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Assessment of readiness to change and relationship to AUDIT score in a trauma population utilizing computerized alcohol screening and brief intervention

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Abstract

Purpose—Trauma patient readiness to change score and its relationship to the Alcohol Use Disorder Identification Test (AUDIT) score were assessed in addition to the feasibility of Computerized Alcohol Screening and Brief Intervention (CASI).

Methods—A bilingual computerized tablet for trauma patients was utilized and the data was analyzed using Stata.

Results—Twenty-five percent of 1,145 trauma patients drank more than recommended and 4% were dependent. As many Spanish-speaking as English-speaking males did not drink, but a higher percentage of Spanish-speaking males drank more than recommended and were dependent. Half of patients who drank more than recommended rated themselves eight or higher on a 10-point readiness-to-change scale. CASI also provided personalized feedback. A high percentage of trauma patients (92%) found CASI easy and a comfort in use (87%).

Conclusion—Bilingual computerized technology for trauma patients is feasible, acceptable, and an innovative approach to alcohol screening, brief intervention and referral to treatment in a tertiary care university.

Keywords

alcohol; screening; brief intervention; computer; trauma

Introduction

Alcohol consumption continues to be a major national public health issue. Excessive alcohol use is the leading cause of death in motor vehicle crashes and is a major lifestyle-related cause of death in the United States [1,2]. Patients hospitalized due to alcohol-related injuries

are more than twice as likely to be readmitted for further alcohol-related injuries and almost twice as likely to perish from subsequent alcohol-related injuries [3].

Standard of Care

In response to the problem, the American College of Surgeons (ACS) has stipulated that trauma centers have a mechanism to identify patients with alcohol use disorders and use the “teachable moment” generated by injury to establish a brief intervention strategy [4]. This method known as Screening, Brief Intervention, and Referral to Treatment (SBIRT) is currently required in all level I and II trauma centers. SBIRT uses an Alcohol Use Disorders Identification Test (AUDIT) developed by the World Health Organization and a brief negotiated interview (BNI) provided by nurses or physicians. Screening for alcohol use disorders with brief intervention and referral to treatment has demonstrated a reduction in alcohol consumption and injury recidivism [3, 5, 6]. Barriers to traditional SBIRT screening exist include language, administration time, and staff training [7]. Due to these barriers, a more feasible and cost effective method to provide these screenings was developed at the UC Irvine Medical Center.

Current CASI system

The current system for screening at UC Irvine Medical Center utilizes computerized alcohol screening and brief intervention (CASI), which has proven to be effective alone in previous studies at the Emergency Department patient population. [6,7] Although the success of computerized alcohol screening has been documented in Emergency Departments at many sites [6, 8, 9, 10], there is a need for study of this tool among trauma and Latino populations.

Starting in April 2009, a CASI tablet computer was used to screen 1,145 trauma patients. Computer technology has shown promise and gained acceptability in the ED setting as an alcohol screening and brief intervention with referral to treatment tool but little information is available for use in trauma patients. When integrated into routine healthcare, tablet computers provide privacy, consistency in approach, and as well as the possibility of capturing information across a spectrum of different populations [11]. Furthermore, with the tablet's ability to translate audio and text interface to different languages, touch screen capabilities, and its portability with wireless internet technology, this modality is easy to use by low-literacy, inexperienced users, severely injured patients, and hard-to-reach populations [6, 8, 12].

The goal of this study was to assess readiness to change and its relationship to the Alcohol Use Disorders Identification Test (AUDIT) score, frequency, and quantity of drinks in the trauma population. This mode of identification of alcohol use implemented a bilingual computerized alcohol screening and brief intervention, which then led to a referral to treatment. The use of computers is becoming a viable method for alcohol screening, intervention, and counseling [6-8]. Their feasibility and acceptability as an effective alcohol screening tool have shown promise in the emergency department (ED) setting [6-11]. However, more information is needed to ascertain if CASI with referral to treatment is as feasible and acceptable in trauma patients as it is in ED patients.

Methods

Study Design

This was a descriptive study of a convenience sample of trauma patients participating in computerized alcohol screening, brief intervention, and referral to treatment in one tertiary care university hospital.

CASI tablet

The CASI modality consists of a bilingual (English and Spanish) audio-graphical interface software program that was up-loaded onto a mobile tablet computer and administered at the bedside of stable trauma patients in the ED and in-patient trauma units. CASI uses dynamic text, touch screen technology, and offers a text-to-speech option. Headphones with Bluetooth technology are also available for patient privacy. A personalized alcohol-reduction plan, along with counseling referral information, was wirelessly printed on department printers.

The alcohol screening section of CASI was developed based on the AUDIT adapted for use in the US by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). CASI uses logical branching to decrease the screening interview for non-drinkers and drinkers whose alcohol consumption was within recommended limits established by NIAAA. These limits are defined as no more than four drinks in a day and no more than 14 drinks in a week for men ages 64 years and younger, and no more than three drinks in a day and no more than seven drinks in a week for women and men age 65 years and older.

At-risk patients are defined as those who drink more than NIAAA recommended limits and have an AUDIT score of 19 or less. They received a computer-guided brief negotiated interview, including personalized feedback, readiness to change, reasons for cutting down, goal setting, and a printed personal alcohol reduction plan [6, 8]. Readiness to change was assessed using an on-screen ruler marker from from 1 to 10 (1 being “not at all ready” and 10 being “extremely ready”) [13]. Patients consistent with alcohol dependency with an AUDIT score of 20 or more received a consultation with a social worker.

Study Setting and Population, Study Protocol, Measurement

Patients were recruited by research associates (undergraduate students trained in clinical research methods and in the use of CASI) in the ED and trauma units. Research associates were required to screen eligible trauma patients seven days a week, without interfering with patient care. All adult trauma patients (as defined by trauma activation criteria in Table 1) were eligible for CASI. Exclusion criteria included medical instability, in current custody or on psychiatric hold, and intoxication. CASI recorded patients' responses, length of time with the module, drinks per day, drinking days per week, the AUDIT score, and readiness to change. In addition, during the research associates implementation a quality-of-assurance survey assessing acceptability of CASI was administered to both English and Spanish-speaking patients. The university's Human Subjects Research Institutional Review Board reviewed and approved the study. All patients gave consent and signed the IRB approved consent form prior to performing this assessment.

Data Analysis

Data was analyzed using Stata (version 10.1; StataCorp, College Station, TX). Results were compared by demographic groups using the chi-square test for independence. Medians and interquartile ranges were used to summarize the data.

Results

A total of 1,145 trauma patients were screened (55% of all trauma patients eligible for CASI) from April 2009 through September 2010. Their characteristics are shown in Table 2. Median age was 38. There was approximately twice the number of males as females. Twelve percent selected the Spanish-language option when taking CASI. Overall, 41% were non-drinkers, 34% drank within recommended limits, 21% were at risk, and 4% had an AUDIT score consistent with alcohol dependency.

As shown in Figure 1, 48% of screened underage drinking patients (ages 18-20) did not drink, 29% were at risk, and less than one percent screened likely dependent. Furthermore, 26% of screened patients aged 21-24 did not drink, 36% were at risk, and 4% were likely dependent. Non-drinking increased in the older patients and the risk for alcohol use decreased with age. Subjects aged 65 or older were 66% non-drinkers, 5% were at risk, and none had scores consistent with dependence. Although at-risk drinking decreased with age, 8% of patients 40-49 years had AUDIT scores consistent with alcohol dependency.

Race & Gender

The patients screened in Spanish exhibited considerable gender differences: 42% of Spanish-speaking males and 14% of Spanish-speaking females screened in the at-risk group (Figure 2). Males who screened in Spanish scored the highest percent of AUDIT scores that are consistent with alcohol dependency (9%). Females screened in Spanish had no AUDIT scores consistent with alcohol dependency and exhibited the highest percent of non-drinkers (68%).

Considerable differences in gender were exhibited in drinking frequency: 23% of males declared drinking two or more days a week and 10% of females declared the same frequency (Figure 3). English-speaking males had the highest frequency (7%) of drinking four days or more a week, followed by English-speaking females (5%) and Spanish-speaking males (4%) in the same frequency group. Spanish-speaking females exhibited the lowest drinking frequency with 84% declaring drinking monthly or less, and no Spanish-speaking females reporting drinking four days or more a week.

Thirty-two percent of Spanish-speaking males revealed drinking quantities above the NIAAA recommended limit when they drink in a typical day, the highest of the four groups (Figure 4). Furthermore, 12% of English-speaking males and 12% of Spanish-speaking females revealed drinking above the NIAAA recommendations. Only 4% of English-speaking females reported drinking above the NIAAA recommendation on a typical drinking day.

Readiness to Change Score

Analyses of readiness-to-change score revealed no significant difference ($p > .05$) among age, gender, and language (Figure 5). Most patients (50%) seemed to be ready to change after obtaining CASI information by scoring 8-10 in the 1-10 scale of readiness ruler. Sixty-seven percent Spanish-speaking females reported a high level of readiness to change (score 8-10) in the 1-10 scale of the readiness ruler, followed by English-speaking females (60% scored 8-10), and Spanish-speaking males (58% scored 8-10). English-speaking males exhibited the lowest percent (46%) in the readiness to change score of 8-10.

Feasibility

Analyses of length of time to complete CASI showed that the median time for patients within NIAAA recommended limits was three minutes, and for patients exceeding NIAAA recommended limits (these patients received both AUDIT and brief intervention) nine minutes. For patients with AUDIT scores consistent with alcohol dependency (AUDIT 20), the median time was four minutes (these patients only completed the AUDIT section).

Research associates surveyed 89 trauma patients after completing CASI, (69 in English and 20 in Spanish) on using CASI as a survey tool. Patients were assessed using an evaluation survey using a 1 to 10 scale. Eight or more on the 10-point scale was considered strong agreement to the question. Ninety-two percent found CASI easy to use (eight or more on a 10-point scale). Eighty-seven percent were more comfortable answering the questions on a

computer. Forty percent preferred to have a computer ask the questions, 30% preferred a person, and 30% had no preference. Fifty-three percent declared that it was easier to be honest with a computer than a person. Sixty-six percent found the CASI recommendations were relevant to them. Forty-eight percent declared that they would change their drinking behavior as a result of taking CASI. No significant difference was observed by language, gender, or age.

Discussion

Results show that CASI was equally acceptable across gender, language, and age of all trauma patients surveyed after administration. Almost all (92%) patients found CASI easy to use, and 87% felt more comfortable answering questions on a tablet computer.

Although it is difficult to determine the accuracy of patient answers, previous research has shown that due to a computer's anonymity, patients tend to provide more honest answers and are more likely to reveal sensitive personal information to a computer rather than to a human interviewer [6, 14]. Our survey showed that most patients preferred a tablet computerized interviewer and that it was easier to be more honest with this modality. We believe that self-reported data using tablet computer technology can determine risk and its capabilities make CASI a feasible and acceptable tool for use in trauma patients.

CASI was able to identify differences in levels of risk, frequency and quantity of drinks by age, gender, and language in the trauma patients. Our results indicated that males exhibited higher drinking frequencies compared to female patients. At-risk levels decreased in older patients, while the highest AUDIT scores consistent to alcohol dependency were seen in patients aged 40-49. Our results seem to reflect national statistics; men exhibit higher amounts of alcoholic drinking prevalence and frequency compared to women and alcohol drinking decreases with increasing age [15]. This confirms the importance of identifying drinking variations between age and gender [16].

This study found that Spanish-speaking males exhibited the highest percentage of likely to be dependent, yet they declared not drinking as frequently as English-speaking males. However, a significant percentage of Spanish-speakers drank above the NIAAA recommended limits. Finally, Spanish-speaking females reported no AUDIT scores consistent with alcohol dependency and the lowest frequency of drinking compared to all groups, but when they did drink they exhibited a significant percent above the NIAAA recommendations. Half of the patients who drank more than recommended, rated themselves 8 or higher on a 10-point readiness-to-change scale. There were no significant differences among age, gender, and language. Although literature shows that full AUDIT with a readiness-to-change ruler is an effective tool for measuring readiness-to-change alcohol use behavior in primary care, more information is needed for its use in trauma patients and different ages, gender, and language [17, 18].

Despite the small Spanish-speaking sample, CASI was able to identify patients with different drinking frequencies, specifically patients with episodic heavy drinking habits. This finding is something previous studies recommended when screening patients for alcohol use [16, 19]. Ethnic and gender differences in alcohol-use patterns could be the result of differences in social or cultural factors such as drinking norms and attitudes [20]. Similar results have been shown among ED patient populations and national data. Other studies report that national alcohol drinking (above NIAAA recommendation) prevalence among non-Hispanic whites is significantly higher than the prevalence for Hispanics [15, 21]. This validates the need for further adaptation and implementation of alcohol screening and brief intervention tools, such as CASI, to be tailored to suit different languages, cultures,

ages, and medical settings beyond the ED [6, 8, 20, 22]. Social and cultural factors could be looked at more thoroughly with future minor refinements to CASI.

Limitations

There are several limitations to be mentioned. First, the external validity of our findings to the general population or to other in-patient trauma units and EDs is limited, given that ours was a convenience sample of trauma patients in one tertiary care university hospital. Patients who were impaired, in custody, medically unstable, on a psychiatric hold, or who did not speak English or Spanish were excluded from using CASI. Second, the Spanish-speaking population in our area is largely of Mexican origin. We do not know if the same drinking patterns would be found in other Spanish-speaking populations. While the CASI program was only offered English and Spanish, programming could be adapted to other languages to capture a greater diversity of patients. Since we do not know which patients refused CASI or were not approached by research associates, the possibility of selection bias cannot be excluded. Despite these limitations, our study indicated that the use of a bilingual computerized tablet in trauma patients for delivery of alcohol screening, brief intervention, and referral to treatment shows promise.

CASI is an innovative approach to alcohol screening, brief intervention and referral to treatment (SBIRT) in trauma units. SBIRT has shown promise as a beneficial and cost-effective tool in the ED setting [6, 8, 11, 16, 18, 23], and it seems to be feasible and acceptable in trauma centers committed to its implementation [24, 25]. Moreover, the use of tablet computer technology seems like a logical next step for SBIRT. Tablet computer technology offers a cost-effective, efficient way to capture and screen more patients, thus freeing up resources that could be allocated appropriately to patients more in need of them. Most of our patients completed CASI in a reasonable amount of time. In addition, clinical providers can use CASI to assist patients to negotiate a change in health-risk behaviors due to alcohol use. With minor modifications, this program could be a robust tool adaptable to different trauma centers, thereby fulfilling the ACS mandate that Level I and II trauma centers implement an alcohol screening and brief intervention program as part of routine trauma care. More research with randomized control trials is needed to determine the effectiveness of computerized brief negotiated interviewing in reducing alcohol risk among trauma patients.

Conclusions

Our study suggests that bilingual computerized technology is feasible, acceptable, and an innovative approach to alcohol screening, brief intervention and referral to treatment in a busy tertiary care university for trauma patients. CASI was able to assess readiness to change and its AUDIT score relationship among trauma patients. Nearly all patients found CASI easy and comfortable to use. Furthermore, CASI was able to identify and provide personalized feedback to trauma patients who drank, were at risk for harmful and hazardous drinking, and those who were likely to be alcohol dependent. Fifty percent of patients who drank more than recommended by the NIAAA rated themselves 8 or higher on a 10-point readiness-to-change scale. CASI is a unique instrument that can be modified to suit any medical setting and patient population with minimal effort and resources.

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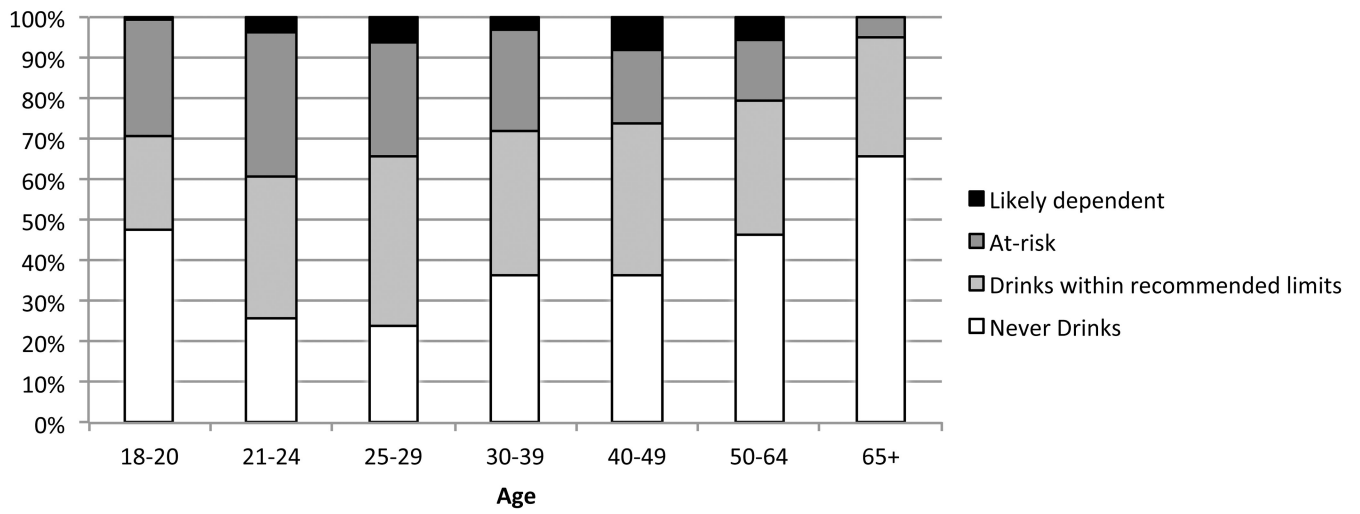


Figure 1. Screening results by age, n = 1,145

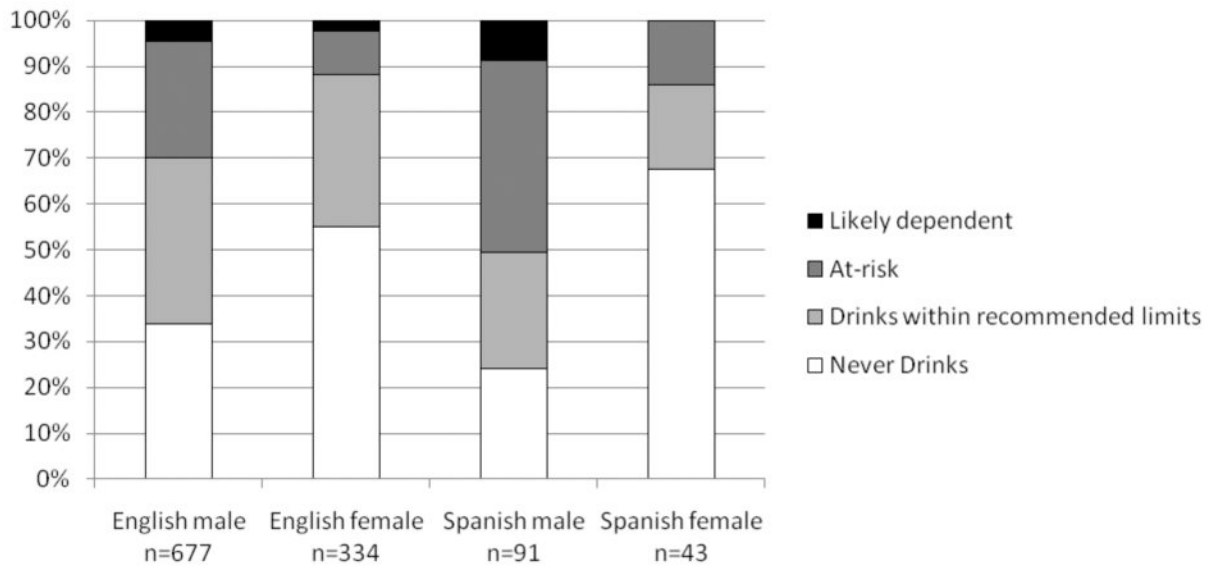


Figure 2. Screening results by gender and language, n = 1,145

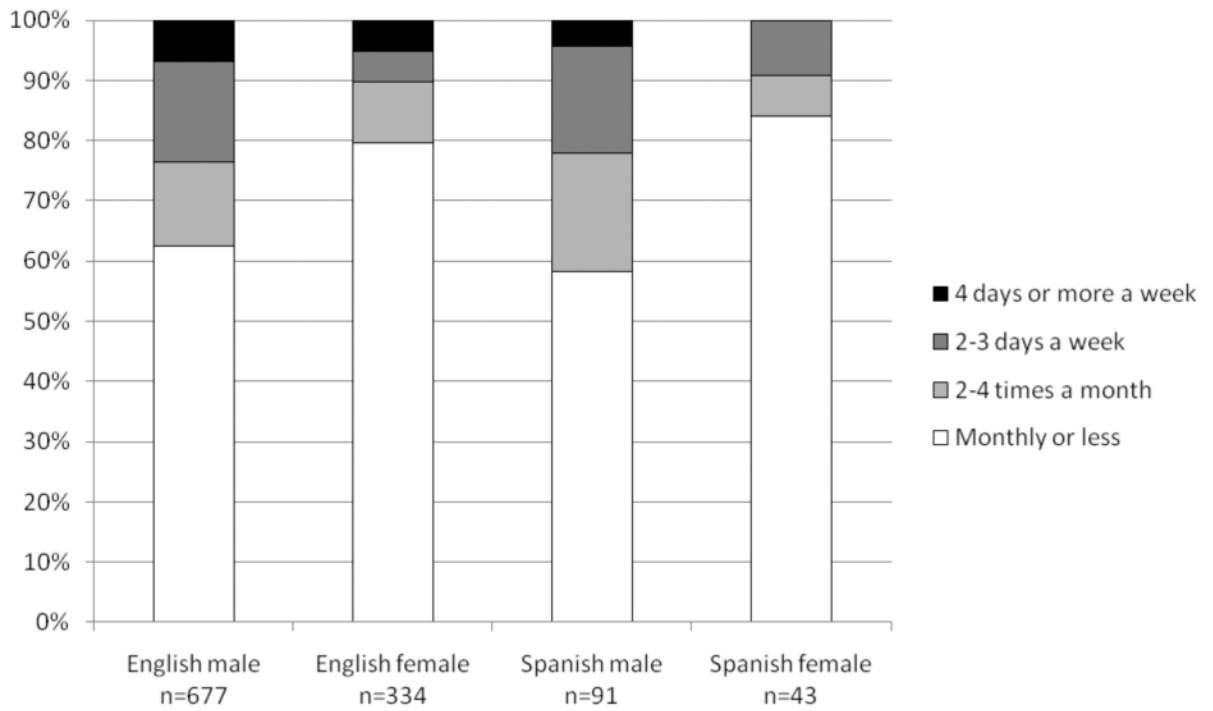


Figure 3. Frequency of alcoholic drink by gender and language, n = 1,145

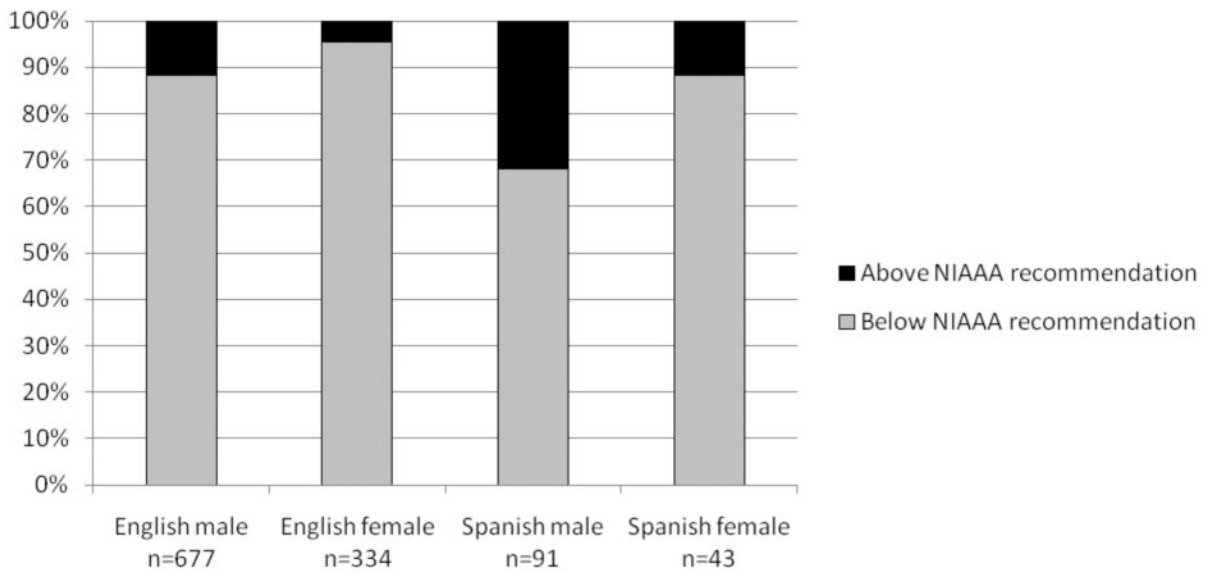


Figure 4. Drinks per drinking day by gender and language, n = 1,145

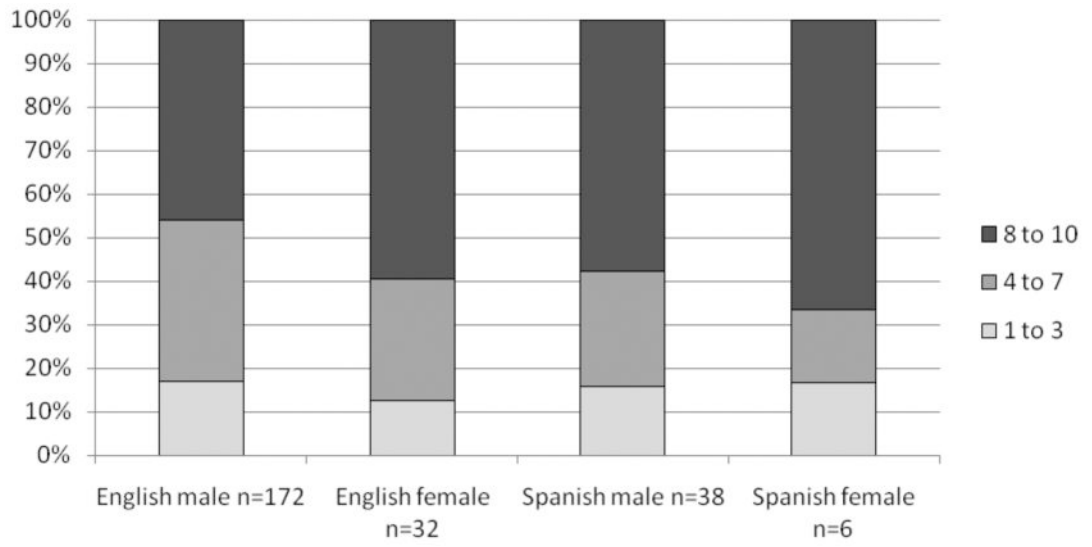


Figure 5. Readiness to change score by gender and language, n = 248

Table 1

Inclusion criteria for trauma victims printed with permission from the University of California, Irvine Medical Center.

Inclusion Criteria for Trauma Victim	
Physical Findings	Mechanism
Diffuse abdominal tenderness	Penetrating injury to extremity above elbow or knee
GCS < 14 in the presence of head injury	Ejection (partial or complete) from vehicle
Bleeding disorder, anticoagulant or anti-platelet medication use	Pedestrian or bicyclist hit at > 20mph or thrown any distance
Pregnancy (Gestation > 20 weeks)	Passenger space intrusion > 12 inches
Suspected spinal injury with sensory deficit or weakness	Motorcycle crash > 20mph including laying down bike Person in same passenger compartment in which trauma death occurred
Seatbelt bruising/abrasions of neck, chest, abdominal	Adult: Falls > 15 feet Child: Fall > 10 feet or 2-3 times child's height.

Table 2
Characteristics of Patients Screened, n = 1,145

	Number	Percentage
Age		
18-20	136	12%
21-24	152	13%
25-29	135	12%
30-39	170	15%
40-49	177	15%
50-64	223	20%
65 +	152	13%
Sex		
Male	768	67%
Female	377	33%
Language		
English	1,011	88%
Spanish	134	12%
Screening Result		
Never drinks	465	41%
Drinks within recommended limits	386	34%
At-risk	248	21%
Likely dependent	46	4%