Screening for Alcohol Problems in the U.S. General Population: A Comparison of the CAGE and TWEAK by Gender, Ethnicity, and Services Utilization*

CHERYL J. CHERPITEL, DR.P.H.

Western Consortium for Public Health, Alcohol Research Group, 2000 Hearst Avenue, Berkeley, California 94709

ABSTRACT: Objective: The purpose of this study was to compare the performance of two screening instruments for alcohol problems, the CAGE and the TWEAK, against ICD-10 and DSM-IV criteria for alcohol dependence by gender and ethnicity, and to evaluate whether characteristics associated with health services utilization may affect the performance of screening instruments in a representative sample of the U.S. adult general population. Method: Data are from the Alcohol Research Group’s 1995 National Alcohol Survey; these were weighted to account for the design effect inherent in multistage cluster sampling and oversampling of blacks and Hispanics. Effective sample size was 2,443: 797 blacks, 642 Hispanics and 1,004 whites and others (primarily Asian and Native American). Sensitivity and specificity were examined for both screening instruments. Logistic regression was used to evaluate the predictive value, separately, for the CAGE and TWEAK, controlling for gender, ethnicity, region of the country and service use (primary care and emergency room). Results: The TWEAK was more sensitive for men than for women, but no differences were found by service use, while the CAGE was more sensitive for men who had used the emergency room during the preceding year compared with those who had not. The TWEAK was more sensitive than the CAGE among white and Hispanic men, among men who had not used the emergency room and among whites who had no service use. Performance of neither the CAGE nor the TWEAK was found to vary by region of the country. Conclusions: Data suggest that while the performance of screening instruments may vary across demographic subgroups in the general population, instruments may perform equally well for identifying problem drinkers in general populations as in clinical populations. (J. Stud. Alcohol 60: 705-711, 1999)

A NUMBER OF relatively short screening instruments have been developed for use in clinical populations to identify alcohol dependence or alcohol abuse/harmful drinking. The validity of these instruments, based on diagnostic criteria (International Classification of Diseases [ICD] or Diagnostic and Statistical Manual of Mental Disorders [DSM]) for problem drinking, has been tested primarily in clinical populations comprised largely of white male patients. The performance of screening instruments is less well established among women and ethnic minorities, or in general populations. The prevalence of problem drinking in primary care and emergency room (ER) settings has recently gained considerable attention (Buchsbaum et al., 1991b; Chan et al., 1994a; Cherpitel, 1993, 1994; Fleming and Barry, 1991b; Magruder-Habib et al., 1991; Soderstrom et al., 1992), and the need for evaluating easily administered screening instruments to identify those patients who may benefit from a brief intervention or referral for problem drinking has become evident (Buchsbaum et al., 1991a; Cherpitel, 1997, 1998; Fleming and Barry, 1991a; Volk et al., 1997).

Although the prevalence of alcohol-related problems has been found to be higher in both emergency room and primary care samples than in the general population from which they come (Cherpitel, 1991, 1995a), the prevalence of alcohol dependence in the general population, nevertheless, has not been found to be inconsequential. The 1988 National Health Interview Survey found that 9% of American adults met DSM-III-R criteria for current alcohol abuse and dependence (Grant et al., 1991), while the 1990 National Alcohol Survey found 4% positive for current alcohol dependence alone and 5% according to ICD-10 criteria, and 7% and 4.6% positive on DSM-IV and ICD-10 criteria, respectively, for alcohol abuse and/or dependence (Grant, 1996).

Relatively few studies, however, have examined the performance of screening instruments for identifying problem drinking in general populations. One study examined sensitivity of the CAGE, Brief Michigan Alcoholism Screening Test (BMAST) and TWEAK against a past-year diagnosis of alcohol dependence, using DSM-III-R criteria, in a primary care population compared with a sample of the general population from the same metropolitan area, and found sensitivity for these instruments to be higher in the primary care sample (Chan et al., 1993, 1994a,b). No study to date,
however, has reported the performance of screening instruments in a representative sample of the U.S. population, nor have many of these studies analyzed screener performance across gender and ethnic groups in the general population. While the use of standard diagnostic instruments would be preferable for establishing the prevalence of alcohol dependence in nonclinical populations, such instruments are lengthy, and the use of shorter screening instruments would seem advantages in this regard. Additionally, such short screening instruments would be useful as a first-stage screening device in general population surveys to identify those who would then be given a standard diagnostic instrument.

Screening instruments may not be expected to perform as well in the general population as in clinical populations, due to a lower prevalence of alcohol dependence and harmful drinking/abuse in nonclinical samples. The Epidemiological Catchment Area study found a higher proportion of those in clinical populations had a symptom count for alcohol dependence well above the diagnostic threshold compared with those in the general population, while those in the general population were more likely to have a symptom count right at the diagnostic threshold (Helzer et al., 1985). Differences in characteristics between those in the general population and more frequent users of clinical services (who would have a greater probability of falling into such samples than less frequent users of these health care services), may also explain differential performance of screening instruments in the general population compared to clinical populations. However, a prior comparison of drinking patterns and problem and demographic characteristics between a representative sample of ER patients in a large HMO and a representative sample of the general population of the same county who reported membership in the HMO found the major difference between the two samples was the frequency of ER use (Cherpitel, 1992).

To fill this gap in our knowledge and examine the performance of screening instruments in nonclinical populations, the sensitivity and specificity of the CAGE and TWEAK are compared across gender and ethnic groups for black, Hispanic and white/other respondents from a U.S. national household probability sample of adults. To evaluate whether characteristics associated with health services utilization may affect the performance of screening instruments, analyses also include whether the respondent reported using primary care and/or ER services in the year preceding the interview. Both ICD-10 and DSM-IV criteria for current alcohol dependence are used as the gold standard against which the performance of screening instruments is compared. Logistic regression analysis is used to evaluate the predictive value of the CAGE and the TWEAK on alcohol dependence, controlling for demographic characteristics, region of the country and service use (ER and primary care).

These analyses are important in determining those screeners that may be most effective for identifying problem drinkers in nonclinical populations.

Method

Sample

The data are from the Alcohol Research Group's 1995 National Alcohol Survey. Fieldwork for the study was subcontracted to the Institute for Survey Research at Temple University. The sample consisted of adults 18 years and older living in households within the 48 contiguous states. A multistage area-probability sample was drawn, using 100 primary sampling units, with an oversampling of blacks and Hispanics. Completed interviews were obtained on 1,587 black, 1,598 Hispanic and 1,740 white/other (primarily Asian and Native American) respondents, representing completion rates of 77% for blacks and Hispanics, and 76% for whites/other. Noninterviews were due to refusals (13%), and incapacitation, language barriers and failure to locate the respondent (10%). Data were weighted to reflect the number of adults living in a selected household and the interview completion rate in a given area. Data were also weighted to take into account the design effect inherent in the use of multistage cluster sampling, using an approach originally suggested by Kish (1965) for estimating a design effect average. The average design effect was 1.99 for blacks, 2.49 for Hispanics and 1.73 for whites/others, using 48 variables from six domains of the questionnaire, which resulted in an effective sample size (N = 2,443; 52% women) of 797 blacks, 642 Hispanics and 1,004 whites/others for analysis. "Others" in this latter category included 29 Asians, 22 Native Americans and 5 of mixed race.

Table 1 shows demographic characteristics of the sample by ethnicity. Whites/others were more likely to be older, better educated and to be current drinkers than blacks or Hispanics, and less likely to have never been married, to be unemployed, and to have no health insurance. They were also more likely to have used primary care services in the last year than blacks or Hispanics, while Hispanics were less likely to have used the ER during the last year compared with whites or blacks. No differences were found in the rate of alcohol dependence across the three groups.

Data collection

Interviews were conducted with informed consent in the respondents' homes by trained interviewers using structured interview schedules (questionnaires) of about 1 hour in length. Hispanic respondents were given a choice of being interviewed in English, or in Spanish with a bilingual interviewer. The Spanish version of the questionnaire underwent a process of translation and independent backtranslation. Respondents who self-identified as either "white of Hispanic origin" or "black of Hispanic origin" (Latino, Mexican, Central or South American, or any other Hispanic origin) were classified as Hispanic. Respondents who self-identified as "black, not of Hispanic origin" were categorized as black.
TABLE 1. Demographic characteristics by ethnicity (in percent)

<table>
<thead>
<tr>
<th></th>
<th>White/other</th>
<th>Black</th>
<th>Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>48</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Women</td>
<td>52</td>
<td>55</td>
<td>50</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-29</td>
<td>19</td>
<td>27*</td>
<td>14*</td>
</tr>
<tr>
<td>30-49</td>
<td>44</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>50+</td>
<td>37</td>
<td>27*</td>
<td>22*</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤8th grade</td>
<td>5</td>
<td>8*</td>
<td>37*</td>
</tr>
<tr>
<td>Some high school</td>
<td>10</td>
<td>17*</td>
<td>18*</td>
</tr>
<tr>
<td>High school graduate</td>
<td>37</td>
<td>38</td>
<td>29*</td>
</tr>
<tr>
<td>Some college</td>
<td>25</td>
<td>24</td>
<td>17*</td>
</tr>
<tr>
<td>College graduate</td>
<td>23</td>
<td>13*</td>
<td>9*</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marriage/marriage-like relationship</td>
<td>69</td>
<td>49*</td>
<td>68</td>
</tr>
<tr>
<td>Separated/divorced</td>
<td>10</td>
<td>14*</td>
<td>9</td>
</tr>
<tr>
<td>Widowed</td>
<td>7</td>
<td>8</td>
<td>3*</td>
</tr>
<tr>
<td>Never married</td>
<td>14</td>
<td>29*</td>
<td>20*</td>
</tr>
<tr>
<td>Unemployed</td>
<td>4</td>
<td>10*</td>
<td>8*</td>
</tr>
<tr>
<td>No health insurance</td>
<td>11</td>
<td>20*</td>
<td>18*</td>
</tr>
<tr>
<td>Used ER in last year</td>
<td>11</td>
<td>12</td>
<td>8*</td>
</tr>
<tr>
<td>Used primary care in last year</td>
<td>34</td>
<td>20*</td>
<td>20*</td>
</tr>
<tr>
<td>Current drinker</td>
<td>67</td>
<td>54*</td>
<td>54*</td>
</tr>
<tr>
<td>Alcohol dependence-ICD-10</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Alcohol dependence-DSM-IV</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

*p < .05, comparison of proportions between blacks and whites.
*+p < .08, comparison of proportions between Hispanics and whites.

All other respondents are included in the “white and other” category for analyses reported here.

Instruments

Among other questions, respondents were asked items comprising the CAGE and TWEAK screening instruments, items related to alcohol dependence, use of emergency room or primary care services during the last year, and demographic characteristics including region of the country where the respondent lived (East, South, Central, West).

Both the CAGE and the TWEAK are mnemonics. The CAGE (Ewing, 1984) was designed for rapid verbal screening for alcohol dependence in clinical practice and is derived from the following four items: (1) Have you ever felt you should cut down on your drinking? (2) Have people annoyed you about your drinking? (3) Have you ever felt bad or guilty about your drinking? (4) Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (eye-opener)? Validity of the CAGE was established in relation to a diagnosis of alcohol dependence based on psychiatric evaluation in a Veterans Administration psychiatric inpatient population (Mayfield and Johnston, 1981; Mayfield et al., 1974). Based on a positive response to two or more items, the CAGE has been found to have a sensitivity ranging from 72-91%, and a specificity from 77-96% (Beresford et al., 1990; Bernadt et al., 1982; Bush et al., 1987). The CAGE has been used extensively in clinical populations, in both written and verbal form; however, relatively little data are available on its performance across gender and ethnic minorities.

The TWEAK is a recently developed instrument designed to identify “at risk” drinking in prenatal populations (Russell et al., 1994), and asks questions having to do with tolerance (holding more than five drinks), friends or relatives worried about a person’s drinking, taking a drink first thing in the morning (eye-opener), blackouts (amnesia), and felt a need to cut down on drinking. Two of the TWEAK items were taken from the CAGE (eye-opener and cut down) and two (worried and amnesia), from the full Michigan Alcoholism Screening Test (MAST) (Selzer, 1971). Using a cut point of 2 (when a weight of 2 is applied to tolerance and worry, and a weight of 1 to the remaining three items), the TWEAK was found to have a sensitivity of 79% and a specificity of 83% in prenatal populations against a criterion of drinking one or more ounces of absolute alcohol per day (Russell et al., 1994). Using a cut point of 3, as used in the present study, the TWEAK has been found to have a sensitivity ranging from 94-84% (Chan et al., 1993; Cherpetel, 1995b) and a specificity from 89-81% (Chan et al., 1993; Cherpetel, 1998) against diagnostic criteria for alcohol dependence in clinical samples. The question having to do with the number of drinks one can hold (tolerance) presumably makes this instrument more sensitive to identifying alcohol problems among women since it can take into account a lower threshold for women (Russell, 1994). One question on the TWEAK and all four CAGE questions were asked on a lifetime basis. If respondents were positive on these lifetime based questions, they were asked again regarding the last 12 months.

Alcohol dependence during the last year was measured by 24 items similar to those in the Alcohol Section of the Composite International Diagnostic Interview (CIDI) core (Wittenberg et al., 1991), which operationalized both ICD-10 (World Health Organization, 1992) and DSM-IV (American Psychiatric Association, 1994) criteria (Caetano and Room, 1994). These same items have been used to operationalize alcohol dependence in prior National Alcohol Surveys (Caetano and Tam, 1995; Caetano et al., 1997). Items which operationalized ICD-10 included questions related to the six domains of craving, impaired capacity to control, withdrawal, tolerance, neglect of interests, and continued use despite problems; while DSM-IV included questions related to the seven domains of tolerance, withdrawal, drinking more than intended, unsuccessful efforts to control, giving up pleasures or interests to drink, spending a great deal of time in drinking activities, and continued use despite problems. A respondent was considered alcohol dependent if positive on three or more domains in either of the diagnostic schemes considered separately. The standard against which sensitivity of the screening instruments was analyzed was comprised of those positive on either or both of the diagnostic schemes.
Among current drinkers (those who reported having any alcoholic beverage during the past 12 months) 20% reported consuming eight or more drinks on at least 1 day during the last year, and 65% of those positive on either or both of the diagnostic schemes reported doing so.

Data analysis

The sensitivity (percentage correctly classified as having the condition) and specificity (percentage correctly classified as not having the condition) for current alcohol dependence (ICD-10 and/or DSM-IV criteria) are reported at a cut point of 2 for the CAGE and 3 for the TWEAK for reporting these experiences as having occurred during the preceding year. Two-tailed tests of significant differences between proportions of sensitivity across gender and ethnic subgroups are reported for the CAGE and the TWEAK, and for the CAGE compared to the TWEAK within demographic subgroups (Table 2). Significant differences between proportions of sensitivity are also reported for those who made an ER visit (Table 3) and those who made a primary care visit (Table 4) during the previous 12 months compared with those who did not, within gender and ethnic subgroups for the CAGE and TWEAK, and for the CAGE compared to the TWEAK within service use and demographic subgroups. The data in the tables will be discussed further in the Results section which follows.

Logistic regression (SPSS, 1996), with simultaneous entry of variables, was then used to analyze the predictive value on alcohol dependence, separately from the CAGE and the TWEAK, controlling gender, ethnicity, region of the country, and service use (ER and primary care). CAGE, TWEAK, and gender were coded dichotomously. Men were compared to women as the reference category. Both ethnicity and region were coded as indicator contrasts, with whites/others as the reference group to which blacks and Hispanics were contrasted, and West as the reference group to East, South and Central were contrasted. The interaction term of screening in-
Table 4. Sensitivity (S) and specificity (SP) for the CAGE and TWEAK by primary care use during the last year among current drinkers.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>CAGE</td>
<td>(40)</td>
<td>(950)</td>
<td>(29)</td>
</tr>
<tr>
<td>TWEAK</td>
<td>(56)</td>
<td>91</td>
<td>(55)</td>
</tr>
<tr>
<td>White/other</td>
<td>(19)</td>
<td>(218)</td>
<td>(33)</td>
</tr>
<tr>
<td>CAGE</td>
<td>58</td>
<td>97</td>
<td>54</td>
</tr>
<tr>
<td>TWEAK</td>
<td>74</td>
<td>92</td>
<td>78</td>
</tr>
<tr>
<td>Black</td>
<td>(9)</td>
<td>(59)</td>
<td>(9)</td>
</tr>
<tr>
<td>CAGE</td>
<td>38</td>
<td>92</td>
<td>65</td>
</tr>
<tr>
<td>TWEAK</td>
<td>64</td>
<td>82</td>
<td>79</td>
</tr>
</tbody>
</table>

Note: Weighted N's are in parentheses; subgroup N's may not sum to total because of weighting.
*p < .05. Comparison of proportions of sensitivity between CAGE and TWEAK.

Instrument (CAGE or TWEAK) by region was also entered into an additional regression for each instrument, with region coded as a deviation contrast, comparing each region to the overall effect of the other regions. Odds ratios (ORs) are reported for each variable in the equation. ORs give the likelihood, for example, that a respondent with a positive CAGE compared with a respondent with a negative CAGE will be positive for alcohol dependence, controlling for all other variables in the equation. The 95% confidence interval (CI) is reported for each variable that reached statistical significance.

Analysis is carried out on current drinkers, since this is the population considered to be at risk for current problem drinking.

Results

Table 2 shows the sensitivity and specificity for the CAGE and TWEAK within gender and ethnic subgroups. No differences were found across subgroups for the CAGE, while sensitivity of the TWEAK was found to be significantly better among men than among women. Compared to the CAGE, sensitivity of the TWEAK was found to be best among white and Hispanic males.

Sensitivity and specificity of the CAGE and TWEAK were then compared for those who did and those who did not report an ER visit during the preceding 12 months. As seen in Table 3, sensitivity of the CAGE was better among men who had attended the ER during the last year (84%) than among those who had not (55%), but no difference was found among women, or within ethnic groups. Sensitivity for the TWEAK was not found to differ significantly in relation to whether an ER visit was made during the preceding year, but was found to be significantly better than the CAGE among men and among whites who did not make an ER visit.

As seen in Table 4, no difference was found in sensitivity of these instruments within gender or demographic subgroups in relation to primary care service use during the last year. Sensitivity of the TWEAK was better than the CAGE for men regardless of primary care use, and was also better among whites for those who did not make a primary care visit during the preceding year.

Table 5 shows the predictive value, separately for the CAGE and the TWEAK, on alcohol dependence, controlling for gender, ethnicity, region of the country, and ER treatment and primary care treatment during the last year. Both the CAGE and TWEAK were highly predictive of alcohol dependence: those positive on the CAGE were 37 times more likely than those negative to be alcohol dependent, while those positive on the TWEAK were 30 times more likely to be alcohol dependent than those negative on the TWEAK. Gender was also found to be a significant predictor of alcohol dependence when CAGE status was controlled, but not when TWEAK status was controlled, with men almost 3 times more likely than women to be alcohol dependent. Region of the country was also found to be significant in both equations, with those living in the East and Central regions only a third as likely as those living in the West to be alcohol dependent.

Table 5. Odds ratios (OR) and confidence intervals (CI) for demographic characteristics, health services use and screener on alcohol dependence.

<table>
<thead>
<tr>
<th></th>
<th>CAGE as screener</th>
<th>TWEAK as screener</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 940)*</td>
<td>(n = 932)*</td>
</tr>
<tr>
<td>Screener (positive)</td>
<td>37.14*</td>
<td>30.75*</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>2.67*</td>
<td>1.69</td>
</tr>
<tr>
<td>Ethnicity (white/other)</td>
<td>2.04-68.17</td>
<td>1.42-99.2</td>
</tr>
<tr>
<td>Black</td>
<td>0.80</td>
<td>0.79</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.11</td>
<td>1.42</td>
</tr>
<tr>
<td>Region (West)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East</td>
<td>0.32*</td>
<td>0.36*</td>
</tr>
<tr>
<td>South</td>
<td>0.62</td>
<td>0.69</td>
</tr>
<tr>
<td>Central</td>
<td>0.38*</td>
<td>0.38*</td>
</tr>
<tr>
<td>ER treatment</td>
<td>0.76</td>
<td>0.92</td>
</tr>
<tr>
<td>PC treatment</td>
<td>1.07</td>
<td>1.22</td>
</tr>
</tbody>
</table>

*Excludes three respondents on whom all data were not obtained.
*Excludes nine respondents on whom all data were not obtained.
*p < .05 (x^2 with 1 df); *p < .01 (x^2 with 1 df).
dependent. Neither ethnicity nor health services use was predictive of alcohol dependence in either equation. Additional regressions were examined for the CAGE and TWEAK including the interaction term of screening instrument by region (not shown), that was not found to be significant.

Discussion

Differences were found by gender, ethnicity and service use in sensitivity of both the CAGE and TWEAK. The TWEAK was found to be more sensitive for men than for women, while the CAGE was more sensitive for men and whites who had not used the ER during the year preceding the interview compared with those who had. Differences in sensitivity were also found between the CAGE and the TWEAK, with the TWEAK performing better than the CAGE among whites and Hispanic men (but not black men), among men who had not used the ER during the last year, and among whites who had not used the ER or primary care services during the preceding year. It is important to note here that multiple comparisons were carried out on these data, thereby increasing the probability that some of the differences found may have occurred by chance alone. On the other hand, small sample sizes in some of the gender/ethnic/service use categories may have precluded the detection of additional differences in instrument performance across subgroups.

Ordering of the two instruments may also have influenced their relative performance, to some degree (the CAGE was administered first, followed by the TWEAK). Both instruments were administered rather late in the interview, after numerous questions had been asked regarding quantity and frequency of drinking and drinking patterns and problems, including questions which obtained an ICD-10 or DSM-IV diagnosis for alcohol dependence. This, too, may have influenced instrument performance—a prior study found that sensitivity of the CAGE was reduced when preceded by questions related to defining quantity and frequency of drinking (Steinweg and Worth, 1993).

While the prevalence of alcohol dependence in this general population sample is similar to that found in other national alcohol surveys (Caetano and Tam, 1995; Grant, 1996), it is substantially lower than that found in clinical populations, and this may also have affected instrument performance. Using the same diagnostic criteria for alcohol dependence as that used here, prevalence of alcohol dependence ranged from 10% among Hispanic patients to 16% among white/other patients in a California ER sample (Cherpitel, 1998) and 9% for white patients and 12% for white patients in a Mississippi ER sample (Cherpitel, 1997).

A comparison of the sensitivity of the CAGE and TWEAK reported here with that from these two ER studies, using the same gold standard, found both instruments performed better within the same gender/ethnic subgroups in the ER sample than in this national probability sample of the general population (Cherpitel, 1997, 1998). Prior primary care clinic studies also report higher sensitivity for the CAGE and TWEAK than that found here, although these studies have not examined instrument performance within gender/ethnic subgroups (Chan et al., 1993, 1994a; Fleming and Barry, 1991a; Liskow et al., 1995).

Few significant differences in the performance of these instruments by ER and primary care use were found, possibly due to small sample sizes as mentioned above; and contrary to what might be expected, with one exception differences found suggest that the sensitivity of the CAGE and TWEAK may be better for those not using the ER or primary care services during the preceding year than for those who did use such services. The lack of significant differences found by services use may also be related to the fact that those who reported use of such services in the preceding year may not necessarily be heavy users of these services, as are many of those sampled in these clinical settings, and who thus have a greater likelihood of falling into such samples. Service use was based here on reporting even one visit to an ER or primary care clinic during the previous year.

A comparison of the performance of screening instruments in the two ER studies described above (Cherpitel, 1997, 1998) found that while region of the country (South vs West) was not an important predictor of alcohol dependence, regional differences in the performance of screening instruments may exist, even when ethnicity is taken into account. Logistic regression analysis reported here, however, suggests that region is an important predictor of alcohol dependence, with those living in the East and Central regions less likely to be alcohol dependent compared to those in the West, but performance of neither the CAGE nor the TWEAK varied by region.

Data reported here suggest that while the performance of screening instruments may vary across demographic subgroups in the general population, instruments may, nevertheless, perform equally well for identifying problem drinkers in general populations as in clinical populations. Further research is needed in order to determine the usefulness of screening instruments for problem drinking within gender and ethnic subgroups in nonclinical populations, and whether regional differences, beyond ethnicity, in the performance of screening instruments exist in the general population.

References

AMERICAN PSYCHIATRIC ASSOCIATION. Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), Washington DC, 1994.
Buchsbaum, D.G., Buchanan, R.G., Lawton, M.J. and Schnoll, S.H.
Alcohol consumption patterns in a primary care population. Alcohol
Bush, B., Shaw, S., Cleary, P., Delbanco, T.L. and Aronson, M.D.
Screening for alcohol abuse using the CAGE questionnaire. Amer.
Caftano, R. and Room, R. Alcohol dependence in the 1990 U.S.
National Alcohol Survey: Operationalizing and comparing two nosological
Caftano, R. and Tam, T.W. Prevalence and correlates of DSM-IV
and ICD-10 alcohol dependence: 1990 U.S. National Alcohol Survey. Alcohol
Caftano, R., Tam, T., Greenfield, T.K., Cherpitel, C.J. and Midanik,
L.T. DSM-IV alcohol dependence and drinking in the U.S. population: A
Chan, A.W., Prustach, E.A. and Welte, J.W. Detection by the CAGE
of alcoholism or heavy drinking in primary care outpatients and the
Chan, A.W., Prustach, E.A. and Welte, J.W. Detection of alcoholism in
Chan, A.W., Prustach, E.A., Welte, J.W. and Russell, M. Use of the
TWEAK test in screening for alcoholism/heavy drinking in three
Cherpitel, C.J. Drinking problems and patterns among primary care
patients: A comparison with the general population. Alcohol Aem 26:
Cherpitel, C.J. Drinking patterns and problems: A comparison of ER
Cherpitel, C.J. Alcohol and injuries: A review of international emergency
Cherpitel, C.J. Alcohol use among primary care patients: Comparing an
HMO with county clinics and the general population. Drug Alcohol
Cherpitel, C.J. Alcohol and casualties: Comparison of county-wide emergency
Cherpitel, C.J. Screening for alcohol problems in the emergency depart-
Cherpitel, C.J. Comparison of screening instruments for alcohol prob-
lems between black and white emergency room patients from two re-
Cherpitel, C.J. Differences in performance of screening instruments for
problem drinking among blacks, whites and Hispanics in an emergency
Fwing, J.A. Detecting alcoholism: The CAGE Questionnaire. JAMA 252:
Fleming, M.F. and Barry, K.L. A three-sample test of a masked alcohol
Fleming, M.F. and Barry, K.L. The effectiveness of alcoholism screening
Grant, B.F. Prevalence and correlates of drug use and DSM-IV drug
dependence in the United States: Results of the National Longitudinal Al-
Grant, B.F., Hartford, T.C., Chou, P., Pickering, R., Dawson, D.A.,
Stinson, F.S. and Noble, J. Prevalence of DSM-III-R alcohol abuse and
dependence, United States, 1988. Alcohol Htlth Res. World 15:
Helzer, J.E., Robins, L.N., McEvoy, L.T., Spitznagel, E.L., Stoltz-
and Diagnostic Interview Schedule diagnoses. Physician reexamination of
Liskow, B., Campbell, J., Rickel, E.J. and Powell, B.J. Validity of the
CAGE questionnaire in screening for alcohol dependence in a walk-in
Magruder-Habib, K., Durand, A.M. and Frey, K.A. Alcohol abuse and
Mayfield, D.G. and Johnston, R.G.M. Screening techniques and preva-
ience estimation in alcoholism. In Fann, W.E. (Ed) Phenomenology and
Mayfield, D., McElroy, G. and Hall, P. The CAGE questionnaire: Val-
Russell, M. New assessment tools for risk drinking during pregnancy: T-
Russell, M., Marcher, S.S., Sokol, R.J., Madar, P., Bottoms, S., Ja-
cobson, S. and Jacobson, J. Screening for pregnancy risk-drinking. Aem
Selzer, M.L. The Michigan Alcoholism Screening Test: The quest for
Soderstrom, C.A., Dischinger, P.C., Smith, G.S., McDuff, D.R.,
Herpi, J.R. and Gorelick, D.A. Psychoactive substance dependence
Statistical Package for the Social Sciences. SPSS for Windows:
Steinweg, D.L. and Worth, H. Alcoholism: The keys to the CAGE.
Volk, R.J., Steinhauser, J.R., Cantor, S.B. and Holzer, C.E. III. The
Alcohol Use Disorders Identification Test (AUDIT) as a screen for at-
risk drinking in primary care patients of different racial/ethnic back-
Witchten, H.U., Robins, L.N., Cottler, L.B., Saxtorium, N., Burke,
J.D. and Regier, D. Cross-cultural feasibility, reliability and sources of
variance of the Composite International Diagnostic Interview (CIDI).
World Health Organization. The ICD-10 Classification of Mental
and Behavioral Disorders: Clinical Descriptions and Diagnostic Guidelines.