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What the MacAndrew Alcoholism Scale-R
Measures in a Sample of Criminal Offenders
With a High Base Rate of Substance Abuse

Trudy L. Reed
Carleton University
Department of Psychology

Submitted in partial fulfilment of the requirements
for the degree of Master of Arts in Psychology

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What the MacAndrew Alcoholism Scale-R
Measures in a Sample of Criminal Offenders
With a High Base Rate of Substance Abuse

submitted by Trudy L. Reed, Hon. B.A.
in partial fulfilment of the requirements for
the degree of Master of Arts

Chair

Department

Thesis Supervisor

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Abstract

The MacAndrew Alcoholism Scale-R (MAC-R) was used to measure tendencies towards substance abuse in a large sample of incarcerated adult male offenders with a high base rate of substance abuse at a correctional treatment facility. The results indicated that polyabusers (i.e., individuals abusing both alcohol and drugs) scored significantly higher on the MAC-R scale than did non-abusers, alcohol abusers, or drug abusers. In turn, alcohol abusers and drug abusers scored significantly higher than non-abusers.

In addition, MAC-R scores were found to vary as a function of severity of abuse, with subjects who exhibited more severe deleterious effects of substance abuse obtaining significantly higher scores. However, contrary to previous suggestions, the MAC-R was not found to be invulnerable to dissimulation or faking under standard test administration conditions.

In this sample of criminal offenders, higher MAC-R scores were found to be associated with impulsivity, negative or oppositional attitudes toward authority, low frustration tolerance, poor modulation of anger or

hostility, and generally more pro-criminal attitudes (especially identification with criminal others). Higher MAC scores were also correlated with the a juvenile arrest history, prior institutional misconducts, prior breaches of probation and parole, and association with other criminals in the community. There was a low negative correlation between MAC-R scores and education, but not with age.

Finally, a preliminary investigation of the new MMPI-2 Addiction Potential Scale (APS) suggested little or no practical advantage of the APS over the MAC-R in detecting "addiction proneness" in this sample.

The present results must be interpreted cautiously because statistically significant differences were actually of little meaningful or practical significance due to the large sample size.

*Dedicated to my parents,
for their continual support,
understanding, and love.*

*With special thanks to Tom Casar,
Gisèle Reed, Traven D. Reed,
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and Dr. Robert Saltstone*

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Chapter 1

Introduction

Development of the MacAndrew Alcoholism Scale

Over the years, several attempts have been made to derive specific scales to detect alcoholism from the items of the Minnesota Multiphasic Personality Inventory (MMPI), mostly with limited success (for a review, see Otto, Lang, Megargee, & Rosenblatt, 1988). Among these were the Hampton Alcoholism Scale (Al: Hampton, 1953); the Holmes Alcoholism Scale (Am: Holmes, 1953); and the Alcoholic Differentiation Scale (Ah: Hoyt & Sedlacek, 1958). All three were devised to discriminate between diagnosed alcoholics and normal control subjects.

MacAndrew and Geertsma (1964) investigated the validity of these three scales (Al, Am, and Ah) using 300 males who voluntarily applied to a state alcoholism clinic and 300 male nonalcoholic psychiatric outpatients at a state psychiatric clinic. The point biserial correlations between the two patient groups and the three scales were a modest .22, .34, and .33 for the Al, Am, and Ah scales respectively, and these values declined even further with the omission of two

items common to all the scales which directly enquired into alcohol use. The failure of all three scales to discriminate between alcoholics and nonalcoholic psychiatric patients suggested to MacAndrew and Geertsma that the scales were primarily indices of general maladjustment rather than alcoholism.

With this in mind, MacAndrew (1965) developed the MacAndrew Alcoholism Scale (MAC) to differentiate male alcoholics from male nonalcoholic psychiatric outpatients, and thereby to identify alcohol abuse independent of general psychopathology. By comparing the MMPI responses of 300 male nonalcoholic psychiatric outpatients to those of 300 male alcoholic outpatients, the 51 items that best discriminated between the two groups were selected to form a scale. Two of these items were later dropped because of high face validity and vulnerability to dissimulation, i.e., they enquired directly into the subjects' drinking behaviour.

In 1989, the MMPI was significantly revised (MMPI-2) and the original MAC scale was replaced by the MAC-R scale. Four of the original MAC items were among those items eliminated from the MMPI-2 because of

"objectionable content". However, since the MAC scale is typically interpreted in terms of raw scores, the decision was made to maintain a 49-item scale in the MMPI-2. Thus, the four objectionable items were replaced with four new items which were found to differentiate alcoholic from nonalcoholic males (Graham, 1990).

Alcohol versus drug abusers. In developing his alcoholism scale, MacAndrew (1965) wanted specifically to discriminate between alcoholics and other maladjusted personalities. He therefore excluded all subjects with any history of drug use, to ensure that his sample was a "pure" alcoholic group (MacAndrew, 1981). However, no significant differences have been found between the MAC scores of alcoholics and drug abusers in several subsequent studies (e.g., Craig, 1984; Kranitz, 1972; Lachar, Berman, Grisell, & Schooff, 1976). This suggests either that alcoholics and drug abusers share similar personality characteristics or that the MAC is incapable of differentiating between these two groups.

Although MMPI scales are generally interpreted in terms of T-score elevations, MacAndrew (1965) suggested using raw scores with a cut-off score of 24 for the MAC scale (this may have reflected a conceptualization of "alcoholism" as a discrete category rather than a continuum, although the specific reasons for the suggestion are unclear; in any case, MacAndrew's suggestion has become common practice in clinical use of the scale). Classifying patients with scores of 24 or higher as "alcoholics" and patients with scores of less than 24 as "nonalcoholics" resulted in 81.8% of patients being correctly classified, with 8.8% false negatives and 9.5% false positives (MacAndrew, 1965). However, more recently there seems to be a general consensus, at least among practising clinicians, that this cut-off is too low and that a more appropriate cut-off would be 28. Alternatively, some clinicians (e.g., Butcher, 1990; Graham, 1987, 1990) have suggested a kind of "sliding" cut-off: For the original MAC scale, Graham (1987) indicates that scores below 24 "strongly contraindicate a substance abuse problem" (p. 171), while scores of 24-27 are "somewhat

suggestive" of substance abuse and scores of 28 or more are "strongly suggestive" of substance abuse problems. For the MAC-R, two slightly different "sliding cut-off" schemes have been suggested. Graham (1990) proposed three ranges, with scores less than 24 indicating low risk, scores of 24-27 indicating moderate risk, and scores of 28 or greater indicating high risk. Butcher (1990), on the other hand, proposed 4 ranges: less than 26 indicating low risk, 26 to 28 indicating moderate risk, 29-31 indicating high risk, and 32 or greater indicating very high risk.

The MAC has been used in a variety of non-psychiatric settings for the purposes of discriminating abusers from non-abusers among prison inmates (Zager & Megargee, 1981), tavern patrons (Ciancio, Saltstone, & Fraboni, 1990), and high school students (Wolfson & Erbaugh, 1984), and others. It should be noted, however, that MacAndrew (1981) himself has argued that the MAC was not intended to serve as a general alcoholism scale in this sense and that such use may be invalid. One of the practices targeted for criticism is the use of the scale with groups having base rates of alcoholism which differ significantly from that of the

standardization sample, i.e., 50% (Gottesman & Prescott, 1989; Preng & Clopton, 1986). In order for a psychometric instrument to be effective, it must make possible a greater number of correct decisions than could be made with the base rates of the condition alone (Meehl & Rosen, 1955). Gripshover and Dacey (1994) reported that in a clinic with a high base rate of substance abuse, the MAC scale was of little practical value in identifying substance abusers. Table 1 summarizes the published studies on the MAC scale for a variety of different subject groups. As can be seen in the table, the majority of these studies report significant differences between alcoholic and control groups, even though the alcoholics were examined in such diverse settings as outpatient clinics, state hospitals, inpatient treatment centres, taverns, and domiciliaries. On the other hand, the studies summarized in Table 1 also reveal some evidence to suggest that the MAC is not a specific measure of risk for alcoholism per se. Numerous studies (e.g., Burke & Marcus, 1977; Kranitz, 1972; Lachar et al., 1976;

Table 1
Summary of previous research with the MAC/MAC-R.

Investigators	Groups	Basic findings
Whisler & Cantor (1966)	Alcoholic: 73 male residents in VA domiciliary. Control: 67 males randomly assembled from same domiciliary.	Alcoholics scored significantly higher than controls.
Rhodes (1969)	Alcoholic: 200 male outpatients at an alcoholic clinic. Psychiatric: 200 male university outpatients at a psychiatric clinic.	Alcoholics scored significantly higher than nonalcoholics.
Rich & Davis (1969)	Alcoholics vs. psychiatric patients vs. normals, each group with 60 males and 60 females from a state hospital	Both alcoholic groups scored significantly higher than psychiatric patients and normals.
Uecker (1970)	Alcoholic: 111 male veterans admitted to a treatment unit. Nonalcoholic: 56 male veterans admitted to the psychiatric unit at the same hospital.	Alcoholics scored significantly higher than nonalcoholics.
Kranitz (1972)	Alcoholic: 200 male outpatients. Nonalcoholic: 200 male psychiatric outpatients [both from MacAndrew's (1965) study]. Heroin addicts: 100 males in an institutional treatment center. Alcoholic: 50 males from VA hospital. Nonalcoholic: 50 male psychiatric patients from VA hospital.	No significant differences between MacAndrew's alcoholics and VA alcoholics, MacAndrew's alcoholics and heroin addicts, heroin addicts and VA alcoholics. Significant differences between VA alcoholics and VA nonalcoholics, heroin addicts and VA nonalcoholics, and VA non-alcoholics and MacAndrew's nonalcoholics.
De Groot & Adamson (1973)	Alcoholic: 64 male inpatients in a treatment program. Nonalcoholic: 98 male psychiatric inpatients in the same hospital.	Inpatient alcoholics scored significantly higher than inpatient nonalcoholics.
Hoffmann et al. (1974)	Clinical records from a treatment facility and state hospital scanned to identify male alcoholics who might have attended a university where administering the MMPI to entering freshmen was part of the admission procedure. Alcoholic: 25 male students who later became alcoholics. Controls: 148 classmates of the alcoholics.	Significant differences between prealcoholics and controls. No significant differences between alcoholics at time of college and at time of treatment.
Apfeldorf & Hunley (1975)	Alcoholic: 31 males with records of offenses indicating problem drinking. Nonalcoholic: 94 males with records of offenses indicating problem drinking. Controls: 118 nonalcoholics with no records of offenses.	Alcoholics and offenders scored significantly higher on MAC than the controls but did not differ significantly from each other.

Table 1 (cont.)

Lechar et al. (1976)	<p>Alcoholic: 65 inpatients who volunteered for a treatment program.</p> <p>Heroin addicts: 17 outpatient addicts before their voluntary admission to a methadone maintenance program.</p> <p>Heroin addicts: 31 patients either addicted to heroin or receiving methadone maintenance</p> <p>Polydrug abusers: 52 inpatients volunteering for a multiple-drug dependence treatment program.</p> <p>Control: 165 psychiatric patients divided into 3 groups matched to each group of addicts, 64 (39%) with a documented history of some form of substance abuse.</p>	Each group of self-identified substance abusers obtained higher MAC scores than did matched controls without a history of drug abuse. Both alcoholics and polydrug abusers scored higher than did matched controls with a history of substance abuse. Controls with a history of drug abuse scored higher than did controls without a history. No significant differences among the 3 groups of addicts.
Atsides et al. (1977)	<p>Alcoholic: 70 inpatients.</p> <p>Neurotic: 70 inpatients.</p>	Classification rate lower than that reported by MacAndrew (1965)
Rhodes & Chang (1978)	<p>Alcoholic: 75 male inpatients from a VA treatment unit.</p> <p>Neurotic: 50 male VA inpatients.</p> <p>Heroin addict: 30 male addicts from a VA drug treatment ward.</p>	The MAC was shown to better differentiate between alcoholics, neurotics, and heroin abusers than the Institutionalized Chronic Alcohol Scale (ICAS).
Burke & Marcus (1977)	<p>Alcoholics: 73 males.</p> <p>Alcohol & drug abusers: 33 males.</p> <p>Alcoholic-schizophrenic: 24 males.</p> <p>Alcoholic, alcohol & drug abuser, & schizophrenic: 130 males.</p> <p>Drug abusers: 13 males.</p> <p>Drug abusers-schizophrenic: 7 males</p> <p>Alcohol & drug abuser & schizophrenic: 53 males.</p> <p>Schizophrenic: 27 males.</p> <p>Neither alcoholic, drug abuser, nor schizophrenic: 45 males.</p>	MAC scale did not differentiate patients with a history of drug abuse from patients with a history of alcoholism.
Friedrich & Loftsgard (1978)	Problem drinkers: 86 males & 14 women who attended a 4-session alcoholism education course.	The MAC most useful in identifying subjects in the more advanced stages of alcoholism.
Navarro (1979)	<p>Alcoholic: 20 female AA members.</p> <p>Nonalcoholic: 20 female psychiatric inpatients.</p> <p>Control: 20 females with no diagnosis of alcoholism or psychiatric illness</p>	There were no significant differences among any of the groups.

Table 1 (cont.)

Schwartz & Graham (1979)	<p>Alcoholic: 64 inpatients (44 males, 20 females).</p> <p>Antisocial psychiatric: 130 inpatients (57 males, 73 females)</p> <p>General psychiatric: 195 inpatients (80 males, 135 females).</p>	The female alcoholic group obtained significantly higher MAC scores than the female antisocial psychiatric and the female general psychiatric group, but the latter two did not differ from each other.
Sutker et al. (1979)	<p>Alcoholic: 175 males voluntarily admitted to alcohol treatment.</p> <p>Heroin addict: 125 males voluntarily admitted to drug treatment.</p>	Alcoholics scored significantly higher on MAC than heroin addicts.
Holmes et al. (1982)	<p>Alcoholic: 120 male VA inpatients in a treatment program (60 court-ordered, 60 committed voluntarily).</p> <p>Psychiatric: 60 male inpatients with no diagnosis of alcoholism.</p>	The MAC was compared with other special alcohol scales of the MMPI in being able to differentiate between alcoholics and psychiatric patients all with questionable ability.
Cra. (1984)	<p>Opiate & polydrug abuser: 155 males voluntarily admitted for treatment.</p> <p>93 of these had a concurrent problem with alcohol (of the 93 patients, 21 patients met the DSM-III criteria for alcohol dependence and 72 patients met the DSM-III criteria for alcohol abuse), while 49 had no alcohol problems, and 13 had an undetermined alcohol status.</p>	Addicts with an alcohol problem obtained significantly higher MAC scores than addicts without a current alcohol diagnosis. Patients that abused heroin, methadone, codeine or talwin scored significantly higher on the MAC than those abusing psychoactive drugs.
Wolfson & Erbaugh (1984)	<p>High school students: 76 females, 59 males.</p> <p>Psychiatric inpatient: 43 females, 47 males (no history of substance abuse).</p> <p>Psychiatric outpatient: 43 females, 38 males (no history of substance abuse).</p> <p>Drug abusers: 50 females, 50 males at a drug treatment centre.</p>	MAC scores of adolescent female substance abusers significantly higher than peers in high school sample or those with behavior and psychiatric disorders. MAC scores of adolescent male substance abusers were significantly higher than peers in a high school sample, but did not differ from males with behavior and psychiatric disorders.
Davis et al. (1987)	<p>Alcoholic only: 525 male, 211 female inpatients</p> <p>Drug abuse only: 71 male, 70 female inpatients</p> <p>Alcohol & Drugs: 143 male, 57 female inpatients</p> <p>Selected medical outpatients: 2853 males, 4237 females (physician suspected psychological or emotional problems).</p> <p>Unselected medical outpatients: 2500 males, 2500 females (from part of another research protocol).</p> <p>Contemporary normals: 646 males, 762 females (part of a normative sample).</p> <p>Psychiatric inpatients: 92 males, 122 females.</p>	When samples of males and females were broken down into four age groups, the MAC correctly identified 90% of male alcoholics in the 18 to 24 year age group but only 41% of female alcoholics in the same age group. In the remaining samples, the predicted rate of alcoholism, using the MAC, was approximately 1.5 to 4 times the estimated lifetime prevalence rate.

Table 1 (cont.)

Jaffe & Archer (1987)	University undergraduate: 125 females, 61 males from a psychology department.	MAC more sensitive indicator of alcohol abuse among females than male respondents
Ciancio et al. (1980)	Voluntary patrons of tavern: 38 females, 80 males (subjects were divided into alcoholics and nonalcoholics based on scores from a self-rated drinking scale).	Only 14% of the variance in the MAC was accounted for by the self-rating scale Alcohol Use Questionnaire.
Wolf et al. (1990)	<p>Psychiatric inpatients: 129 females, 78 males.</p> <p>Antisocial Personality Disorder (APD): 3 males, 4 females</p> <p>APD + Alcohol and Drug Dependence: 9 males, 5 females.</p> <p>Alcohol and Drug Dependence: 5 males, 4 females.</p> <p>Drug Dependence: 4 males, 10 females.</p> <p>APD + Drug Dependence: 5 males, 3 females.</p> <p>APD + Alcoholism: 4 males, 1 female</p> <p>No Research Diagnosis: 5 males, 18 females (not meeting criteria for research diagnoses)</p> <p>Other Research Diagnosis: 14 males, 46 females with no APD or alcohol or drug dependence</p> <p>Alcoholic: 5 males, 11 females.</p>	MAC scores of males significantly higher than females. Subjects with APD only (no alcohol/drug dependence) scored significantly higher than subjects with APD + Alcoholism, No Research Diagnosis, Other Research Diagnosis, or Alcoholism without APD. Subjects with APD + alcoholism + drug dependence scored significantly higher than subjects with Other research Diagnosis or those with Alcoholism without APD.
Apfeldorf & Hunley (1994)	<p>Alcoholic: 48 males.</p> <p>Alcoholic and other psychiatric diagnoses: 27 males.</p> <p>Psychiatric diagnoses only: 24 males.</p> <p>Medical diagnoses only: 22 males</p> <p>(all domiciliary residents).</p>	Alcoholics scored significantly higher than subjects with psychiatric diagnoses only but alcoholics with psychiatric diagnoses did differ from either psychiatric diagnoses only or subjects with medical diagnoses

Rhodes & Chang, 1978; Wolfson & Erbaugh, 1984) have observed that the MAC does not differentiate between alcoholics and drug abusers, which implies that the MAC may be more a general measure of addiction proneness or potential.

Factors affecting MacAndrew scores

Criminality. High MAC scores have been observed not only in addiction-prone individuals but also among individuals with a general antisocial orientation (Finney, Smith, Skeeters, & Auvenshine, 1971). Several studies (Hightower, 1984; Ruff, Ayers, & Templar, 1975; Schwartz & Graham, 1979; Wolf, Schubert, Patterson, Grande, & Pendleton, 1990; Zager & Megargee, 1981) have reported that the MAC scale failed to discriminate between groups of alcoholics, antisocial individuals (antisocial or aggressive behaviour as primary or secondary behavioral reason for hospitalization), and psychiatric patients. However, in general, criminal offenders tend to score significantly higher on the MAC than non-offenders. Among non-offenders, alcohol abusers obtained higher MAC scores than non-abusers; in contrast, among offenders, the MAC scores of alcohol

abusers and non-abusers did not differ significantly (Hightower, 1984; Levenson, Aldwin, Butcher, De Labry, Workman-Daniels, & Bosse, 1990). Ruff et al. (1975) interpreted this result as evidence that MAC scores are influenced by an antisocial personality. But in contrast, Schwartz and Graham (1979) concluded that the MAC scale did not indicate a general dimension of antisociality, since in their study the mean MAC scores of female antisocial psychiatric and general psychiatric patients did not differ significantly, nor did the mean MAC scores of male alcoholic, antisocial psychiatric, and general psychiatric patients differ significantly from one another.

O'Neil, Giacinto, Waid, Roitzsch, Miller, & Kilpatrick, (1983) found that higher MAC scores were associated with a greater likelihood of past drinking-related arrests, convictions, jail terms, and fines, and specifically with convictions for driving under the influence. Knowles and Schroeder (1989) reported that MAC scores of university students were related to a variety of antisocial behaviours, including theft, property destruction, violence, and impaired driving

arrests. As well, the MAC was found to correlate significantly with other non-alcohol-related behaviours, i.e., behaviours that may be classified as sensation-seeking or "thrill-seeking" (see below, pp. 23 et ss.).

It would be of interest therefore to more systematically investigate the specific backgrounds (both criminal and personal) of individuals obtaining high MAC scores. In addition, in view of the earlier suggestions that the MAC may be strongly influenced by antisocial traits or characteristics, it is important to determine if the MAC is capable of differentiating between substance abusers and non-abusers in offender populations.

Vulnerability to dissimulation. It has been claimed that the MAC scale, because it does not enquire about alcohol or drug use per se and thus has low face validity, is resistant to dissimulation. For example, Caldwell (1988) asserts (apparently on the basis of "clinical experience" rather than empirical data) that the MAC scale is not affected by high or low scores on the L, F, or K scales, and he concludes therefore that the MAC is for all intents and purposes invulnerable to

"faking". This is perhaps of particular importance for correctional or forensic use of the MMPI, where subjects may often perceive strong incentives to appear as "normal" or problem-free as possible and to present themselves as having no treatment needs (which may be considered both in the determination of sentencing and in evaluations for early release via "temporary absence programs", halfway houses, or parole).

In a rare experimental examination of this question, Otto et al. (1988) looked at the ability of the MMPI to detect positive dissimulation (intentional concealment of problems) of alcoholism. Male inpatients and a control group at a Veteran's Administration hospital completed the MMPI twice. For the first administration, subjects received standard instructions, while for the second administration, subjects were directed to hide any problems or shortcomings. The authors do not report specific MAC cores for the standard versus dissimulation conditions, other than noting that the scores did change and that, using a cut-off of 24, 18 of 39 dissimulating alcoholics scored in the normal range on the MAC.

Nonetheless, Otto et al. (1988) note that only 10 subjects were able to dissimulate without substantially affecting MMPI invalidity indices, and of these only 3 were incorrectly classified by the MAC. However, while these findings are interesting, since they were obtained in the context of explicit instructions to fake, they do not directly speak to the question of the susceptibility of the MAC or MAC-R to dissimulation under standard testing conditions.

Severity of abuse. Moore (1984) examined the MAC scores among young males (16 to 20) referred for pre-sentence investigations after conviction for a misdemeanour offense. Offenders were classified according to their typical pattern of alcohol intoxication during the previous 12 months: rarely, occasionally, weekly, or biweekly. The "biweekly" and "weekly" groups had the highest MAC scores followed by the "occasionally" group and then the "rarely" group. Similar results were found by Levenson et al. (1990) in middle-aged and older men (age 42 to 89) participating in a study of normative aging. It would appear, then, that MAC scores are related to frequency of alcohol use/abuse and/or amount consumed.

Apfeldorf and Huntley (1981) investigated whether the difference in MAC scores of alcoholics and nonalcoholic psychiatric patients reflect a difference in diagnosis (alcoholism versus other psychiatric diagnoses) and/or a difference in actual drinking behaviour. They selected three groups of domiciliary residents -- alcoholics, psychiatric patients, and "normal" individuals having no diagnosis of alcoholism or other psychiatric illness -- and identified "excessive" and "nonexcessive" drinkers within each group. A patient's drinking status was based on records of disciplinary offenses classified by the assistant director of the domiciliary as to whether there was any evidence of alcohol use or abuse associated with the misbehaviour. It was concluded that MAC scores were influenced more by diagnosis than by alcohol consumption. The alcoholic groups scored highest, the normal groups were intermediate, and the psychiatric groups had the lowest MAC scores regardless of actual drinking pattern. Each group was significantly different from the other two groups. There were no significant differences in MAC scores

between excessive and nonexcessive drinkers classified without regard to psychiatric diagnosis.

However, this finding seems to contradict the results of an earlier study by the same authors (Apfeldorf & Huntley, 1975), where it was reported that the MAC was unable to discriminate alcoholic patients from nonalcoholic patients who also were heavy drinkers but not diagnosed as alcoholic. The contradiction is difficult to interpret, but Preng and Clopton (1986) suggest that the earlier study failed to provide sufficient diagnostic information about heavy drinkers (i.e., whether the nonalcoholic, heavy-drinkers had psychiatric or medical diagnoses). In the later study, the fact that the subjects were excessive or nonexcessive drinkers did not in itself influence the MAC scores of the two groups (alcoholics - 30.32 and 30.80, respectively; psychiatric patients - 24.00 and 23.94, respectively). However, the mean MAC scores of excessive drinkers among the "normal" individuals were nearly as high as the scores of the alcoholic groups. Thus, the results of the Apfeldorf and Huntley (1981) study may suggest that the MAC can detect certain types

of heavy drinkers but fails to detect other types of heavy drinkers, e.g., those who have psychiatric diagnoses (Preng & Clopton, 1986). On the other hand, one must be cautious in accepting this interpretation in view of the questionable distinction between the two types of alcoholics -- i.e., those who were "excessive drinkers" and those who were not "excessive drinkers". Some clinicians and researchers make little or no distinction between heavy drinking and alcoholism, while others (e.g., Rosenberg, 1972) have emphasized that the quantity of alcohol consumed does not in itself indicate whether or not an individual is an alcoholic. The same argument could be applied to drugs, i.e., that even fairly frequent drug use may not necessarily constitute drug abuse or drug addiction. Following Rosenberg (1972), it would therefore be of interest to derive a measure of severity of substance use/abuse and determine whether there are differences in MAC scores of individuals with varying levels of severity where the severity measure would be defined by criteria other than simple consumption.

Age. In general, previous research has suggested that MAC scores are not significantly affected by age

(Craig, 1984; Graham, 1987; Levenson et al., 1990; MacAndrew, 1981; Uecker, Boutilier, & Richardson, 1980; Wisniewski, Glenwick, & Graham, 1985). However, Friedrich and Loftsgard (1978) reported that older subjects scored significantly higher than younger subjects on the MAC scale among 100 people (including 14 women) who attended a 4-session alcoholism treatment program. Similarly, Apfeldorf and Huntley (1975) reported that, for their group of alcoholics, age was significantly correlated with MAC scores ($r = -.61$). They suggested that the negative correlation between age and the MAC scale implies that certain personality traits (such as hand shaking and sweating easily) and symptoms of "alcoholics" (lively social presence suggested by items related to a being a good crowd mixer or talking readily to strangers) may diminish with advancing age. This would follow from Jellinek's (1946) finding that alcoholism tends to be less of a problem among the aged since drinking tends to decline after the age of 45. However, in a subsequent study, Apfeldorf and Huntley (1981) found no significant correlation between age and MAC scores.

Education. There is limited published data regarding the relationship between education and the MAC scale. Friedrich and Loftsgard (1978) reported a moderate but significant negative correlation ($r = -.24$) between MAC scores and educational level. However, Preng and Clopton (1986) found no significant correlation between MAC scores and educational level in a sample of alcoholics and psychiatric patients at a Veteran's Administration hospital.

Family history of substance abuse. Subjects with a family history of alcohol abuse tend to score significantly higher on the MAC than subjects with no family history of alcoholism (Patton, Barnes, & Murray, 1994; Saunders & Schuckit, 1981). Consistent with this finding, Knowles and Schroeder (1989) reported that MAC scores in male university students were positively correlated with a history of parental alcohol abuse, although the correlation was quite modest ($r = .10$). Subjects who had a family history of alcoholism missed school more often because of drinking, binged (two days or more) more frequently, were more likely to experience blackouts, and had trouble with school administration more often than subjects with no family

history of alcohol abuse. However, Sher and McCrady (1984) were unable to find any evidence to support the hypothesis that MAC scores were related to family drinking history.

What does the MacAndrew Scale measure?

Since the items comprising the MAC scale do not directly refer to alcohol or drug use, and yet the scale as a whole does seem to differentiate substance abusers from non-abusers, it may be presumed that the scale reflects personality traits or characteristics associated in some way with or reflecting a vulnerability to or a potential for substance abuse. Finney et al. (1971) reported that high scorers on the MAC are bold, self-confident, and sociable but rebellious. The authors also noted that some high MAC subjects seem to be drawn to religion using repression, faith, and inspiration to keep their delinquent impulses in check.

Both Schwartz and Graham (1979) and Svanum and Hoffman (1982) reported that the major content dimensions of the MAC scale are cognitive impairment, school maladjustment, interpersonal competence, and

risk-taking. Schwartz and Graham (1979) also identified extroversion, exhibitionism, and moral indignation as factors, while Svanum and Hoffman (1982) identified two additional factors of fundamental rebellious orientation and blackouts/memory lapses. Schwartz and Graham (1979) found that high MAC scorers were impulsive, had high energy levels, and had a higher than normal level of general psychological maladjustment.

Burke (1983) identified five orthogonal factors for items comprising the MAC scale. The first two of these factors, which were bipolar, correspond to the two main factors generally found in factor analyses of the full MMPI inventory: general psychological health vs. general anxious maladjustment, and over-control vs. under-control or impulsivity. The third and fourth factors were also both bipolar: The third factor loaded negatively on indices of psychosis, while the fourth factor reflected a dimension of alienation. Finally, the fifth factor was associated with overcontrolled hostility. Burke (1983) also reported that MAC scores were positively correlated with

measures of impulsivity, pressure for action, and acting-out potential, and negatively correlated with measures of control.

Stability of MacAndrew scores. Simple test-retest coefficients for the MAC have been reported as $r = .82$ for males and $r = .75$ for females over a six-week period (Graham, 1987). For the MAC-R, Graham (1990) reports test-retest coefficients of .62 for males and .78 for females over a one-week test-retest interval. Beyond this, as previously noted, several studies have suggested that the MAC is a measure of personality traits related to potential for substance abuse, and not merely a reflection of either the short- or long-term consequences of substance abuse itself. For example, MAC scores have been shown to predict future alcohol problems, even in the absence of current abuse. Hoffmann, Loper, & Kammeier (1974) examined the MAC scores of males in an alcohol treatment program who had completed the MMPI 13 years earlier while entering their freshman year. At the time of initial testing, these subjects showed no symptoms of alcoholism. However, their initial MAC scores did not differ significantly from their MAC scores 13 years later, at

the time they began treatment. On the other hand, there were significant differences between the scores of the pre-alcoholics and those of their classmate controls. This suggests that the MAC is measuring certain characterological traits associated with a high risk for alcoholism even several years prior to the emergence of actual symptoms of addiction.

As well, if MAC scores were directly affected by long-term abuse of alcohol, there should be a strong correlation between MAC scores and duration of alcohol abuse. No such relationship was found by Uecker et al. (1980) who reported a near-zero correlation between MAC scores and number of years of abuse ($r = .002$). Similarly, several studies have indicated that the MAC scale is not simply a measure of the short-term effects of alcohol abuse, since there are typically no significant differences between pre- and post-treatment MAC scores (Huber & Danahy, 1975; Rohan, 1972; Rohan, Tatro, & Rotman, 1969). Thus, MAC scores of alcoholics are stable over a period of (presumably) enforced abstinence. Since the absence of pre-post differences in MAC scores has been reported for several types of

treatment programs, including pharmacotherapies, aversion therapy, and individual or group psychotherapy, it is evident that the MAC scores are impervious to the effects of a broad range of short-term treatment interventions (MacAndrew, 1981).

It is worth noting that Mundt (1992) compared the original and revised versions of the MAC from the MMPI and MMPI-2 using the MMPI-AX (an early experimental version of the MMPI containing all of the items from both inventories) which allows protocols to be scored for either the MMPI or the MMPI-2. He reported that overall MAC-R scores were significantly lower than MAC scores, suggesting that cut-off scores derived for the MAC might require some modification or re-evaluation for the MAC-R.

Correlation with other MMPI scales. The MAC scores of alcoholic and nonalcoholic psychiatric patients have been shown to be correlated with scores on several MMPI validity and clinical scales, as well as some supplemental scales (Schwartz & Graham, 1979). These results should be interpreted carefully because of the overlap of items on the MAC scale and the other scales. However, significant positive correlations

were reported between the MAC scale and F ($\underline{r} = .30$, 5 shared items) and Ma ($\underline{r} = .55$, 5 items shared). The MAC was also correlated with Wiggins' Authority Conflict ($\underline{r} = .61$), Family Problems ($\underline{r} = .28$), Manifest Hostility ($\underline{r} = .53$), Hypomania ($\underline{r} = .57$), and Psychoticism ($\underline{r} = .43$) content scales. Finally, MAC scores were correlated with scores on the Harris-Lingoes' Authority Problems ($\underline{r} = .37$, 3 of 8 items shared with the MAC-R), Social Alienation ($\underline{r} = .40$, 3 of 13 items shared), and Self-Alienation ($\underline{r} = .32$, 3 of 12 items shared) content scales (Schwartz & Graham, 1979). O'Neil et al. (1983) also found that high MAC scores were associated with higher scores on the Ma scale, while Pfoest and Kuncze (1984) reported that persons with elevations on F, K, Pd (7 items shared with the MAC-R), and Ma tended to obtain relatively high MAC scores.

Significant negative correlations were reported between the MAC scale and L ($\underline{r} = -.35$, only 1 item shared), K ($\underline{r} = -.42$, no items shared), Hy ($\underline{r} = -.26$, only 1 item shared), and Welsh's R scale ($\underline{r} = -.62$) (Schwartz & Graham, 1979). Similarly, O'Neil et al.

(1983) noted that lower MAC scores were associated with higher scores on L, K, D (no items shared), Si (no items shared), and R.

Schwartz and Graham (1979) concluded that the pattern of intercorrelations of the MAC with other MMPI scales suggests that the MAC is associated with two clusters of personality characteristics and self-descriptions. The first cluster is related to a shallow, impulsively aggressive or hostile interpersonal stance characterized by a high level of energy expenditure: This cluster corresponds to MacAndrew's "primary alcoholic", whose features include rapid and strong emotional arousal and a reward-seeking orientation to the world (MacAndrew, 1981). MacAndrew (1981) reported that approximately 85% of the alcoholics in his studies were high MAC scorers and could be characterized as primary alcoholics. The second personality cluster is related to general psychological maladjustment and problems with thinking and concentration, corresponding to MacAndrew's (1981) label "secondary alcoholics" or alcoholics who score low on the MAC (approximately 15%).

Primary alcoholics begin drinking and become alcoholics earlier in life than do secondary alcoholics (Graham & Strenger, 1988; Tarter, McBride, Buonpane, & Schneider, 1977), and are less able than secondary alcoholics to cite a precipitating cause to account for the onset of their excessive drinking (Tarter et al., 1977). MacAndrew (1981) characterized secondary alcoholics as basically neurotics who abuse alcohol in an attempt to cope with psychological distress such as anxiety or depression. However, there is no reported relationship between MAC scores and magnitude of psychological distress, as measured by the mean MMPI T score for each subject (Allen, Faden, Rawlings, & Miller, 1990; Pfoest & Kuncze, 1984). Moreover, Moore (1984) reported that MAC scale scores were unrelated to pleasure-seeking drinking among alcoholics. Alcoholics with high MAC scores reported drinking to avoid feelings (i.e., to avoid punishment) more often than alcoholics with low scores, and both high-scoring and low-scoring alcoholics were equally likely to report that they drank for pleasure.

A recurring trait in the descriptions of primary alcoholics is one of sensation-seeking (striving to maintain a high level of arousal through engaging in a variety of exciting, risky, stimulating, and/or uninhibited behaviours). However, it is generally concluded that the MAC is not simply a measure of sensation-seeking or generalized antisocial stance (studies generally find a significant correlation between sensation-seeking and Pd scores), largely because there seems to be little relationship between MAC scores and Pd scores (O'Neil et al., 1983; Schwartz & Graham, 1979). Apfeldorf and Huntley (1975) also showed that these two scales share little common variance, observing only a slight correlation between the MAC and Pd scales ($r = .20$). Comparing the original and revised versions of the MAC using the experimental MMPI-AX version, Mundt (1992) reported that both the MAC and MAC-R scales correlated positively with the original MMPI Pd scale and with three MMPI-2 content scales (ASP, ANG, and CYN) but neither correlated significantly with the MMPI-2 revision of the Pd scale.

On the other hand, Baker, Boer, and Beer (1991) reported that the MAC-R was correlated ($r = .57$) with a sensation-seeking scale, interpreting this as suggesting that a tendency toward alcoholism or substance abuse may be associated with seeking more stimulation from the environment. Similarly, Patton et al. (1994) reported that high MAC scorers were more extroverted, sought stimulation to increase their level of arousal, and tended to be generally more impulsive. In comparing MAC scores with independent clinical ratings for Air Force psychiatric patients, Lachar et al. (1976) found that, in addition to excessive alcohol use, those who scored high on the MAC scale more often displayed assaultive and immature behaviour, and had histories of financial and marital problems. As well, male veterans with higher MAC scores more often reported alcohol-related job disruptions; previous use of marijuana, hallucinogens, and barbiturates; drinking in bars; and drinking liquor straight than did veterans with lower MAC scores (Friedrich & Loftsgard, 1978; O'Neil et al., 1983). High scores on the MAC were associated with a greater number of symptoms of

alcoholism and alcohol-related problems, and high MAC scorers consumed greater amounts of beer and liquor on a more frequent basis than did low MAC scorers (Knowles & Schroeder, 1989). Finally, in a sample of nonalcoholic males, Sher and Levenson (1982) found that subjects considered to be at a heightened risk for alcoholism based on their MAC scores showed greater reduction in cardiovascular and affective responses to stress when they consumed alcohol than did low-risk control subjects. The authors suggested that these high MAC individuals may find alcohol consumption more reinforcing because they obtain a greater degree of the stress-response dampening effects of alcohol when they drink.

The present study On the basis of the present review, it seems safe to conclude that the MacAndrew scale is measuring some personality trait or dimension or tendency related in some way to substance abuse. However, it is clear that several claims have been made regarding the clinical use and predictive utility of the scale which are based on inadequate or conflicting experimental evidence. One of the primary purposes of the present study was to examine some of these claims

in a large sample of incarcerated adult male criminal offenders. In particular, in view that the MAC may be strongly influenced by anti-social traits or characteristics, the following questions were addressed:

1. Is the MAC-R capable of differentiating (a) between substance abusers and non-abusers, and (b) among alcoholics, drug abusers, and alcohol-plus-drug abusers in an adult criminal offender population?
2. Is the MAC-R invulnerable to dissimulation or faking when dissimulation is defined by the configuration of the three validity scales following administration under standard testing conditions?
3. Does the MAC-R differentiate levels of severity of abuse as indicated by the number of areas of functioning negatively affected by substance abuse?
4. What personality or behavioral traits or characteristics and/or other aspects of personal

and criminal history are associated with MAC-R scores among criminal offenders?

5. What is the relationship between MAC-R scores and scores on the new MMPI-2 Addiction Potential Scale (APS) in an offender sample?

Chapter 2

Method

Subjects

There were 1141 men, aged 18 to 65 ($M = 30.2$), admitted to the Assessment Unit at the Rideau Treatment Centre (RTC) over a 4 year period (1991 to 1994) who completed the MMPI-2 (demographic information is presented in Table 2). There were 69 cases excluded because of "invalid" MMPI-2 profiles (i.e., $F > T100$), and an additional 40 others were excluded because of some uncertainty about or inability to confirm their substance abuse histories. Thus, the subjects used were 1032 men who completed the MMPI-2 with a valid profile and confirmed substance abuse histories. All subjects were serving sentences of between 3 months and 2 years less a day.

Procedure

The values used for this study were based on archival data collected over a period of three years. Each inmate had completed a social history questionnaire and a structured interview conducted by a correctional Case Management officer, a social worker,

a psychometrist, or a psychologist. These enquired into the inmate's family history, education, psychiatric history, marital status, employment etc., as well as his current and previous criminal history. Subsequently, the responses of each subject were cross-checked against existing file information, including information obtained from collateral sources where available. The subjects also completed the MMPI-2, the Criminal Sentiments Scale (CSS: Andrews & Wormith, 1984), and the Socialization (So) Scale from the California Psychological Inventory (CPI). In cases where the inmates were illiterate, the tests were performed with the aid of a tape recording device. The interviews and psychological tests were part of a standard pre-treatment assessment battery, typically completed in 3-4 sessions over a 3-4 day period.

Measures

MMPI-2 scales. For the MMPI-2, the three validity scales (L, F, and K), the 10 standard clinical scales, and seven supplementary scales -- A, R, Es, Do, APS, AAS and MAC-R -- were scored for each subject. High scores on the A (Anxiety) scale reflect distress, anxiety, discomfort, and general emotional upset. High

scorers tend to be inhibited, overcontrolled, lacking in self-confidence, and easily upset in social situations (Graham, 1987). High scorers on the R (Repression) scale tend to be conventional, cautious or guarded, submissive, and perhaps inflexible, and they strive to avoid unpleasant or disagreeable situations; low scores on this scale suggest an individual who is outgoing, gregarious, spontaneous/impulsive, and perhaps self-indulgent (Graham, 1987). The Es (Ego Strength) scale is a measure of adaptability, resiliency, personal resourcefulness and is also a good indicator of psychological health and stress-coping abilities (Graham, 1987). The Do (Dominance) scale is a measure of a subject's tendencies to be controlling versus passive/underassertive in his or her interpersonal relationships, with low scores suggesting submissiveness or lack of assertiveness (Graham, 1987). High scores on the APS (Addiction Potential Scale) suggest a high probability of significant problems with substance abuse, although like the MAC-R none of the items on this scale contain obvious references to abuse of alcohol or drugs. The AAS (Addiction Acknowledgment

Scale), on the other hand, consists entirely of items relating to substance abuse and is therefore a measure of the subject's willingness or ability to acknowledge and disclose problems with substance abuse (Graham, 1993).

Socialization (So) Scale. The So scale is a 54-item True-False scale from the California Psychological Inventory (CPI). This scale provides a measure of social conformity and indicates the extent to which social values are accepted and internalized (Megargee, 1972). So scores are negatively correlated with MMPI Pd scores and with psychopathy ratings (Hare & Schalling, 1978). Since the scale was derived independently and only later inserted into the CPI, it is suitable for use as a stand-alone test, and was so used in this study.

Pd-So Index. This index is obtained from the arithmetic difference between T-scores on the MMPI-Pd scale and the CPI-So scale, following Heilbrun's (1979) suggestion that combining the two scale scores in this way may provide a more accurate estimate of psychopathic tendencies or antisocial (procriminal) traits than either scale alone.

Criminal Sentiments Scale. The Criminal Sentiments Scale (CSS: Andrews & Wormith, 1984; Andrews, Wormith, & Kiessling, 1985) is a 41-item inventory assessing agreement/disagreement with statements reflecting attitudes towards Law, Courts and Police (LCP); Tolerance of Law Violations (TLV); and Identification with Criminal Others (ICO). The CSS has been validated by Roy and Wormith (1985), among others, and appears to have acceptable internal consistency and construct validity as a general measure of procriminal attitudes and values.

Chapter 3

Results

Subjects had been assigned to substance abuse groups based on their responses to the direct questions of whether they had a previous or present alcohol and/or drug abuse problem. Also, when available, their responses were checked from other existing file information. Therefore, group membership was part of a pre-existing classification system. The four substance abuse groups used were non-abusers, alcohol abusers, drug abusers, and alcohol plus drug abusers (poly-abusers). The following base rates were observed for this sample of adult inmates: Non-abusers comprised 6.7% of the sample ($n = 69$), alcohol abusers comprised 29.3% ($n = 302$), drug abusers comprised 13.9% ($n = 143$), and poly abusers comprised 50.2% ($n = 518$). Overall, therefore, 93.3% of the subjects had some history of substance abuse, which appears to be high in comparison with other correctional facilities. This is very likely due to the fact that two of the major treatment programs offered at Rideau Treatment Centre are designed to address problems with alcohol and/or

drugs, and thus many offenders are specifically classified to Rideau to participate in these programs.

Demographic data for these four substance abuse groups are summarized in Table 2. As can be seen, the alcoholic subjects were significantly older than non-abusers, drug abusers, or poly abusers. However, non-abusers were slightly better educated than the alcoholics or poly abusers. Overall, the present sample consisted mainly of unemployed males receiving social assistance, most of them either separated or divorced. Drug abusers and poly abusers were more likely to have been unemployed at the time of the latest offense(s) than alcoholics or non-abusers. Nearly half of the subjects had been expelled or suspended from school at least once, especially in the case of poly abusers where more than half the group had such a history. Half of the subjects had a family history of alcohol and/or drug abuse, and forty percent had a family history of criminal convictions.

Type of substance abuse

A one-way analysis of variance (ANOVA) was conducted using MAC-R scores as the dependent variable and substance abuse group as the independent variable.

Table 2

Means/percentages (and standard deviations) for the basic demographic variables.

Variable	#Subjects	NA	ALC	DA	PA
Age at testing * (mean) (s.d.)	1032	27.5 10.6	33.5 10.4	28.6 6.8	29.3 7.6
Education * (mean) (s.d.)	1032	10.8 2.2	10.1 1.9	10.3 1.6	9.9 1.8
Ever expelled or * suspended from school (%)	500	6.4	23.8	11.8	58.0
Marital Status *					
Single(%)	248	34.8	20.9	34.3	21.6
Married/Common Law(%)	336	39.1	36.2	23.8	32.0
Separated/Divorced(%)	437	26.1	40.9	42.0	45.6
Widowed(%)	10	0.0	2.0	0.0	0.8
Employment *					
Unemployed(%)	533	38.2	47.5	62.4	68.0
Employed(%)	300	49.1	42.5	36.0	25.7
Student(%)	17	10.9	1.5	0.8	1.3
Retired/Disabled(%)	46	1.8	8.0	0.8	5.0
Receiving social * assistance (%)	776	5.2	26.3	13.1	55.4
Family history of * alcohol/drug abuse (%)	596	3.4	30.4	10.2	56.0
Family history of * criminal convictions (%)	390	5.1	26.9	10.3	57.7

NA - Non-abusers

ALC - Alcoholics

DA - Drug Abusers

PA - Poly Abusers

The ANOVA revealed a significant groups effect, $F(3, 1028) = 26.63$, $p < .001$ (see Figure 1). Post-hoc comparisons using Tukey's procedure revealed that MAC-R scores of poly abusers were significantly higher than those of non-abusers, alcohol abusers, or drug abusers. Alcohol abusers and drug abusers scored significantly higher than non-abusers but did not differ significantly from one another. The effect variance was $\omega^2 = 0.07$, $p < .001$, indicating that little variance in MAC-R scores was being accounted for in the substance abuse groups variable. A multivariate analysis of variance (MANOVA) was conducted using the 3 validity scales, the ten clinical scales, and six of the supplementary scales (A, R, Es, Do, APS and AAS) as the dependent variables and substance abuse group as the independent variable. The MANOVA revealed a significant groups effect, $F(57, 3006) = 6.73$, $p < .001$ (see Figure 2). The univariate tests revealed significant differences among groups for all of the MMPI-2 scales except Hy, Mf, and Es. The effect variance was $\omega^2 = 0.10$, $p < .001$.

Figure 1. Mean MAC-R scores for the four substance abuse groups.

Figure 1
MAC-R Scores for Substance Abuse Groups

Figure 2. MMPI-2 group (mean) profiles for the four
substance abuse groups.

Figure 2
MMPI-2 Profiles for Substance Abuse Groups

Criminality variables

More than half of the total sample had a juvenile criminal record (see Table 3) and nearly 60% of those with a juvenile record were poly abusers.

Interestingly, 76% of subjects had convictions for property offenses while only 63% of subjects had convictions for specific alcohol and/or drug offenses. Drug abusers and poly abusers had more convictions for property offenses than alcoholics or non-abusers, $F(3, 982) = 15.19, p < .001$, while alcohol abusers had more convictions for assault, $F(3, 1006) = 9.08, p < .001$. Overall, substance abusers had more than double as many total convictions as non-abusers, $F(3, 981) = 21.92, p < .001$.

Vulnerability to dissimulation

The MMPI-2 profiles of all subjects were classified into one of 3 types of validity profiles, based on the pattern of L, F, and K scores: A "minimizing" profile (subjects attempting to present themselves in the best possible light by denying or minimizing significant problems) was defined as L and K greater than or equal to T65 and F less than T60. A "disclosing" profile (subjects admitting to problems or

Table 3.

Means (and standard deviations) or percentages for criminal variables.

Variable	#Subjects	NA	ALC	DA	PA
Juvenile arrest record (%)	601	5.3	24.0	12.6	58.1
# Property Offences (mean) (s.d.)	986	3.5 6.7	4.8 9.0	8.9 10.6	8.7 9.8
# Assault Offences (mean) (s.d.)	1010	1.1 1.9	1.7 2.3	0.9 1.6	2.0 2.5
# Alcohol/Drug (mean) Offenses (s.d.)	994	0.3 0.7	3.1 3.0	2.9 5.7	2.7 3.3
Total # Convictions (mean) (s.d.)	985	6.8 7.7	14.6 12.3	17.0 15.0	19.6 14.6

NA - Non-abusers
ALC - Alcoholics
DA - Drug abusers
PA - Poly abusers

* $p < .05$ or better

difficulties, exhibiting some dissatisfaction or distress, and requesting help) was defined as L and K less than T65, F greater than L and K, and F less than or equal to T80. An "exaggerating" profile (subjects openly admitting to problems and feeling rather vulnerable and overwhelmed by their perceived problems or symptoms) was defined as F greater than T80 but less than or equal to T100. Profiles with T-scores of 100 or higher on the F-scale were excluded from all statistical analyses.

Figure 3 shows the mean MMPI-2 profiles for each of these three validity groups. As can be seen, the procedures used to categorize subjects were successful in that the configurations of the group validity profiles were appropriate for each of the groups and the mean validity profiles differed significantly from one another, $F(36,2024) = 44.14, p < .001$.

As a test of Caldwell's (1988) claim that the MAC scale is invulnerable to or resistant to faking, the MAC-R scores of the disclosing, minimizing, and exaggerating groups were compared using an ANOVA.

Figure 3. MMPI-2 group (mean) profiles for the three validity groups.

Figure 3
MMPI-2 Profiles for Validity Groups

The results revealed a significant groups effect, $F(2, 1029) = 53.19$, $p < .001$ (see Figure 4). Post-hoc comparison using Tukey's procedure revealed that subjects with disclosing or exaggerated profiles scored significantly higher on the MAC-R scale than subjects with minimizing profiles, but the disclosing and exaggerating groups did not differ significantly from one another. The effect variance was $\omega^2 = 0.09$, $p < .001$, indicating that little variance in MAC-R scores was being accounted for in the validity groups variable.

Severity of substance abuse

An estimate of severity of substance abuse was calculated as the number of areas of the subject's functioning negatively affected by substance abuse, with higher values indicating more severe abuse. The four areas considered for these analyses were family or marital functioning, employment, criminal offenses, and physical or mental health problems. Thus, subjects could potentially score between 0 (no significant impact on any of the four areas) and 4 (all four areas negatively affected by substance abuse).

Figure 4. Mean MAC-R scores for the three validity groups.

Figure 4
MAC-R Scores for Validity Groups

An ANOVA with MAC-R scores as the dependent variable and severity index as the independent variable revealed a significant groups effect, $F(4, 880) = 22.63$, $p < .001$ (see Figure 5). Since many of the subjects with a severity score of 0 would have been those with no history of substance abuse, this analysis was repeated including only those subjects with a history of some type of substance abuse. Again, the ANOVA revealed a significant groups effect, $F(4, 814) = 10.23$, $p < .001$. Post-hoc comparisons using Tukey's procedure revealed that greater severity of abuse was associated with higher MAC-R scores: Subjects experiencing deleterious effects of substance abuse in 3 or 4 of these areas of functioning obtained significantly higher MAC-R scores than subjects for whom substance abuse had impacted on 0, 1, or 2 areas. The effect variance was $\omega^2 = 0.06$, $p < .001$, indicating that little variance in MAC-R scores was being accounted for in the severity groups variable.

Other individual factors

There was no significant relationship between age and MAC-R scores ($r = .04$), but there was a low

Figure 5. Mean MAC-R scores for the four severity groups.

Figure 5
MAC-R Scores for Severity Groups

negative correlation between number of years of formal education and MAC-R scores ($r = -.13$), $p < .001$. In addition, there was a low positive correlation between family history of substance abuse and MAC-R scores (point biserial $r = .11$, $p < .001$).

Correlations with other psychometric variables

A series of point biserial correlations revealed that MAC-R scores were significantly correlated with the presence of a juvenile arrest history ($r = .21$), prior institutional misconducts ($r = .18$), prior breaches of probation or parole ($r = .16$), and association with criminal others in the community ($r = .17$).

Considering only coefficients of .20 or higher (see Table 4), Pearson product-moment correlations revealed that MAC-R scores were positively correlated with the Pd-So Index ($r = .348$) and with two subscales of the CSS: Identification with Criminal Others ($r = .21$) and Tolerance for Law Violations ($r = .25$). Additionally, the MAC-R was negatively correlated with the CSS Attitudes toward Law, Courts, and Police subscale ($r = -.17$) and with the CPI Socialization Scale ($r = -.40$). The MAC-R also correlated

Table 4

Correlations of MAC-R scores with other scales.

Variable	r
MMPI-2 Validity Scales	
L	-.339**
F	.258**
K	-.305**
MMPI-2 Clinical Scales	
Hs (Hypochondrias)	-.008
D (Depression)	-.155**
Hy (Hysteria)	-.092*
Pd (Psychopathic Deviate)	.235**
Mf (Masculinity/Femininity)	-.095*
Pa (Paranoia)	.056
Pt (Psychasthenia)	.029
Sc (Schizophrenia)	.108**
Ma (Mania)	.490**
Si (Social Introversion)	-.136**
MMPI-2 Supplementary Scales	
R (Repression)	-.507**
Es (Ego Strength)	-.130**
AAS (Addiction Acknowledgement)	.392**
APS (Addiction Proneness)	.437**
Criminal Sentiments Scale	
Attitudes toward Law Courts and Police (LCP)	-.167**
Tolerance for Law Violations (TLV)	.250**
Identification with Criminal Others (ICO)	.216**
California Psychological Inventory	
So (Socialization scale)	-.392**
Pd-So Index	.350**

** p < .001

* p < .05

significantly with the three MMPI-2 validity scales (see below) and with most of the MMPI-2 standard clinical and supplementary scales (see Table 4). A correlation matrix (Pearson product-moment coefficients) for MAC-R scores versus other MMPI-2 scales is presented in Table 4 above. As noted above, there were several statistically significant correlations between the MAC-R and the other scales, but because of the large sample size many of these were of little practical significance.

Addiction Proneness Scale (APS)

In the present sample, there was a significant correlation between APS scores and MAC-R scores, $r = .44$, $p < .001$. A one-way ANOVA using APS scores as the dependent variable and substance abuse group as the independent variable revealed a significant groups effect, $F(3, 1020) = 19.55$, $p < .001$. Post-hoc comparisons using Tukey's procedure revealed that APS scores of poly abusers were significantly higher than those of non-abusers, alcohol abusers, or drug abusers. Alcohol abusers and drug abusers scored significantly higher than non-abusers but did not differ significantly from one another. The effect size was

$\omega^2 = 0.05$, $p < .001$, indicating that little variance in APS scores was being accounted for in the substance abuse groups variable. Finally, an ANOVA with APS scores as the dependent measure and type of validity profile as the independent variable also revealed a significant groups effect, $F(2, 1029) = 53.19$, $p < .001$. The effect variance was $\omega^2 = 0.12$, $p < .001$, indicating that little variance in APS scores was being accounted for in the validity groups variable. Thus, the pattern of the findings for the APS scale was essentially the same as for the MAC-R scale in the present sample.

Chapter 4

Discussion

The present study investigated what the MAC-R was measuring in a sample of adult incarcerated offenders with a high base rate of substance abuse. First, the MAC-R differentiated significantly between inmates with a history of substance abuse and inmates without a history of substance abuse. The mean MAC-R score for non-abusers in this offender sample was 25, which is above MacAndrew's (1965) suggested cut-off for substance abusers. This might be interpreted as suggesting that inmates may generally score slightly higher on the MAC-R than normals, even in the absence of substance abuse, which would be consistent with previous suggestions that MAC-R scores are affected by antisocial traits or characteristics. On the other hand, even in non-offender populations there has been general agreement for some time that the cut-off of 24 is probably too low and that many normals who do not abuse alcohol or drugs score higher than 24 on this scale.

Second, the MAC-R scores of poly abusers were significantly higher than those of non-abusers, alcoholics, or drug abusers, while alcoholics and drug abusers scored significantly higher than non-abusers but did not differ significantly from one another. Thus, the MAC-R failed to distinguish between alcohol abusers and drug abusers but clearly differentiated between substance abusers and non-abusers. As well, the overall MMPI-2 profiles indicated that substance abusers scored significantly higher than non-abusers on most of the standard clinical and supplementary scales (Figure 2), regardless of the type of substance abuse. This finding is consistent with previous findings suggesting that the MacAndrew scale reflects a general proneness for addiction, rather than a specific risk for alcoholism. The finding that poly abusers showed the highest scale elevations across the board is consistent with the hypothesis that higher MAC-R scores may be associated with more severe substance abuse (see also Figure 5).

The present results also indicate that, contrary to previous suggestions, the MacAndrew scale is not

immune or even particularly resistant to faking (dissimulation). Subjects with exaggerated or disclosing profiles, defined according to their L-F-K configurations, had significantly higher MAC-R scores than those presenting a minimizing profile. The overall MMPI-2 profiles of the three validity groups shows that the minimizing profile is less elevated (clinical, more distressful?) than either of the disclosing or exaggerating profiles. These results directly contradict Caldwell's (1988) claim that the MAC is invulnerable to faking and has important clinical implications for assessment of individuals who are likely to have strong incentives for dissimulation. This would include not only criminal offenders but also a variety of other populations such as individuals in child custody and access cases. Moreover, the fact that these results were obtained under standard test administration conditions rather than with the use of specific instructions to "fake good" or "fake bad" adds weight to the present conclusion.

In the present study, higher MAC-R scores were clearly associated with greater severity of substance

abuse, where severity was defined as the number of major functioning areas (family/ marital, employment/work, criminal offenses, or physical/mental health) negatively affected by substance abuse. The overall MMPI-2 profiles for the severity groups also reveals that the high severity groups exhibited greater general profile elevation, indicative of higher levels of maladjustment and distress.

There was a near zero correlation between age and MAC-R scores, but a slight negative correlation between years of formal education and MAC-R scores. This would be consistent with previous research indicating that drug and poly abusers tend to initiate substance abuse earlier than alcohol abusers, and consequently tend to drop out of school sooner, either because of poor progress or because of expulsion by school authorities. In addition, there was a low positive correlation between family history of substance abuse and MAC-R scores.

Correlational analyses comparing the MAC-R with various other psychometric scores suggest that the personality characteristics of substance abusing

criminal offenders include a tendency to be impulsive, to resent authority, to have poor frustration tolerance, to have difficulties with anger and resentment, and to endorse attitudes supportive of crime and other criminals. Higher MAC scores were also associated with a greater likelihood of a juvenile arrest history, prior institutional misconducts, prior breaches of probation and parole, and association with other criminals in the community. As well, high MAC-R scorers reported more alcohol-related marital problems, and more alcohol-related job problems ($r = .24$, $p < .001$; $r = .25$, $p < .001$, respectively).

The MAC-R was positively correlated with the new MMPI-2 APS scale. However, there was nothing in the present results to suggest that the APS is any more effective in detecting "addiction proneness" than the MAC-R, at least in an offender population. Poly abusers scored significantly higher on the APS than alcoholics, drug abusers, or non-abusers; and alcoholics and drug abusers scored significantly higher than non-abusers but did not differ significantly from one another. Subjects with exaggerated or disclosing

validity profiles scored significantly higher on the APS than subjects with minimizing profiles, indicating that the APS is also susceptible to dissimulation. Finally, higher APS scores were associated with greater severity of substance abuse, as with the MAC-R.

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