7%, N = 114). The crimes often involved property offences (86.3%, N = 145), although 28.6% (N = 48) of the respondents had committed a violent offence in the period prior to their current detention. Compared to the Dutch national drug-using population known to addiction care and treatment institutes, the research group appears in general to have a relatively problematic background. Apart from the prevalence of mostly severe addiction and criminal problems, other important issues exist: many have very low education, a problematical family background and often psychiatric diagnoses.

Variables and measuring instruments

The variables were measured using the following assessment instruments.

General registration lists. These lists provided information on those variables pertaining to the individual's background (age, Dutch vs. non-Dutch cultural origin, level of education, legal vs. illegal source of income and duration of detention).

Judicial registers. Through certificates from the General Documentation Register and Penitentiary Files, information concerning a criminal past and the outcome variable 'violent crime' could be gathered. The outcome variable was dichotomized as yes or no for the repeat of a violent crime (violence against other persons, maltreatment, manslaughter, murder and rape). The term for committing a violent crime was constantly set at two years. The period that the participants were detained was controlled for along with any period of detention within the two-year term.

The Addiction Severity Index (ASI; McLellan et al., 1985). Information regarding physical health, employment, use of alcohol and drugs, criminal past, family and social relations, and psychological symptoms was gathered using the ASI. The original composite scores and the severity ratings from the different parts of the ASI (physical health, employment, use of alcohol and drugs, criminal past, family and social relations, and psychological symptoms) were used in the analyses. Problem severity is rated on a scale from 0 to 9:

- 0-1 No real problem, treatment not indicated
- 2-3 Slight problem, treatment probably not necessary
- 4-5 Moderate problem, some treatment indicated
- 6-7 Considerable problem, treatment necessary
- 8-9 Extreme problem, treatment absolutely necessary.

A composite score is derived for each scale by arithmetic weighting of highly correlated items. Starting age for alcohol, heroin or cocaine use, number of years and daily alcohol, heroin or cocaine use constituted separate variables.

The reliability and validity of the ASI have been found to be satisfactory for various populations in the USA, such as multi-problem psychiatric patients (Appleby, Dyson, & Luchins, 1997), mentally ill substance users (Hodgins & El-Guebaly, 1992) and homeless substance users (Zanis, McLellan, Cnaan, & Randall, 1994). Recent research has also shown the reliability and validity of the ASI to be

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satisfactory for addict populations in The Netherlands (Hendriks, 1990; Hendriks, Kaplan, van Limbeek, & Geerlings, 1989; de Jong, Willems, Schippers, & Hendriks, 1995) and also for the specific population of drug-using inmates being investigated here (Amoureus, Van den Hurk, Schippers, & Breteler, 1994).

The Diagnostic Interview Schedule (DIS; Robins et al., 1981). The DIS was used to collect data on the prevalence of psychopathology, including substance use disorders. The DIS is a valid, and reliable structured psychiatric interview, developed to assess DSM-II classifications. Assessed were affective disorders (including depressive disorders and manias), anxiety disorders (including panic disorder, phobic disorder and obsessive-compulsive disorder) and schizophrenia/schizoform disorders. From the substance use disorders, drug and alcohol dependence were assessed. Both lifetime and recent (preceding six months) prevalence were assessed.

Exclusion and final sample size

During follow-up measurement, the detention data for 42 respondents (23.5%) could not be retrieved because of unavailable penitentiary files. Offence data were not available for 8 respondents (4.5%) because the certificates could not be retrieved from the General Documentation Register. Two respondents (1.2%) had died. Fifty participants had to be excluded from the final analyses. Comparison of background characteristics and of variables in the areas of drug use and criminality showed the 50 respondents who had to be excluded did not differ significantly from the remaining sample of 128.

Data-analysis

Spearman's rank correlations were used to analyse the correlations between the various predictor variables. Discriminant analysis was used to distinguish between violent drug-using inmates and non-violent drug-using inmates. Discriminant analysis was preferred over logistic regression because the experimenters were interested in the degree of variance shared by violent crime and the various predictors. Four discriminant analyses were conducted. In the first analysis, the extent to which general variables, such as age, level of education and criminal past, could discriminate between the violent and the non-violent drug-using inmates was examined. In the second analysis, the experimenters tested whether the addition of variables obtained from the DIS, those pertaining to substance abuse in particular, contributed to the prediction of violent crime. In the third analysis, they tested whether the addition of ASI variables, those pertaining to substance abuse in particular, contributed to the prediction of violent crime. In the third analysis, they first research question (Tables 1 to 6). Analyses 2 and 3 also provide insight into the predictive power of substance abuse. Apart from that, a fourth analysis was performed with ASI variables, while leaving out variables referring to drug use. A comparison between analyses 3 and 4 was paramount to investigate the predictive validity of the ASI-substance use items.

The statistical software SPSSX (SPSS, 1986) was used.

Results

In Table 1, the coefficients for those variables discriminating the most between the violent and non-violent drug-using inmates are presented. These coefficients reflect the correlation between a specific variable and the discriminant function and are typically used for interpretation. As can be seen, the detainee's criminal past provides an important contribution to the prediction of violent crime: those committing more violent offences and more property offences prior to detention were more likely to commit a violent crime at follow-up. Non-Dutch detainees were also more likely to be violent during follow-up than Dutch detainees (-.30).

Variable	Discriminant coefficient	
Demographic Cultural origin	30	
Violent offences Property offences	.77 .55	

Table 1. Results of discriminant analysis using general variables (*N* = 128)

Table 2. Classification results using general variables (N = 128)

	Predicted group membership		
	Non-violent drug-using inmates	Violent drug-using inmates	
Actual group membership			
Non-violent drug-using inmates	94% (101)	6% (6)	
Violent drug-using inmates	76% (16)	24% (5)	
Overall correct classification	82%	Ď	
Sensitivity	24%	, D	
False-positive predictions	55%	, D	
False-negative predictions	14%	, D	
Prior probabilities			
Non-violent drug-using inmates	.83		
Violent drug-using inmates	.17		
Wilks λ	.85		
Canonic correlation	.39		
Explained variance	15%	Ď	

In Table 2, the classification results of the discriminant analysis with the variables from Table 1 are presented. The violent (or non-violent) crime of 82% of the 128 drug-using inmates was correctly predicted. Of the non-recidivists, 101 (94%) were correctly identified as such. Nevertheless, only 5 (24%) of the actual violent drug-using inmates were correctly placed in the group of predicted violent drug-using inmates on the basis of these variables. This means that of the 21 violent drug-using inmates, 16 (76%) were predicted as non-violent drug-using inmates, and .17 for violent drug-using inmates, which means that the three variables pertaining to cultural background and criminal past are responsible for the correct classification of an additional 11% of the non-recidivists and 7% of the violent drug-using inmates. The explained variance in the discriminant scores using these variables was 15%.

Variable	Discriminant coefficient	
Demographic		
Cultural origin	31	
Criminal past		
Violent offences	.52	
Property offences	.38	
Use of alcohol		
DIS-diagnosis alcohol recent	.15	
Use of drugs		
DIS-diagnosis drugs recent	.24	
Psychiatric problems		
DIS-diagnosis anxiety recent	.18	

Table 3. Results of discriminant analysis using general variables and DIS variables (N = 128)

Table 3 shows a criminal past to be the strongest predictor of future violent crime, also when DIS classifications are entered into the prediction. Violent drug-using inmates committed more violent offences (.52) and more property offences (.38) prior to detention. Non-Dutch detainees were also more likely to be violent drug-using inmates than Dutch detainees (-.31). DIS classifications, including substance abuse, play a lesser role. In comparison with non-violent drug-using inmates the DIS classifications alcohol dependence (recent, .15), drug dependence (recent, .24) and anxiety disorder (recent, .18) were more often classified in violent participants.

In Table 4 the classification results of the discriminant analysis with the variables from Table 3 are presented. Violent crime (or its absence) of 85% of the 128 drug-using inmates was correctly predicted. Of the non-violent drug-using inmates, 102 (95%) were correctly identified. Of the violent drug-using inmates, 7 (31%) were correctly identified as such on the basis of the present variables. The sensitivity is 31%: of the 21 violent drug-using inmates 7 are predicted as violent criminal. The prior probabilities were .83 for non-violent drug-using inmates and .17 for violent drug-using inmates, which means that the present variables are responsible for the correct classification of an additional 14% of the non-violent drug-using inmates and 54% of the violent drug-using inmates. The explained variance in the discriminant scores, using these variables, was 19%.

Table 5 shows not only cultural background and criminal past to play an important role in the prediction of violent crime, but also the ASI information with regard to alcohol and drug use. Violent drug-using inmates committed more violent offences (.44) and more property offences (.31) prior to research detention, but also had more problems with the police and justice than non-violent drug-using inmates (.32), had several years of daily cocaine use (.34), started using cocaine at a younger age than non-violent drug-using inmates (-.28), started using heroin at a younger age than non-violent drug-using inmates (-.15), had a longer need for

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	Predicted group membership		
	Non-violent drug-using inmates	Violent drug-using inmates	
Actual group membership			
Non-violent drug-using inmates	95% (102)	5% (5)	
Violent drug-using inmates	69% (14)	31%(7)	
Overall correct classification	85%		
Sensitivity	31%		
False-positive predictions	42%		
False-negative predictions	12%		
Prior probabilities			
Non-violent drug-using inmates	.83		
Violent drug-using inmates	.17		
Wilks λ	.81		
Canonic correlation	.43		
Explained variance	19%		

Table 4. Classification results using general variables and DIS variables (N = 128)

treatment of alcohol abuse than non-violent drug-using inmates (.13), had a poorer health than non-violent drug-using inmates (-.19), and had a longer need for treatment for social problems than non-violent drug-using inmates (.20). Finally, the psychopathology of the detainees also appears to play a role in their violent crime (.18).

In Table 6 the classification results of the discriminant analysis with the variables from Table 3 are presented. Violent crime (or its absence) of 93% of the 128 drug-using inmates was correctly predicted. Of the non-violent drug-using inmates, 104 (97%) were correctly identified. Of the violent drug-using inmates, 15 (71%) were correctly identified as such on the basis of the present variables. The sensitivity is 71%: of the 21 violent drug-using inmates 16 are predicted as violent criminal. The prior probabilities were .83 for non-violent drug-using inmates and .17 for violent drug-using inmates, which means that the present variables are responsible for the correct classification of an additional 14% of the non-violent and drug-using inmates and 54% of the violent drug-using inmates. The explained variance in the discriminant scores using these variables is 38%.

A similar discriminant analysis including the ASI variables, leaving out the variables referring to drug use, showed that this 'ASI' explained 20% of the variance, thereby pointing to the importance of both drug variables and non-drug variables in this instrument. Violent crime (or its absence) of 84% of the 128 drug-using inmates was correctly predicted. Of the non-violent drug-using inmates, 101 (94%) were correctly identified. Of the violent drug-using inmates, 6 (28%) were correctly identified as such on the basis of the present variables. The sensitivity is 29%: of the 21 violent drug-using inmates, 6 are predicted as violent criminal. The prior probabilities were .83 for non-violent drug-using inmates and

Variable	Discriminant coefficient
Democraphie	
Cultural origin	_ 24
	.34
Criminal past	
Violent offences	.44
Property offences	.31
Physical health	
ASI composite score physical health	19
Use of alcohol	
ASI severity rating use of alcohol	.13
Use of drugs	
ASI number of years frequent use of cocaine	.34
ASI starting age use of cocaine	28
ASI starting age use of heroin	15
Criminal past	
ASI severity rating justice and police	.32
Psychiatric problems	
ASI composite score psychiatric symptoms	18
Social problems	.10
ASI severity rating social relations	.20

Table 5. Results of discriminant analysis using general variables and ASI variables (N = 128)

.17 for violent drug-using inmates, which means that the present variables are responsible for the correct classification of an additional 14% of the non-violent drug-using inmates and 54% of the violent drug-using inmates.

Discussion

The first and most important question in this study was: does the ASI appear to be useful for the prediction of violent crime? A comparison of the results of the discriminant analyses showed that the addition of the ASI variables to demographic and criminal record variables clearly lead to a better prediction of violent crime. In comparison with earlier studies on violent crime (see Blackburn, 1993; Steadman, 1987), the definitive classification obtained in the present analyses can be stated as good. Over 95% of the non-violent drug-using inmates were correctly classified; 71% of the violent drug-using inmates were correctly classified; and the false–positive rate was low (17%). In a review of violence prediction studies, Steadman (1987) found correct identification of violent groups to range between 23% and 54% with the false–positive rates ranging between 46% and 86%. Also in comparison with DIS classifications, ASI variables appear to have better predictive validity.

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	Predicted group membership		
	Non-violent drug-using inmates	Violent drug-using inmates	
Actual group membership			
Non-violent drug-using inmates	97% (104)	3% (3)	
Violent drug-using inmates	29% (6)	71% (15)	
Overall correct classification	93%		
Sensitivity	71%		
False-positive predictions	17%		
False-negative predictions	5%		
Prior probabilities			
Non-violent drug-using inmates	.83		
Violent drug-using inmates	.17		
Wilks λ	.62		
Canonic correlation	.61		
Explained variance	38%)	

Table 6. Classification results using general variables and ASI variables (N = 128)

The second question in this study was: does substance abuse predict violent crime among drug-using inmates? In this and earlier research (Monahan & Steadman, 1983), prior violence has certainly been found to be one of the best predictors of future violence. However, it appears that in addition to variables connected to the detainee's criminal past, drug use influences violent crime among drug-using inmates.

The substance abuse variables of the ASI have an independent predictive value in addition to the variables from the remaining life areas of the ASI. This is contrary to the findings of Abram (1989) and Teplin et al. (1993). As they themselves observe, however, their operationalization of the predictor variables using the NIMH-DIS may account for this lack of prediction. The current study also suggests a limited predictive value of DIS classifications. The ASI differentiates between several types of drug use, and it is striking that especially the use of cocaine, and not so much the use of alcohol, seems to influence the prediction of violent crime (see Table 3). A tentative explanation is that cocaine has a powerful energizing effect, whereas opioids, such as heroin, and alcohol have a sedative effect. Cocaine has been found to lead to psychiatric problems because of its aggression-enhancing effects. A study by Inciardi (1993) shows that in the USA the increase in the number of cocaine users is associated with an increase in the number of violent crimes. The use of cocaine and alcohol do not appear to correlate significantly among themselves, but the present results should nevertheless be interpreted with caution because of other possible intercorrelations between the predictor variables.

The present study nevertheless has some restrictions. The data were obtained using both self-report and official judicial registers. The reliability of the data from the judicial registers is questionable in part because the confirmation percentages are so small. The consequence of such an approach is that the results of this study only concern those participants who committed a violent crime and were caught. Nevertheless, Kommer (1987) concludes that judicial registers are the best sources with regard to criminality. A major problem for prediction studies in violent crime research is the low base rate, which is the incidence of the criterion in the population of interest (Steadman, 1987). In this study, 18% of the respondents were found to re-offend during a two-year follow-up. This means that the violent criminality in this study can be predicted rather precisely. The generalizability of the present findings to other violent populations, however, may be quite limited because of the severe, drug-related problems of the participants.

The results of this study are promising. Steadman et al. (1993), for example, emphasized the importance of including variables from different domains (demographic, historical, clinical, social) and correct operationalization of these variables for the prediction of violent offences. The ASI provides information on a number of variables from a number of different domains and appears to make an important contribution to the prediction of repeated violent crime among a population of drug-using prison detainees. In the framework of some earlier American studies, it is interesting to note that the ASI can also be adjusted to show the use of alcohol and drugs either during or immediately prior to an offence being committed. That is, use of the ASI in penitentiaries offers clear possibilities for more careful specification of the drug-violence relationship, the referral of drug-using detainees, and treatment (Amoureus et al., 1994).

A follow-up study using the ASI is important. The present results should be replicated with a comparable but larger population of drug-using detainees, and use of the ASI to predict violent crime among other populations certainly seems to be relevant. For example, the application of the ASI with forensic patients, who are mainly detainees for violent offences, seems to be important. At this moment there is much attention focused on the addiction issue with forensic patients in The Netherlands. Approximately 50-60% of the patients in forensic psychiatric clinics, for example, used alcohol and/or drugs prior to admission. A substantial number of those patients with severe drug problems are also known to have been under the influence of alcohol and/or drugs at the time of the violent crime. In order to estimate the risk of violent crimes and violent recidivism and to determine treatment, insight into the role of drug use in the crime scenario is very much needed. The primary aim in the treatment of forensic patients is to prevent these patients from committing yet another violent crime after discharge from the forensic clinic. Further study of the relationship between violent crime/recidivism and alcohol and particular types of drug use (cocaine, heroin, cannabis) is thus important, and the ASI can play an important role in the assessment of this information.

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