ALCOHOL RESEARCH UK

Accuracy of Alcohol Use Disorders Identification Test (AUDIT) for detecting problem drinking in 18-35 year-olds in England

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Key findings

- The AUDIT screening test was accurate for the assessment of hazardous drinking, DSM-IV alcohol abuse and alcohol dependence, and DSM-V alcohol use disorders in the study sample. The AUDIT-C screening test had a similar accuracy profile to full AUDIT for the identification of hazardous drinking.

- The optimal cut-points for identifying hazardous drinking using AUDIT scores were 9 (men) and 4 (women).

- The optimal cut-points for identifying DSM-IV alcohol abuse were 10 (men) and 5 (women)

- The optimal cut-points for identifying DSM-IV alcohol dependence were 12 (men) and 7 (women)

- The optimal cut-points for identifying DSM-5 alcohol use disorders were 10 (men) and 6 (women)

- In all cases lower cut-points improved sensitivity (i.e. were more likely to capture all drinkers in the relevant categories), while higher cut-points improved specificity (i.e. were less likely to lead to 'false positives')

- Following AUDIT screening, GPs could use web-based programmes to calculate probabilities and use these in feedback and dialogue with patients, rather than relying on fixed cut-points to identify risk.

Research team

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Background

The accuracy of screening tests for identifying problem drinkers in primary care settings has recently been evaluated in an International Cochrane Collaboration systematic review and meta-analysis (Smith et al., 2014). This review found that AUDIT (Babor et al., 2001) had good accuracy for identifying alcohol abuse or dependence, and that the short-form AUDIT-C had good accuracy for identification of hazardous drinking. But this Cochrane review did not include any studies for a UK primary care population that focused on young adults aged 18-35 years or that included women.

In this accuracy study we:

1. Assessed the accuracy of the AUDIT and AUDIT-C for the detection of hazardous drinking, alcohol abuse (DSM-IV), alcohol dependence (DSM-IV) and alcohol use disorders (DSM-5) with young adults in a UK primary care population using ROC analysis and suggested optimal cut-point threshold scores

2. Calculated probability estimates for each discrete test score using Bayes' Theorem (Foxcroft et al., 2009).

Method

This was a method comparison study, with 14 primary care practices in the Thames Valley area of England. Using a systematic sampling protocol, a selection of 14,480 adults aged 18-35 years were sent a 30-item General Lifestyle Questionnaire (GLQ) that included the 10-item AUDIT, to complete and return. All patients, regardless of AUDIT score, were also invited to participate in a telephone interview following return of the questionnaire.

Telephone interviews were conducted within 14 days by trained researchers who were blind to AUDIT responses and score, using (a) Time-Line Follow-Back (TLFB) to ascertain quantity and frequency of alcohol consumption in the previous 90 days (Sobell et al., 1988; Sobell et al., 1992), and (b) World Mental Health Composite International Diagnostic Interview (WMH-CIDI) to assess alcohol abuse, alcohol dependence and alcohol use disorders (Robins et al., 1988).

Quantity of alcohol ascertained via TLFB, was standardized into UK units. Hazardous drinking was defined as exceeding recommended drinking levels: 14 (women) or 21 (men) units of alcohol in any one week; or 2 (women) or 3 (men) units a day for five days in any one week (Royal College of Physicians, 2011). Alcohol abuse and alcohol dependence variables using DSM-IV criteria (American Psychiatric Association, 1994) were created from WMH-CIDI data using algorithms provided by the WHO WMH-CIDI Centre at Harvard University. The new DSM-5 (American Psychiatric Association, 2013) alcohol use disorders (AUD) variable was created from WMH-CIDI data by the authors (code available on request).

ROC curves, sensitivity, specificity, positive and negative predictive values and positive likelihood ratios were calculated, along with 95% confidence intervals. An unweighted and two weighted Youden J Index scores were also calculated to indicate potential optimal threshold (cut-point) test scores. We used Bayes Theorem to calculate post-test probability by reference test, index test and gender.

Findings

Of the 14,480 patients invited to participate in the study, 1,022 (7.1%) patients consented by returning the GLQ. Of these, 626 (61.3%) also consented to be interviewed. We completed 420 (138 men and 282 women) telephone interviews within our target timeframe of two-weeks following return of the GLQ. Comparing our achieved sample (N=420) with Lower Layer Super Output Area Index of Multiple Deprivation (IMD) quintiles for England (2007), most respondents (53%) came from the lowest deprivation quintile; only 10% were from the two highest deprivation quintiles. The majority were white (86%), and 25% were aged 18-24, 32% aged 25-29 and 43% aged 30-35.

Using TLFB reference standard data, 49% (67) men and 51% (144) women were classified as hazardous drinkers. Using WMH-CIDI reference standard data, 36% (49) men and 19% (53) women were classified positive for DSM-IV alcohol abuse, 13% (18) men and 8.5% (24) women were classified positive for DSM-IV alcohol dependence, and 52% (72) men and 40% (112) women were classified positive for DSM-5 AUD (none vs. mild/moderate/severe).

Table 1 presents the area under the curve (AUC) for the AUDIT and AUDIT-C tests for hazardous drinking in men and women. The AUCs with respective 95% CIs indicate that both tests have good or very good accuracy for the respective reference standard with no evidence of a difference between the two tests for hazardous drinking. The AUC for alcohol abuse, alcohol dependence and AUD, with 95% CIs, is also shown
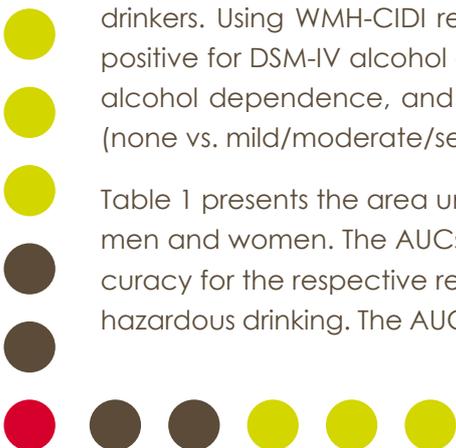
in the Table, and indicates that AUDIT is a good or very good accuracy test for dependence and AUD, but less so for abuse (sufficient accuracy).

Optimal cut-points for identification of hazardous drinking using AUDIT were nine and four for men and women, respectively. The optimum cut-point decreased to five and two when weighting favoured sensitivity, and increased to eleven and seven when weighting favoured specificity, for men and women, respectively.

| Reference Standard Measure	MALES (n=138)		FEMALES (n=282)	
	AUDIT AUC (95% CI)	AUDIT-C AUC (95% CI)	AUDIT AUC (95% CI)	AUDIT-C AUC (95% CI)
TLFB Hazardous Drinker	0.79 (0.73-0.85)	0.82 (0.76-0.88)	0.84 (0.79-0.88)	0.85 (0.82-0.90)
WMH-CIDI DSM-IV Abuse	0.62 (0.54-0.72)	NA	0.65 (0.57-0.72)	NA
WMH-CIDI DSM-IV Dependence	0.77 (0.65-0.87)	NA	0.76 (0.67-0.74)	NA
WMH-CIDI DSM-5 AUD	0.70 (0.60-0.78)	NA	0.73 (0.67-0.78)	NA

Table 1: Area Under the Curve (AUC) for AUDIT and AUDIT-C as predictors of hazardous drinking classification measured using Time-Line Follow Back (TLFB), and AUDIT for classification of DSM alcohol problems measured using the World Mental Health Composite International Diagnostic Interview (WMH-CIDI), in males and females.

Optimal cut-points for identification of DSM-IV alcohol abuse using AUDIT were ten and five for men and women, respectively. The optimum cut-point decreased to five and two when weighting favoured sensitivity, and increased to fifteen and ten when weighting favoured specificity, for men and women, respectively.

Optimal cut-points for identification of DSM-IV alcohol dependence using AUDIT were twelve and seven for men and women, respectively. The optimum cut-point decreased to nine and two when weighting favoured sensitivity, and increased to twelve and eleven when weighting favoured specificity, for men and women, respectively.

Optimal cut-points for identification of DSM-5 AUD (none vs. mild/moderate/severe) using AUDIT were ten and six for men and women, respectively. The optimum cut-point decreased to five and two when weighting favoured sensitivity, and increased to thirteen and eleven when weighting favoured specificity, for men and women, respectively.

Post-test probability curves, for hazardous drinking, DSM-IV alcohol abuse, DSM-IV alcohol dependence, and DSM-5 AUD, along the range of AUDIT scores, are shown in Figure 1
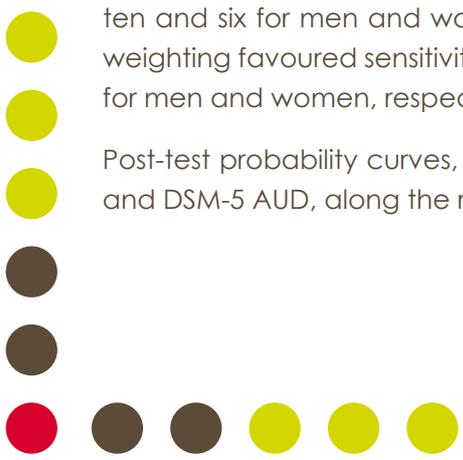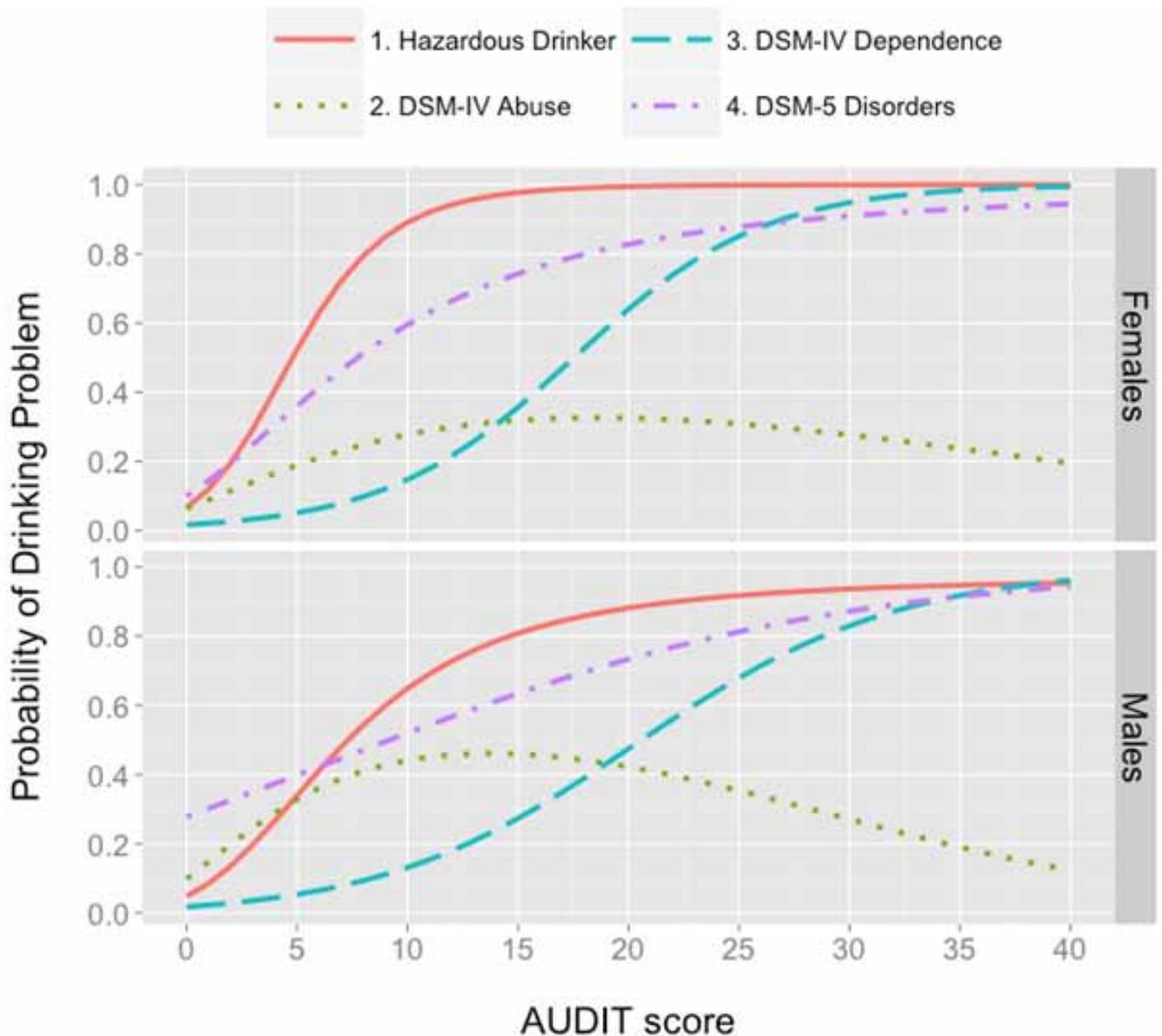
Figure 1: Bayes' Theorem post-test probability estimates for drinking problems in English males and females aged 18-35, according to AUDIT score.

For a male with an AUDIT score of 25, he would have a 0.92 probability of being a hazardous drinker, a 0.35 probability of being an alcohol abuser, a 0.68 probability of being alcohol dependent, and a 0.81 probability of having an alcohol use disorder. For a female with an AUDIT score of 25, she would have a 1.00 probability of being a hazardous drinker, a 0.31 probability of being an alcohol abuser, a 0.85 probability of being alcohol dependent, and a 0.88 probability of having an alcohol use disorder.

Discussion

In this study we found that the AUDIT screening test was accurate for the assessment of reference standard classifications of hazardous drinking, DSM-IV alcohol abuse, DSM-IV alcohol dependence, and DSM-5 AUD in a sample of 18-35 year-old adults from UK primary care. The short-form AUDIT-C had a similar accuracy

profile to the full AUDIT for the detection of hazardous drinking. The response rate was low, and the sample skewed to low deprivation postcodes.

Optimal test thresholds depended on the value attached to minimizing the cost associated with false test results. From a public health paradigm it may be more appropriate to be more tolerant of false positives and use a threshold with higher sensitivity for detecting hazardous drinking, when coupled with brief, low cost and effective interventions.

An alternative approach, using Bayes Theorem, is to calculate the post-test probability for each test score and to use this in feedback and dialogue with screened patients. This approach has the advantage of using all available information rather than collapsing test scores above and below a selected threshold score, and can also take account of varying pre-test probabilities based on known prevalence rates for specific age, gender and other population parameters, and clinical judgment.

Such an approach is entirely feasible using computer- or web-based assessment and feedback technology, and could also address some of the implementation problems that have been identified with alcohol screening and brief intervention in general practice (van Beurden et al., 2012). The feasibility and effectiveness of this approach should be examined in further research.

Further Information

DF & LS jointly conceived and designed the project and analysis. HT and SH collected data and undertook initial analyses. DF undertook the analyses and led the writing for this report.

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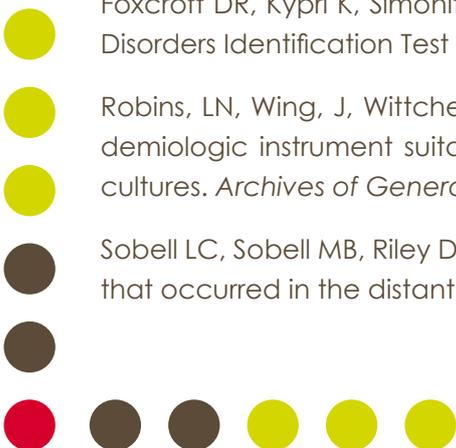
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