

AN ANALYSIS OF AUDIT SCORES OF ADOLESCENT OFFENDERS
IN TWO MIDWESTERN COUNTIES

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Summary.—The Alcohol Use Disorder Identification Test provides an accurate measure of risk associated with alcohol-related problems across sex, age, and cultures. As a recommended screening tool to detect patients who are appropriate candidates for brief, preventive alcohol interventions, it was given to 78 adolescents in a diversion program for drunk drivers in two southeastern Nebraska counties during routine alcohol-dependency evaluations. The subjects were grouped by age (18 and younger and over 18 years) and by sex. Based on a previous study, it was hypothesized that the responses to the first three AUDIT questions, related to alcohol consumption, would reflect sex and age differences. A 2×2 analysis of variance of scores on separate items indicated significant main effects for age ($F_{1,74} = 10.40, p < .002$) for Question 1 with older boys' and girls' groups reporting they have drinks containing alcohol more frequently, for sex ($F_{1,74} = 14.65, p < .001$) on Question 2 with the older boys' group reporting more frequent drinking on a typical day, and for age ($F_{1,74} = 7.74, p > .01$), and sex ($F_{1,74} = 4.12, p < .05$) on Question 3 with the older boys' group indicating that they more frequently consumed six or more drinks on one occasion. It is recommended that the AUDIT-C be included in drug and alcohol assessments with adolescents similar to those tested here, and professionals be alert to the possibilities of sex and age differences in response to questions related to consumption.

Alcohol abuse in young adults and adolescents is common in both college and primary care settings (Fielin, Reid, & O'Connor, 2000). Adolescents should be screened for alcohol misuse as part of routine medical care (Knight, Sherritt, Harris, Gates, & Chang, 2003). Often physicians and college professionals' recognition of alcohol dependence in this population is low (Kitchens, 1994). For years many professional organizations have recommended questioning clients about alcohol use (Steinbauer, Cantor, Holzer, & Volk, 1998). Because history of alcohol use is often minimized by clients in hospital settings, early detection of alcohol use is beneficial to staff (Dolman & Hawkes, 2005). Accurately assessing patients for drinking problems during the routine clinical encounter is difficult. The diagnostic standard for alcohol dependence or abuse, in the DSM-IV (American Psychiatric Association, 2000) requires a detailed interview which often is not feasible for routine screening.

The Alcohol Use Disorder Identification Test (AUDIT), developed and evaluated over several decades, has been judged an accurate measure of risk

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associated with alcohol-related problems across sex, age, and cultures (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993; Allen, Littern, Fertig, & Babor, 1997). It has been recommended as a screening tool to detect patients who are appropriate candidates for brief, preventive alcohol interventions (Saunders, *et al.*, 1993). Cook, Chung, Kelly, and Clark (2005) suggested clinicians should use the AUDIT or CRAFFT, rather than the CAGE, to screen young persons for alcohol use disorders, indicating that the AUDIT performs best, but its length may limit its utility in this setting.

Bush, Kivlahan, McDonell, Fihn, and Bradley (1998) reported the first three questions of the AUDIT about alcohol consumption, now called the AUDIT-C, appear to provide a practical, valid primary care screening set for heavy drinking or active alcohol abuse or dependence. In a large primary care sample, a 3-question version of the AUDIT identified hazardous drinkers as well as the full AUDIT when such drinkers were defined by quantity-frequency criterion. This set of questions may be useful as an initial screen for assessing hazardous drinking behavior (Gordon, Maisto, McNeil, Kraemer, Conigliaro, Kelly, & Conigliaro, 2001).

Sensitivity of such a screening questionnaire might differ according to the introductory items (Bischof, Reinhardt, Grothues, Dybek, Meyer, Hapke, John, & Rumpf, 2005). Recent findings (Canagasaby & Vinson, 2005; O'Brien, McCoy, Champion, Mitra, Robbins, Teuschler, Wolfson, & Durant, 2006) suggest that asking a single question could identify unhealthy alcohol use. Such data could lead to easier adherence to practice guidelines that recommend screening adults for alcohol misuse. The purpose of this study was to report a profile of AUDIT question responses in a midwestern adolescent population of alcohol offenders, with particular focus on questions relating to alcohol consumption, the AUDIT-C, as a brief, three-question screen based on the AUDIT. Nevitt, Lundak, and Galardi (2006) reported both sex and age differences in AUDIT scores using a similar sample of adolescents. A secondary purpose was to examine possible sex or age differences. Such differences were reported previously (Nevitt, *et al.*, 2006) in a similar sample of adolescent clients.

METHOD

Subjects

A study sample of 78 was randomly selected from 120 high school and college-age adolescents in a mandated county diversion program for minors in possession of alcohol (MIP) and drunk driving offenders. All subjects had received either a MIP or a driving while intoxicated (DWI) offense and therefore were referred by the county to a professional evaluator between April 2005 and May 2006. The subjects were 49 boys and 29 girls living in or near two midwestern counties, Otoe and Nemaha, in southeast Nebraska.

The sample was representative of adolescents already in local diversion programs, with 90% of the sample white and 10% Asian, Hispanic, and African American. The mean age for all groups was 18.4 yr. ($SD=1.2$), and the age range was from 14 years to 19 years. All subjects were attending either high school or college. The mean number of years of education was 11.7 ($SD=1.4$). All alcohol dependency evaluations were done by the same professional psychologist who routinely made these evaluations for the southeastern portion of the state. This professional was blinded as to the purpose of the study.

Tests

The Alcohol Use Disorders Identification Test (AUDIT) is a 10-item self-report screening test developed by the World Health Organization (WHO) to identify clients at risk for alcohol use disorders (Babor, de la Fuente, Saunders, & Grant, 1992). Questions that focus on consumption (frequency, quantity, and binge drinking) are widely recommended as initial screening questions for use in clinical settings (NIAAA, 1995; Canning, Kennell-Webb, Marshall, Wessely, & Peters, 1999; Fleming & Graham, 2001).

The first three questions of the AUDIT, called AUDIT-C, assess hazardous alcohol use relating strictly to consumption, such as drinking quantity, frequency, and binge behavior. Questions 4 through 10 assess dependence symptoms and harmful alcohol use. The AUDIT uses both current, defined as "within the past month," and lifetime time frames (Conigrave, Saunders, & Whitfield, 1995). Scores can vary from 0 to 40.

Examples of questions about consumption and hazardous use include Question 1. "How often do you have a drink containing alcohol?"; Question 2. "How many drinks containing alcohol do you have on a typical day when you are drinking?"; and Question 3. "How often do you have six or more drinks on one occasion?" Examples of questions in the other two domains include "How often during the last year have you failed to do what normally was expected from you because of drinking?" AUDIT scores can vary from 0 to 40.

Procedure

Self-reported information gathered during a standard alcohol abuse or dependency evaluation was recorded. All alcohol dependency evaluations were done by the same professional, who was not informed as to the purpose of the study. Of particular interest were the responses to the first three questions of the AUDIT related to hazardous use and alcohol consumption (Bush, *et al.*, 1998) and their relationship with the overall AUDIT scores.

Nevitt, *et al.* (2006) reported main effects for sex and age on AUDIT scores with a sample similar to the one tested in this study. It was hypothesized that the first three AUDIT questions were largely responsible for the

sex and age differences observed previously and would appear again. It was further hypothesized that Question 3, which asks about the frequency of drinking six or more drinks on one occasion, might be an effective brief screening question for both heavy drinking or active alcohol abuse or dependence in adolescents.

For purposes of statistical analysis of age and sex differences, clients were grouped by age (18 years or older and under 18 years) and by sex (boys and girls). There were 27 clients in the older boys' group, 23 in the younger boys' group, 17 in the older girls' group, and 11 in the younger girls' group. Ten of the clients in the older boys' group were attending college as were six of the clients in the older girls' group. A 2 (age) \times 2 (sex) design (Bruning & Kintz, 1987) was used to assess several dependent variables: individual scores on AUDIT Questions 1, 2, and 3, combined scores on AUDIT Questions 4-10, and total scores.

RESULTS

The mean total score on the AUDIT for girls was 10.0 with a standard deviation of 5.1. For boys the mean was 13.9, with a standard deviation of 6.2. This is high for this relatively young sample, as the generally accepted cut-off for optimal sensitivity or specificity of alcohol use disorders is a score of 8 (Conigrave, *et al.*, 1995). A 2 \times 2 analysis of variance of total AUDIT scores yielded significant main effects for age ($F_{1,74}=5.15$, $p<.01$) and sex ($F_{1,74}=6.15$, $p<.05$) but not for the interaction ($F_{1,74}=0.12$, $p>.05$). The means and standard deviations by questions by age and sex grouping are displayed in Table 1. A 2 \times 2 analysis of variance for the combined scores on Questions 1, 2, and 3 indicated significant main effects for age ($F_{1,74}=8.33$,

TABLE 1
MEAN SCORES AND STANDARD DEVIATIONS BY AGE AND SEX GROUPS ON AUDIT QUESTIONS

Sex by Question	Under 18 Years			Over 18 Years		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Boys						
Question 1	23	2.0	0.9	27	2.7	0.6
Question 2	23	2.7	1.0	27	3.1	0.9
Question 3	23	1.9	0.7	27	2.6	0.7
Questions 1-3	23	6.3	2.3	27	8.5	1.8
Questions 4-10	23	6.5	4.4	27	8.0	4.2
Total Score	23	10.9	6.2	27	15.7	5.9
Girls						
Question 1	11	2.0	0.8	17	2.6	0.8
Question 2	11	2.0	0.8	17	2.2	0.9
Question 3	11	1.9	0.9	17	2.0	0.9
Questions 1-3	11	5.4	2.4	17	6.8	2.5
Questions 4-10	11	3.8	2.3	17	5.0	3.5
Total Score	11	8.5	4.7	17	11.4	5.2

$p < .005$) and sex ($F_{1,74} = 6.30$, $p < .01$) but not for the interaction ($F_{1,74} = .01$, $p > .05$).

A 2×2 analysis of variance of scores on the separate AUDIT questions indicated significant main effects for age ($F_{1,74} = 10.40$, $p < .002$) on Question 1, for sex ($F_{1,74} = 14.65$, $p < .001$) on Question 2, and for age ($F_{1,74} = 7.74$, $p < .01$) and sex ($F_{1,74} = 4.12$, $p < .05$) on Question 3.

TABLE 2
PEARSON CORRELATION COEFFICIENTS FOR AUDIT QUESTIONS ($N = 78$)

Question	Total AUDIT Scores	Question 1	Question 2	Question 3	Questions 4-10
1	.60*		.25*	.65*	.44*
2	.63*			.61*	.45*
3	.77*				.57*

* $p > .01$.

The Pearson correlations for scores on the AUDIT-C questions are displayed in Table 2. Scores on Question 3 showed the highest correlation with Question 1 ($r_{78} = .65$, $p < .01$), Question 2 ($r_{78} = .61$, $p < .01$), and Total scores ($r_{78} = .77$, $p < .01$) in this sample of adolescents.

DISCUSSION

It was noted that the same sex and age differences were reported previously in a study in which a 2×2 analysis of variance was applied to AUDIT Total scores of a demographically similar sample (Nevitt, *et al.*, 2006). Sex differences in AUDIT scores in adolescent samples have been reported by other researchers (Chung, Colby, Barnett, Rohsenow, Spirito, & Monti, 2000). Reinert and Allen (2002) reported the AUDIT-C scores for boys appears approximately equal in validity to the full scale AUDIT. The literature supporting screening adolescent girls is less robust. Sex and age differences may be associated with order of item presentation (Bischoff, *et al.*, 2005). The present findings should, however, probably not be generalized beyond adolescents being treated in alcohol education settings. Regional variations in alcohol use have been known to be reflected in samples (Cherpitel, 1998).

Fleming, Barry, Manwell, Johnson, and London (1997) reported the three AUDIT questions on alcohol consumption performed better than the full test in identification of heavy drinkers who might benefit from brief primary care interventions. On the basis of these findings and others similar (Bush, *et al.*, 1998), for clinicians who do not currently use a validated alcohol screening questionnaire, professionals might begin asking clients who drink questions about their typical frequency and quantity of drinking, and the frequency of having six or more drinks on one occasion.

Daepfen, Yersin, Landry, Pecoud, and Decrey (2000) stated the

AUDIT performs well when embedded within a broader general health risk questionnaire. Research is needed to understand better how screening for alcohol use problems can become part of routine health examinations and how screening tools might be integrated with other health-risk assessments. The AUDIT-C could successfully be included in assessment of at-risk adolescent populations. Professionals might be alert to the possibilities of sex and age differences in response to questions on consumption.

REFERENCES

- ALLEN, J. P., LITTERN, R. Z., FERTIG, J. B., & BABOR, T. A. (1997) A review of research on the Alcohol Use Disorders Identification Test (AUDIT). *Alcoholism: Clinical and Experimental Research*, 21, 613-619.
- AMERICAN PSYCHIATRIC ASSOCIATION. (2000) *Diagnostic and statistical manual of mental disorders*. (4th ed. Rev.) Washington, DC: Author.
- BABOR, T., DE LA FUENTE, J., SAUNDERS, J., & GRANT, M. (1992) *AUDIT: The Alcohol Use Disorders Identification Test: guidelines for use in primary health care*. Geneva: World Health Organization.
- BISCHOF, G., REINHARDT, S., GROTHUES, J., DYBEK, I., MEYER, C., HAPKE, U., JOHN, U., & RUMPE, H. J. (2005) Effects of item sequence on the performance of the AUDIT in general practices. *Drug and Alcohol Dependence*, 79, 373-377.
- BRUNING, J. L., & KINTZ, B. L. (1987) *Computational handbook of statistics*. New York: Scott, Foresman.
- BUSH, K., KIVLAHAN, D. R., McDONELL, M. B., FIBIN, S. D., & BRADLEY, K. A. (1998) The AUDIT alcohol consumption questions--(AUDIT-C). *Archives of Internal Medicine*, 178, 1789-1795.
- CANAGASABY, A., & VINSON, D. C. (2005) Screening for hazardous or harmful drinking using one or two quantity-frequency questions. *Alcohol*, 40, 208-213.
- CANNING, U., KENNEL-WEBB, S., MARSHALL, E., WESSLEY, S., & PETERS, T. (1999) Substance misuse in acute general medical admissions. *QJM: Monthly Journal of the Association of Physicians*, 92, 310-326.
- CHERPITEL, C. J. (1998) Performance of screening instruments for identifying alcohol dependence in the general population, compared with clinical populations. *Alcoholism: Clinical and Experimental Research*, 22, 1399-1404.
- CHUNG, T., COLBY, S., BARNETT, N., ROHSENOW, D., SPIRITO, A., & MONTI, P. (2000) Screening adolescents for problem drinking: performance of brief screens against DSM-IV alcohol diagnoses. *Journal of Studies on Alcohol*, 61, 579-587.
- CONIGRAVE, K. M., SAUNDERS, J. B., & WHITFIELD, J. B. (1995) Diagnostic tests for alcohol consumption. *Alcohol and Alcoholism*, 30, 13-26. [Electronic version]
- COOK, R. L., CHUNG, T., KELLY, T. M., & CLARK, D. B. (2005) Alcohol screening in young persons attending a sexually transmitted disease clinic: comparison of AUDIT, CRAFT, and CAGE instruments. *Journal of General Internal Medicine*, 20, 1-6.
- DAEPPEN, J. B., YERSIN, B., LANDRY, U., PECOUD, A., & DEGREY, H. (2000) Reliability and validity of the Alcohol Use Disorders Identification Test (AUDIT) imbedded within a general health risk screening questionnaire: results of a survey in 332 primary care patients. *Alcohol: Clinical and Experimental Research*, 24, 659-665.
- DOLMAN, J. M., & HAWKES, N. D. (2005) Combining the AUDIT Questionnaire and biochemical markers to assess alcohol use and risk of alcohol withdrawal in medical inpatients. *Alcohol and Alcoholism*, 40, 515-519.
- FELIN, D., REID, M. C., & O'CONNOR, P. G. (2000) Screening for alcohol problems in primary care: a systematic review. *Archives of Internal Medicine*, 160, 1977-1989.
- FLEMING, M. F., BARRY, K. L., MANWELL, L. B., JOHNSON, K., & LONDON, R. (1997) Brief physician advice for problem alcohol drinkers. *Journal of the American Medical Association*, 277, 1039-1045.
- FLEMING, M., & GRAHAM, A. W. (2001) Screening and brief interventions for alcohol use disorders in managed care settings. *Recent Developments in Alcohol*, 15, 393-416.

- GORDON, A. J., MAISTO, S. A., MCNEIL, M., KRAEMER, K. L., CONIGLIARO, R. L., KELLEY, M. E., & CONIGLIARO, J. (2001) Three questions can detect hazardous drinkers. *Journal of Family Practice*, 50, 313-320.
- KITCHENS, J. M. (1994) Does this patient have an alcohol problem? *Journal of the American Medical Association*, 272, 1782-1787.
- KNIGHT, J., SHERRITT, L., HARRIS, S., GATES, E., & CHANG, G. (2003) Validity of brief alcohol screening tests among adolescents: a comparison of the AUDIT, POSIT, CAGE, and CRAFFT. *Alcoholism: Clinical and Experimental Research*, 27, 67-73.
- NATIONAL INSTITUTE ON ALCOHOL ABUSE AND ALCOHOLISM. (1995) *The physician's guide to helping patients with alcohol problems*. (DHHS NIH Pub. No. 95-3769) Washington, DC: U.S. Government Printing Office.
- NEVITT, J., LINDAK, J., & GALARDI, G. (2006) A profile of adolescent alcohol offenders in two rural midwestern counties. *Psychological Reports*, 98, 379-384.
- O'BRIEN, M. C., MCCOY, T. P., CHAMPION, H., MITRA, A., ROBBINS, A., TEUSCHLER, H., WOLFSON, M., & DURANT, R. H. (2006) Single question about drunkenness to detect college students at risk for injury. *Academy of Emergency Medicine*, 13, 629-636.
- REINERT, D., & ALLEN, J. (2002) The Alcohol Use Disorders Identification Test (AUDIT): a review of recent research on alcoholism. *Clinical and Experimental Research*, 26(2), 272-279.
- SAUNDERS, J. B., AASLAND, O. G., BABOR, T. E., DE LA FUENTE, J. R., & GRANT, M. (1993) Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption: II. *Addiction*, 88, 791-804.
- STEINBAUER, J. R., CANTOR, S. B., HOLZER, C. E., & VOLK, R. J. (1998) Ethnic and sex bias in primary care screening tests for alcohol use disorders. *Annals of Internal Medicine*, 129, 353-362.

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