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Number XX

Screening, Behavioral Counseling, and Referral in Primary Care to Reduce Alcohol Misuse

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Preface

The Agency for Healthcare Research and Quality (AHRQ) conducts the Effective Health Care Program as part of its mission to organize knowledge and make it available to inform decisions about health care. As part of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, Congress directed AHRQ to conduct and support research on the comparative outcomes, clinical effectiveness, and appropriateness of pharmaceuticals, devices, and health care services to meet the needs of Medicare, Medicaid, and the Children's Health Insurance Program (CHIP).

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Systematic reviews are the building blocks underlying evidence-based practice; they focus attention on the strength and limits of evidence from research studies about the effectiveness and safety of a clinical intervention. In the context of developing recommendations for practice, systematic reviews are useful because they define the strengths and limits of the evidence, clarifying whether assertions about the value of the intervention are based on strong evidence from clinical studies. For more information about systematic reviews, see http://www.effectivehealthcare.ahrq.gov/reference/purpose.cfm

AHRQ expects that CERs will be helpful to health plans, providers, purchasers, government programs, and the health care system as a whole. In addition, AHRQ is committed to presenting information in different formats so that consumers who make decisions about their own and their family's health can benefit from the evidence.

Transparency and stakeholder input from are essential to the Effective Health Care Program. Please visit the Web site (http://www.effectivehealthcare.ahrq.gov) to see draft research questions and reports or to join an e-mail list to learn about new program products and opportunities for input. Comparative Effectiveness Reviews will be updated regularly.

We welcome comments on this CER. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by e-mail to epc@ahrq.hhs.gov.

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Key Informants are the end users of research, including patients and caregivers, practicing clinicians, relevant professional and consumer organizations, purchasers of health care, and others with experience in making health care decisions. Within the EPC program, the Key Informant role is to provide input into identifying the Key Questions for research that will inform healthcare decisions. The EPC solicits input from Key Informants when developing questions for systematic review or when identifying high priority research gaps and needed new research. Key Informants are not involved in analyzing the evidence or writing the report and have not reviewed the report, except as given the opportunity to do so through the peer or public review mechanism.

Key Informants must disclose any financial conflicts of interest greater than $10,000 and any other relevant business or professional conflicts of interest. Because of their role as end-users, individuals are invited to serve as Key Informants and those who present with potential conflicts may be retained. The Task Order Officer and the EPC work to balance, manage, or mitigate any potential conflicts of interest identified.

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Screening, Behavioral Counseling, and Referral in Primary care to Reduce Alcohol Misuse

Structured Abstract

Objectives: To assess the effectiveness of screening followed by behavioral counseling for adolescents and adults with alcohol misuse in primary care settings.

Data Sources: MEDLINE, Embase, the Cochrane Library, CINAHL, PsycINFO. Additional studies were identified from reference lists and technical experts.

Review Methods: Two people independently selected, extracted data from, and rated the quality of relevant trials and systematic reviews. Quantitative analyses were conducted for outcomes when feasible and used subgroup analyses to explore whether results differed by intensity, sex, country, person delivering the counseling, or setting. Two reviewers graded the strength of evidence (SOE) using established criteria.

Results: A total of 23 trials and 6 systematic reviews were included. The trials generally enrolled subjects with risky/hazardous or harmful drinking, usually excluding those with alcohol dependence. For adults receiving counseling interventions, we found a reduction of 3.6 drinks per week (WMD, 3.6, 95% CI, 2.4 to 4.8) compared with those in control groups and an 11 percent increase (WMD, 0.11, 0.08 to 0.13) in the percentage achieving recommended drinking levels over 12 months (*moderate* SOE). Interventions also improved some utilization outcomes (e.g., hospital days and costs: *low SOE*). For most health outcomes, available evidence either demonstrated no difference between interventions and controls (e.g., mortality: *low SOE*) or was insufficient to draw conclusions (e.g., alcohol-related liver problems: *insufficient SOE*). The best evidence of effectiveness is for brief (up to 15 minutes) multi-contact interventions. The NNS to get 1 adult from risky/hazardous to recommended levels over 12 months with a brief multi-contact counseling intervention ranged from 23 to 167.

For older adults, trials provided evidence of effectiveness, but effect sizes were smaller than for all adults. Trials enrolling college students provided evidence of effectiveness for reducing consumption and binge drinking (*moderate* SOE) and some accident, utilization, and academic outcomes (*low*, *low* and *moderate* SOE, respectively). Studies in adults found benefits lasting up to 3 years; for college students, some benefits found at 6 months were not maintained at 12 months. The one study enrolling pregnant women did not find a significant difference for reduction in consumption. Evidence was insufficient for adolescent populations.

Conclusions: Behavioral counseling interventions improve intermediate outcomes and some health care utilization outcomes for adults with risky/hazardous and harmful drinking. For most health outcomes, available evidence either found no difference between interventions and controls or was insufficient to draw conclusions. The best evidence of effectiveness is for brief multi-contact interventions.

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Executive Summary

Background

Alcohol misuse, which includes the full spectrum from drinking above recommended limits (i.e., risky/hazardous drinking) to alcohol dependence,[1-3] is associated with numerous health and social problems and more than 85,000 deaths per year in the United States [4,5] and an estimated annual cost to society of more than $140 billion.[6] Alcohol misuse is estimated to be the third leading cause of preventable mortality in the United States following tobacco use and being overweight.[7] Alcohol misuse contributes to a variety of conditions, including hypertension, cirrhosis, gastritis and gastric ulcers, pancreatitis, breast cancer, neuropathy, cardiomyopathy, anemia, osteoporosis, cognitive impairment, depression, insomnia, anxiety, and suicide.[8,9] Excessive alcohol consumption is a major factor in trauma-related injury and violence.[10]

Definitions of the spectrum of alcohol misuse (i.e., unhealthy alcohol use[3]) continue to evolve. For the purposes of this report, we will use the definitions described in Table ES-1.

Table ES-1. Definitions of the spectrum of alcohol misuse

Risky or hazardous use	Consumption of alcohol above recommended daily, weekly, or per occasion amounts[5]
Harmful use[11,12]	A pattern of drinking that is already causing damage to health. The damage may be either physical (e.g., liver damage from chronic drinking) or mental (e.g., depressive episodes secondary to drinking)
Alcohol abuse[13]	A. A maladaptive pattern of alcohol use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12-month period: (1) recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, or home (e.g., repeated absences or poor work performance related to alcohol use; alcohol-related absences, suspensions, or expulsions from school; neglect of children or household); (2) recurrent alcohol use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired); (3) recurrent alcohol-related legal problems (e.g., arrests for alcohol-related disorderly conduct); or (4) continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol (e.g., arguments with spouse about consequences of intoxication, physical fights). B. The symptoms have never met the criteria for Alcohol Dependence.
Alcohol dependence[13] (alcoholism, alcohol addiction)	A maladaptive pattern of alcohol use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period: (1) tolerance, as defined by either of the following: (a) a need for markedly increased amounts of alcohol to achieve intoxication or desired effect (b) markedly diminished effect with continued use of the same amount of alcohol (2) withdrawal, as manifested by either of the following: (a) the characteristic withdrawal syndrome for alcohol (b) alcohol (or a closely related drug) is taken to relieve or avoid withdrawal symptoms; (3) alcohol is often taken in larger amounts or over a longer period than was intended; (4) there is a persistent desire or unsuccessful efforts to cut down or control alcohol use; (5) a great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects; (6) important social, occupational, or recreational activities are given up or reduced because of alcohol use; (7) alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol (e.g., continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

Though estimating the prevalence of alcohol misuse is challenging, it has been estimated that 40-50 percent of the U.S. population are affected, with the majority of these individuals engaging in what is considered risky drinking.[3] A range of risky drinkers from 4 percent to 29 percent has been found across primary care populations, with prevalence estimates of 0.3 to 10.0 percent for harmful drinkers and 2.0 to 9.0 percent for alcohol dependence.[14] Alcohol dependence has lifetime prevalence rates on the order of 17 percent for men and 8 percent for women.[15] Rates of alcohol-use disorders among medical outpatients are similar to those seen in the general population and are generally higher in males and younger people of all races/ethnicities.[14,16]

The National Institute on Alcohol Abuse and Alcoholism (NIAAA) has proposed epidemiologically based alcohol use guidelines to limit risks for drinking-related consequences by establishing age- and sex-specific recommended consumption thresholds.[17] Maximum recommended consumption is 1 or fewer standard drinks per day for adult women and for anyone older than 65 years of age, and 2 or fewer standard drinks per day for adult men. A standard drink is defined as one 12-ounce bottle of beer, one 5-ounce glass of wine, or 1.5 ounces of distilled spirits.[18,19] These guidelines do not apply to people (such as adolescents, pregnant women, and people with alcohol dependence or medical conditions or medication use) for whom alcohol intake is contraindicated, or to circumstances (driving) in which no consumption is considered safe.

Screening and Behavioral Counseling

Several screening questionnaires can be used to identify alcohol misuse. The most commonly studied instruments include the Alcohol Use Disorders Identification Test (AUDIT) and its abbreviated versions (e.g., the AUDIT-C), the CAGE questionnaire (Cut-down, Annoyed, Guilty, Eye-opener), the Michigan Alcoholism Screening Test (MAST), and versions of the single-question screening recommended by NIAAA, also called the Single Alcohol Screening Question (SASQ).

Behavioral interventions and patient education are often used for patients who engage in less severe alcohol misuse (i.e., risky/hazardous/harmful drinking).[5] Brief interventions generally aim to moderate a patient's alcohol consumption to sensible levels and to eliminate harmful drinking practices, rather than to insist on complete abstinence.

Table ES-2. What are brief behavioral interventions delivered in primary care settings?

- Can be defined as "a single session or multiple sessions of motivational discussion focused on increasing insight and awareness regarding substance use and motivation toward behavioral change."[20]
- Range from very brief interventions within a primary care visit to multi-contact interventions that entail multiple, often more lengthy, visits and nonvisit contacts over an extended period.[1]
- Can include the following elements: motivational interviews of varying length and number, cognitive behavioral therapy, self-completed action plans, written health education or self-help materials, requests to keep drinking diaries, written personalized feedback, follow-up telephone counseling, or exercises to complete at home.

The assumption underlying brief behavioral counseling interventions in primary care—if they are effective—is that, for identified risky or harmful drinkers, reducing overall alcohol consumption or adopting safer drinking patterns (that is, fewer drinks per occasion and not drinking before driving) will reduce the risk for medical, social, and psychological problems.[21]

Little experimental evidence supports this assumption, and most epidemiologic evidence relates health outcomes to existing drinking behaviors rather than to changes in drinking behaviors. Cross-sectional and cohort studies have consistently related high average alcohol consumption to short- or long-term health consequences.[19,22] A meta-analysis of studies examining the association between all-cause mortality and average alcohol consumption found that men averaging at least 4 drinks per day and women averaging 2 or more drinks per day experienced significantly increased mortality relative to nondrinkers.[23] Studies also relate heavy per-occasion alcohol use (i.e., binge drinking) to acute injury risks and alcohol-related life problems.[19,22]

The NIAAA and others encourage physicians to identify patients with alcohol-related risks or problems and to provide office-based brief interventions or referrals as needed.[17,24,25] In everyday practice, screening and screening-related assessment procedures are necessary to identify the range of alcohol users in order to offer appropriate treatment.[26,27]

Even so, few primary care clinicians use recommended screening protocols or offer treatment and screening, and treatment rates for alcohol misuse remain low.[27] Most patients who misuse alcohol receive care from their primary care provider, where they represent about one fifth of patients seen, a proportion similar to those seen for diabetes and hypertension.[9]

In 2004, the U.S. Preventive Services Task Force (USPSTF) developed recommendations for screening and behavioral counseling interventions in primary care to reduce alcohol misuse.[28] The summary of the recommendations states as follows:

- The USPSTF recommends screening and behavioral counseling interventions to reduce alcohol misuse by adults, including pregnant women, in primary care settings. Grade: B Recommendation (i.e., The USPSTF recommends that clinicians provide the service to eligible patients. The USPSTF found at least fair evidence that the service improves important health outcomes and concludes that benefits outweigh harms).
- The USPSTF concludes that the evidence is insufficient to recommend for or against screening and behavioral counseling interventions to prevent or reduce alcohol misuse by adolescents in primary care settings. Grade: I Statement (insufficient evidence to make a recommendation).

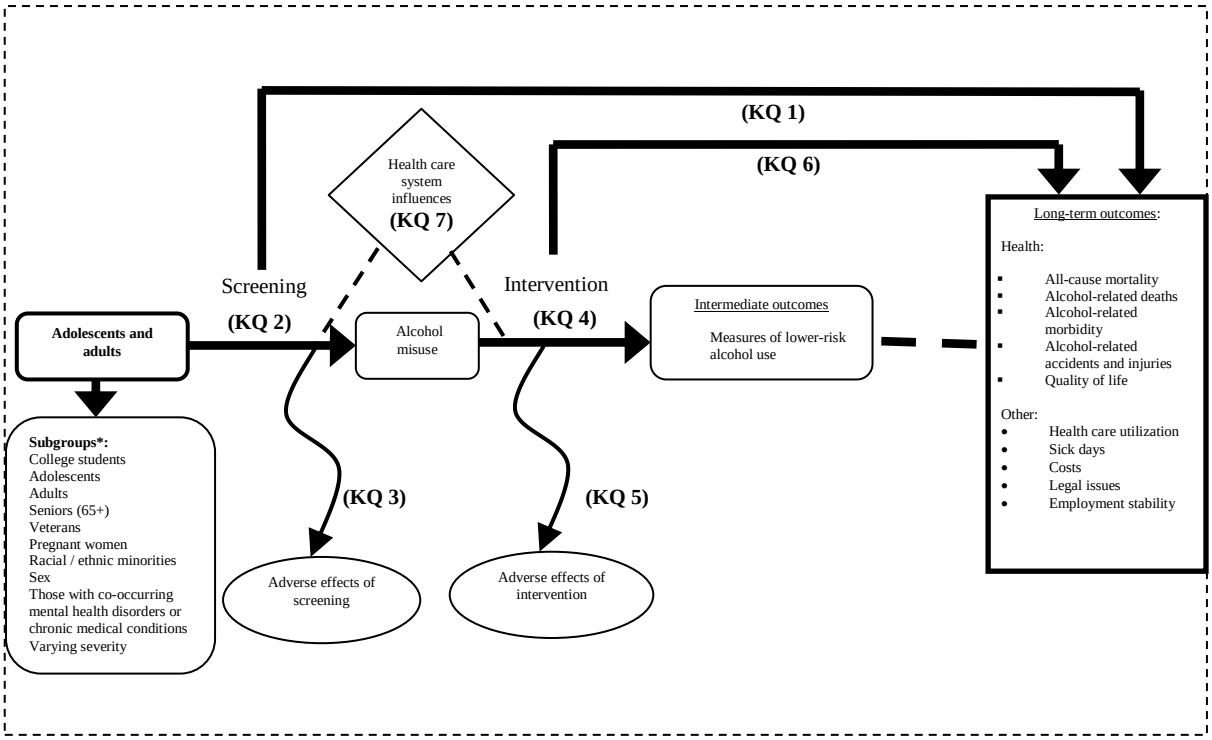
Objective

The main objective for this report is to conduct a systematic review of the effectiveness of screening followed by behavioral counseling, with or without referral, for alcohol misuse in primary care settings, addressing seven questions (Table ES-3). This new review differs from the report on which the USPSTF 2004 recommendations were based in the following ways: we allowed inclusion of screening and behavioral interventions for the full spectrum of alcohol misuse, as long as subjects were identified by screening in a primary care or primary care-like setting; we added referral as an intervention of interest and changed the title to reflect this; we expanded the eligible settings from traditional primary care to also include settings with primary care-like relationships (e.g., infectious disease clinics for people with HIV); and we added additional outcomes of interest to our inclusion/exclusion criteria and analytic framework (Figure ES-1).

Table ES-3. Key Questions (KQs) addressed by this review

KQ 1: What is the direct evidence that screening for alcohol misuse followed by a behavioral counseling intervention, with or without referral, leads to reduced morbidity, reduced mortality, or changes in other long-term (6 months or longer) outcomes (e.g., health care utilization, sick days, costs, legal issues, employment stability)?
KQ 2: How do specific screening modalities compare with one another for detecting alcohol misuse?
KQ 3: What adverse effects are associated with screening for alcohol misuse and screening-related assessment?
KQ 4a: How do behavioral counseling interventions, with or without referral, compare with usual care for improving intermediate outcomes for people with alcohol misuse as identified by screening?
KQ 4b: How do specific behavioral counseling approaches, with or without referral, compare with one another for improving intermediate outcomes for people with alcohol misuse as identified by screening?
KQ 5: What adverse effects are associated with behavioral counseling interventions, with or without referral, for people with alcohol misuse as identified by screening?
KQ 6: How do behavioral counseling interventions, with or without referral, compare with one another and with usual care for reducing morbidity, reducing mortality, or changing other long-term (6 months or longer) outcomes (e.g., health care utilization, sick days, costs, legal issues, employment stability) for people with alcohol misuse as identified by screening?
KQ 7: To what extent do health care system influences promote or hinder effective screening and interventions for alcohol misuse?

Figure ES-1. Analytic framework for screening, behavioral counseling, and referral in primary care to reduce alcohol misuse



Methods

The topic development and refinement processes were guided by the information provided by the topic nominator, a scan of the literature, methods and content experts, and Key Informants. Key Informants and Technical Expert Panel (TEP) members participated in conference calls and

discussions through e-mail to review the analytic framework, KQs, search strategy, inclusion/exclusion criteria, research protocol, and to discuss the literature.

We searched MEDLINE®, Embase, the Cochrane Library, CINAHL®, PsycINFO®, and the International Pharmaceutical Abstracts from January 1, 1985, to February 1, 2011. We used either Medical Subject Headings as search terms when available or key words when appropriate, focusing on terms to describe the relevant population and the screening and behavioral interventions of interest. We limited searches to English language.

We developed inclusion and exclusion criteria with respect to Populations, Interventions, Comparisons, Outcomes, Timing, Settings, and study designs (PICOTS). We included studies enrolling adults and/or adolescents (ages 12 years or older) with alcohol misuse identified by screening in primary care settings or settings with a primary care-type relationship.

For KQ 2, we focused on systematic reviews and meta-analyses, and we did not restrict the publication date. We supplemented the findings with information from other sources to fill in important gaps. For all other KQs, we included controlled trials published in 1985 or later and systematic reviews and meta-analyses published in the last 5 years that directly address our KQs. Studies of at least 6 months' duration were eligible. For KQs 1 and 3, we searched for studies that assigned patients to screening compared with another screening approach, no screening, or usual care. For KQs 4, 5, and 6, we searched for studies that assigned subjects that had a positive screening test to an intervention of interest and to at least one eligible comparator. For KQ 7, studies included in any of the earlier KQs were eligible.

All titles and abstracts identified through searches were independently reviewed by two trained members of the research team. Studies marked for possible inclusion by either reviewer were retrieved for full-text review. Each full-text article retrieved was independently reviewed by two trained members of the team for final inclusion/exclusion. If the reviewers disagreed, conflicts were resolved by discussion with an experienced team member.

We designed and used structured data abstraction forms to extract pertinent information from each included article, including characteristics of study populations, settings, interventions, comparators, study designs, methods, and results. All data abstractions were completed by trained reviewers and then reviewed for completeness and accuracy by a second member of the team.

To assess the quality of studies, we used predefined criteria, rating studies as good, fair, or poor. Two independent reviewers assigned quality ratings for each study. Disagreements between the two reviewers were resolved by consulting an experienced member of the team.

When analyzing data for this report, we stratified evidence by population (adults, older adults, young adults/college students, and pregnant women). Quantitative analyses were conducted of outcomes reported by a sufficient number of studies that were homogeneous enough to justify combining their results. We used subgroup analyses to explore whether results differed by intensity, sex, country, provider delivering the intervention, or setting. The chi-squared statistic and the I^2 statistic were calculated to assess heterogeneity in effects between studies.[29,30] Heterogeneity was also explored through sensitivity analyses. When quantitative analyses were not appropriate (e.g., because of heterogeneity, insufficient numbers of similar studies, or insufficiency or variation in outcome reporting), we synthesized the data qualitatively.

To assess the differential effects of interventions using more or less time and those using single or multiple contacts, we grouped interventions by intensity of counseling, as measured by duration and number of contacts: very brief (up to 5 minutes, single contact), brief (more than 5

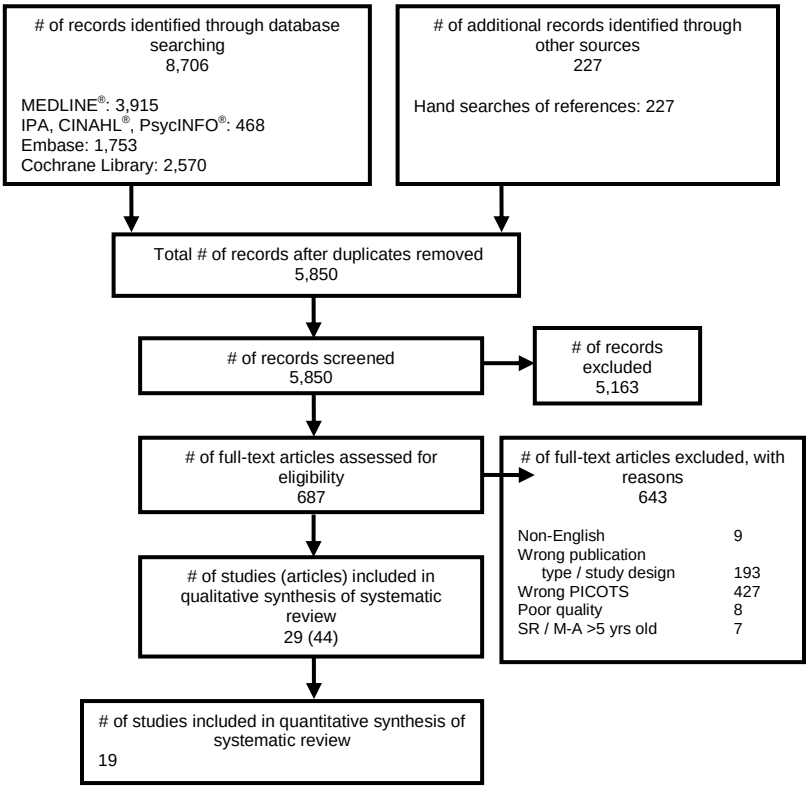
and up to 15 minutes, single contact), extended (beyond 15 minutes, single contact), brief multicontact (each contact up to 15 minutes), and extended multicontact (some contacts beyond 15 minutes).

We graded the strength of evidence as high, moderate, low, or insufficient based on established methods guidance. Two reviewers assessed each domain for each key outcome, and differences were resolved by consensus. We assessed applicability of the evidence following established methods guidance. We used the PICOTS framework to explore factors that affect applicability.

Results

We included 44 published articles reporting on 29 studies: 23 randomized controlled trials (RCTs) and six meta-analyses or systematic reviews (Figure ES-2). In the 23 included trials, sample sizes ranged from 72 to 1,559, and study duration ranged from 6 to 48 months. Eleven were conducted solely in the United States; 10 took place outside the United States, and the remaining 2 were conducted in a combination of U.S. and non-U.S. sites. We summarize the main findings for each Key Question by population and outcome, and report the strength of evidence (SOE) for each.

Figure ES-2. Disposition of articles



Abbreviations: IPA, International Pharmaceutical Abstracts; M-A, meta-analysis; PICOTS, population, intervention, comparator, outcomes, timing, setting or study duration; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SR, systematic review

Key Question 1. What is the direct evidence that screening for alcohol misuse followed by a behavioral counseling intervention, with or without referral, leads to reduced morbidity, reduced mortality, or changes in other long-term (6 months or longer) outcomes?

We did not find any studies directly addressing this Question.

Key Question 2: How do specific screening modalities compare with one another for detecting alcohol misuse?

Several good instruments (based on sensitivity and specificity) are available to screen for alcohol misuse. Many of them require as little as 1 to 2 minutes to administer (e.g., single question screens, AUDIT-C, CAGE, TWEAK, T-ACE).

For adults, the AUDIT-C and the full AUDIT have the highest reported sensitivities for detecting alcohol misuse (0.98 and 0.97, respectively). The specificity for the AUDIT-C, however, is fairly low (0.57), and a wide range of values have been reported for the sensitivity and specificity of the AUDIT. The CAGE has very low sensitivity for detecting risky/hazardous or harmful drinking and is therefore not a good screening test for identifying risky/hazardous or harmful drinking. The CAGE appears to be a good test for detecting alcohol abuse or dependence. Single alcohol screening questions demonstrated good sensitivity (0.62 to 0.81) and specificity (0.79 to 0.93) for detecting at-risk drinking among adult primary care populations.

For older adults, the AUDIT-C, AUDIT, the ARPS, and shARPS instruments performed well for detecting risky drinking. The CAGE with a positive screen being ≥1 also performed very well (sensitivity range 0.79 to 0.88).

For young adults and college students, the included systematic reviews identified only one study reporting the sensitivity and specificity of a screening instrument, the full AUDIT (≥8), which performed well for identifying risky/hazardous or harmful drinking (sensitivity = 0.82; specificity = 0.78).

For pregnant women, the T-ACE, TWEAK, and AUDIT-C had the highest sensitivity values for identifying problem drinking; for abuse and dependence, the AUDIT-C and the T-ACE had the highest sensitivities. The AUDIT-C performed better than other instruments for detecting both risky drinking and abuse or dependence, demonstrating both high sensitivity and high specificity.

Key Question 3. What adverse effects are associated with screening for alcohol misuse and screening-related assessment?

We did not find any studies directly addressing this Question.

Key Question 4a. How do behavioral counseling interventions, with or without referral, compare with usual care for improving intermediate outcomes for people with alcohol misuse as identified by screening?

Overall, evidence supports the effectiveness of behavioral interventions for improving a number of intermediate outcomes for adults, older adults, and young adults/college students (*moderate or low* SOE, depending on the population and outcome). For pregnant women, the one included study did not provide evidence of the effectiveness of behavioral interventions for improving intermediate outcomes over 6 months or longer (*low or insufficient* SOE, depending on the outcome), but it found higher rates of abstinence maintained for the subgroup of subjects

who were abstinent pre-assessment for the intervention group compared with the control group. Table ES-4 summarizes findings for the three intermediate outcomes most commonly reported, by population.

Table ES-4. Effectiveness and strength of evidence (SOE) of behavioral interventions compared with controls for improving intermediate outcomes, by population

	Consumption (Drinks/Week)	Binge Drinking	Recommended Drinking Levels
Adults	Reduction of 3.6 (2.4 to 4.8) Moderate SOE	12% fewer subjects reported binge drinking (7%, 16%) Moderate SOE	11% more subjects achieved (8%, 13%) Moderate SOE
Older adults	Reduction of 1.7 (0.6 to 2.8) Moderate SOE	Insufficient SOE	9% more subjects achieved (2%, 16%) Low SOE
Young adults or college students	Reduction of 1.7 (0.7 to 2.6) Moderate SOE*	0.9 fewer heavy drinking days (0.3, 1.5) Moderate SOE*	Insufficient SOE
Pregnant women	Data from 1 study found no difference Low SOE	Insufficient SOE	Insufficient SOE
Adolescents	Insufficient SOE	Insufficient SOE	Insufficient SOE

Notes: data presented are effect size (95% CI) for all interventions regardless of intensity of counseling; the effect sizes for brief multicontact interventions were generally greater than those shown; all outcomes are 12 months unless otherwise indicated with a footnote; all percentages reported are absolute risk differences from our meta-analyses

Abbreviations: SOE, strength of evidence

*These data are 6-month outcomes; for consumption for young adults, we were unable to calculate pooled point estimate for 12-month data, but range of reduction was 1.2 to 4.1 drinks per week at 12 months (moderate SOE); for binge drinking for young adults, differences were not statistically significant at 12 months (*low* SOE).

Subgroup analyses did not identify differences between men and women. Brief multicontact interventions have the best evidence of effectiveness across populations, outcomes, and have follow-up data over several years. Very brief (up to 5 minutes) and brief (more than 5, and up to 15 minutes) single-contact interventions appear to be ineffective or less effective.

Key Question 4b. How do specific behavioral counseling approaches, with or without referral, compare with one another for improving intermediate outcomes for people with alcohol misuse as identified by screening?

This Key Question addressed direct, head-to-head evidence comparing more than one specific behavioral intervention approach. We identified four randomized controlled trials enrolling adults and one enrolling college students. All five compared different types/intensities of interventions. Overall, head-to-head evidence from the five studies was insufficient to draw firm conclusions about whether specific types of interventions (i.e., different levels of intensity) differ in effectiveness for most intermediate outcomes of interest (*insufficient* SOE). None of the studies reported a statistically significant difference between the two groups of interest; for a few intermediate outcomes, some studies found no statistically significant difference between interventions (*low* SOE).

Key Question 5: What adverse effects are associated with behavioral counseling interventions, with or without referral, for people with alcohol misuse as identified by screening?

We found no evidence of direct harms, aside from opportunity costs associated with the interventions, which ranged from a minimum of 5 minutes to a maximum of approximately 2 hours dispersed over multiple in-person and/or telephone visits (*moderate* SOE) (Table ES-5).

Table ES-5. Adverse effects associated with behavioral counseling interventions compared with controls for adults

Outcome	Results Effect Size (95% CI)	Strength of Evidence
Increased smoking	No difference between groups (unable to calculate effect size)	Low
Opportunity costs/time	Range from about 5 minutes to approximately 2 hours dispersed over multiple in-person and/or telephone visits, depending on planned intervention intensity	Moderate
Anxiety	No difference between groups (unable to calculate effect size)	Low
Stigma, labeling, discrimination, or interference with doctor-patient relationship	Evidence was insufficient to draw conclusions	Insufficient
Illegal substance use	Evidence was insufficient to draw conclusions	Insufficient

Abbreviations: NA, not applicable; RCT, randomized controlled trial

Key Question 6. How do behavioral counseling interventions, with or without referral, compare with one another and with usual care for reducing morbidity, reducing mortality, or changing other long-term (6 months or longer) outcomes for people with alcohol misuse as identified by screening?

The tables below provide a summary of the main results for adults (Table ES-6), older adults (Table ES-7), and young adults and college students (Table ES-8). We did not identify any studies enrolling pregnant women reporting outcomes for this question (*insufficient* SOE).

Table ES-6. Effectiveness of behavioral interventions compared with controls for adults: health, utilization, and other outcomes

Health Outcomes	Results Effect size (95% CI)	Strength of Evidence
Mortality	Our meta-analyses did not find a reduction in all-cause mortality for adults (4 studies; rate ratio 0.64, 95% CI, 0.24 to 1.7*)	Low
Alcohol-related accidents†	Evidence was insufficient to draw conclusions	Insufficient
Alcohol-related liver problems	Evidence was insufficient to draw conclusions	Insufficient
Utilization Outcomes		
Hospitalization	Fewer hospital days in the last 6 months for the intervention group compared with the control group at 6, 12, and 48 months: 35 vs. 180, 91 vs. 146, and 420 vs. 664, p<0.001, p<0.001, and p<0.05, respectively**	Low
Emergency visits	Difference between groups for visits in the past 6 months did not reach statistical significance††	Low
Primary care visits	No significant difference between intervention and control groups: WMD, -0.14 visits, 95% CI, -0.5 to 0.2	Low
Costs	Over 48 months Project TrEAT reported a total economic benefit of the brief intervention of $423,519, including over $190,000 savings in emergency department and hospital use and almost $230,000 in avoided costs of crime and motor vehicle accidents. Using data from 48-month followup, the authors reported a cost per patient of $205, and a benefit per patient of $7,985, for a resulting benefit-cost ratio of 39 (95% CI, 5.4 to 72.5).**	Low
Other Outcomes		
Legal problems	One 48-month randomized controlled trial found no significant difference between the intervention and control groups for several legal problems‡, but did report a difference for controlled substance/liquor violations, with 2 in the intervention group compared with 11 in the control group (p<0.05)**	Low
Quality of life	Three 12-month studies (total N=353) reported no difference between intervention and control groups for general quality of life measures	Low

Note: evidence was insufficient to draw conclusions for sick days or employment stability. Data are reported for 12-month outcomes unless otherwise noted.

*Meta-analysis including all age groups combined (adults, older adults, and young adults/college students) also found no statistically significant reduction in mortality (6 studies; rate ratio 0.52, 95% CI, 0.22 to 1.2), although point estimates trended toward favoring behavioral interventions. Few studies reported mortality, additional studies would be needed to increase precision, and there is little long-term data.

**These data are from Project TrEAT;[31-33] the best available evidence.

† "Accidents" is used here to indicate motor vehicle events and injuries.

††But results trended in favor of the intervention group at 6, 12, and 48 months: 47 vs. 70, 60 vs. 62, and 302 vs. 376, p>0.10, p>0.10, and p<0.10, respectively[31-33]

‡Legal problems included assault/battery/child abuse, resist/obstruct officer/disorderly conduct, criminal damage/property damage, theft/robbery, and other arrests

Table ES-7. Effectiveness of behavioral interventions compared with controls for older adults: health, and utilization, and other outcomes

Health Outcomes	Results Effect size (95% CI)	Strength of Evidence
Mortality	Evidence from 1 study was insufficient to draw conclusions	Insufficient
Alcohol-related accidents†	Evidence was insufficient to draw conclusions	Insufficient
Alcohol-related liver problems	Evidence was insufficient to draw conclusions	Insufficient
Utilization Outcomes		
Hospitalization	Evidence was insufficient to draw conclusions	Insufficient
Emergency visits	Evidence was insufficient to draw conclusions	Insufficient
Primary care visits	Evidence was insufficient to draw conclusions	Insufficient
Costs	An economic analysis of Project GOAL found no significant difference in economic outcomes through 24 months.[34] The total costs of health care and social consequences were estimated to be $5,241 (95% CI, $2,995 to $7,487) per patient in the treatment group and $6,289 (95% CI, $3,549 to $9,029) per patient in the control group	Low

Note: Evidence was insufficient to draw conclusions for sick days, legal issues, employment stability, and quality of life. Data are reported for 12-month outcomes unless otherwise noted.

† "Accidents" is used here to indicate motor vehicle events and injuries.

Table ES-8. Effectiveness of behavioral interventions compared with controls for young adults and college students: health, utilization, and other outcomes

Health Outcomes	Results Effect size (95% CI)	Strength of Evidence
Mortality	One trial reported one death in the control group	Insufficient
Motor vehicle events	A subgroup analysis (N=226) of young adults from Project TrEAT[35] found fewer motor vehicle crashes with nonfatal injuries for those in the intervention group than for controls (9 vs. 20, respectively; p<0.05) and fewer total motor vehicle events (114 vs. 149; p<0.05) after 48 months of followup.	Low
Alcohol-related liver problems	Evidence was insufficient to draw conclusions.	Insufficient
Utilization Outcomes		
Hospitalization	The subgroup analysis from Project TrEAT reported a lower number of days of hospitalization for the intervention group that did not reach statistical significance (131 vs. 150, p=NS).[35]	Low
Emergency visits	The subgroup analysis from Project TrEAT reported fewer emergency department visits for the intervention group than for the control group (103 vs. 177, p<0.01).[35]	Low
Primary care visits	Evidence was insufficient to draw conclusions.	Insufficient
Costs	Evidence was insufficient to draw conclusions.	Insufficient
Other Outcomes		
Academic problems	Evidence from two trials (N=576 and N=104) conducted in New Zealand suggests that behavioral interventions result in fewer consequences related to academic role expectations (rate ratio between 0.70 and 0.80).[36,37]	Moderate
Legal problems	The subgroup analysis from Project TrEAT found no significant difference between the intervention and control groups for assault/battery/child abuse, resist/obstruct officer/disorderly conduct, criminal damage/property damage, theft/robbery, and other arrests, but did report a difference for controlled substance/liquor violations, with 0 in the intervention group compared with 8 in the control group (p<0.01).[35]	Low

Note: evidence was insufficient to draw conclusions for quality of life. Data are reported for 12-month outcomes unless otherwise noted.

Key Question 7: To what extent do health care system influences promote or hinder effective screening and interventions for alcohol misuse?

Interventions required sufficient support systems in order to provide screening and screening-related assessment, and in some cases, provider prompting. Such supports are likely required for effective screening and intervention. The country where studies were conducted (United States compared with non-United States) did not have a significant impact on the effectiveness of interventions for consumption outcomes. Interventions conducted in academic/research-oriented settings and those conducted in community-based primary care settings were both effective for reducing alcohol consumption, with data showing a trend toward greater reduction for interventions delivered in academic/research-oriented settings (WMD, -5.0 drinks/week, 95% CI, -7.6 to -2.5) than for those delivered in community-based settings (WMD, -3.2, 95% CI, -4.3 to -2.2). Interventions delivered by primary care providers and by research personnel were both effective for reducing alcohol consumption, with data showing a trend toward greater reduction for interventions delivered mostly by primary care providers (WMD, -4.0 drinks per week, 95% CI, -5.4 to -2.6) than for those delivered primarily by research personnel (WMD, -3.0, 95% CI, -

5.0 to -1.0). Most interventions required training of providers and/or staff. Such training may be required for practices to deliver effective screening and interventions for alcohol misuse.

Discussion

We aimed to conduct a systematic review of the effectiveness of screening followed by behavioral counseling for alcohol misuse in primary care settings. In the Background section, we describe four categories of alcohol misuse: risky/hazardous use, harmful use, alcohol abuse, and alcohol dependence. It is important to note that the four categories are not all discrete categories (i.e., an individual may meet the definition for more than one category for some of these categories). It appears that the included trials of behavioral counseling generally enrolled subjects with risky/hazardous or harmful drinking, but the trials use varying terminology to describe the included populations and often enrolled heterogeneous populations (i.e., included subjects with various types of alcohol misuse). Nevertheless, the vast majority of trials excluded subjects with alcohol dependence or constructed inclusion/exclusion criteria to substantially limit the number of potential subjects with alcohol dependence.

Given the heterogeneity in terminology used by the included trials and the potential overlap of some categories of alcohol misuse, our best assessment is that our overall findings from behavioral counseling intervention trials are applicable to risky/hazardous and harmful drinkers, and are unlikely to be applicable to those with alcohol dependence. It is uncertain whether findings are applicable to people with alcohol abuse.

Screening for Alcohol Misuse

We found that several good instruments (based on sensitivity and specificity) are available to screen for alcohol misuse in primary care settings. Many of them require as little as 1 to 2 minutes to administer (e.g., single-question screens, AUDIT-C, CAGE, TWEAK, T-ACE). For people with positive screening tests, screening-related assessments are still necessary to determine whether an individual has risk/hazardous/harmful drinking or if they meet criteria for alcohol abuse or dependence.

For adults, the AUDIT-C and the AUDIT have the highest reported sensitivities for detecting alcohol misuse (0.98 and 0.97, respectively). The specificity for the AUDIT-C, however, is fairly low (0.57), and a wide range of values have been reported for the sensitivity and specificity of the AUDIT. The CAGE is a good screen for some types of alcohol misuse but not others; that is, it has very low sensitivity for detecting risky/hazardous or harmful drinking, but it appears to be a good test for detecting alcohol abuse or dependence. Single alcohol screening questions demonstrated good sensitivity (0.62 to 0.81) and specificity (0.79 to 0.93) for detecting risky/hazardous drinking among adult primary care populations.

For older adults, young adults and college students, and pregnant women, main findings for screening instruments are described above in the Results section.

Behavioral Counseling Interventions in Primary Care

All Adults (Age 18 and Older)

We found that behavioral counseling interventions improved intermediate outcomes (*moderate* SOE) and some utilization outcomes (including hospital days and costs, *low* SOE) for adults with alcohol misuse. For most health outcomes, available evidence either found no difference between interventions and controls (e.g., mortality, *low* SOE) or was insufficient to

draw conclusions about the effectiveness of behavioral interventions compared with controls (e.g., alcohol-related liver problems, *insufficient* SOE).

We found an average reduction of 3.6 drinks per week for adults receiving interventions compared with those in control groups and an 11 percent increase in the percentage of adults achieving recommended drinking levels over 12 months. This translates to a number needed to treat (NNT) of 9.1 to get 1 person to change from risky/hazardous drinking to drinking recommended levels over 12 months with a behavioral intervention, and a range for the number needed to screen (NNS) of 31 to 227, depending on the prevalence of risky/hazardous drinking in the population (Table ES-9). When using effectiveness data for brief (more than 5, and up to 15 minutes) multicontact interventions, these improve to a NNT of 6.7 and range of NNS from 23 to 167.

Table ES- 9. Projected range of outcomes of screening 1,000 adults in primary care and providing a behavioral counseling intervention for those identified with risky/hazardous drinking

	Lower Estimate of Range	Upper Estimate of Range
Prevalence of risky/hazardous drinking	4%	29%
People identified with risky/hazardous drinking*	40	290
Potential behavioral interventions delivered	40	290
People achieving recommended drinking levels by 12 months with behavioral intervention**	4.4	31.9
NNT to get 1 person to change from risky/hazardous drinking to drinking recommended amounts with behavioral intervention	9.1	9.1
NNS to get 1 person to change from risky/hazardous drinking to drinking recommended amounts with behavioral intervention	227	31
People achieving recommended drinking levels by 12 months with *brief multi-contact* behavioral intervention†	6	43.5
NNT to get 1 person to change from risky/hazardous drinking to drinking recommended amounts with *brief multi-contact* behavioral intervention	6.7	6.7
NNS to get 1 person to change from risky/hazardous drinking to drinking recommended amounts with *brief multi-contact* behavioral intervention	167	23
Prevalence of alcohol dependence	2%	9%
People identified with alcohol dependence*	20	90

Data in table are number of people unless specified as percent; the 1,000 people screened are those that have not been previously screened and have no known history of alcohol misuse.

Abbreviations: NA, not applicable; NNS, number needed to screen; NNT, number needed to treat

*Number identified from screening and screening-related assessment; A range of risky drinkers (4%–29%) has been found across multiple primary care populations, with prevalence estimates of 2.0 to 9.0% for alcohol dependence.[14]

**Based on absolute difference of 11% (that would achieve recommended drinking levels) from our meta-analysis including interventions of all intensity

† Based on absolute difference of 15% (that would achieve recommended drinking levels) from our subgroup meta-analysis for brief multicontact interventions

The evidence for effectiveness in adults is strongest for brief multi-contact interventions; these studies consistently found statistically significant improvements in consumption, binge

drinking, and achieving recommended drinking levels. The effect sizes for brief multi-contact interventions were greater than for other intensities (although confidence intervals generally overlapped). In addition, the best studies show that the effect of brief multi-contact interventions remains for several years of followup,[32,33,38] and show improvement for some utilization outcomes (fewer hospital days[32,33]) and costs (benefit-cost ratio of 39:1 over 48 months, 95% CI, 5.4 to 72.5[32]).

Evidence suggests that very brief interventions (up to 5 minutes, single contact) and brief interventions (up to 15 minutes, single contact) are less effective or ineffective. Although extended multi-contact interventions appear to be effective for improving intermediate outcomes, we did not find evidence that they are more effective than brief multi-contact interventions.

Long-term outcomes up to 48 months revealed that participants in the intervention groups maintained reductions in consumption or continued to reduce consumption further, but differences between intervention and control groups were no longer statistically significant by 48 months. Studies identified relatively delayed reduction in consumption in control groups to levels achieved by the intervention group that could reflect the natural history of alcohol consumption, the cumulative effect of yearly follow-ups with the health care system, attrition (if more subjects lost to followup from the control group were risky drinkers than those lost to followup from the intervention group), or (late) regression to the mean.

Our subgroup analyses found similar benefits for men and women and for studies conducted in the United States compared with those conducted in other countries. We found a trend toward a greater reduction in consumption for interventions delivered primarily by primary care providers (WMD, 4.0 drinks/week, 95% CI, 2.6 to 5.4) than for those delivered primarily by research personnel (3.0 drinks/week, 95% CI, 1.0 to 5.0); and for interventions delivered in academic/research-oriented settings (WMD, 5.0 drinks/week, 95% CI, 2.5 to 7.6) than for those delivered in community-based settings (3.2 drinks/week, 95% CI, 2.2 to 4.3).

Older Adults

Two studies enrolling older adults provided evidence of the effectiveness of behavioral interventions for reducing consumption and improving the percentage drinking at recommended levels, but effect sizes were smaller than those found for all adults (Table ES-2). Evidence for health outcomes was insufficient to draw conclusions.

Young Adults and College Students

We found evidence of effectiveness of behavioral interventions for improving intermediate outcomes and some accident, utilization, and academic outcomes (Tables ES-2 and ES-8), including fewer motor vehicle events, hospitalization days, and emergency department visits for those in the intervention group compared with the control group (*low* SOE).[35] Unlike studies in adults, which generally found benefits to last for up to 3 years for intermediate outcomes, some benefits of interventions for college students found at 6 months were not maintained at 12 months. This could be due to the natural history of drinking among college students or could indicate the need for additional booster sessions to maintain benefits.

Pregnant Women

We found just one study enrolling pregnant women (N=250)[39] that met our inclusion criteria. The study did not find a significant difference for reduction in consumption (*low* SOE), but

found higher rates of abstinence maintained for subjects who were abstinent pre-assessment for the intervention group compared with the control group.

Potential Adverse Effects of Behavioral Counseling Interventions

Potential adverse effects of screening and behavioral counseling interventions for alcohol misuse have received little attention in published studies. We found no studies reporting on illegal substance use, stigma, labeling, discrimination, or interference with the doctor-patient relationship. We found very limited evidence reporting no difference between intervention and control groups for smoking rates and anxiety (*low SOE*).

The time required for interventions used in the included studies ranged from a minimum of 5 minutes to a maximum of approximately 2 hours dispersed over multiple in-person and/or telephone visits (*moderate SOE*). The brief multi-contact intervention used in Project TrEAT (which provides some of the best evidence of effectiveness of behavioral interventions for risky/hazardous drinking in primary care) required two 15-minute visits with the primary care physician 1 month apart and two follow-up phone calls from a nurse.

Treatments for Alcohol Dependence

Although we did not systematically examine the efficacy/effectiveness of various treatments for alcohol dependence (Table ES-10), we summarize the available evidence regarding such treatments because screening for alcohol misuse will inevitably identify some individuals with alcohol dependence; thus, providers and those making recommendations need some information about whether there are effective interventions available for alcohol dependence. Additional information on treatments for dependence is provided in the full report.

Table ES- 10. Treatments for alcohol dependence

- Cognitive behavioral therapy
- Motivational enhancement therapy
- 12-step programs (e.g., Alcoholics Anonymous)
- Intensive outpatient programs using group or individual counseling
- Alcoholism treatment centers (e.g., Betty Ford)
- Pharmacotherapy* (disulfuram, naltrexone, acamprosate)
- Detoxification (inpatient, residential, day treatment, or outpatient)

Notes: this is not an exhaustive list of all treatments that have been studies or utilized for alcohol dependence but rather includes the most common.

*Pharmacotherapy can be used in addition to psychosocial therapy but is not recommended for use alone.

Very few studies have examined the efficacy of brief interventions for alcohol dependence in a primary care setting. A systematic review of the literature concluded that there was no evidence for efficacy for brief behavioral interventions in patients with alcohol dependence in a primary care setting.[40] Similarly, our review did not find any studies demonstrating efficacy of behavioral interventions for people with alcohol dependence in a primary care setting; studies included in our review that enrolled more than 10 percent of subjects with alcohol dependence reported behavioral interventions to be less effective or ineffective compared with studies not enrolling subjects with alcohol dependence. Thus, whereas the overall evidence for the effectiveness of treatment for alcohol dependence is considerable,[41] the same cannot be said for the effectiveness of brief interventions for alcohol dependence in primary care settings.

Studies of pharmacotherapy for patients with alcohol dependence have generally enrolled subjects responding to advertisements or those being treated in specialty alcohol treatment centers. We were unable to identify any pharmacotherapy studies that identified subjects by screening in a primary care setting or that treated subjects with pharmacotherapy in a primary care setting. Further, we were unable to identify any studies of pharmacotherapy for people with risky/hazardous or harmful drinking.

Applicability

The findings are generally applicable to people with risky/hazardous and harmful drinking identified by screening in primary care settings (see beginning of Discussion). Most studies excluded all or most potential subjects with alcohol dependence; thus, our findings for behavioral interventions in primary care settings likely do not apply to people with alcohol dependence, who probably require other treatments (e.g., referred for specialty treatment). Compared with the results of studies that enrolled few or no subjects with alcohol dependence, our subgroup analyses found that studies enrolling 10 percent or more subjects with alcohol dependence found behavioral interventions to be ineffective or less effective. This supports the theory that people with alcohol dependence are not likely to respond to the types of interventions evaluated in this report.

We did not identify any studies in adolescent populations or any conducted exclusively among veterans, and the results thus have uncertain applicability to these populations. We did, however, identify a sufficient number of studies of young adults/college students and older adults to draw conclusions (of *low* to *moderate* strength) for several intermediate outcomes for these populations. Although we searched for studies conducted in settings with primary care-like relationships (e.g., infectious disease clinics for people with HIV), we did not find any, and our results have uncertain applicability to such settings/populations.

All interventions required support systems to provide screening and screening-related assessment, and, in some cases, provider prompting. Screenings to identify subjects for the included studies were often extensive, multi-step processes that included face-to-face interviews lasting up to 30 minutes by research personnel. Less time would be required for screening and screening-related assessments in primary care practice; we estimate less than 2 minutes for negative screens and 5-10 minutes for positive screens, with most of the time for screening-related assessment to determine whether the patient has an alcohol use disorder as opposed to risky/hazardous or harmful drinking. Nevertheless, supports are likely required for effective screening and intervention. In addition, most interventions required training of providers and/or staff. Such training may be required to ensure that practices conduct effective screening and interventions for alcohol misuse.

Effective interventions were generally delivered either completely in person or also included phone followups. However, one study of adults in Germany demonstrated some benefits resulting from a telephone-based intervention,[42] and two studies conducted in college student populations demonstrated benefits resulting from Web-based interventions delivered via computer.[36,37,43]

It is unclear whether our findings are applicable to people with comorbid medical or psychiatric conditions, and some researchers have suggested that brief behavioral interventions may be ineffective or less effective in people with comorbid psychiatric conditions. A subgroup analysis (N=88) from a study conducted in Germany found that brief interventions did not significantly reduce drinking for subjects with comorbid anxiety and/or depression.[44]

We did not find any evidence that would inform decisions about the appropriate frequency of screening (i.e., whether it should be done annually, every five years, or something else).

Limitations

The scope of this report is limited to primary care settings. Emergency departments or other health care settings may also offer opportunities to provide behavioral interventions to reduce alcohol misuse.

Most of the evidence we identified in this report was in the form of intermediate outcomes that rely on self-report of alcohol use. Some studies verified self-report using collaterals, such as a family member. Although there are no biomarkers accurate enough to be widely accepted to measure changes in alcohol use, self-report of alcohol use has been found to be accurate if collected carefully.[45,46]

It is possible that the assessments of alcohol misuse conducted in the included trials conceal therapeutic benefits of the behavioral interventions (i.e., bias results toward the null). Many studies included extensive assessment of alcohol-related behaviors, which could directly result in behavior changes. The control groups in the included studies generally reduced alcohol consumption. Some possible explanations for changes in behavior as a result of the screening and screening-related assessment include (1) increased awareness of the extent of their drinking; (2) the screening questions prompted them to discuss drinking with their primary care provider at a subsequent visit; (3) receipt of some minimal intervention, such as printed educational materials about general health or about alcohol specifically (control groups in the included studies often received some printed materials); or (4) regression to the mean. One study empirically tested whether brief assessment (without a behavioral intervention) reduces hazardous drinking by comparing brief assessment with a control that did not include assessment. The study concluded that assessment appears to reduce hazardous drinking but noted a potential limitation of measurement artifact due to social desirability bias.[43]

Future Research

Several gaps in the evidence were identified that could be potential targets for future research (see full report for details).

Conclusions

Behavioral counseling interventions improve intermediate outcomes (i.e., alcohol consumption, binge drinking, drinking above recommended amounts: *moderate* SOE) and some health care utilization outcomes (including hospital days and costs: *low* SOE) for adults with risky/hazardous and harmful drinking. For most health outcomes, available evidence either found no difference between interventions and controls (e.g., mortality: *low* SOE) or was insufficient to draw conclusions about the effectiveness of behavioral interventions compared with controls (e.g., alcohol-related liver problems, alcohol-related accidents, quality of life: insufficient SOE). Brief multi-contact interventions (usually around 15 minutes per contact) have the best evidence of effectiveness for adults (compared with single-contact interventions or very brief 5-minute interventions).

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Introduction

Alcohol misuse, which includes the full spectrum from drinking above recommended limits (i.e., risky/hazardous drinking) to alcohol dependence,[1-3] is associated with numerous health and social problems and more than 85,000 deaths per year in the United States,[4,5] and an estimated annual cost to society of more than $140 billion.[6] Alcohol misuse is estimated to be the third leading cause of preventable mortality in the United States, following tobacco use and overweight.[7] Alcohol misuse contributes to a variety of conditions, including hypertension, cirrhosis, gastritis and gastric ulcers, pancreatitis, breast cancer, neuropathy, cardiomyopathy, anemia, osteoporosis, cognitive impairment, depression, insomnia, anxiety, and suicide.[8,9] Excessive alcohol consumption is a major factor in trauma-related injury and violence.[10]

Risky/hazardous drinking and alcohol-related disorders (i.e., alcohol abuse and dependence) are a widespread public health problem in the United States. In 2007, the number of alcoholic liver disease deaths was 14,406 and the number of alcohol-induced deaths, excluding accidents and homicides, was 23,199.[7] In 2008, more than 11,000 people were killed in alcohol-impaired driving crashes.[47] These fatalities accounted for 32 percent of all motor vehicle traffic fatalities in the United States. Risky/hazardous or harmful drinking that goes unrecognized can further complicate the assessment and treatment of medical and psychiatric conditions.[9]

Definitions of the spectrum of alcohol misuse (i.e., unhealthy alcohol use[3]) continue to evolve. For the purposes of this report we will use the definitions described in Table 1.

Though estimating the prevalence of alcohol misuse is challenging, it has been estimated that 40 to 50 percent of the U.S. population is affected, with the majority of these individuals engaging in what is considered risky drinking.[3] Alcohol dependence has lifetime prevalence rates on the order of 17 percent for men and 8 percent for women.[15]

Currently, an estimated 50 percent of adults 18 years of age or older are regular drinkers.[48] About 18 percent of adolescent boys and 14 percent of adolescent girls from 12 to 17 years of age reported drinking before age 13.[7] Although often underreported, alcohol use remains common among older people. An estimated 6 percent of older adults are considered to be heavy users of alcohol.[49] Lastly, in a recent survey 11.8 percent of pregnant women in the United States reported recent use of alcohol.[50]

A range of risky drinkers (4 percent to 29 percent) has been found across multiple primary care populations, with prevalence estimates of 0.3 to 10.0 percent for harmful drinkers and 2.0 to 9.0 percent for alcohol dependence.[14] Rates of alcohol-use disorders among medical outpatients are similar to those seen in the general population and are generally higher in males and younger people of all races/ethnicities.[14,16]

Primary care clinicians commonly see patients with a range of alcohol-related risks and problems. In Wisconsin, about 20 percent of primary care patients were found to be risky drinkers based on National Institute on Alcohol Abuse and Alcoholism (NIAAA) guidelines.[51] Across multiple primary care populations, 4 percent to 29 percent are risky drinkers, 0.3 percent to 10 percent are harmful drinkers, and 2 percent to 9 percent exhibit alcohol dependence.[14] Prevalence of these forms of alcohol misuse generally is higher in males and younger people of all races and ethnicities.[16]

Table 1. Definitions of the spectrum of alcohol misuse

Risky or Hazardous Use	Consumption of Alcohol Above Recommended Daily, Weekly, or Per Occasion Amounts[5]
Harmful use	Defined by the ICD-10[11,12] as a pattern of drinking that is already causing damage to health. The damage may be either physical (e.g., liver damage from chronic drinking) or mental (e.g., depressive episodes secondary to drinking).
Alcohol abuse	Defined by DSM-IV-TR (diagnostic code 305.00)[13] as A. A maladaptive pattern of alcohol use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12 month period: (1) recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, or home (e.g., repeated absences or poor work performance related to alcohol use; alcohol-related absences, suspensions, or expulsions from school; neglect of children or household); (2) recurrent alcohol use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired); (3) recurrent alcohol-related legal problems (e.g., arrests for alcohol-related disorderly conduct); or (4) continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol (e.g., arguments with spouse about consequences of intoxication, physical fights). B. The symptoms have never met the criteria for Alcohol Dependence.
Alcohol dependence (alcoholism, alcohol addiction)	Defined by DSM-IV-TR (diagnostic code 303.90[13] as a maladaptive pattern of alcohol use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period: (1) tolerance, as defined by either of the following: (a) a need for markedly increased amounts of alcohol to achieve intoxication or desired effect (b) markedly diminished effect with continued use of the same amount of alcohol (2) withdrawal, as manifested by either of the following: (a) the characteristic withdrawal syndrome for alcohol (b) alcohol (or a closely related drug) is taken to relieve or avoid withdrawal symptoms; (3) alcohol is often taken in larger amounts or over a longer period than was intended; (4) there is a persistent desire or unsuccessful efforts to cut down or control alcohol use; (5) a great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects; (6) important social, occupational, or recreational activities are given up or reduced because of alcohol use; (7) alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol (e.g., continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

Abbreviations: DSM-IV-TR, *Diagnostic and Statistical Manual of Mental Disorders* (4th Edition, Text Revision); ICD-10, International Classification of Diseases (10th Revision)

Several agencies have established guidelines for recommended levels of alcohol consumption that are considered to be safe. These guidelines do not apply to people (such as adolescents, pregnant women, and those with alcohol dependence or medical conditions or medication use) for whom alcohol intake is contraindicated, or to circumstances (driving) in which no consumption is considered safe. The NIAAA has proposed epidemiologically based alcohol-use guidelines to limit risks for short- and long-term drinking-related consequences by establishing age- and sex-specific recommended consumption thresholds.[17] Maximum recommended consumption is 1 or less standard drink per day for adult women and for anyone older than 65 years of age, and 2 or fewer standard drinks per day for adult men. A standard drink is defined as one 12-ounce bottle of beer, one 5-ounce glass of wine, or 1.5 ounces of distilled spirits.[18,19]

Screening and Behavioral Counseling

Physicians who provide ongoing care can assist patients who have current problems, or who are at risk for problems, through effective identification (screening and screening-related assessment), office-based interventions, and referrals to specialty services as needed.[24] The American Society of Addiction Medicine recommends that the services of primary care physicians and other primary health care providers include, at a minimum, the provision of the following four elements of care:[52] (1) Assessment of the nature and extent of alcohol, nicotine, and other drug use by patients, with consistency of data collection and documentation akin to the consistency of assessment and documentation of vital signs; (2) routine screening for the presence of alcohol, nicotine, or other drug use problems in patients, as well as screening for risk factors for development of alcohol, nicotine, and other drug dependence; (3) appropriate intervention by the primary care provider; and (4) ongoing general medical care services to people who manifest alcohol, nicotine, or other drug problems, including dependence.

There are a number of screening questionnaires that can be used to identify alcohol misuse. The most commonly studied instruments include the Alcohol Use Disorders Identification Test (AUDIT) and its abbreviated versions (e.g., the AUDIT-C), the CAGE questionnaire (Cut-down, Annoyed, Guilty, Eye-opener), the Michigan Alcoholism Screening Test (MAST), and versions of the single-question screening recommended by NIAAA, also called the Single Alcohol Screening Question (SASQ). Greater description of these and other instruments is provided in Key Question 2 and related appendixes.

Behavioral interventions and patient education are often used for patients who engage in less severe alcohol misuse (i.e., risky/hazardous/harmful drinking).[5] Brief interventions generally aim to moderate a patient's alcohol consumption to sensible levels and to eliminate harmful drinking practices, rather than to insist on complete abstinence. There is ongoing debate about the elements of a brief intervention.[53] The Substance Abuse and Mental Health Services Administration (SAMHSA) defines brief intervention as "a single session or multiple sessions of motivational discussion focused on increasing insight and awareness regarding substance use and motivation toward behavioral change."[20] These interventions range from very brief interventions within a primary care visit to multi-contact interventions that entail multiple, often more lengthy, visits and non-visit contacts over an extended period.[1] Brief alcohol interventions can include the following elements: motivational interviews of varying length and number, cognitive behavioral therapy, self-completed action plans, written health education or self-help materials, requests to keep drinking diaries, written personalized feedback, follow-up telephone counseling, or exercises to complete at home.

The assumption underlying brief behavioral counseling interventions in primary care—if they are effective—is that, for identified risky or harmful drinkers, reducing overall alcohol consumption or adopting safer drinking patterns (that is, fewer drinks per occasion and not drinking before driving) will reduce the risk for medical, social, and psychological problems.[21] Little experimental evidence supports this assumption, and most epidemiologic evidence relates health outcomes to existing drinking behaviors rather than to changes in drinking behaviors. Cross-sectional and cohort studies have consistently related high average alcohol consumption to short- or long-term health consequences.[19,22] A meta-analysis of studies examining the association between all-cause mortality and average alcohol consumption found that men averaging at least 4 drinks per day and women averaging 2 or more drinks per day experienced significantly increased mortality relative to nondrinkers.[23] Studies also relate heavy per-occasion alcohol use ("binge drinking") to acute injury risks and alcohol-related life problems.[19,22] Injury

rates are higher for binge drinkers who consume 5 or more drinks on one occasion as infrequently as 3 to 6 times per year, even when average intake is not excessive.[54]

Prior US Preventive Services Task Force Recommendations

In 2004, the U.S. Preventive Services Task Force (USPSTF) developed recommendations for screening and behavioral counseling interventions in primary care to reduce alcohol misuse.[28] The summary of the recommendations states as follows:

- The USPSTF recommends screening and behavioral counseling interventions to reduce alcohol misuse by adults, including pregnant women, in primary care settings. Grade: B Recommendation (i.e., the USPSTF recommends that clinicians provide the service to eligible patients. The USPSTF found at least fair evidence that the service improves important health outcomes and concludes that benefits outweigh harms).
- The USPSTF concludes that the evidence is insufficient to recommend for or against screening and behavioral counseling interventions to prevent or reduce alcohol misuse by adolescents in primary care settings. Grade: I Statement (insufficient evidence to make a recommendation).

The USPSTF made a distinction between screening and screening-related assessment. Screening involves identifying patients with probable risky/harmful alcohol use, whereas screening-related assessment entails confirming screening results and distinguishing patients suitable for brief interventions from those needing specialty care referral.

In the report developed for the USPSTF, it was generally accepted that less severe alcohol problems (e.g., risky/hazardous drinking) are appropriate for brief interventions in primary care, whereas more severe problems, particularly alcohol abuse and dependence, may require specialty addiction treatment.[1,5,28] However, specialty treatment services may be in short supply and some people may not be willing to follow up with specialty treatment services. Consequently, primary care physicians may sometimes provide the only care that people with alcohol abuse or dependence receive.

Current Practice

The NIAAA and others encourage physicians to identify patients with alcohol-related risks or problems and to provide office-based brief interventions or referrals as needed.[17,24,25] In everyday practice, screening and screening-related assessment procedures are necessary to identify those who misuse alcohol in order to offer appropriate treatment.[26,27]

Even so, few primary care clinicians use recommended screening protocols or offer treatment and screening, and treatment rates for alcohol misuse remain low.[27] One study of primary care physicians found that although most (88 percent) reported asking their patients about alcohol use, only 13 percent used standardized screening instruments.[27] Another study found that patients with alcohol dependence received the recommended quality of care, including assessment and referral to treatment, only about 10 percent of the time.[55] Less than a quarter of people with alcohol-related disorders ever seek help for these conditions; higher proportions of women than men seek help, despite the higher prevalence of alcohol-related disorders among men.[9] Most patients who misuse alcohol receive care from their general practitioner or primary care provider, where they represent about one fifth of patients seen, a proportion similar to the proportions seen for diabetes and hypertension.[9]

In a recent clinician's guide to the NIAAA guidelines,[56] the authors explain that many primary care physicians are familiar with counseling at-risk drinkers but choose to refer most patients to specialized rehabilitation programs. These programs may not be appropriate for problem drinkers who have risky or harmful alcohol use but do not meet the DSM-IV-TR criteria for abuse or dependence. Even if patients accept a referral and complete a rehabilitation program, only about one third will respond to treatment.[52] Patients receiving referrals to specialty care based on positive screening results appear more likely to accept appointments for alcohol-related counseling than those receiving usual care (i.e., those who were not screened).[57]

Scope and Key Questions

This topic was nominated by a member of the USPSTF, which aims to update its recommendations every 5 years in accordance with criteria for inclusion in the National Guideline Clearinghouse. The most recent USPSTF recommendations for screening and behavioral counseling interventions in primary care to reduce risky/harmful alcohol use were issued in 2004.[28] In this new review, we used similar Key Questions (KQs) to those in the earlier systematic review that informed the USPSTF recommendations, titled Behavioral Counseling Interventions in Primary Care to Reduce Risky/Harmful Alcohol Use.[1] In addition, the scope of this report has been expanded to allow the inclusion of screening and behavioral interventions for the full spectrum of alcohol misuse, expanding the review to include subjects with alcohol abuse and dependence, as long as subjects were identified by screening in a primary care or primary care-like setting. We also added "referral" as an intervention of interest and changed the title to reflect this addition. Because of the changes in scope and revisions to the KQs, we did not simply evaluate new literature since the previous report (i.e., an update of the previous document), but instead, we newly evaluated all of the literature dating back to 1985 that addressed our KQs.

The main objective for this report is to conduct a systematic review of the effectiveness of screening followed by behavioral counseling, with or without referral, for alcohol misuse in primary care settings. In this review, we address the following KQs:

- KQ 1: What is the direct evidence that screening for alcohol misuse followed by a behavioral counseling intervention, with or without referral, leads to reduced morbidity (e.g., alcohol-related morbidity, alcohol-related accidents and injuries), reduced mortality, or changes in other long-term (6 months or longer) outcomes (e.g., health care utilization, sick days, costs, legal issues, employment stability)?
- KQ 2: How do specific screening modalities compare with one another for detecting alcohol misuse?
- KQ 3: What adverse effects are associated with screening for alcohol misuse and screening-related assessment?
- KQ 4a: How do behavioral counseling interventions, with or without referral, compare with usual care for improving intermediate outcomes (e.g., change in mean number of drinks per drinking day, number of heavy drinking episodes) for people with alcohol misuse as identified by screening?
- KQ 4b: How do specific behavioral counseling approaches, with or without referral, compare with one another for improving intermediate outcomes for people with alcohol misuse as identified by screening?
- KQ 5: What adverse effects are associated with behavioral counseling interventions, with or without referral, for people with alcohol misuse as identified by screening?

- KQ 6: How do behavioral counseling interventions, with or without referral, compare with one another and with usual care for reducing morbidity (e.g., alcohol-related morbidity, alcohol-related accidents and injuries), reducing mortality, or changing other long-term (6 months or longer) outcomes (e.g., health care utilization, sick days, costs, legal issues, employment stability) for people with alcohol misuse as identified by screening?
- KQ 7: To what extent do health care system influences promote or hinder effective screening and interventions for alcohol misuse?

Methods

Topic Development and Refinement

This topic was nominated by a member of the U.S. Preventive Services Task Force (USPSTF), which aims to update its recommendations every 5 years in accordance with criteria for inclusion in the National Guideline Clearinghouse. The most recent USPSTF recommendations for screening and behavioral counseling interventions in primary care to reduce risky/harmful alcohol use were issued in 2004.[28]

During the topic development and refinement processes, we generated an analytic framework, preliminary Key Questions (KQs), and preliminary inclusion/exclusion criteria in the form of PICOS (Population, Intervention, Comparison, Outcome, Setting). The processes were guided by the information provided by the topic nominator, a scan of the literature, methods and content experts, and Key Informants. We worked with seven Key Informants during the topic refinement, all of whom were also members of our Technical Expert Panel (TEP) for this report. Key Informants and TEP members participated in conference calls and discussions through e-mail to review the analytic framework, KQs, and PICOS at the beginning of the project; discuss the preliminary assessment of the literature, including inclusion/exclusion criteria and review of the protocol; and provide input on the information and categories included in evidence tables.

Our KQs were posted for public comment on AHRQ's Effective Health Care Web site from December 14, 2010 through January 11, 2011 and were finalized after review of the comments and discussion with the TEP. Our preliminary KQs included additional questions about pharmacotherapy for alcohol dependence in the primary care setting. After public input and feedback from the TEP, we decided not to include pharmacotherapy in this report. One of the main reasons was that initial literature searching and expert input suggested that there are no studies of pharmacotherapy in the primary care setting that would meet inclusion/exclusion criteria, but that there are a great number of studies of pharmacotherapy in other settings. Thus, we determined that to give the pharmacotherapy topic the attention it deserves would require greatly expanding the scope of this report to include many other settings or considering the pharmacotherapy topic for a separate report.

This report adopted nearly all of the KQs identified in the earlier systematic review that informed the USPSTF recommendations, titled Behavioral Counseling Interventions in Primary Care to Reduce Risky/Harmful Alcohol Use.[1] In addition, the scope of this report has been expanded to allow the inclusion of screening and behavioral interventions for the full spectrum of alcohol misuse, expanding the review to include subjects with alcohol abuse and dependence, as long as subjects were identified by screening in a primary care or primary care-like setting. We also expanded the eligible settings from traditional primary care to also include settings with primary care-like relationships (e.g., infectious disease clinics for people with HIV), added additional outcomes of interest to our PICOS and analytic framework, and added "referral" as an intervention of interest and changed the title to reflect this addition.

Analytic Framework

We developed an analytic framework to guide the systematic review process (Figure 1). KQ 1 addresses the direct evidence of effectiveness of screening for alcohol misuse for improving morbidity, mortality, or other long-term outcomes. KQ 2 examines how specific screening

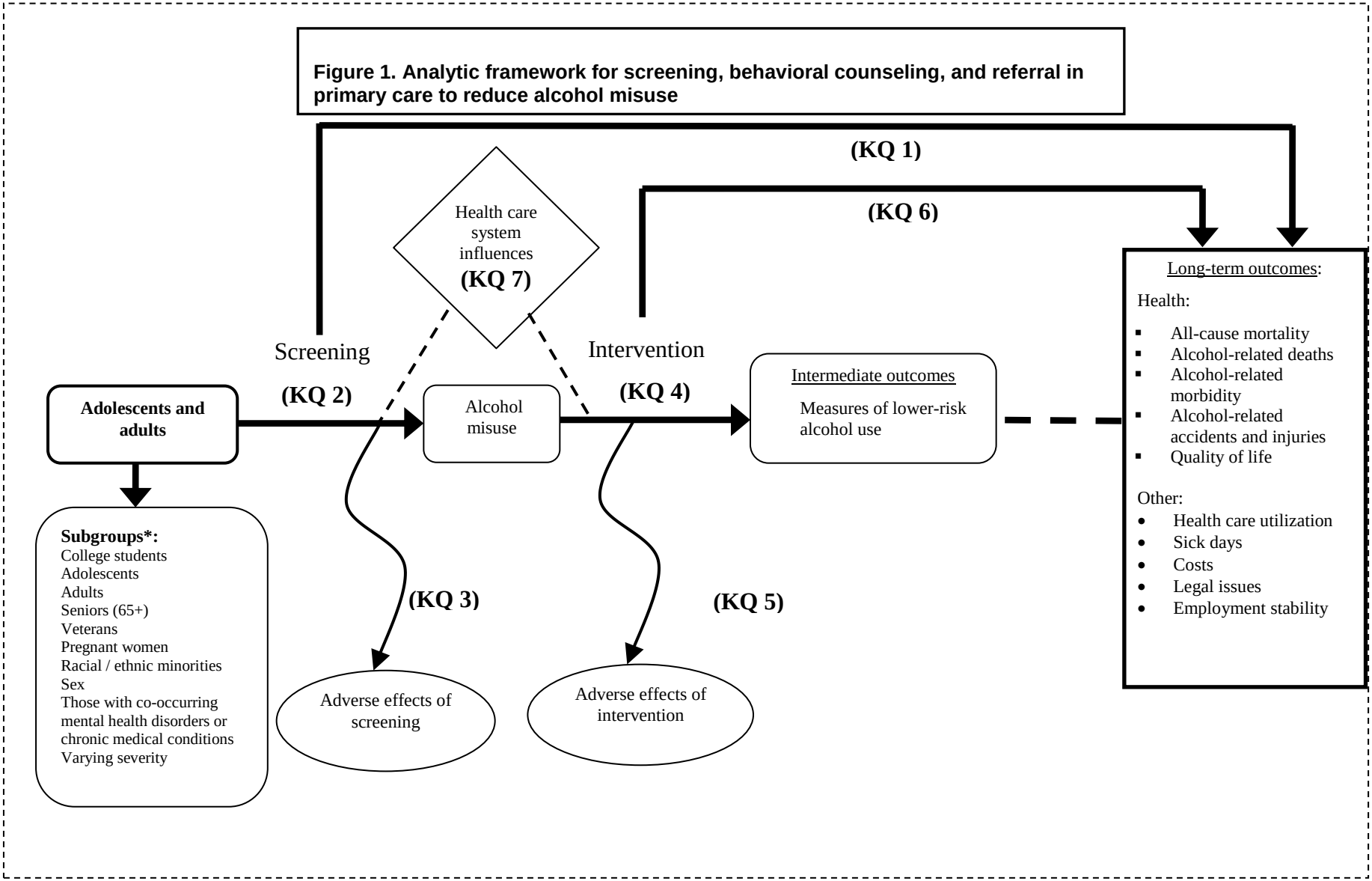


Figure 1. Analytic framework for screening, behavioral counseling, and referral in primary care to reduce alcohol misuse
(KQ 1)
(KQ 6)
Health care system influences
(KQ 7)
Screening
(KQ 2)
Intervention
(KQ 4)
Adolescents and adults
Alcohol misuse
Intermediate outcomes
Measures of lower-risk alcohol use
Long-term outcomes:
Health:
All-cause mortality
Alcohol-related deaths
Alcohol-related morbidity
Alcohol-related accidents and injuries
Quality of life
Other:
Health care utilization
Sick days
Costs
Legal issues
Employment stability
Subgroups*:
College students
Adolescents
Adults
Seniors (65+)
Veterans
Pregnant women
Racial / ethnic minorities
Sex
Those with co-occurring mental health disorders or chronic medical conditions
Varying severity
(KQ 3)
(KQ 5)
Adverse effects of screening
Adverse effects of intervention

approaches compare with one another for detecting alcohol misuse. KQ 3 and KQ 5 address the potential adverse effects of screening (KQ 3) and behavioral counseling interventions (KQ 5). KQ4 examines the efficacy and comparative effectiveness of behavioral counseling interventions for improving intermediate outcomes (e.g., rates of alcohol use, binge drinking). KQ 6 investigates the efficacy and comparative effectiveness of behavioral counseling interventions for improving morbidity, mortality, or other long-term outcomes. KQ 7 addresses the health care system influences that promote or hinder effective screening and intervention for alcohol misuse.

Literature Search

To identify articles relevant to each KQ, we searched MEDLINE®, Embase, the Cochrane Library, CINAHL®, PsycINFO®, and the International Pharmaceutical Abstracts. The full search strategy is presented in Appendix A. We used either Medical Subject Headings (MeSH or MH) as search terms when available or key words when appropriate, focusing on terms to describe the relevant population and the screening and behavioral interventions of interest. We reviewed our search strategy with the TEP and incorporated their input into our search strategy.

We limited the electronic searches to "human" and "English language." Sources were searched from January 1, 1985, to February 1, 2011. The start date was selected based on the earliest publication date found in previous systematic reviews (which was 1988) and expert opinion about when the earliest literature on this topic was published. We did not simply conduct searches starting from where the 2004 systematic review[1] left off because our review has some differences in scope (described above under Topic Development and Refinement). We used the National Library of Medicine (NLM) publication type tags to identify reviews, randomized controlled trials (RCTs), and meta-analyses. Because our scope included pharmacotherapy at the time of the initial searches, the following terms were also included: "naltrexone," "Revia," "Vivitrol," "acamprosate," "Campral," disulfiram," "Antabuse," and "Alcohol Deterrents"[MeSH]. After public review of the KQs and discussion with the TEP, studies of pharmacotherapy were removed from the inclusion criteria.

We manually searched reference lists of pertinent reviews, included trials, and background articles on this topic to look for any relevant citations that might have been missed by our searches. We imported all citations into an EndNote® X4 (Thomson Reuters, New York, NY) electronic database.

We searched for unpublished studies relevant to this review using ClinicalTrials.gov and the World Health Organization's International Clinical Trials Registry Platform.

We will also conduct an updated literature search (of the same databases searched initially) concurrent with the peer review process. Any literature suggested by peer reviewers or from the public will be investigated and, if appropriate, incorporated into the final review. Appropriateness will be determined by the same methods listed above.

Study Selection

We developed eligibility (inclusion and exclusion) criteria with respect to patient populations, interventions, comparisons, outcomes, settings, and study designs and durations for each KQ (Table 2). For KQ 2, we focused on systematic reviews and meta-analyses, and we did not restrict the publication date. For all other KQs, we focused on controlled trials published no earlier than 1985 and systematic reviews / meta-analyses published in the last 5 years that directly address our KQs. We did not perform separate searches for system influences; evidence from studies included in KQs 1, 3, 4, 5, and 6 was used to address KQ 7.

Table 2. Study eligibility criteria

Population(s)	Adults and/or adolescents (ages 12 years and older) with alcohol misuse or being screened for alcohol misuse* Subgroups of interest include pregnant women, adolescents, college students, adults >65 years, racial/ethnic minorities (e.g., Latinos, Native Americans, African Americans), people with co-occurring mental health disorders or chronic medical conditions, people with different severity/levels of alcohol misuse (e.g., risky drinking vs. dependence) and veterans with alcohol misuse.
Interventions	Office-based screening for alcohol misuse followed by behavioral counseling interventions primarily to reduce alcohol intake (e.g., motivational interviews, cognitive behavioral therapy, action plans, written materials, and personalized feedback, among others) with or without referral Studies using office-based screening for alcohol misuse with one of the following instruments will be eligible for inclusion: • Alcohol Use Disorders Identification Test (AUDIT) and its abbreviated versions • Cut-down, Annoyed, Guilty, Eye-opener (CAGE) questionnaire • Michigan Alcoholism Screening Test (MAST) and its abbreviated and population-specific versions • Rapid Alcohol Problems Screen (RAPS) • Tolerance, Annoyed, Cut-down, Eye-opener (T-ACE) and Tolerance, Worried, Eye-opener, Amnesia, Kut-down (TWEAK) questionnaires, which are based on the CAGE questionnaire and designed for screening pregnant women • Single-question screening recommended by NIAAA, also called the Single Alcohol Screening Question (SASQ) • Alcohol-Related Problems Survey (ARPS), shortened version (shARPS) • Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) • In addition, studies using one or more questions related to quantity and/or frequency of alcohol use will be eligible.
Comparators	Different combinations, approaches, and modalities for the above interventions Usual care (as defined by the study, representing however a particular practice or setting is providing care for patients who do not receive an intervention). This could include no screening, no discussion, providing no information, or providing minimal information in the form of written materials. Office-based screening for alcohol misuse with another of the screening instruments above
Outcomes	Intermediate outcomes: Rates of alcohol use, reported as the mean number of drinks per week Percentage of participants without binge drinking Percentage of participants who achieve the recommended drinking levels or patterns Receipt of and follow-up with referrals Abstinence from any use of alcohol Health outcomes, utilization outcomes, and other end points: Alcohol-related morbidity and mortality All-cause mortality Alcohol-related accidents and injuries Health care utilization Sick days Costs Legal issues Employment stability Quality of life

Table 2. Study eligibility criteria (continued)

Outcomes (continued)	Potential adverse effects of interventions Anxiety Stigma, labeling, and/or discrimination Interference with the doctor-patient relationship Opportunity costs/time Increased smoking, and/or illegal substance use
Timing	Outcome assessment at least 6 months after randomization (or from receipt of the intervention for non-randomized controlled trials)
Settings	Traditional primary-care settings; Settings with a primary care-type relationship that may be applicable to traditional primary care settings (e.g., infectious disease clinics for people with HIV, oncology clinics for people with cancer); At least 80% of the enrolled sample was required to have been recruited via office-based screening. No geographic limits
Study designs	For KQs 1, 3, 4, 5, 6, and 7: Randomized controlled trials, nonrandomized trials with concurrent eligible controls, and recent systematic reviews[†] with or without meta-analyses; For KQ 2:[‡] Systematic reviews[†] of screening instruments with or without meta-analyses For KQ 1: studies that assigned patients to screening compared with another screening approach, no screening, or usual care. For KQs 4 and 6: studies that assign subjects that had a positive screening test to an intervention of interest and to at least one eligible comparator. For KQs 3, 5, and 7: we evaluated the information within the trials and systematic reviews included for KQs 1, 4, and 6. No sample size limits

* Alcohol misuse includes risky or hazardous drinking, harmful drinking, alcohol abuse, and alcohol dependence.

[†]For KQs 1, 3, 4, 5, 6, and 7, systematic reviews were required to have been published within the past 5 years (to focus on current evidence, as older reviews will not have included the more recent trials). For KQ2, no date cutoff was set because systematic reviews were planned to be the primary source for answering this question (whereas we were evaluating all of the individual studies that would potentially be included in a systematic review for the other KQs).

[‡]KQ2 aimed to address which screening modalities (if any) are capable of distinguishing people with dependence from those with less severe alcohol misuse, how the screening instruments compare for various subpopulations (e.g., pregnant women, adults over 65), and general characteristics of the screening tests (e.g., number of questions, sensitivity, specificity). Like the previous USPSTF review, we will assess the approaches used for screening using included systematic reviews and within the included studies (of screening followed by an intervention). We will supplement the findings with information from other reviews, if necessary.

For this review, results from well-conducted trials provide the strongest evidence to compare interventions with respect to efficacy, effectiveness, and harms. We defined controlled trials as those comparing screening with no screening (KQs 1 and 3) or one type of intervention and/or referral with another and/or with usual care (all other KQs). Studies of at least 6 months' duration were eligible for inclusion, and we did not impose any limits on sample size.

All titles and abstracts identified through searches were independently reviewed for eligibility against our inclusion/exclusion criteria by two trained members of the research team. Studies marked for possible inclusion by either reviewer underwent full-text review. For studies without adequate information to determine inclusion or exclusion, we retrieved the full text and then made the determination. All results were tracked in an EndNote® database.

Each full-text article included during title/abstract review was independently reviewed by two trained members of the team for inclusion or exclusion based on the eligibility criteria described above. If both reviewers agreed that a study did not meet the eligibility criteria, the

study was excluded. If the reviewers disagreed, conflicts were resolved by discussion and consensus or by consulting a third member of the review team. As described above, all results were tracked in an EndNote® database. We recorded the reason that each excluded full-text publication did not satisfy the eligibility criteria and compiled a comprehensive list of such studies (Appendix B).

Data Extraction and Data Management

For studies that met our inclusion criteria, we abstracted important information into evidence tables. We designed and used structured data abstraction forms to gather pertinent information from each article, including characteristics of study populations, settings, interventions, comparators, study designs, methods, and results. Trained reviewers extracted the relevant data from each included article into the evidence tables. All data abstractions were reviewed for completeness and accuracy by a second member of the team. We recorded intention-to-treat (ITT) results if available. All data abstraction was performed using Microsoft Excel® software. Evidence tables containing all abstracted data of included studies are presented in Appendix C.

Quality Assessment

To assess the quality (internal validity) of studies, we used predefined criteria based on those developed by the USPSTF (ratings: good, fair, poor)[58] and the University of York Centre for Reviews and Dissemination.[59] In general terms, a "good" study has the least risk of bias and its results are considered to be valid. A "fair" study is susceptible to some bias but probably not sufficient enough to invalidate its results. A "poor" study has significant risk of bias (e.g., stemming from serious errors in design or analysis) that may invalidate its results.

Two independent reviewers assigned quality ratings for each study. Disagreements between the two reviewers were resolved by discussion and consensus or by consulting a third member of the team. We gave good quality ratings to studies that met all, or all but one, criteria. We gave poor quality ratings to studies that had a fatal flaw (defined as a methodological shortcoming that leads to a very high risk of bias) in one or more categories, and we excluded them from our analyses. Appendix D details the criteria used for evaluating the quality of all included studies.

Data Synthesis

Prioritization and/or categorization of outcomes were determined by the research team with input from TEP members. We separated evidence for adults, older adults, young adults and college students, and pregnant women. Quantitative analyses were conducted using meta-analyses of outcomes reported by a sufficient number of studies that were homogeneous enough to justify combining their results. To determine whether quantitative analyses were appropriate, we assessed the clinical and methodological heterogeneity of the studies under consideration following established guidance.[60] We did this by qualitatively assessing the PICOTS of the included studies, looking for similarities and differences. We stratified results by population, separating those for adults, young adults or college students, older adults, and pregnant women. When quantitative analyses were not appropriate (e.g., due to heterogeneity, insufficient numbers of similar studies, or insufficiency or variation in outcome reporting), we synthesized the data qualitatively.

For our meta-analyses, our primary outcome was change in alcohol consumption (drinks per week) between baseline and 12 months. Some studies reported alcohol consumption over a

different time period (e.g., past 30 days). For those studies, we converted the number of drinks into a weekly rate. In cases where alcohol consumption was reported in gram units, we used a conversion factor of 13.7 grams as equivalent to a standard drink.[61] Many studies did not report a variance measure of the mean change from baseline to endpoint, but included variance information at baseline and 12 months. We assumed a correlation of 0.5 in order to estimate the mean change variance and conducted sensitivity analyses with assumed correlations of 0.3 and 0.7 to confirm that this assumption did not significantly change our results. Separate analyses were run for studies reporting 6 month alcohol consumption outcomes. We also ran meta-analyses for several other intermediate outcomes (e.g., binge drinking, achievement of recommended drinking levels) with sufficient data and for all-cause mortality. In addition to calculating an overall pooled point estimate, we calculated pooled point estimates for each category of intensity of the interventions. Intervention intensity was categorized as very brief (single contact, 5 minutes or less), brief (single contact, up to 15 minutes), extended (single contact, greater than 15 minutes), brief multi-contact (multiple contacts, up to 15 minutes each), or extended multi-contact (multiple contacts, one or more of them greater than 15 minutes). We also performed subgroup analyses for men and women to assess whether treatment effects differed by sex. Other subgroups were explored through separate analyses stratifying by each of the following: type of provider conducting the intervention, country, and whether the study included alcohol dependent subjects.

Random-effects models were used to estimate pooled effects.[62] For the primary outcome of alcohol consumption (drinks per week), the effect measure was the mean difference between behavioral counseling intervention and control. For the intermediate outcomes of binge drinking and achievement of recommended drinking levels, the percentage of patients at 12 months were compared with a risk difference. For all-cause mortality, because the follow-up period varied between trials, the analysis was based on number of deaths per person-year and the comparison between intervention and control was calculated as a risk ratio. Forest plots graphically summarize results of individual studies and of the pooled analysis (Appendix E).[63]

The chi-squared statistic and the I^2 statistic (the proportion of variation in study estimates due to heterogeneity) were calculated to assess heterogeneity in effects between studies.[29,30] An I^2 from 0 to 40 percent might not be important, 30 percent to 60 percent may represent moderate heterogeneity, 50 percent to 90 percent may represent substantial heterogeneity, and ≥75 percent represents considerable heterogeneity.[64] The importance of the observed value of I^2 depends on the magnitude and direction of effects and on the strength of evidence for heterogeneity (e.g., p-value from the chi-squared test, or a confidence interval for I^2). Whenever including a meta-analysis with considerable statistical heterogeneity in this report, we provide an explanation for doing so, considering the magnitude and direction of effects.[64] Potential sources of heterogeneity were examined by analysis of subgroups of study design, study quality, patient population, and variation in interventions. Heterogeneity was also explored through sensitivity analyses. We also conducted meta-regression for our primary analysis (change in alcohol consumption at 12 months) to assess the potential impact of geographic location of studies (US vs. non-US), severity of alcohol misuse (studies enrolling more than 10 percent of subjects with alcohol dependence), and type of provider delivering the intervention (primary care provider, nurse, researcher). Quantitative analyses were conducted using Stata® version 11.1 (StataCorp LP, College Station, TX) and Comprehensive Meta Analysis® version 2.2.055 (BioStat, Inc., Englewood, NJ).

Grading Strength of Evidence

We graded the strength of evidence based on the guidance established for the Evidence-based Practice Center Program.[65] Developed to grade the overall strength of a body of evidence, this approach incorporates four key domains: risk of bias (includes study design and aggregate quality), consistency, directness, and precision of the evidence. We considered all evidence from intermediate outcomes to be indirect. It also considers other optional domains that may be relevant for some scenarios, such as a dose-response association, plausible confounding that would decrease the observed effect, strength of association (magnitude of effect), and publication bias.

Table 3 describes the grades of evidence that we assigned. We graded the strength of evidence for harms (KQs 3 and 5), the intermediate outcomes analyzed in KQ 4, and for morbidity, mortality, and other long-term health outcomes for KQ 6. Two reviewers assessed each domain for each key outcome, and differences were resolved by consensus.

Table 3. Definitions of the grades of overall strength of evidence[65]

Grade	Definition
High	High confidence that the evidence reflects the true effect. Further research is very unlikely to change our confidence in the estimate of effect.
Moderate	Moderate confidence that the evidence reflects the true effect. Further research may change our confidence in the estimate of the effect and may change the estimate.
Low	Low confidence that the evidence reflects the true effect. Further research is likely to change our confidence in the estimate of the effect and is likely to change the estimate.
Insufficient	Evidence either is unavailable or does not permit estimation of an effect.

Applicability Assessment

We assessed applicability of the evidence following guidance from the Methods Guide for Comparative Effectiveness Reviews.[66] We used the PICOTS framework to explore factors that affect applicability. Some factors identified a priori that may limit the applicability of evidence included the following: age of enrolled populations, sex of enrolled populations (e.g., few women may be enrolled in studies), race / ethnicity of enrolled populations, few studies evaluating pregnant women, the elderly, or adolescents, and the use of interventions that may be difficult to incorporate into routine practice for many providers (i.e., they require substantial resources or time, they may be delivered by research staff rather than existing staff in the practice).

Peer Review and Public Commentary

[This section will be updated for the final report once the review has been completed.]

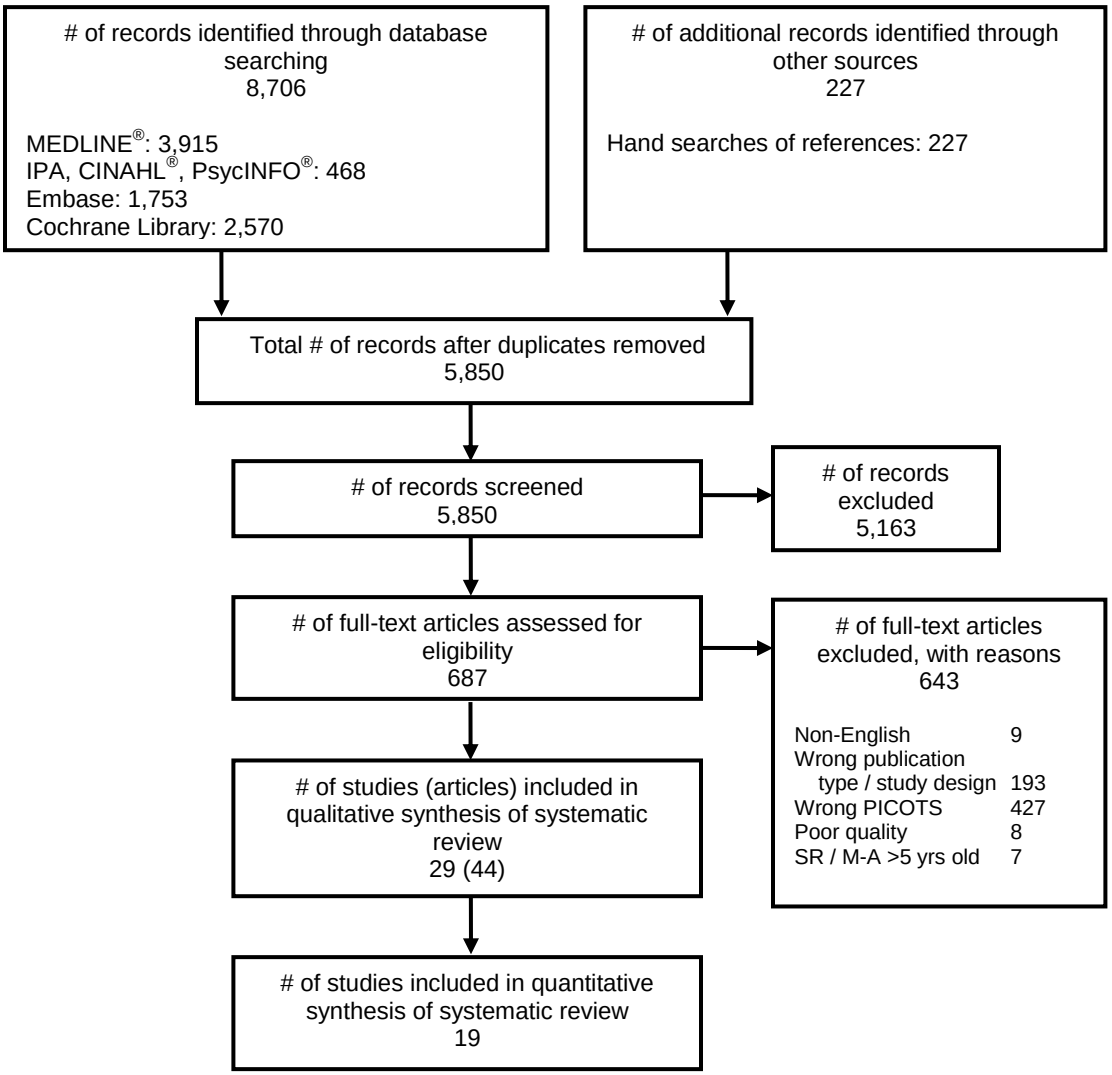
An external peer review was performed on this report. Peer reviewers were charged with commenting on the content, structure, and format of the evidence report, providing additional relevant citations, and pointing out issues related to how we conceptualized the topic and analyzed the evidence. Our peer reviewers (listed in the Front Matter) gave us permission to acknowledge their review of the draft. We compiled all comments and addressed each one individually, revising the text as appropriate. AHRQ also provided review from its own staff. In addition, the SRC placed the draft report on the AHRQ Web site (http://effectivehealthcare.ahrq.gov/) for public review.

Results

Introduction

Results of our searches are presented in Figure 2. We included 44 published articles reporting on 29 studies: 23 randomized controlled trials (RCTs) and six meta-analyses or systematic reviews. Our findings include studies rated good or fair for internal validity. Evidence tables for included studies, by key question (KQ), can be found in Appendix C.

Figure 2. Disposition of articles



Abbreviations: IPA, International Pharmaceutical Abstracts; M-A, meta-analysis; PICOTS, population, intervention, comparator, outcomes, timing, setting and study duration; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SR, systematic review

In the 23 included trials, sample sizes ranged from 72 to 1,559, and study duration ranged from 6 to 48 months. Eleven were conducted solely in the United States; 10 took place outside the U.S., and the remaining 2 were administered in a combination of U.S. and non-U.S. sites.

This chapter is organized by KQ; within applicable KQs, results are presented for the following populations: adults (including subgroups of men and women when possible), older adults, young adults or college students, and pregnant women. We did not find any studies in an adolescent population meeting inclusion criteria.

Key Question 1. What is the direct evidence that screening for alcohol misuse followed by a behavioral counseling intervention, with or without referral, leads to reduced morbidity, reduced mortality, or changes in other long-term outcomes?

To answer this question, we searched for randomized controlled trials and nonrandomized trials with concurrent eligible controls that assigned subjects to screening compared with another screening approach, no screening, or usual care. Systematic reviews of such trials were also eligible for inclusion. Of note, unlike other Key Questions (4-6) in this report that included studies that randomized/assigned subjects who had positive screening tests to behavioral counseling interventions and to comparators, this question searched for studies that randomized/assigned subjects to screening versus no screening, usual care, or another screening approach.

Summary of Findings

Morbidity, Mortality, Health Care Utilization, Sick Days, Costs, Legal Issues, Employment Stability, and Quality of Life

We found no studies meeting inclusion/exclusion criteria (insufficient strength of evidence).

Key Question 2: How do specific screening modalities compare with one another for detecting alcohol misuse?

Commonly used screening tools to identify alcohol misuse include but are not limited to the following:

- Alcohol Use Disorders Identification Test (AUDIT) and its abbreviated versions, including the AUDIT-C
- Cut-down, Annoyed, Guilty, Eye-opener (CAGE) questionnaire
- Michigan Alcoholism Screening Test (MAST) and its abbreviated and population-specific versions
- Rapid Alcohol Problems Screen (RAPS)
- Tolerance, Annoyed, Cut-down, Eye-opener (T-ACE) and Tolerance, Worried, Eye-opener, Amnesia, Kut-down (TWEAK) questionnaires, which are based on the CAGE questionnaire and designed for screening pregnant women
- Versions of the single-question screening recommended by NIAAA, or similar single-question screening, such as the Single Alcohol Screening Question (SASQ)
- Alcohol-Related Problems Survey (ARPS), shortened version (shARPS)

Additional description of screening tools is provided in Appendix F.

Summary of Findings

- A number of good instruments (based on sensitivity and specificity) are available to screen for alcohol misuse.
- Many of them require as little as 1 to 2 minutes to administer (e.g., single question screens, AUDIT-C, CAGE, TWEAK, T-ACE)

Adults

- Overall, the AUDIT-C and the full AUDIT have the highest reported sensitivities for detecting alcohol misuse (0.98 and 0.97, respectively). The specificity for the AUDIT-C, however, is fairly low (0.57), and a wide range of values have been reported for the sensitivity and specificity of the AUDIT.
- The CAGE has very low sensitivity for detecting risky/hazardous or harmful drinking and is therefore not a good screening test for identifying risky/hazardous or harmful drinking. The CAGE appears to be a good test for detecting alcohol abuse or dependence.
- Single alcohol screening questions demonstrated good sensitivity (0.62 to 0.81) and specificity (0.79 to 0.93) for detecting at-risk drinking among adult primary care populations.

Older Adults

- The AUDIT-C, AUDIT, the ARPS, and shARPS instruments performed well for detecting at-risk drinking.
- For detecting abuse or dependence, the MAST instrument performed very well, with sensitivities over 90 percent. However, the MAST is a 22-item instrument that is very likely impractical in most primary care settings. The CAGE with a positive screen being ≥1 also performed very well (sensitivity range 0.79 to 0.88).

Pregnant Women

- The T-ACE, TWEAK, and AUDIT-C had the highest sensitivity values for identifying problem drinking; for abuse and dependence, the AUDIT-C and the T-ACE had the highest sensitivities.
- The AUDIT-C performed better than other instruments for detecting both at-risk drinking and abuse or dependence, demonstrating both high sensitivity and high specificity.

Young Adults and College Students

- The included systematic reviews identified only one study reporting the sensitivity and specificity of a screening instrument, the full AUDIT (≥8), which performed well for identifying risky/hazardous or harmful drinking (sensitivity = 0.82; specificity = 0.78).

Detailed Assessment

Four systematic reviews compared screening instruments for detecting alcohol misuse[67-70] and a fifth review reported on the use of the AUDIT alone.[71] All five reviews focused on primary care populations, with two focused on all adults,[70,71] one on adults age 60 or older, [67] one on women,[68] and one on pregnant women.[69] Outcomes of interest included the sensitivity and

specificity of the screening tool to detect at-risk drinking or alcohol dependence and a recommended cutoff score for the population included in the studies. Table 4 provides a summary of the five systematic reviews included in this report along with an overall quality rating for each article. Each systematic review included in this report was evaluated for scientific rigor. Criteria for study quality are listed in Appendix D.

Table 4. Characteristics of included systematic reviews comparing screening modalities with one another for detecting alcohol misuse in primary care

Author/Year	Population	Number of Studies Included	Total Number of Patients	List of Screening Instruments Included	Alcohol Misuse	Quality Rating
Berks 2008[67]	Primary care, adults 60 or older	9	6,353	CAGE, MAST, SMAST, AUDIT ARPS, shARPS SMAST-G	Hazardous drinking Alcohol abuse or dependence	Fair
Berner 2007[71]	Primary care, adults, college students, older adults	13 PC 1 college health	22,195*	AUDIT	At-risk drinking	Good
Bradley 1998[68]	Primary care/ and OB, mostly women	9	Total:10,865* Women: 10,522*	CAGE, TWEAK, AUDIT, T-ACE	Heavy drinking Alcohol abuse or dependence	Fair
Burns 2010[69]	Pregnant Women	5	6,724	T-ACE, TWEAK AUDIT-C, CAGE NET, SMAST	At-risk drinking Alcohol abuse or dependence	Fair
Fiellin 2000[70]	Primary care, adults	38	NR	AUDIT, CAGE SMAST, single question, QF	At-risk/ hazardous/harmful drinking Alcohol abuse or dependence	Fair

Abbreviations: ARPS, Alcohol-Related Problems Survey; AUDIT, Alcohol Use Disorders Identification Test; AUDIT-C, Alcohol Use Disorders Identification Test – Consumption, CAGE, Cut-down, Annoyed, Guilty, Eye-opener questionnaire; MAST, Michigan Alcoholism Screening Test; NET, Normal drinker, Eye-opener, Tolerance questionnaire; OB, obstetrics; PC, primary care; QF, quantity / frequency; shARPS, shortened Alcohol-Related Problems Survey; SMAST, short Michigan Alcoholism Screening Test; SMAST-G, short Michigan Alcoholism Screening Test – geriatric version; T-ACE, Tolerance, Annoyed, Cut-down, Eye-opener questionnaire; TWEAK, Tolerance, Worried, Eye-opener, Amnesia, Kut-down questionnaire

* These numbers do not include studies conducted in non-primary care settings

The sensitivity of any instrument refers to the ability of the test to correctly identify those patients who have the disease or condition, whereas the specificity notes the ability of the instrument to correctly identify those who do not. A high sensitivity is clearly important where the test is used to identify a serious but treatable disorder. A test with high specificity correctly identifies patients without the disorder. A test with a high sensitivity but low specificity may result in many patients who are negative for the disorder being subjected to further investigation, potentially using valuable time/resources when they are not needed.

Screening for Risky, Hazardous, or Harmful Drinking

Sensitivity and specificity values for each of the screening instruments are reported in Table 5 for studies identifying risky, hazardous, or harmful drinking. Where reported, cutoff scores for each instrument are also included.

Table 5. Screening instrument performance for detecting at-risk, hazardous, or harmful drinking in primary care

Instrument and Cutoff Score if Reported	Adults Range of Sens; Range of Spec	Older Adults Range of Sens; Range of Spec	Pregnant Women Range of Sens; Range of Spec	Young Adults / College Students Range of Sens; Range of Spec
ARPS		0.93; 0.63[67]		
shARPS		0.92; 0.51[67]		
AUDIT ≥8*	0.25[71] to 0.97[70]; 0.61 to 0.96[71]	0.28[67] to 0.88[71]; 0.95 to 1.00[67]	0.23; 0.97[69]	0.82; 0.78[71]
AUDIT-C ≥3	0.98; 0.57[70†]	0.54 to 1.00; 0.81 to 0.93[67]	0.95; 0.85[69]	
CAGE ≥2	0.49 to 0.84; 0.75 to 0.97[70]	0.14 to 0.39[‡67]; 0.97 [67]	0.38 to 0.49; 0.92 to 0.93[68,69]	
SMAST ≥2	0.68; 0.92[70]	0.48; 1.00[§ 67]	‖	
NET ≥1[#]			0.71; 0.86[69]	
Single question: past 3 months**	0.62; 0.93[70]			
Single question past 12 months[††]	0.81; 0.79[72]}			
T-ACE ≥2[‡‡ §§]			0.69 to 0.92; 0.38 to 0.89[68,69]	
TWEAK ≥2[‡‡ ‖‖]			0.71 to 0.91; 0.73 to 0.83[68,69]	
QF >7 dr/wk	0.50; 0.87[70] Women: 0.29; 0.90 Men: 0.69; 0.79[68]			

Abbreviations: ARPS, Alcohol-Related Problems Survey; AUDIT, Alcohol Use Disorders Identification Test; AUDIT-C, Alcohol Use Disorders Identification Test – Consumption, CAGE, Cut-down, Annoyed, Guilty, Eye-opener questionnaire; dr, drinks; MAST, Michigan Alcoholism Screening Test; NET, Normal drinker, Eye-opener, Tolerance questionnaire; NI, none identified; NIAAA, National Institute on Alcohol Abuse and Alcoholism; QF, quantity / frequency; SASQ, Single Alcohol Screening Question; sens, sensitivity; shARPS, shortened Alcohol-Related Problems Survey; SMAST, short Michigan Alcoholism Screening Test; spec, specificity; T-ACE, Tolerance, Annoyed, Cut-down, Eye-opener questionnaire; TWEAK, Tolerance, Worried, Eye-opener, Amnesia, Kut-down questionnaire; wk, week

*Although the range of sensitivities for the AUDIT at a cutoff ≥8 includes a value as low as 0.25, 5 of 8 studies in adults found sensitivities above 70%, with the largest, U.S.-based study (rated high quality) reporting sensitivity and specificity of 0.76 and 0.92, respectively. For adults, AUDIT with a positive screen being ≥5 has a sensitivity of 0.84 and a specificity of 0.90.[70]

†Results are from a VA Gen Med Clinic population[70]

‡ For older adults, CAGE with a positive screen being ≥1 has a sensitivity ranging from 0.79 to 0.88.[67]

§ For older adults, SMAST-G ≥3 has sensitivity = 0.52 and specificity = 0.96.[67]

‖ For pregnant women, SMAST ≥3 has sensitivity = 0.11 and specificity = 0.96.[69]

For pregnant women, NET ≥2 has sensitivity = 0.61 and specificity = 0.87 and NET ≥3 has sensitivity = 0.24 and specificity = 0.99.[69]

** Single question 3 months: “On any single occasion during the past 3 months, have you had more than 5 drinks containing alcohol?” Combined result for at-risk, abuse, and dependence.

†† Single question 12 months: "How many times in the past year have you had X or more drinks in a day?" (X = 5 for men and 4 for women). A positive response to this single-question screen was defined as 1 or more. (NIAAA rec)

‡‡Combined results for the all definitions of “tolerance” in T-ACE and TWEAK (including “high” and “hold”)

§§For pregnant women, T-ACE ≥1 has sensitivity from 0.76 to 0.91 and specificity from 0.70 to 0.79, and T-ACE ≥3 has sensitivity from 0.38 to 0.61 and specificity from 0.94 to 0.97.[68,69]

|||| For pregnant women, TWEAK ≥1 has sensitivity from 0.66 to 0.92 and specificity from 0.64 to 0.72, and TWEAK ≥3 has sensitivity from 0.59 to 0.67 and specificity from 0.92 to 0.94.[68,69]

The AUDIT appears to be the most widely used screening instrument for detecting harmful or hazardous drinking and shows very good sensitivity and excellent specificity across a number of populations. The AUDIT showed variable performance for older adult populations with sensitivity ranging from 0.28 to 0.83 and specificity showing somewhat stronger results in the range of 0.51 to 0.96. The three consumption questions of the AUDIT-C showed excellent sensitivity and specificity in two subpopulations (i.e., older adults and pregnant women) and seems to be an excellent screening instrument for identifying harmful drinking in these populations. Also performing very well for detecting at-risk drinking among pregnant women were the TWEAK and the T-ACE. Specificity of these two instruments was also high, ranging from 0.71 to 0.89, indicating a low false-positive rate, which can save time and resources.

The CAGE was also used in a number of studies and showed very low sensitivity for detecting risky, harmful, or hazardous drinking. A single question was roughly comparable to that reported for longer questionnaires, supporting the use of the brief single-question screen endorsed by the NIAAA.[18] The single question screen typically asks patients to report on drinking 4 (women) or 5 (men) drinks per occasion over a recent time period (e.g., past 3 months) and has been used widely used with college populations to screen into secondary prevention studies.

With respect to pregnant women, the TWEAK, T-ACE, and AUDIT-C had the highest sensitivity for identifying risky drinking. Sensitivity values indicate that about 7 to 9 of 10 risky drinkers would be identified correctly using one of these brief questionnaires. CAGE and SMAST were poor at identifying risky drinking in pregnant women.

Screening for Abuse/Dependence

Table 6 presents results for the sensitivity and specificity of the screening instruments for detecting alcohol abuse or dependence across the various populations.

In general, a number of the screening instruments had good sensitivity for detecting alcohol abuse or dependence, with several studies reporting sensitivities above 0.90 (for the AUDIT, AUDIT-C, CAGE, SMAST) for adults. Specificity was better for the AUDIT (0.85 to 0.96) and CAGE (0.79 to 0.97) than for the AUDIT-C (0.45). For pregnant women, the three-question AUDIT-C had better sensitivity than the AUDIT for detecting abuse or dependence (0.96 to 1.0 vs. 0.23), but the AUDIT had greater specificity (0.97 vs. 0.71).

The CAGE showed much better sensitivity for detecting alcohol abuse/dependence than it did for at-risk drinking. The single question alcohol screen did not show good sensitivity for detecting alcohol abuse or dependence, identifying 4 to 7 out of 10 adults with the disorder but the specificity of the SASQ was excellent in adult populations.

Table 6. Screening instrument performance for detecting alcohol abuse or dependence in primary care

Instrument	Adults Range of Sens; Range of Spec	Older Adults Range of Sens; Range of Spec	Pregnant Women Range of Sens; Range of Spec	Young Adults / College Students Range of Sens; Range of Spec
ACI	0.28; 0.86[70]			
AUDIT ≥8*	0.61 to 0.96; 0.85 to 0.96[70]	0.33; 0.91[67]	0.23; 0.97[69]	
AUDIT-C ≥3	0.90; 0.45[70]		0.96 to 1.00; 0.71[69]	
CAGE ≥2	0.77 to 0.94; 0.79 to 0.97[70] Women: 0.38; 0.92[68] Men: 0.47; 0.93	0.63; 0.82[70]		
HSS	0.78; 0.71[70]			
LAST ≥2	0.63; 0.93[70]			
MAST ≥4†		0.91; 0.84[67]		
MAST-G ≥5		0.70; 0.80[70]		
SMAST ≥2‡	1.00; 0.85[70]			
SAAST ≥3	0.13 to 0.69; 0.67 to 0.95[70]			
SDDS-PC	0.38 to 0.75; 0.97 to 0.99[70]			
T-ACE ≥2			0.60 to 0.88; 0.37 to 0.66[69]	
TWEAK ≥3	0.75; 0.90[70]			
QF >20 dr/wk	0.20; 0.97[70] Women: 0.07; 0.99 Men: 0.36; 0.93[68]			
QF >4 dr/day	0.47; 0.96[70]			
QF (unspecified)		0.48; 0.76[70]		

Abbreviations: ACI, Alcohol Clinical Index; AUDIT, Alcohol Use Disorders Identification Test; AUDIT-C, Alcohol Use Disorders Identification Test – Consumption, CAGE, Cut-down, Annoyed, Guilty, Eye-opener questionnaire; dr, drinks; HSS, Health Screening Survey; LAST, Luebeck Alcohol Dependence and Abuse Screening Test; MAST, Michigan Alcoholism Screening Test; QF, quantity / frequency; SAAST, Self-administered Alcoholism Screening Tests; SDDS-PC, Symptom-Driven Diagnostic System for Primary Care; sens, sensitivity; SMAST, short Michigan Alcoholism Screening Test; spec, specificity; T-ACE, Tolerance, Annoyed, Cut-down, Eye-opener questionnaire; TWEAK, Tolerance, Worried, Eye-opener, Amnesia, Kut-down questionnaire; wk, week

When values for identifying both current and lifetime abuse/dependence were reported, the table reflects data for detecting a current disorder.

Our included systematic reviews did not report data on the performance of the following instruments for detecting alcohol abuse and/or dependence: ARPS (Alcohol-Related Problems Survey); shARPS, shortened Alcohol-Related Problems Survey; NET, Normal drinker, Eye-opener, Tolerance questionnaire.

* For adults, AUDIT >8 has sensitivity ranging from 0.38 to 0.96 and specificity ranging from 0.90 to 0.96.

† For older adults, MAST ≥3 has sensitivity ranging from 0.64 to 0.97 and specificity ranging from 0.67 to 0.79.

‡ For all adults, SMAST >5 has sensitivity ranging from 0.45 to 0.80 and specificity ranging from 0.79 to 0.88. For pregnant women, SMAST ≥3 has sensitivity = 0.15 and specificity = 0.98.

Instrument Burden

The practitioner and patient time burdens are important considerations when choosing a screening instrument. The instruments included in these systematic reviews varied from 1 to 60 questions and administration time for the various instruments ranged from less than 1 minute to 15 minutes (Table 7). Briefer questionnaires may be more feasible to administer in a busy practice and are less likely to disrupt the flow of patients.

Table 7. Screening instrument details

Instrument	Number of Questions	Administration	Time Burden
ARPS	60	Written/Computer Scoring	16 min
shARPS	32	Written/Computer Scoring	2-5 min
AUDIT	10	Oral, written, computer	2-5 min
AUDIT-C	3	Written	1-2 min
CAGE	4	Written/Oral	1 min
MAST	22	Written	8 min
MAST-G	24	Written	10 min
SMAST	13	Written	5 min
SMAST-G	10	Written	NR
NET	3	Written/Oral	1 min
Single question: 3 months	1	Oral	<1 min
Single question: 12 months	1	Oral	<1 min
T-ACE	4	Written/Oral	1 min
TWEAK	5	Written/Oral	<2 min

Abbreviations: ARPS, Alcohol-Related Problems Survey; sharps, Alcohol-Related Problems Survey – shortened version; AUDIT, Alcohol Use Disorders Identification Test; AUDIT-C, Alcohol Use Disorders Identification Test – Consumption; CAGE, Cut-down, Annoyed, Guilty, Eye-opener questionnaire; MAST, Michigan Alcoholism Screening Test; NET, Normal drinker, Eye-opener, Tolerance questionnaire; SMAST, short Michigan Alcohol Screening Test; T-ACE, Tolerance, Annoyed, Cut-down, Eye-opener questionnaire; TWEAK, Tolerance, Worried, Eye-opener, Amnesia, Kut-down questionnaire

Key Question 3. What adverse effects are associated with screening for alcohol misuse and screening-related assessment?

Possible adverse effects of screening for alcohol misuse include anxiety; stigma, labeling, or discrimination; and interference with the doctor-patient relationship. Additionally, we considered the possible opportunity costs given that screening may take time away from other clinical activities. Finally, one could hypothesize that screening for unhealthy alcohol use might lead to increased smoking or illegal substance use if people replace one substance/vice with another. However, we found no studies that explicitly addressed any of these potential adverse effects (insufficient strength of evidence).

Summary of Findings

Adverse effects

- We found no studies meeting inclusion/exclusion criteria (insufficient strength of evidence)

Key Question 4a. How do behavioral counseling interventions, with or without referral, compare with usual care for improving intermediate outcomes for people with alcohol misuse as identified by screening?

Summary of Findings

In the bulleted text below we summarize the main findings for each population (adults, older adults, young adults and college students, and pregnant women) by outcome and report the strength of evidence (SOE) for each outcome. Overall, evidence supports the effectiveness of behavioral interventions for improving a number of intermediate outcomes for adults, older adults, and young adults/college students (*moderate* or *low* SOE, depending on the population and outcome). For pregnant women, the included studies did not provide evidence of the effectiveness of behavioral interventions for improving intermediate outcomes over 6 months or longer (*low* or *insufficient* SOE, depending on the outcome). Subgroup analyses did not identify differences between men and women. Brief multi-contact interventions have the best evidence of effectiveness across populations, outcomes, and have follow-up data over several years. Very brief (up to 5 minutes) and brief (up to 15 minutes) single-contact interventions appear to be ineffective or less effective. Table 8 summarizes findings for the three intermediate outcomes most commonly reported, by population.

Table 8. Summary of effectiveness and strength of evidence of behavioral interventions compared with controls for improving intermediate outcomes, by population

	Consumption (Drinks/Week)	Binge Drinking	Recommended Drinking Levels
Adults	Reduction of 3.6 (2.4 to 4.8) Moderate SOE	12% fewer subjects reported binge drinking (7%, 16%) Moderate SOE	11% more subjects achieved (8%, 13%) Moderate SOE
Older adults	Reduction of 1.7 (0.6 to 2.8) Moderate SOE	Insufficient SOE	9% more subjects achieved (2%, 16%) Low SOE
Young adults or college students	Reduction of 1.7 (0.7 to 2.6) Moderate SOE*	0.9 fewer heavy drinking days (0.3, 1.5) Moderate SOE*	Insufficient SOE
Pregnant women	Data from 1 study found no difference Low SOE	Insufficient SOE	Insufficient SOE
Adolescents	Insufficient SOE	Insufficient SOE	Insufficient SOE

Notes: data presented are effect size (95% CI); all outcomes are 12 months unless otherwise indicated with a footnote; all percentages reported are absolute risk differences from our meta-analyses

Abbreviations: SOE, strength of evidence

*These data are 6 month outcomes; for consumption for young adults, we were unable to calculate pooled point estimate for 12-month data, but range of reduction was 1.2 to 4.1 drinks per week at 12 months (*moderate* SOE); for binge drinking for young adults, differences were not statistically significant at 12 months (*low* SOE).

Adults

- **Consumption**: behavioral interventions resulted in a greater reduction in quantity of alcohol consumed than controls at 12 months (WMD, -3.6 drinks per week, 95% CI, -4.8 to -2.4, moderate SOE). **Subgroup analyses** for **men and women** found similar benefits. When stratifying by **intensity** of the intervention, we found no statistically significant

difference between very brief interventions and controls (just one study contributed), but found greater reduction for brief, brief multi-contact, and extended multi-contact interventions than for controls. We found similar results for studies **conducted in the US** compared with those conducted in other countries, a trend toward a greater reduction in consumption for **interventions delivered primarily by primary care providers** (WMD, -4.0 drinks per week, 95% CI, -5.4 to -2.6) than for those delivered primarily by research personnel (WMD, -3.0, 95% CI, -5.0 to -1.0), and that studies enrolling 10 percent or more **subjects with alcohol dependence** found behavioral interventions to be ineffective or less effective than other studies.

- **Binge drinking**: behavioral interventions resulted in 12 percent more subjects reporting no binge drinking by 12 months compared with controls (Risk difference 0.12, 95% CI, 0.07 to 0.16, moderate SOE). Subgroup analyses for **men and women** found similar results. When stratifying by **intensity** of the intervention, brief multi-contact and extended multi-contact interventions were efficacious at 12 months (with 11 percent and 19 percent absolute difference compared with controls, respectively), but brief interventions did not reach statistical significance compared with controls.
- **Recommended drinking levels achieved**: 11 percent more subjects receiving interventions achieved recommended drinking levels by 12 months compared with controls (Risk difference 0.11, 95 percent CI, 0.08 to 0.13, moderate SOE). Subgroup analyses for **men and women** found similar magnitude of benefit. All of the intervention **intensities** studied were efficacious. The absolute difference in percentage of subjects achieving recommended drinking levels was numerically greatest for the brief multi-contact interventions (15 percent compared with 8 percent for very brief and brief interventions at 12 months), but the confidence intervals overlap.
- **Follow-up with referrals:** none of the included studies reported (insufficient SOE).
- **Abstinence**: three heterogeneous studies reporting abstinence among secondary outcome measures provided insufficient evidence to make a conclusion.[73-75] Of note, none of the studies were designed to achieve abstinence and it should probably not be a goal of behavioral interventions for most people.

Older Adults

- **Consumption**: behavioral interventions resulted in a greater decrease than controls at 12 months (WMD, -1.7 drinks per week, 95% CI, -2.8 to -0.6, moderate SOE)
- **Binge drinking**: evidence was insufficient to make a conclusion (insufficient SOE).
- **Recommended drinking levels achieved**: 9 percent more subjects in the intervention groups than in control groups achieved recommended drinking levels by 12 months (Risk difference 0.09, 95% CI, 0.02 to 0.16, *low* SOE).
- **Follow-up with referrals:** none of the included studies reported (insufficient SOE).
- **Abstinence:** none of the included studies reported (insufficient SOE).

Young Adults and College Students

- **Consumption**: interventions resulted in greater reduction than controls at 6 months (WMD, -1.7 drinks per week, 95% CI, -2.6 to -0.7, moderate SOE) and at 12 months (from 1.2[76] to 4.1[35] drinks per week, moderate SOE).

- **Binge drinking**: in-person interventions resulted in a greater reduction in heavy drinking days per month compared with controls (WMD, -0.9 heavy drinking days, 95% CI, -1.5 to -0.3), as did web-based interventions (RR, 0.76, 95% CI, 0.61 to 0.93) at 6 months (*moderate* SOE); but differences were not statistically significant at 12 months (*low* SOE).
- **Recommended drinking levels achieved**: none of the included studies reported (*insufficient* SOE).
- **Follow-up with referrals**: none of the included studies reported (*insufficient* SOE).
- **Abstinence:** none of the included studies reported (*insufficient* SOE).

Pregnant Women

- **Consumption**: reduction in mean drinks per drinking day was not significantly different between groups (-0.3 vs. -0.4, p= NS, excluding patients who maintained abstinence through the end, *low* SOE).
- **Binge drinking**: none of the included studies reported (*insufficient* SOE).
- **Recommended drinking levels achieved**: none of the included studies reported (*insufficient* SOE).
- **Follow-up with referrals**: none of the included studies reported (*insufficient* SOE).

Abstinence: one study provided insufficient evidence for the overall sample (*insufficient* SOE), but found maintenance of higher rates of abstinence for the subgroup of subjects who were abstinent prior to assessment (86 percent vs. 72 percent, P=0.04, *low* SOE).

Evidence in Adults

Characteristics of Included Studies

Table 9 summarizes the characteristics of the 16 trials targeting adult populations meeting our inclusion criteria for this question. Further details are provided in Appendix C. All were randomized controlled trials conducted exclusively in primary care settings except for the WHO study,[73] which included a variety of outpatient medical settings (including some emergency departments), depending on the country. The trials generally targeted those with risky/hazardous drinking, including binge drinkers. One study conducted in Spain enrolled exclusively those with binge drinking.[77] Most studies excluded subjects with alcohol dependence or constructed inclusion/exclusion criteria to limit the number of potential subjects with alcohol dependence (e.g., exclusion of those with symptoms of withdrawal in the past year, with a history of receiving treatment for an alcohol problem, or who had been told by a clinician to cut down in the past). However, it was often not reported whether any subjects with alcohol dependence were enrolled. Three studies reported more than 10 percent of included subjects with alcohol dependence.[42,78,79] These included a study conducted in 85 general practices in Germany with 30.4 percent meeting criteria for dependence (by DSM-IV diagnostic interview),[42] a study conducted in rural primary care sites in Thailand with around 15 percent (based on an AUDIT score >25),[78] and a study conducted in 40 primary care practices in Australia with 35 percent (those with moderate physical dependence based on the physical dependence on alcohol (Ph) score from the Comprehensive Drinker Profile, although the study excludes those with evidence of severe alcohol dependence based on Ph score >10, or those with severe levels of alcohol-related problems based on a MAST score of >20).[79]

Table 9. Characteristics of included trials comparing behavioral counseling interventions with usual care for improving intermediate outcomes for adults with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/wk)	Quality
Anderson, 1992[80]	154 NR	12	UK	8 PC group practices	43 to 45.1	0	NR	37.9 to 38.8	Fair
WHO Brief Intervention Study, 1996[73]	1559 0	9	8, including US	outpatient medical settings	35.9 to 36.9	19.2	NR	NR	Fair
Bischof et al., 2008[42,44,81] SIP study	408 30.4	12	Germany	85 general practices	35.9 to 36.8	31.9	NR	21 to 25.2	Fair
Curry, 2003[82]	307 NR	12	US Wash. state	23 PCPs in an HMO, urban clinic	47	35	20	14.2	Fair
Fleming et al., 1997[31-33,35,83] Project TrEAT	774 NR*	48	US Wisconsin	17 community PC practices	NR**	38	5.6 to 11.9	18.9 to 19.1	Good
Fleming et al., 2008[84,85] Healthy Moms	235 NR	6	US Wisconsin	34 OB practices	Median 28	100	18.3	8 to 8.5†	Good
Lock, 2006[86]	127 0	12	UK	General practices	44.1	50	NR	23 to 26.48	Fair
Maisto et al., 2001[87-89] ELM	301 NR	12	US Penn.	12 PC clinics	45.6	30.2	23.3	15.5 to 18.6	Fair
Noknoy, 2010[78]	117 13.8 to 15.3††	6	Thailand	Rural PC units	37	8.5	100 (Thai)	15.15	Fair
Ockene et al., 1999[38,90,91] Project Health	530 2	48	US Mass.	4 PC sites (93 clinicians)	43.5 to 44.2	32.1 to 38.7	4.3 to 6.6	16.6 to 18.9	Fair
Richmond, 1995[79] Alcoholscreen	378 35‡	12	Australia	40 PC practices	37.7	43	NR	38.5	Fair
Rubio, 2010[77]	752 0	12	Spain	20 PC centers in Madrid	NR, >70% were 31-40	34.7	NR	26.90 to 27.42	Fair
Saitz, 2003[75] SIP	312 NR‡‡	6	US Mass.	Urban academic PC practice	42.2 to 43.7	29 to 43	80 to 82	Mean drinks per drinking day: 5.5 to 5.6	Fair
Scott, 1990[92]	72 NR	12	UK	8 PC group practices	44.4 to 47.2	100	NR	25.8 to 26.7	Fair
Senft, 1997[74] Freeborn, 2000[93]	516 0	24	US Oregon	3 PC clinics in an HMO	41.9 to 43	28.1 to 31.1	17.4 to 18.7	16.5	Fair
Wallace, 1988[94]	909 NR	12	UK	47 group practices	41.7 to 44.6	29.1 to 29.8	NR	35.1 (females) and 62.2 (males)	Fair

Abbreviations: % Dep, percentage of subjects with alcohol dependence; ELM, Early Lifestyle Modification; Fem, female; HMO, health maintenance organization; Mass, Massachusetts; mths, months; N, total number randomized/assigned to treatment and control groups; NR, not reported/unclear; OB, obstetrical; PC, primary care; PCP, primary care physician; Penn, Pennsylvania; SIP (Bischof et al), Stepped Intervention for Problem Drinkers; SIP (Saitz et al), Screening and Intervention in Primary Care Study; TrEAT, Trial for Early Alcohol Treatment; UK, United Kingdom; US, United States; Wash, Washington; WHO, World Health Organization; wk, week; y, years

Notes: When data were not reported for mean age, %female, %non-white, and baseline alcohol consumption for the total sample but was presented for each study group, we give the range of the means for the various study groups.

*6 subjects (per medical record audit) received formal alcohol treatment during the 1-year follow up period; those may represent subjects ultimately diagnosed with alcohol dependence.

**Group 1: Men, 20.2% 18-30y; 27.2% 31-40y; 23.9% 41-50y; 28.8% 51-65y; Women, 43.5% 18-30y; 25.9% 31-40y; 15.6% 41-50y; 15.0% 51-65y. Group 2: Men, 26.0% 18-30y; 25.1% 31-40y; 21.3% 41-50y; 27.7% 51-65y; Women, 35.7% 18-30y; 35.7% 31-40y; 18.2% 41-50y; 10.5% 51-65y.

†Healthy Moms trial set the inclusion criteria below the NIAA recommended limit of 30 drinks per month because they reasoned that postpartum women may be more vulnerable to alcohol-related harm and they wanted to see if brief intervention could reduce drinking in this population.

††Based on AUDIT >25.

‡Percentages with moderate physical dependence based on the Ph score from the Comprehensive Drinker Profile. The study exclude those with evidence of severe alcohol dependence (Ph score >10) or those with severe levels of alcohol related problems (MAST >20).

‡‡Mean (SD) Alcohol Dependence Scale (ADS) score 7.4 to 7.5 (ADS score can range from 0-47. A score of 9 or more is highly predictive of DSM diagnosis of EtOH dependence).

Seven studies were conducted exclusively in the United States, four in the United Kingdom, and one each in Germany, Thailand, Australia, and Spain (Table 9). Most studies followed subjects for 6 to 12 months; three studies reported outcomes beyond 12 months, up to 24 months[74,93] or 48 months.[31-33,35,38,83,90]

The mean age ranged from 35 to 47 for all but one study conducted in postpartum women (Healthy Moms), reporting a median age of 28.[84] Women represented 30 percent or more of study participants in all US studies. Rates of non-white participants were not reported in many studies, and were usually low when reported (generally 4 percent to 23 percent), except for two trials—one conducted in Thailand[78] (100 percent Thai) and one conducted in an urban academic practice (80 percent to 82 percent non-white).[75]

Most studies reported a baseline alcohol consumption between 15 and 30 drinks per week. Two studies conducted in the UK[80,94] and one from Australia[79] reported more than 30 drinks per week at baseline. One study, the Healthy Moms study, reported a median 8 to 8.5 drinks per week.[84] It was the only study reporting fewer than 14 drinks per week at baseline. The authors explain that they set the inclusion criteria below the NIAAA recommended limit of 30 drinks per month because they reasoned that postpartum women may be more vulnerable to alcohol-related harm and they wanted to see whether brief intervention could reduce drinking in this population. As a result, some of the women included in this study would not meet criteria for alcohol misuse. Less than 30 percent of the included women were breastfeeding.

In the trials reviewed, methods to identify individuals with alcohol misuse generally involved two steps: (1) screening (of a population to identify those with probable alcohol misuse) and (2) screening-related assessment (confirming screening results and distinguishing patients suitable for the intervention and enrollment in the trial from those needing specialty care referral). This two-stage procedure was used by the oldest relevant study[94] and was adapted by many of the subsequent studies. The screening-related assessment stage was often a longer in-person interview conducted by research personnel, including detailed questions about each day's drinking in the past week. Studies generally used validated, established screening instruments (e.g., AUDIT) as adjuncts to various quantity, frequency, and use-per-occasion measures. None

of the studies relied on just the CAGE instrument to identify those with alcohol misuse, but several studies used it as a supplement to quantity-frequency measures. Research team personnel were most often involved in screening and determination of study eligibility, rather than primary care physicians or clinic staff. Additional details of screening methods for individual studies are provided in Appendix C.

The interventions of included studies for this section are described in Table 10, stratified by intervention intensity. Intervention intensity varied from very brief (single contact, 5 minutes or less) to brief (single contact, up to 15 minutes) to brief multi-contact (multiple contacts, up to 15 minutes each) to extended multi-contact (multiple contacts, one or more of them greater than 15 minutes). The most common were brief interventions, utilized by six studies, and brief multi-contact interventions, included in seven studies. Four trials included multiple intervention arms.[42,44,73,79,81,87-89]

The majority of studies tested interventions delivered primarily by the patient's primary care physician (9/16 studies; 10/20 interventions).[31-33,35,38,77,79,80,82,83,90-92,94] Three studies tested interventions delivered primarily by nurses,[78,84-86] three studies (contributing five interventions) tested interventions delivered primarily by research team personnel such as a health counselor or trained psychologist,[42,44,74,81,87-89,93] and one study from the WHO group (contributing two interventions) tested interventions delivered by various clinic staff.[73] Among the interventions involving patient's usual primary care physician, some used the physicians to deliver initial and any repeated intervention contacts while others also used educators, counselors, or nurses.

The majority of control groups received screening/assessment followed by usual care or by the provision of a general health pamphlet. A few studies included additional components in the control group that could bias the results toward the null—control group protocols in these studies included recording screening/assessment results on the chart,[79] forwarding screening/assessment results to a physician,[87] or advice from nurses on cutting down drinking and a leaflet with daily benchmark alcohol guides.[86]

The study by Saitz and colleagues was the only included study to focus on a systems intervention to provide physicians with positive alcohol screening results and simple recommendations for their patients at a visit.[75] It was a cluster RCT conducted in urban primary care practices. Physicians in the control group did not receive any information from the study.

Table 10. Description of behavioral counseling interventions for improving intermediate outcomes for adults with alcohol misuse, by intervention intensity

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Very brief	Richmond, 1995[79] Alcoholscreen	Group 2: Physician advice and a self-help manual (after assessment)	PCP	In person	1	5 min
Very brief	WHO Brief Intervention Study, 1996[73]	Group 1: Advice, illustrated pamphlet	Various clinic staff	In person	1	5 min
Brief	Anderson, 1992[80]	Brief advice, feedback about own consumption and norms, and a self-help booklet	PCP	In person	1	10 min

Table 10. Description of behavioral counseling interventions for improving intermediate outcomes for adults with alcohol misuse, by intervention intensity (continued)

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Brief	Lock, 2006[86]	Brief advice ("drink-less" protocol) on standard drink units, recommended consumption levels, benefits of cutting down, tips on reducing consumption, advice on goal-setting, action plan, and self-help booklet/diary	Nurse or PA	In person	1	5-10 min
Brief	Maisto et al., 2001[87-89] ELM	Brief advice: emphasized feedback from baseline results and implications for drinking, coupled with advice regarding a goal to reduce or stop alcohol consumption	Research staff	In person	1	10-15 min
Brief	Scott, 1990[92]	Brief advice, feedback about own consumption and norms, and a self-help booklet	PCP	In person	1	10 min
Brief	Senft, 1997[74] Freeborn, 2000[93]	30-second message from PCP and 15-minute session with health counselor immediately following PCP visit	PCP and study health counselor	In person	1	~15 min
Brief	WHO Brief Intervention Study, 1996[73]	Group 2: Brief intervention, 30-page illustrated problem solving manual	Various clinic staff	In person	1	15 min
Brief multi-contact	Curry, 2003[82]	Brief motivational message from PCP during regularly scheduled visit; self-help manual; written personalized feedback; up to 3 outreach phone counseling calls from health educator	PCP and research health educator	In person and phone	Up to 4	1-5 min
Brief multi-contact	Fleming et al., 1997[31-33,35,83] Project TrEAT	Two visits 1 month apart with PCP and a follow-up phone call from the clinic nurse 2 weeks after each visit; workbook containing feedback regarding current health behaviors, review of prevalence of problem drinking, list of adverse effects of alcohol, worksheet on drinking cues, drinking agreement / prescription, and drinking diary cards	PCP and nurse	In person and phone	4	15 min for PCP contacts; NR for phone calls
Brief multi-contact	Fleming et al., 2008[84,85] Healthy Moms	Two visits, each with phone follow-up; a workbook containing scripted messages with feedback regarding current health behaviors, prevalence of problem drinking, list of adverse effects of alcohol focused on women and pregnancy, worksheet on drinking cues, drinking agreement in the form of a prescription, and drinking diary cards	Nurse (90%) or OB	In person and phone	4	15 min for two in person contacts; NR for phone calls
Brief multi-contact	Noknoy, 2010[78]	Motivational enhancement protocol: brief counseling sessions using patient-centered interviewing style and considering stages of change	Nurse or PA	In person	3	15 min

Table 10. Description of behavioral counseling interventions for improving intermediate outcomes for adults with alcohol misuse, by intervention intensity (continued)

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Brief multi-contact	Ockene et al., 1999[38,90,91] Project Health	Tailored consultation with clinician plus follow up visit. Counseling involved talking about number of drinks per week, binge drinking, or both. RAs affixed patients' alcohol consumption info and patient education materials to patient's chart at regular office visit; also included a health booklet at enrollment.	PCP	In person	2	5-10 min
Brief multi-contact	Rubio, 2010[77]	Brief advice using intervention workbook (review of alcohol-related health effects, pie chart displaying frequency of types of at-risk drinkers, list of methods for cutting down, treatment contract, cognitive behavioral exercises) plus phone reinforcement by nurse and general health booklet	PCP	In person	2	10-15 min
Brief multi-contact	Wallace, 1988[94]	Brief advice, an information booklet ("That's the Limit"), sex-based recommendation for limiting drinking, a drinking diary, and follow up sessions	PCP	In person	1 to 5*	NR
Extended multi-contact	Bischof et al., 2008[42,44,81] SIP study	Group 1: Full Care (FC): immediate computerized post-assessment feedback and multiple sessions of counseling by psychologist	Trained psychologists from research team	Phone	4	Scheduled for 30 min each; mean received was 80.3 min
Extended multi-contact	Bischof et al., 2008[42,44,81] SIP study	Group 2: Stepped Care (SC): immediate computerized post-assessment feedback and maximum of 3 counseling sessions with psychologist. Sessions were discontinued if patients indicated consumption below study criteria and high self-efficacy to maintain desired behavior.	Trained psychologists from research team	Phone	Up to 4	Scheduled for 30-40 min each; mean received was 40 min
Extended multi-contact	Richmond, 1995[79] Alcoholscreen	Group 1: "Alcoholscreen" program: 5 short consultations (introduction, patient education, 3 follow-ups) designed to reduce drinking to recommended limits. Included self-help manual, daily alcohol diary, and personalized patient education and counseling	PCP	In person	5	15-20 min (intervention visit); 5-25 min (follow-up visits)
Extended multi-contact	Maisto et al., 2001[87-89] ELM	Motivational enhancement: longer, main initial session, 2 shorter booster sessions, use of empathy and other techniques to enhance motivation; focus on delivery of feedback of assessment data and setting alcohol use goals	Research staff	In person	3	one 30-45 min; two 15-20 min booster sessions

Table 10. Description of behavioral counseling interventions for improving intermediate outcomes for adults with alcohol misuse, by intervention intensity (continued)

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
NR/ Unknown †	Saitz, 2003[75] SIP	Providing physicians with positive alcohol screening results and specific recommendations for their patients at a visit.	PCP	In person	NR/ Unknown †	NR/Unknown†

Abbreviations: ELM, Early Lifestyle Modification; min, minutes; No., number; NR, not reported; OB, Obstetrician; PA, Physician Assistant; PCP, primary care physician; RA, Research Assistant; SIP (Bischof et al), Stepped Intervention for Problem Drinkers; SIP (Saitz et al), Screening and Intervention in Primary Care Study; TrEAT, Trial for Early Alcohol Treatment

*All intervention subjects received an invitation to a 1-month follow up; other follow up was offered at 4, 7, and 10 months at the discretion of the practitioner.

†No particular behavioral intervention was required, the intervention was to provide physicians with positive screening results. Based on assessment immediately after the visit, some discussion about drinking was reported for 51% (residents) to 74% (faculty) of visits for the intervention group (and 70% for residents and 51% for faculty in the control group).

Alcohol Use, Number of Drinks

Results of our meta-analyses are summarized in Table 11. Additional details and forest plots are provided in Appendix E. Adults receiving behavioral interventions had a greater reduction in quantity of alcohol consumed than those in control groups by 3.2 and 3.6 drinks per week at 6 and 12 months, respectively. Similarly, subgroup analyses for men and women found greater reduction in alcohol consumption for those receiving behavioral interventions than those in control groups at 6 and 12 months, with reductions ranging from 2.5 to 4.6 drinks per week.

When stratifying by intensity of the intervention, we found no statistically significant difference between very brief interventions and controls (just one study contributed to the meta-analysis for this comparison), but found greater reduction in alcohol consumption for brief (by 3.7 drinks per week at 12 months), brief multi-contact (by 3.5 drinks per week at 6 months and 4.4 drinks per week at 12 months) and extended multi-contact interventions (by 2.5 drinks per week at 12 months) than for controls.

The meta-analyses for all adults did not have significant statistical heterogeneity at 6 or 12 months. The subgroup analyses for men at 12 months and the analyses for the brief multi-contact interventions had moderate statistical heterogeneity (Table 11). From analyses removing each individual study one at a time, the moderate heterogeneity was no longer present after removing the study by Wallace and colleagues,[94] which reported a greater effect size in males than any other study. Of note, this study reported one of the highest baseline rates of drinks per week of the included studies; it was one of three included studies reporting over 30 drinks per week at baseline on average. Removing this study would decrease the effect size to -2.7 drinks per week (I^2=0) for the subgroup analysis for men at 12 months and to -3.7 (I^2=0) for the brief multi-contact interventions among all adults at 12 months.

Table 11. Mean change in drinks per week for behavioral counseling interventions compared with controls: summary of meta-analyses for adults

Population	Intensity	Timing	N	WMD*	95% CI	I^2
Adults	All	12 months	14 (4,332 subjects)	-3.6	-4.8, -2.4	14
Adults	Very brief	12 months	1	2.7	-5.2, 10.6	0
Adults	Brief	12 months	4	-3.7	-6.3, -1.0	0
Adults	Brief, multi-contact	12 months	5	-4.4	-6.1, -2.7	58
Adults	Extended, multi-contact	12 months	4	-2.5	-4.8, -0.3	0
Adults	All	6 months	11	-3.2	-4.4, -2.0	28
Adults	Very brief	6 months	1	0.9	-7.5, 9.3	0
Adults	Brief	6 months	1	1.1	-9.5, 11.8	0
Adults	Brief, multi-contact	6 months	6	-3.5	-4.9, -2.1	48
Adults	Extended, multi-contact	6 months	1	-2.1	-10.9, 6.7	0
Adult men	All	12 months	6	-4.0	-6.6, -1.3	64
Adult men	All	6 months	4	-4.1	-7.9, -0.2	30
Adult women	All	12 months	6	-4.6	-5.9, -3.2	0
Adult women	All	6 months	5	-2.4	-3.4, -1.3	0

Abbreviations: CI, confidence interval, rounded to tenths; N, number of comparisons contributing to the meta-analysis; WMD, weighted mean difference (for absolute difference for change in drinks per week), rounded to tenths

*Negative numbers favor behavioral counseling interventions over controls

We conducted meta-regression and ran subgroup analyses for the change in consumption at 12 months for several variables to explore whether effectiveness differed significantly for certain populations, settings, or intervention characteristics (Appendix E). These included country (studies conducted in the United States compared with non-U.S. studies), person primarily responsible for delivering the intervention (primary care provider, nurse, or research personnel), and whether subjects with alcohol dependence were included in the sample. Subgroup analyses by country found similar effect sizes for studies conducted in the United States and for non-U.S. studies and our meta-regression did not find country to be a significant contributor to the overall variance in the analysis. Thus, studies conducted in the United States and outside of the United States have found similar effectiveness of behavioral interventions for reducing alcohol consumption over 12 months, on average.

Our subgroup analyses found a trend toward a greater numerical reduction in drinks per week for interventions delivered primarily by primary care providers (WMD, -4.0, 95% CI, -5.4 to -2.6) than for those delivered primarily by research personnel (WMD, -3.0, 95% CI, -5.0 to -1.0). Just one intervention delivered by a nurse contributed to the analysis; the reduction in drinks per week was not statistically significant for that study (WMD, -0.2, 95% CI, -8.9 to 8.6). Our meta-regression did not find provider type to be a significant contributor to the overall variance in the analysis.

Our subgroup analyses suggested that studies enrolling 10 percent or more subjects with alcohol dependence found behavioral interventions to be less effective than those enrolling 0 to 10 percent of subjects with dependence or those not reporting sufficient data to determine the percentage with dependence (but likely including 0 to 10 percent based on inclusion/exclusion criteria). Of note, pooled analyses for the former subgroup did not find a statistically significant benefit of behavioral interventions (WMD, -2.4 drinks per week, 95% CI, -5.2 to 0.4), but this group included one very brief intervention[79] that was not effective and could possibly explain the nonsignificant result. Removing the very brief intervention resulted in statistically significant benefit for studies enrolling 10 percent or more subjects with alcohol dependence (WMD, -3.1

drinks per week, 95% CI, -6.1 to -0.2), but still with a magnitude of effect lower than that for studies enrolling 0 to 10 percent of subjects with alcohol dependence or those not reporting sufficient data to determine the percentage (WMD, -3.6 to -4.7 drinks per week) (Appendix E). Our meta-regression did not find the percentage of subjects with alcohol dependence to be a significant contributor to the overall variance in the analysis.

The study from Saitz and colleagues stratified results by faculty and resident physicians.[75] It reported that 51 percent of resident physicians and 74 percent of faculty physicians in the intervention group (physicians received positive alcohol screening results and simple recommendations they could give to their patients) had some discussion about drinking during the visit compared with 70 percent and 51 percent in the control group, respectively. Unexpectedly, resident physicians in the control group had higher rates of discussions and advice about drinking during the visit than those in the intervention group. The relatively high rates of discussions, advice, and counseling in the control group might be due to contamination, a high standard of usual care, physicians' awareness that they were being studied, or from assessments of alcohol use prompting patients to discuss alcohol. Although the intervention appeared to increase alcohol discussions among faculty but not residents, the effect on self-reported alcohol consumption was greater among patients of residents than faculty. The study reported that patients in the intervention group who saw resident physicians had fewer drinks per drinking day than those in the control group at 6 months (adjusted: 3.8, 95% CI, 1.9 to 5.7 compared with 11.6, 95% CI, 5.4 to 17.7). However, there was no difference for patients who saw faculty physicians. Some possible explanations for the findings include differences in patient mix between faculty and residents and random variation.

Long-term alcohol consumption up to 48 months was reported by two studies: Project TrEAT[31,32,83] and Project Health.[38,90] In Project TrEAT, men and women in the intervention group maintained the reduction in alcohol consumption (mean drinks per week) achieved by 12-months through 48-month followup. However, by 48 months, differences between intervention and control groups were no longer statistically significant, because of late onset (between 36 and 48 months) reductions in control group usage primarily among men. The relatively delayed reduction in control consumption to levels achieved by the intervention group at 12 months could reflect the natural history of alcohol consumption, the cumulative effect of yearly follow-ups with the health care system, or (late) regression to the mean. Similarly, Project Health found that participants in the intervention group maintained the significant reductions in drinks per week seen at 6 and 12 months through the 48 month follow up, but that there were no longer significant differences in drinks/week between the intervention and control groups at 48 months that had been seen at earlier follow-up.[38] Of note, between 35 percent and 40 percent of subjects did not complete the 48 month follow up in Project Health (333 of 530 subjects were analyzed at 48 months), increasing the risk of attrition bias. The attrition, however, was not significantly different between groups (i.e., it was non-differential).

Binge Drinking

Results of our meta-analyses are summarized in Table 12. Additional details and forest plots are provided in Appendix E. Among adults receiving behavioral interventions, 12 percent more subjects (absolute difference) reported no binge drinking by 12 months compared with control groups. Subgroup analyses for men and women found similar results.

Table 12. Percentage of subjects with no binge drinking for behavioral counseling interventions compared with controls: summary of meta-analyses for adults

Population	Intensity	Timing	N	Risk Difference*	95% CI	I^2
Adults	All	12 months	8 (2,737 subjects)	0.12	0.07, 0.16	17
Adults	Very brief	12 months	NA	NA	NA	NA
Adults	Brief	12 months	2	0.10	-0.03, 0.24	37
Adults	Brief, multi-contact	12 months	4	0.11	0.06, 0.16	42
Adults	Extended, multi-contact	12 months	2	0.19	0.07, 0.31	0
Adult men	All	12 months	3	0.13	0.07, 0.18	0
Adult women	All	12 months	3	0.13	0.02, 0.23	66**

Abbreviations: CI, confidence interval, rounded to hundredths; N, number of comparisons contributing to the meta-analysis; NA, not applicable

Only two studies reported the outcome at 6 months; both were brief multi-contact (Risk difference 0.09, 95% CI, 0.02 to 0.16).

*Positive numbers favor behavioral counseling interventions and reflect the absolute difference between groups for the percentage of subjects with no binge drinking

**The subgroup analyses for women at 12 months had moderate to substantial statistical heterogeneity. From analyses removing each individual study one at a time, the moderate to substantial heterogeneity was no longer present after removing the study by Rubio and colleagues, which reduced the I2 to 0, but did not change the point estimate for the risk difference (without Rubio it was 0.13, 95% CI, 0.02 to 0.24). The study by Rubio and colleagues was the only study exclusively enrolling those with binge drinking.[77]

When stratifying by intensity of the intervention, the analyses for all adults only included brief, brief multi-contact, and extended multi-contact interventions. The brief multi-contact and extended multi-contact interventions were efficacious at 12 months (with 11 and 19 percent absolute difference compared with controls, respectively), but brief interventions did not reach statistical significance for percentage of subjects with no binge drinking compared with controls.

The study from Saitz and colleagues described in the previous section stratified results by faculty and resident physicians.[75] The percentage of subjects with any binge drinking, defined as more than three drinks per occasion for women and older adults and more than four for men, was among the secondary outcomes reported at 6 months. Among patients in the intervention group who saw resident physicians, 44 percent (95% CI, to 30, 58) reported any binge drinking compared with 64 percent (95% CI, 45 to 79) in the control group. The percentages for those seeing faculty physicians were 51 percent (95% CI, 44 to 59) and 42 percent (95% CI, 30 to 55), respectively.

Long-term binge drinking outcomes up to 48 months were reported by 2 studies: Project TrEAT[31,32,83] and Project Health.[38,90] In Project TrEAT, there was a significant reduction in the number of people who reported binge drinking, with the intervention group demonstrating a greater reduction than the control group. The difference between groups remained significant at 6, 12, 24, and 36 months (61.5 percent vs. 70.7 percent, $p<0.01$, at 36 months), but was not statistically significantly different at 48 months (63.8 percent vs. 70.4 percent, $p<0.10$).[32] In Project Health, differences in binges per month between the intervention and control groups were not significant at 48 months.[38] Of note, between 35 percent and 40 percent of subjects did not complete the 48 month follow up in Project Health (333 of 530 subjects were analyzed at 48 months), increasing the risk of attrition bias.

Recommended Drinking Levels Achieved

Results of our meta-analyses are summarized in Table 13. Additional details and forest plots are provided in Appendix E. Among adults receiving behavioral interventions, 11 percent more subjects (absolute difference) achieved recommended drinking levels by 12 months compared with control groups. Subgroup analyses for men and women found similar magnitude of benefit.

Table 13. Percentage of subjects achieving recommended drinking levels for behavioral counseling interventions compared with controls: summary of meta-analyses for adults

Population	Intensity	Timing	N	Risk Difference*	95% CI	I^2
Adults	All	12 months	13 (5,973 subjects)	0.11	0.08, 0.13	31
Adults	Very brief	12 months	2	0.08	0.02, 0.14	0
Adults	Brief	12 months	5	0.08	0.04, 0.12	0
Adults	Brief, multi-contact	12 months	6	0.15	0.11, 0.19	28
Adults	Extended, multi-contact	12 months	NA	NA	NA	NA
Adults	All	6 months	5	0.13	0.10, 0.17	29
Adults	Very brief	6 months	NA	NA	NA	NA
Adults	Brief	6 months	1	0.08	0.01, 0.15	0
Adults	Brief, multi-contact	6 months	4	0.15	0.11, 0.19	7
Adults	Extended, multi-contact	6 months	NA	NA	NA	NA
Adult men	All	12 months	6	0.12	0.09, 0.15	27
Adult women	All	12 months	6	0.14	0.09, 0.20	39

Abbreviations: CI, confidence interval, rounded to hundredths; N, number of comparisons contributing to the meta-analysis

Only two studies reported data to contribute to a subgroup analysis for adult men at 6 months; both were brief multi-contact (Risk difference 0.12, 95% CI, 0.01 to 0.23). Similarly, only two reported data to contribute to a subgroup analysis for adult women at 6 months; both were brief multi-contact (Risk difference 0.19, 95% CI, 0.11 to 0.26).

*Positive numbers favor behavioral counseling interventions and reflect the absolute difference between groups for the percentage of subjects achieving recommended drinking levels.

When stratifying by intensity of the intervention, the analyses for all adults only included very brief, brief, and brief multi-contact interventions, there were no studies included utilizing extended multi-contact interventions. All of the intervention intensities were efficacious. The magnitude of benefit was numerically greatest for the brief multi-contact interventions (15 percent compared with 8 percent for very brief and brief interventions at 12 months), but the confidence intervals overlap.

Long-term data up to 48 months were reported by 2 studies: Project TrEAT[31,32,83] and Project Health.[38,90] In Project TrEAT, there was a significant reduction in the percentage of heavier drinkers (men consuming >20 drinks or women consuming >13 drinks in the previous 7 days) in the intervention group compared with the control group. The difference between groups remained significant at 6, 12, 24, and 36 months (23.2 percent vs. 34.6 percent, $p<0.01$, at 36 months), but was not statistically significantly different at 48 months (22.4 percent vs. 26.4 percent, p= NS).[32] In Project Health, there were no longer significant differences in percentage of low-risk drinking between the intervention and control groups at 48 months that had been seen at

earlier follow-up.[38] Of note, between 35 percent and 40 percent of subjects did not complete the 48 month follow up in Project Health (333 of 530 subjects were analyzed at 48 months), increasing the risk of attrition bias.

Follow-up with Referrals

None of the included studies reported the percentage of subjects that followed up with referrals.

Abstinence

We identified three studies reporting abstinence among secondary outcomes.[73-75] Of note, none of the studies were designed to achieve abstinence and it should probably not be a goal of behavioral interventions for most people (because healthy alcohol use at recommended levels has been associated with improvements in health outcomes, and is a more appropriate goal for most people). From these studies, evidence is insufficient to determine whether behavioral interventions increase rates of abstinence compared with controls. The WHO study reported numerical increases in the percentage of men and women in all study groups: brief counseling, simple advice, and control groups increased from zero percent in the 6 months prior to intervention to 8 percent, 5 percent, and 2 percent for men and to 12 percent, 7 percent, and 4 percent for women, respectively (p-values not calculated due to small cell sizes).[73] Senft and colleagues reported that between 8 percent and 11 percent of subjects were abstinent across study groups at both 6 and 12 months (exact data not reported, difference was not statistically significant).[74] Saitz and colleagues reported the percentage of abstinent subjects, defined as no drinking during the 30 day period. Among patients in the intervention group who saw resident physicians, 18 percent (95% CI, 6 to 43) reported abstinence compared with 5 percent (95% CI, 1 to 25) in the control group. The percentages for those seeing faculty physicians were 22 percent (95% CI, 13 to 35) and 26 percent (95% CI, 15 to 42) respectively.

Evidence in Older Adults

Table 14 summarizes the characteristics of included publications targeting older adult populations. We included two randomized controlled trials that enrolled exclusively older adults: Project GOAL[34,95] and the Healthy Living as You Age (HLAYA) study.[96,97] In addition, we identified one subgroup analysis of subjects 65 years or older enrolled in the Early Lifestyle Modification (ELM) study, a randomized controlled trial included in the previous section on adults.[89]

The subgroup analysis of ELM[87,88] included 45 of the 301 enrolled subjects. The subgroup analysis has a high risk of selection bias and confounding compared with the main study results. There were significant differences in baseline measures of alcohol consumption for the brief advice group compared with the motivational enhancement and the standard care groups. Due to the high risk of bias in this subgroup analysis of 45 subjects, we determined that the best evidence in older adults is from Project GOAL and HLAYA, thus we focus on the evidence from those 2 trials below.

Table 14. Characteristics of included trials comparing behavioral counseling interventions with usual care for improving intermediate outcomes for older adults with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (Y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/Wk)	Quality
Fleming, 1999[95] Mundt, 2005[34] GOAL	158 0	24	US Wisconsin	24 PC practices	NR >92% age 65-75	33.5	NR	15.54 to 16.58	Fair
Lin, 2010[96] Moore, 2010[97] HLAYA	631 NR	12	US Calif.	PC practices (145 PCPs)	68.4	29	13	15.2	Fair

Abbreviations: Calif, California; % Dep, percentage of subjects with alcohol dependence; Fem, female; GOAL, Guiding Older Adult Lifestyles; HLAYA, Healthy Living as You Age; mths, months; N, total number randomized/assigned to treatment and control groups; NR, not reported/unclear; PC, primary care; PCP, primary care physician; Penn, Pennsylvania; US, United States; wk, week; y, years

The studies generally targeted those with risky/hazardous drinking, including binge drinkers. Project GOAL included men consuming greater than 11 drinks per week and women consuming greater than 8, those with two or more positive responses on the CAGE, and binge drinkers (4 or more drinks per occasion for men two or more times in the last three months; 3 or more per occasion for women). The HLAYA study included at-risk drinkers based on Comorbidity Alcohol Risk Evaluation Tool (CARET) scores of 1-7, such as those drinking 3 drinks four or more times per week, 2 or more drinks at least twice per week and often having heartburn, or 2 drinks daily and taking alprazolam at least 3 to 4 times per week.

Both trials were conducted exclusively in the United States. Study duration ranged from 12 months for HLAYA[89,96,97] to 24 months for Project GOAL.[34,95] The studies reported a baseline alcohol consumption between 15 and 17 drinks per week.

In the included trials, methods to identify those with alcohol misuse varied, but all included an assessment of the quantity and frequency of alcohol consumption. Project GOAL included men drinking 11 drinks or more per week and women drinking 8 or more, those with two or more positive responses to the CAGE, and those with binge drinking (4 or more drinks per occasion for men 2 or more times in the last 3 months or 3 or more per occasion for women).[95] It also included a 30 minute face-to-face assessment using the Time Line Follow-Back (TLFB) method to determine if potential subjects met inclusion criteria. HLAYA used the Comorbidity Alcohol Risk Evaluation Tool (CARET) to screen subjects for inclusion, including an assessment of the quantity and frequency of drinking over the past 12 months, assessment of binge/heavy episodic drinking, driving after drinking, medical and psychiatric history, symptoms that could be worsened by alcohol, and medications that could interact negatively with alcohol. Those with an at-risk score (1-7) on the CARET were eligible.[97]

The interventions of included studies for this section are described in Table 15, organized by intervention intensity. Project GOAL included a brief multi-contact intensity intervention[34,95] (multiple contacts, up to 15 minutes each) and HLAYA included an extended multi-contact intervention[89,96,97] (multiple contacts, one or more of them greater than 15 minutes).

Table 15. Description of behavioral counseling interventions for improving intermediate outcomes for older adults with alcohol misuse, by intervention intensity

Intensity	Study	Intervention	Delivered by	Delivery method	No. of contacts	Length of each contact
Brief multi-contact	Fleming, 1999[95] Mundt, 2005[34] GOAL	General health booklet plus drinking behavior feedback (workbook), review of problem-drinking prevalence, reasons for drinking, adverse effects of alcohol, drinking cues, a "prescribed" drinking agreement, drinking diary cards	PCP and nurse	In person and phone	4	10-15 min for PCP contacts; NR for phone calls
Extended multi-contact	Lin, 2010[96] Moore, 2010[97] HLAYA	Personalized risk report and diary for tracking alcohol use; PCP gave oral and written advice in prescription style via an alcohol education booklet; followed by additional feedback and counseling with motivational interviewing from health educator at weeks 2, 4, and 8	PCP and health educator	In person and phone	4	15-20 min

Abbreviations: GOAL, Guiding Older Adult Lifestyles; HLAYA, Healthy Living as You Age; min, minutes; NR, not reported / unclear; PCP, primary care physician

Project GOAL tested an intervention delivered by the patient's primary care physician[34,95] and HLAYA tested an intervention delivered by the physician and a health educator.[96,97]

Project GOAL and HLAYA used control groups receiving screening/assessment followed by usual care and the provision of a general health booklet.[34,95-97]

Alcohol Use, Number of Drinks

Both trials focusing on older adults reported greater reduction in quantity of alcohol consumed for those receiving behavioral interventions compared with those in control groups. Project GOAL[34,95] reported a decrease of over 5 drinks per week for subjects in the intervention group at 6, 12, and 24 months compared with a small decrease for those in the control group (-0.31 to -2.0 drinks per week, $p<0.05$ at 6, 12, and 24 months). The HLAYA study[96,97] reported approximately 1.2 fewer drinks in the past 7 days for those in the intervention group (OR, 0.87, 95% CI, 0.76 to 0.99). Pooling data from these two studies resulted in a decrease of 1.7 more drinks per week for subjects in the intervention groups than for those in control groups (WMD, -1.74, 95% CI, -2.8 to -0.6, Appendix E). We were unable to conduct subgroup analyses for men and women, because neither study reported results separately by sex.

Binge Drinking

Project GOAL and the HLAYA study both reported measures of binge drinking for subjects in the intervention group at 12 months. In Project GOAL[34,95] about 69 percent of subjects in the intervention group reported no binge drinking episodes in the previous 30 days compared with about 51 percent in the control group ($p<0.025$). The HLAYA study did not find a statistically significant difference between the intervention and control group in the percentage of subjects with one or more heavy drinking days in the past 7 days at 12 months (OR, 0.89, 95% CI, 0.4 to 1.97); however, the difference was significant at 3 months (OR, 0.46, 95% CI, 0.22 to 0.99).[96,97]

Recommended Drinking Levels Achieved

Both trials focusing on older adults reported some measure of whether recommended drinking levels were achieved. Project GOAL[34,95] found a greater percentage of subjects not

drinking excessively in the previous 7 days (more than 20 drinks per week for men and more than 13 per week for women) in the intervention group compared with the control group at both 6 and 12 months (84.6 percent vs. 65.7 percent, $p<0.005$ at 12 months). The differences were not statistically significant at 24 months ($p<0.1$). The HLAYA study[96,97] found a lower percentage of at-risk drinkers at 12 months in the intervention group, but the results were not statistically significant (OR, 0.68, 95% CI, 0.36 to 1.26). Pooling data from these two studies found a 9 percent increase in the percentage of subjects achieving recommended drinking levels (risk difference of 0.09, 95% CI, 0.02 to 0.16, Appendix E). We were unable to conduct subgroup analyses for men and women, because neither study reported results separately by sex.

Follow-Up With Referrals

None of the included studies reported the percentage of subjects that followed up with referrals.

Abstinence

None of the included studies reported this outcome.

Evidence in Young Adults or College Students

Table 16 summarizes the characteristics of included publications targeting young adults or college students. We did not find any studies meeting our inclusion/exclusion criteria that focused on adolescents. We included four randomized controlled trials (five publications)[36,37,43,76,98] and one subgroup analysis of subjects age 18 to 30 from Project TrEAT.[35] The mean age of enrolled populations in the four trials was approximately 20.

The studies generally targeted those with risky/hazardous drinking, including binge drinkers. Two trials conducted in New Zealand enrolled subjects with an AUDIT score of 8 or more and who consumed more than recommended upper limits for episodic drinking on one or more occasion in the preceding 4 weeks (four for women, six for men).[36,37,43] The College Health Intervention Projects (CHIPs) trial included those with heavy drinking defined by more than 50 drinks or 8 or more heavy drinking episodes (5 or more standard 14-g drinks) in the previous 28 days for male students or 40 drinks or 6 or more heavy drinking episodes for female students (4 or more standard drinks).[76] Schaus et al. included men drinking 5 or more drinks in a row on at least one occasion during the past 2 weeks or women drinking 4 or more drinks in a row.[98] The subgroup analysis of Project TrEAT[35] included males who drank more than 14 drinks per week or females who drank more than 11 drinks per week in the past 90 days.

Some studies constructed inclusion/exclusion criteria to limit the number of potential subjects with alcohol dependence (e.g., exclusion of those with symptoms of withdrawal in the past year, with a history of receiving treatment for an alcohol problem, who had been told by a clinician to cut down in the past, or who consumed more than 200 drinks in the previous 28 days).[35,76,98] Other studies did not collect or report information to allow the determination of whether any subjects met criteria for alcohol dependence.[36,37,43]

Table 16. Characteristics of included trials comparing behavioral counseling interventions with usual care for improving intermediate outcomes for young adults or college students with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/Wk)	Quality
Fleming, 2010[76] CHIPs	986 0	12	US and Canada	5 college health clinics	21	50.5 to 51.3	8.1 to 10.5	17.3 to 17.8	Good
Grossberg, 2004[35] TrEAT	226* NR	48	US Wisc.	17 community PC practices	NR**	51	14	16.2 to 18.3	Good*
Kypri, 2008[37] Kypri, 2007[43]	576 NR	12	New Zealand	University primary health care service	20.1 to 20.3	52	NR	NR	Good
Kypri, 2004[36]	104 NR	6	New Zealand	University student health service	19.9 to 20.4	50	NR	NR	Fair
Schaus, 2009[98]	363 0	12	US Florida	College student health center	20.6	52	22	8.38 to 9.59	Fair

Abbreviations: CHIPs, College Health Intervention Projects; % Dep, percentage of subjects with alcohol dependence; Fem, female; mths, months; N, total number randomized/assigned to treatment and control groups; NR, not reported/unclear; PC, primary care; TrEAT, Trial for Early Alcohol Treatment; US, United States; Wisc, Wisconsin; wk, week; y, years

*This was a subgroup analysis of TrEAT,[31] 226 of the 774 enrolled subjects were young adults (age 18 to 30).

**21% 18 to 21, 37% 22 to 25, and 47% 26 to 30.

Two studies were conducted exclusively in the United States, two in New Zealand, and one in the United States and Canada. Study duration ranged from 6 to 12 months for the trials enrolling only young adults or college students.[36,37,43,76,98] For the subgroup analysis of Project TrEAT, outcomes were reported out to 48 months.[35] One trial reported a baseline alcohol use around 17 drinks per week,[76] one around 9 drinks per week,[98] and two trials did not report baseline alcohol use.[36,37,43] The subgroup analysis from Project TrEAT reported a baseline alcohol use of about 17 drinks per week.[35]

In the included studies, methods to identify those with alcohol misuse varied somewhat. Three studies relied primarily on an assessment of the quantity-frequency of alcohol consumption,[35,76,98] and two relied primarily on an AUDIT score of 8 or more with or without quantity-frequency criteria in addition.[36,37,43] Quantity-frequency cutoffs ranged from 5 drinks for men or 4 for women on any occasion in the past 2 weeks (using a single-question screen), for Schaus and colleagues,[98] to 50 or more drinks or 8 or more heavy drinking days (at least 5 drinks per occasion) over the past 28 days for men and 40 or more drinks or 6 or more heavy drinking days (4 drinks per occasion), for women in CHIPs.[76]

The interventions of included studies for this section are described in Table 17, organized by intervention intensity. Three trials evaluated interventions delivered in-person by the PCP,[35,76,98] and two evaluated Web-based interventions that were self-administered via computer.[36,37,43]

All control groups included the delivery of usual care and some form of printed educational material. Control groups for the Web-based interventions received a pamphlet on the health

effects of alcohol consumption.[36,37,43] Control groups in the CHIPs study[76] and Project Health[35] received a general health booklet; the control group in the study by Schaus and colleagues received an alcohol problems prevention booklet.[98]

Table 17. Description of behavioral counseling interventions for improving intermediate outcomes for young adults or college students with alcohol misuse, by intervention intensity

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Brief	Kypri, 2008[37] Kypri, 2007[43]	Web-based assessment and personalized feedback on drinking	Self	Computer	1	10-15 min
Brief	Kypri, 2004[36]	Web-based assessment and personalized feedback on drinking	Self	Computer	1	10-15 min
Brief multi-contact	Fleming, 2010[76] CHIPs	Two visits 1 month apart with PCP and a follow-up phone call or e-mail from the PCP after each visit; feedback regarding current behaviors, review of prevalence of high-risk drinking among college students, list of alcohol's adverse consequences relevant to college students, lists of personal likes and dislikes of drinking, worksheets on drinking cues, BAC level calculator, life goals and alcohol effects, prescription agreement, drinking diary cards	PCP	In person	4	15 min
Brief multi-contact	Grossberg, 2004[35] TrEAT	Two visits 1 month apart with PCP and a follow-up phone call from the clinic nurse 2 weeks after each visit; workbook containing feedback regarding current health behaviors, review of prevalence of problem drinking, list of adverse effects of alcohol, worksheet on drinking cues, drinking agreement / prescription, and drinking diary cards	PCP and nurse	In person	4	15 min
Brief multi-contact	Kypri, 2008[37] Kypri, 2007[43]	Web-based assessment and personalized feedback on drinking	Self	Computer	3	10-15 min
Extended multi-contact	Schaus, 2009[98]	Motivational intervention sessions that combined patient-centered motivational interviewing and cognitive-behavioral skills training + booklet on alcohol prevention	PCP	In person	2	20 min

Abbreviations: BAC, blood alcohol content; CHIPs, College Health Intervention Projects; min, minutes; No., number; PCP, primary care physician; TrEAT, Trial for Early Alcohol Treatment

Alcohol Use, Number of Drinks

All five studies (six of six comparisons) reported measures of alcohol consumption at 6 months. All six comparisons found greater reduction in consumption for interventions than controls. The three studies including subjects in the United States[35,76,98] reported sufficient data to pool similar measures, resulting in an average 1.7 drinks per week reduction for subjects receiving interventions compared with those receiving controls (WMD, -1.7, 95% CI, -2.6 to -0.7, I^2 0 percent). The other two studies (three comparisons), conducted in New Zealand, reported rate ratios favoring the intervention groups for all comparisons that could not be pooled

with the other data without making several statistical assumptions (RRs from 0.74 to 0.79, all with statistically significant 95% CIs).[36,37,43]

At 12 months, four of five studies (five of six comparisons) reported alcohol consumption outcomes. All but the study by Schaus and colleagues (contributing one comparison) found a statistically significant difference favoring behavioral interventions, from 1.2[76] to 4.1[35] drinks per week greater reduction for the intervention group compared with controls. Some possible reasons for the different findings in Schaus and colleagues include (1) that the control group received an alcohol problems prevention booklet, which may bias results toward the null; and (2) the enrolled subjects had a much lower baseline alcohol consumption (around 8 to 9 drinks per week—half of what was reported in other studies), leaving less room for reduction in consumption.

Long-term results beyond 12 months were reported by the subgroup analysis from Project TrEAT.[35] Number of drinks consumed in the previous week decreased more in the intervention group than the control group through 36 months for young adults in the study (-6.8 vs. -4.4, p= 0.02); the differences were no longer significant at 48 months (-7.6 vs. -6.7, p= 0.06).

Binge Drinking

Not enough studies reported the percentage of subjects with or without binge drinking to conduct quantitative synthesis. However, the three studies assessing in-person interventions reported the number of episodes of heavy drinking days or binge episodes in the past month[35,76,98] and the two studies (contributing 3 comparisons) assessing web-based screening and intervention reported the rate ratio of episodic heavy drinking.[36,37,43] For the former three studies, our meta-analyses found a reduction of 0.9 heavy drinking days at 6 months for behavioral interventions compared with controls (WMD, -0.9, 95% CI, -1.5 to -0.3), but no statistically significant difference at 12 months (WMD, -0.2, 95% CI, -1.2 to 0.8) (Appendix E).

For the studies assessing web-based interventions, our meta-analyses found a reduction of episodic heavy drinking at 6 months (RR, 0.76, 95% CI, 0.61 to 0.93) (Appendix E). Just one of the studies assessing web-based interventions followed subjects for 12 months; it found no statistically significant difference at 12 months (For the single dose intervention group vs. placebo RR, 0.75, 95% CI, 0.53 to 1.07; for the multi dose group vs. placebo 0.71, 95% CI, 0.51 to 1.01).[37,43]

Long-term results beyond 12 months were reported by the subgroup analysis from Project TrEAT.[35] Episodes of binge drinking (6 or more drinks per occasion) in the previous 30 days were decreased more in the intervention group than the control group up through 24 months for young adults in the study (-1.7 vs. -0.7, p=0.03); the differences were no longer significant at 36 and 48 months (-1.7 vs. -0.7, p=NS, and -2.3 vs. -1.5, p=0.08, respectively).

Recommended Drinking Levels Achieved

None of the included studies reported this outcome.

Follow-Up With Referrals

None of the included studies reported this outcome.

Abstinence

None of the included studies reported this outcome.

Evidence in Pregnant Women

We found just one study enrolling pregnant women meeting our inclusion criteria (Table 18). The study randomized 250 pregnant women with gestational age of 28 weeks or less to a comprehensive assessment only or a comprehensive assessment followed by a behavioral intervention.[39]

Table 18. Characteristics of included trials comparing behavioral counseling interventions with usual care for improving intermediate outcomes for pregnant women with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/Wk)	Quality
Chang, 1999[39]	250 0 current*	About 6**	US Mass.	Obstetric practices	30.7	100	22	Mean drinks per drinking day: 0.6 to 0.9†	Fair

Abbreviations: % Dep, percentage of subjects with alcohol dependence; Fem, female; Mass., Massachusetts; mths, months; N, total number randomized/assigned to treatment and control groups; US, United States; wk, week;y, years

*None of the 250 subjects satisfied DSM-III-R criteria for current alcohol abuse or dependence at enrollment. But, 40% satisfied criteria for life-time alcohol abuse or dependence (not reported separately); 3 subjects had been previously treated for an alcohol problem.

**Some variation: mean # of weeks of antepartum drinking was 22.4 weeks; gestational age required to be <28 weeks at study entry; mean gestation at baseline was 16 weeks

†These numbers are while pregnant and include abstainers. Excluding abstainers, they report 1.5 to 2.1 mean drinks per drinking day while pregnant.

Potential subjects were identified by screening pregnant women initiating prenatal care with a health survey that included the T-ACE. A score of 2 or more was considered positive.

The intervention for the included study is described in Table 19. We categorized the intensity as extended as it required 45 minutes to deliver. The comprehensive assessment (for both the intervention and control group) consisted of a 2-hour session that included a DSM-III-R SCID interview, the Addiction Severity Index, AUDIT, SMAST, TLFB, Alcohol Craving Scale, Global Assessment of Functioning, and Situational Confidence Questionnaire.

Table 19. Description of behavioral counseling interventions for improving intermediate outcomes for pregnant women with alcohol misuse, by intervention intensity

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Extended	Chang, 1999[39]	Review of lifestyle changes made since pregnancy; articulation of drinking goals while pregnant; identification of circumstances in which she might be tempted to drink; identify alternatives to drinking in such situations; take-home manual with tailored notes; communication about US Surgeon General recommendation	PCP and researcher	In person	1	2-hr assessment; 45 min intervention

Abbreviations: hr, hour; min, minute; No., number; PCP, primary care physician; US, United States

Alcohol Use, Number of Drinks

Both intervention and control groups had a reduction in consumption (mean drinks per drinking day), but the difference between groups was not statistically significant (-0.3 vs. -0.4, p= NS, excluding patients who maintained abstinence through the end).

Binge Drinking

The study did not report this outcome.

Recommended Drinking Levels Achieved

The study did not report this outcome.

Follow-Up With Referrals

The study did not report this outcome.

Abstinence

For the overall sample, data were not reported. For the subgroup of subjects who were abstinent prior to assessment, those who received the intervention maintained higher rates of abstinence than those in the control group (86 percent vs. 72 percent, p= 0.04).

Applicability

The findings are generally applicable to people with risky/hazardous or harmful drinking identified by screening in primary care settings. Most studies excluded all or most potential subjects with alcohol dependence; thus, our findings do not necessarily apply to people with alcohol dependence, who should perhaps be referred for specialty treatment. Most studies enrolled some subjects with binge drinking patterns of consumption, and one study focused only on those with binge drinking.[77] Overall findings and those from the one study focused on binge drinking were consistent in finding interventions to be efficacious for reducing binge drinking. We did not identify any studies in adolescent populations and results thus have uncertain applicability to adolescents. We did, however, identify a sufficient number of studies of young adults/college students and older adults to draw conclusions (of *low* to *moderate* strength) for several intermediate outcomes. Although we searched for studies conducted in settings with primary care-like relationships (e.g., infectious disease clinics for people with HIV), we did not find any, and our results have uncertain applicability to such settings/populations. We did not identify any studies conducted exclusively in veterans.

Effective interventions were generally delivered completely in person or also included phone follow-ups, but two studies conducted with college student populations did demonstrate benefits of web-based interventions delivered via computer.[36,37,43]

Key Question 4b. How do specific behavioral counseling approaches, with or without referral, compare with one another for improving intermediate outcomes for people with alcohol misuse as identified by screening?

This Key Question addresses direct, head-to-head evidence comparing more than one specific behavioral intervention approach. Indirect evidence (i.e., from studies comparing

behavioral interventions with usual care) is addressed in Key Question 4a. We have organized the comparisons for this question by intensity: very brief (up to 5 minutes, single contact), brief (from 6 to 15 minutes, single contact), extended (more than 15 minutes, single contact), brief multi-contact, and extended multi-contact.

Four randomized controlled trials enrolling adults and one enrolling college students provided evidence for this question. All five compared different types/intensities of interventions. Overall, head-to-head evidence from the five studies was insufficient to draw conclusions about whether different interventions (including different levels of intensity) have similar or different effectiveness for most intermediate outcomes of interest (Appendix G). None of the studies reported a statistically significant difference between the two groups of interest to this Key Question.

We did not identify any studies meeting inclusion criteria for older adults or pregnant women [insufficient strength of evidence (SOE) for all comparisons]. No studies compared a very brief intervention with a brief multi-contact intervention (insufficient SOE). No studies compared a brief multi-contact intervention with an extended multi-contact intervention (insufficient SOE). No studies utilized an extended intensity intervention (insufficient SOE).

Summary of Findings

Adults

- **Very brief interventions compared with brief interventions:** one head-to-head study provides insufficient evidence to determine how very brief and brief intensity interventions compare for improving intermediate outcomes.
- **Very brief interventions compared with extended multi-contact interventions:** one head-to-head study provides insufficient evidence for most intermediate outcomes and *low* strength of evidence for a conclusion of no difference in achieving recommended drinking levels at 12 months.
- **Brief interventions compared with extended multi-contact interventions:** one head-to-head study provides insufficient evidence for most intermediate outcomes and *low* strength of evidence for a conclusion of no difference in change in alcohol consumption (number of drinks in the past 30 days) at 12 months.
- **Extended multi-contact compared with extended multi-contact interventions:** one head-to-head study provides insufficient evidence for most intermediate outcomes and *low* strength of evidence for a conclusion of no difference in change in alcohol consumption (change from baseline in alcohol grams per day) at 12 months.

Young Adults and College Students

- **Brief interventions compared with brief multi-contact interventions**: one head-to-head study provides *low* strength of evidence for a conclusion of no difference in alcohol consumption or heavy drinking episodes at 6 or 12 months, and insufficient evidence for other intermediate outcomes, when comparing a single-dose and a multi-dose web-based intervention delivered via computer.

Evidence in Adults

Characteristics of Included Studies

Four trials described in the previous section (KQ 4a) provided evidence in adults for this section (Table 20). All were multi-arm (more than 2 study groups) randomized controlled trials conducted exclusively in primary care settings except for the WHO study,[73] which included a variety of outpatient medical settings (including some emergency departments), depending on the country. The trials generally targeted those with risky/hazardous drinking, including binge drinkers. Two of the four studies reported more than 10 percent of included subjects likely having some degree of alcohol dependence.[42,79] These included a study conducted in 85 general practices in Germany with 30.4 percent meeting criteria for dependence (by DSM-IV diagnostic interview)[42] and a study conducted in 40 primary care practices in Australia with 35 percent having moderate signs or symptoms of dependence, although they excluded those with evidence of severe dependence.[79]

One study was conducted exclusively in the United States, one was multinational including the US, and one each in Germany and Australia (Table 20). Studies followed subjects for up to 12 months. The mean age ranged from 35 to 46. Women represented 19 to 43 percent of study participants. Rates of non-White participants were only reported in one study (23.3 percent).[87]

Two studies reported baseline alcohol consumption between 15 and 30 drinks per week,[42,87] similar to most adult studies included in the previous section; one study did not report baseline consumption and the Australian study reported more than 30 drinks per week at baseline.[79]

Table 20. Characteristics of included trials comparing behavioral counseling interventions with each other for improving intermediate outcomes for adults with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/wk)	Quality
WHO Brief Intervention Study, 1996[73]	1559 0	9	8, including US	outpatient medical settings	35.9 to 36.9	19.2	NR	NR	Fair
Bischof et al., 2008[42] SIP study	408 30.4	12	Germany	85 general practices	35.9 to 36.8	31.9	NR	21 to 25.2	Fair
Maisto et al., 2001[87] ELM	301 NR	12	US Penn.	12 PC clinics	45.6	30.2	23.3	15.5 to 18.6	Fair
Richmond, 1995[79] Alcoholscreen	378 35‡	12	Australia	40 PC practices	37.7	43	NR	38.5	Fair

Abbreviations: % Dep, percentage of subjects with alcohol dependence; ELM, Early Lifestyle Modification; Fem, female; mths, months; N, total number randomized; NR, not reported/unclear; PC, primary care; Penn., Pennsylvania; SIP, Stepped Intervention for Problem Drinkers; US, United States; WHO, World Health Organization; wk, week; y, years

Notes: When data were not reported for mean age, %female, %non-white, and baseline alcohol consumption for the total sample but was presented for each study group, we give the range of the means for the various study groups.

‡Percentages with moderate physical dependence based on the physical dependence on alcohol (Ph) score from the *Comprehensive Drinker Profile*. The study excluded those with evidence of severe alcohol dependence (Ph score >10) or those with severe levels of alcohol related problems (MAST >20).

The interventions compared in the included studies for this section are described in Table 21. Two studies directly compared a very brief intervention with one of greater intensity.[73,79] The WHO brief intervention study compared 5 minutes of simple advice with a 15 minute brief intervention of counseling about drinking, utilizing a 30-page illustrated problem-solving manual that described the benefits of moderate drinking or abstinence, ways of coping with high-risk drinking situations, and constructive alternatives to drinking.[73] Richmond and colleagues compared a single session of 5 minutes of advice from a general practitioner (GP) with a five-session intervention (the Alcoholscreen Program) by the GP in Australia.[79]

The ELM study compared a brief intervention with a motivational enhancement (ME) intervention (an extended multi-contact intensity intervention).[87] Subjects in the brief intervention group received 10 to 15 minutes of advice and those in the ME group received a longer main initial session and two 15-20 minute booster sessions.

The SIP study compared a "full care" intervention with "stepped care"; both interventions were categorized as extended multi-contact by our criteria.[42] Both groups received a computerized intervention. The full care group received a fixed number of four 30-minute telephone-based interventions. The stepped care group received up to three telephone-based interventions, depending on the success of the previous interventions—if they no longer met criteria for at-risk drinking during the previous 4 weeks at each assessment (1, 3, and 6 months) and indicated a high self-efficacy to maintain the acquired behavioral change, the intervention was discontinued and no further contacts were made until the 12 month follow up.

Table 21. Description of behavioral counseling interventions compared in head-to-head trials for improving intermediate outcomes for adults with alcohol misuse

Study	Intensity	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
WHO Brief Intervention Study, 1996[73]	Very brief	Group 1: Advice, illustrated pamphlet	Various clinic staff	In person	1	5 min
WHO Brief Intervention Study, 1996[73]	Brief	Group 2: Brief intervention, 30-page illustrated problem solving manual	Various clinic staff	In person	1	15 min
Richmond, 1995[79] Alcohol-screen	Very brief	Group 2: Physician advice and a self-help manual (after assessment)	PCP	In person	1	5 min
Richmond, 1995[79] Alcohol-screen	Extended multi-contact	Group 1: "Alcoholscreen" program: 5 short consultations (introduction, patient education, 3 follow-ups) designed to reduce drinking to recommended limits. Included self-help manual, daily alcohol diary, and personalized patient education and counseling	PCP	In person	5	15-20 min (intervention visit); 5-25 min (follow-up visits)
Maisto et al., 2001[87] ELM	Brief	Brief advice: emphasized feedback from baseline results and implications for drinking, coupled with advice regarding a goal to reduce or stop alcohol consumption	Research staff	In person	1	10-15 min

Table 21. Description of behavioral counseling interventions compared in head-to-head trials for improving intermediate outcomes for adults with alcohol misuse (continued)

Study	Intensity	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Maisto et al., 2001[87] ELM	Extended multi-contact	Motivational enhancement: longer, main initial session, 2 shorter booster sessions, use of empathy and other techniques to enhance motivation; focus on delivery of feedback of assessment data and setting alcohol use goals	Research staff	In person	3	one 30-45 min; two 15-20 min booster sessions
Bischof et al., 2008[42] SIP study	Extended multi-contact	Group 1: Full Care (FC): immediate computerized post-assessment feedback and multiple sessions of counseling by psychologist	Trained psychologists from research team	Phone	4	Scheduled for 30 min each; mean received was 80.3 min
Bischof et al., 2008[42] SIP study	Extended multi-contact	Group 2: Stepped Care (SC): immediate computerized post-assessment feedback and maximum of 3 counseling sessions with psychologist. Sessions were discontinued if patients indicated consumption below study criteria and high self-efficacy to maintain desired behavior.	Trained psychologists from research team	Phone	Up to 4	Scheduled for 30-40 min each; mean received was 40 min

Abbreviations: ELM, Early Lifestyle Modification; min, minutes; No., number; NR, not reported; OB, Obstetrician; PCP, primary care physician; SIP, Screening and Intervention in Primary Care; US, United States; WHO, World Health Organization; y, years;

*All intervention subjects received an invitation to a 1-month follow up; other follow up was offered at 4, 7, and 10 months at the discretion of the practitioner

†No particular behavioral intervention was required, the intervention was to provide physicians with positive screening results. Based on assessment immediately after the visit, some discussion about drinking was reported for 51% (residents) to 74% (faculty) of visits for the intervention group (and 70% for residents and 51% for faculty in the control group).

Intermediate Outcomes

All four studies reported some intermediate outcome measures of interest (Table 22). All four reported measures of alcohol consumption with reductions in both intervention groups, one reported measures of binge drinking, and 2 reported measures of abstinence. No studies reported follow up with referrals. For many of the outcomes reported, statistical testing to compare the different behavioral interventions was not reported. Among the studies that did report statistical tests to inform the comparison, p-values were not statistically significant or confidence intervals overlapped. In other words, none of the studies reported a statistically significant difference between the two groups of interest to this Key Question. On the other hand, the comparisons are limited by having only a single study and imprecise results for each comparison. Thus, the studies have inadequate power to justify a conclusion of no difference between interventions with any reasonable degree of confidence.

Table 22. Intermediate outcomes for behavioral counseling interventions compared in head-to-head trials for adults with alcohol misuse

Comparison	Study Duration	Alcohol Consumption	Binge Drinking	Recommended Levels Achieved	Abstinence
Very brief vs. Brief	WHO Brief Intervention Study, 1996[73] 9 mths	% of subjects decreasing average daily amount* Men VB: 40.8 vs. B: 40.3 Women VB: 43.2 vs. B: 45.1	NR	Improvement in % of subjects above recommended weekly limit* Men VB: 21 vs. B: 17 Women VB: 27 vs. B: 25	% abstinent* Men VB: 5 vs. B: 8 Women VB: 7 vs. B: 12
Very brief vs. Extended multi-contact	Richmond, 1995[79] Alcoholscreen 12 mths	Reduction in weekly consumption at 12 months* VB: -2.1 vs. EM: -7.0	NR	% drinking above recommended levels (%change from baseline) at *12 months:* VB: 77.1 (-2.1) vs. EM: 76.0 (-7.3), p= NS	NR
Brief vs. Extended multi-contact	Maisto et al., 2001[87] ELM 12 mths	Change in # of drinks in last 30 days at 12 months: B: -33.20 (-48.19, -18.21) vs. EM: -21.99 (-32.32, -11.65)	NR	NR	Change in # of days abstinent at 12 months: B: +2.54 (0.53, 4.56) vs. EM: +3.58 (1.58, 5.57)
Extended multi-contact vs. Extended multi-contact	Bischof et al., 2008[42] SIP study 12 mths	Change in gram alcohol per day from baseline to 12 months: EM (FC): -13.0 vs. EM (SC): -12.2, p= 0.217	Overall data NR, only reported for subgroups**	NR	NR

Abbreviations: B, brief intervention up to 15 minutes; ELM, Early Lifestyle Modification; EM, extended multi-contact intervention (multiple contacts, some or all longer than 15 minutes); FC, full care; mths, months; NR, not reported; NS, not statistically significant; SC, stepped care; SIP, Screening and Intervention in Primary Care; VB, very brief intervention up to 5 minutes; WHO, World Health Organization

*p-values or confidence intervals not reported

**Among those with alcohol dependence: EM (FC): 61.2% vs. EM (SC): 51.4%, p= 0.387; among abusers/at-risk drinkers: EM (FC): 77.6% vs. EM (SC): 78.0%, p= 1.00; among those with heavy episodic drinking only: EM (FC): 80.6% vs. EM (SC): 72.5%, p= 0.577

For the WHO study, both intervention groups reduced alcohol consumption compared with controls; the results were similar in magnitude for the very brief (VB) and the brief (B) interventions for intermediate outcomes; statistical significance (i.e., p-values or confidence intervals) directly comparing the two interventions was not reported. Some point estimates slightly favored the very brief intervention and others favored the brief intervention. Overall, evidence was insufficient to draw conclusions about the direct comparative effectiveness of very brief interventions with brief interventions (Appendix G). Our ability to make a conclusion about how very brief and brief interventions compare in primary care settings based on direct evidence is limited by heterogeneity of settings in the WHO study (with many settings outside of primary care, including those in emergency departments), heterogeneity of interventions (with various approaches or personnel used to deliver the intervention), and variations in the interventions across settings and countries.

Richmond and colleagues reported a reduction in weekly consumption and in the percentage of subjects drinking above recommended levels in those receiving a very brief intervention as well as those receiving an extended multi-contact intervention.[79] Both point estimates favored

the extended multi-contact group, but between-group differences were not reported or were not statistically significant (Table 22).

The ELM study reported a reduction in the number of drinks in the last 30 days for both groups (brief and extended multi-contact), without a statistically significant difference between groups (the confidence intervals for the two groups overlapped).[87] The study also reported an increase in the number of days abstinent for both groups, without a statistically significant difference between groups (the confidence intervals for the two groups overlapped) (Table 22).

The SIP study reported a reduction of grams of alcohol consumed per day for two variations on extended multi-contact interventions ("full care" and "stepped care") that was not significantly different (p=0.217).[42] The study also reported binge drinking outcomes by subgroup (but not for the overall sample) (Table 22).

Evidence in Older Adults

We did not identify any trials meeting our inclusion/exclusion criteria that directly compared two behavioral intervention approaches in older adults.

Evidence in Young Adults or College Students

One 12-month trial from New Zealand described in the previous section (KQ 4a) provided evidence for this section (Table 23).[37,43] It enrolled subjects with an AUDIT score of 8 or more and who consumed more than recommended upper limits for episodic drinking on one or more occasion in the preceding four weeks (four for women, six for men).[36,37,43]

Table 23. Characteristics of included trials comparing behavioral counseling interventions with each other for improving intermediate outcomes for young adults or college students with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/wk)	Quality
Kypri, 2008[37,43]	576 NR	12	New Zealand	University primary health care service	20.1 to 20.3	52	NR	NR	Good

Abbreviations: % Dep, percentage of subjects with alcohol dependence; Fem, female; mths, months; N, total number randomized; NR, not reported/unclear; wk, week; y, years

Notes: When data was not reported for mean age, %female, %non-white, and baseline alcohol consumption for the total sample but was presented for each study group, we give the range of the means for the various study groups

The study compared a brief intensity intervention with a brief multi-contact intervention (Table 24). Both interventions were web-based, self-administered by subjects via computer.[37,43] Those receiving the brief intervention underwent a single electronic screening and brief intervention. Those in the multidose group also received interventions 1 and 6 months later.

Table 24. Description of behavioral counseling interventions compared in head-to-head trials for improving intermediate outcomes for young adults or college students with alcohol misuse

Study	Intensity	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Kypri, 2008[37,43]	Brief	Web-based assessment and personalized feedback on drinking	Self	Computer	1	10-15 min
Kypri, 2008[37,43]	Brief multi-contact	Web-based assessment and personalized feedback on drinking	Self	Computer	3	10-15 min

Abbreviations: min, minutes; No., number

Intermediate Outcomes

The study reported measures of alcohol consumption and binge drinking for each intervention group compared with a control. Both groups reduced consumption (total drinks in the past 2 weeks) compared with the control group at 6 months (brief: rate ratio 0.77, 95% CI, 0.63 to 0.95; brief multi-contact: RR, 0.79, 95% CI, 0.64 to 0.97). At 12 months, differences remained significant for the brief single-contact intervention (RR, 0.77, 95% CI, 0.63 to 0.95), but did not reach statistical significance for the multi-contact intervention (RR, 0.87, 95% CI, 0.71 to 1.06).

For heavy drinking episodes in the past 2 weeks, the multi-contact intervention resulted in lower rates than control at 6 months (RR, 0.65, 95% CI, 0.45 to 0.93), and results trended toward favoring the brief intervention over control, but it did not reach statistical significance (RR, 0.78, 95% CI, 0.55 to 1.12). At 12 months, neither group reached statistical significance compared with control, but results trended toward favoring the intervention groups (RRs from 0.71 to 0.75 with upper limits of CIs at 1.01 and 1.07).

For all of the intermediate outcomes reported, between-group differences were not reported, but similarities in results compared with controls (point estimates and confidence intervals) suggested that additional sessions provided in the multi-contact intervention did not enhance the effect.

Evidence in Pregnant Women

We did not identify any trials meeting our inclusion/exclusion criteria that directly compared two behavioral intervention approaches in pregnant women.

Applicability

With much of the evidence in this section insufficient to draw conclusions about the comparative effectiveness of behavioral interventions, our ability to make statements about applicability is limited. Available evidence was either insufficient or did not find a difference between the behavioral interventions compared. The applicability of the WHO study comparing a very brief to a brief intervention has limited applicability to people identified with alcohol misuse by screening in primary care settings due to the heterogeneity (related to settings and interventions) described above. None of the included studies evaluated adolescents, older adults, pregnant women, or veterans, and results thus have uncertain applicability to those populations.

Whether the interventions can be easily incorporated into usual primary care practice is addressed in other Key Questions.

Key Question 5: What adverse effects are associated with behavioral counseling interventions, with or without referral, for people with alcohol misuse as identified by screening?

Summary of Findings

We reviewed all included studies for evidence of harms across 5 categories: 1) anxiety, 2) stigma, labeling, and/or discrimination, 3) interference with doctor-patient relationship, 4) opportunity costs/time, and 5) increased smoking and/or illegal substance use. Below we summarize the main findings by outcome and report the strength of evidence (SOE) for each outcome. All 23 trials included in Key Question 4a contributed evidence for opportunity costs (for the time required to deliver interventions). Five trials reported evidence for other outcomes relevant for this key question;[31,34,80,83,92,94,95] all of which reported information about smoking and 2 of which reported anxiety.[80,92] We found no evidence of direct harms, aside from opportunity costs associated with the interventions.

Anxiety

- Two studies reported no changes in anxiety levels during treatment (*low* SOE).

Stigma, Labeling, Discrimination, or Interference With The Doctor-Patient Relationship

- No studies addressed these outcomes (*insufficient* SOE).

Opportunity Costs/Time

- One study reported about $39 in personal costs for enrolled subjects due to lost work time and travel.
- The time required for interventions utilized in the included studies ranged from a minimum of 5 minutes to a maximum of approximately 2 hours dispersed over multiple in-person and/or telephone visits (*moderate* SOE).

Increased Smoking or Illegal Substance Use

- Limited evidence in adults and older adults suggests that behavioral interventions for alcohol misuse do not result in increased smoking rates (*low* SOE); we found no evidence in young adults, college students, or pregnant women (*insufficient* SOE)
- None of the included studies reported changes in illegal substance use (*insufficient* SOE)

Evidence in Adults

In Project TrEAT, each patient incurred, on average, approximately $39.00 in personal costs for lost work time and travel for study-related visits.[33]

Across studies, the amount of time that participants invested in the interventions ranged from very brief (up to 5 minutes during a single interaction)[73,79] to more extensive (multiple brief contacts or combinations of brief and longer contacts lasting up to 45 minutes). Additional description of the time required for the interventions in each included study is provided in Key Question 4a.

Four studies reported *no* increases in smoking rates for individuals undergoing behavioral counseling interventions for alcohol misuse.[31,80,92,94] Studies did not report actual data (e.g., number of cigarettes smoked per week) for this outcome, thus we were unable to conduct quantitative synthesis. Studies reporting this outcome just included one sentence stating that there was no change in the mean number of cigarettes smoked,[31] no changes in the reported frequencies of cigarette consumption,[80,92] or that cigarette consumption dropped slightly in both groups.[94]

Two studies reported anxiety changes among individuals undergoing interventions for alcohol misuse. After treatment, mean anxiety level was slightly higher in men [80 4211]but slightly lower in women [92] than compared to before-treatment, but neither effect was significant nor differed significantly from those observed in sex-matched control groups.

Evidence in Older Adults, Young Adults or College Students, and Pregnant Women

Project GOAL specifically targeted older adults and reported that tobacco use did not change during the course of the intervention.[34,95] Similarly, smoking status did not differ in women undergoing behavioral treatment compared to those receiving usual care in Project TrEAT.[83]

Applicability

With such limited findings and insufficient evidence for most of the potential outcomes of relevance to this section, our ability to make conclusions about applicability is limited. Few studies addressed potential harms. Of note, no studies specifically addressed harms in young adults or college students, pregnant women, or among racial or ethnic minority groups. It is unclear if the current findings extrapolate or generalize to these groups.

Key Question 6. How do behavioral counseling interventions, with or without referral, compare with one another and with usual care for reducing morbidity, reducing mortality, or changing other long-term outcomes for people with alcohol misuse as identified by screening?

Summary of Findings

Here we summarize the main findings for each population (adults, older adults, young adults and college students) by outcome and report the strength of evidence (SOE) for each.

Adults

- **Mortality**: Our meta-analyses did not find a reduction in all-cause mortality for adults (4 studies; rate ratio 0.64, 95% CI, 0.24 to 1.7) or for all age groups combined (adults, older adults, and young adults/college students) (6 studies; rate ratio 0.52, 95% CI, 0.22 to 1.2). Point estimates trended toward favoring behavioral interventions, few studies reported mortality, additional studies would be needed to increase precision, and there is little long-term data (*low* SOE).
- **Morbidity (e.g., Alcohol-related accidents, alcohol-related liver problems):** evidence was insufficient to draw conclusions for morbidity outcomes.

- **Hospitalization:** the best evidence comes from Project TrEAT (N=774). It reported a statistically significant difference in hospital days in the last 6 months for the intervention group compared with the control group at 6, 12, and 48 months (35 vs. 180, 91 vs. 146, and 420 vs. 664, $p<0.001$, $p<0.001$, and $p<0.05$, respectively) (*low* SOE).
- **Emergency visits**: the best evidence comes from Project TrEAT (N=774). The difference between groups did not reach statistical significance, but trended in favor of the intervention group at 6, 12, and 48 months (visits in past 6 months: 47 vs. 70, 60 vs. 62, and 302 vs. 376, $p>0.10$, $p>0.10$, and $p<0.10$, respectively) (*low* SOE).
- **Outpatient primary care visits**: no significant difference between intervention and control groups (WMD, -0.14 visits, 95% CI, -0.5 to 0.2) (*low* SOE).
- **Costs:** Benefit-cost analyses from Project TrEAT reported a total economic benefit of the brief intervention of $423,519, including over $190,000 savings in emergency department and hospital use and almost $230,000 in avoided costs of crime and motor vehicle accidents.[33] The average per subject benefit was over $1,100 and the benefit-cost ratio was 5.6:1 (95% CI, 0.4 to 11.0).[33] Using data from 48-month follow up, the authors reported a cost per patient of $205, and a benefit per patient of $7,985, for a resulting benefit-cost ratio of 39 (95% CI, 5.4 to 72.5).[32] (*low* SOE)
- **Legal issues:** one 48-month study (Project TrEAT) found no significant difference between the intervention and control groups for assault/battery/child abuse, resist/obstruct officer/disorderly conduct, criminal damage/property damage, theft/robbery, and other arrests, but did report a difference for controlled substance/liquor violations, with 2 in the intervention group compared with 11 in the control group ($p<0.05$) (*low* SOE).
- **Quality of Life:** Three 12-month studies (total N=353) reported no difference between intervention and control groups for quality of life measures (*low* SOE).[80,86,92]
- **Sick days, employment stability:** evidence was insufficient to draw conclusions.

Older Adults

- **Morbidity and mortality**: evidence from 1 study was insufficient to draw conclusions for morbidity or mortality outcomes.
- **Costs**: an economic analysis of Project GOAL found no significant difference in economic outcomes through 24 months.[34] The total costs of health care and social consequences were estimated to be $5,241 (95% CI, $2,995 to $7,487) per patient in the treatment group and $6,289 (95% CI, $3,549 to $9,029) per patient in the control group (low SOE).
- **Other outcomes**: evidence was insufficient to draw conclusions for utilization, sick days, legal issues, employment stability, and quality of life outcomes for older adults.

Young Adults and College Students

- **Mortality**: One trial reported one death in the control group (insufficient SOE).
- **Motor vehicle events**: a subgroup analysis (N=226) of young adults from Project TrEAT[35] found fewer motor vehicle crashes with non-fatal injuries for those in the intervention group than for controls (9 vs. 20, respectively; $p<0.05$) and fewer total motor vehicle events (114 vs. 149; $p<0.05$) after 48 months of follow-up (low SOE).

- **Hospitalizations**: the subgroup analysis from Project TrEAT reported a lower number of days of hospitalization for the intervention group that did not reach statistical significance (131 vs. 150, p=NS) (low SOE).[35]
- **Emergency visits**: the subgroup analysis from Project TrEAT reported fewer emergency department visits for the intervention group than for the control group (103 vs. 177, p<0.01) (low SOE).[35]
- **Academic**: Evidence from two trials (N=576 and N=104) conducted in New Zealand suggests that behavioral interventions result in fewer consequences related to academic role expectations (rate ratio between 0.70 and 0.80, moderate SOE).[36,37]
- **Legal events**: the subgroup analysis from Project TrEAT found no significant difference between the intervention and control groups for assault/battery/child abuse, resist/obstruct officer/disorderly conduct, criminal damage/property damage, theft/robbery, and other arrests, but did report a difference for controlled substance/liquor violations, with 0 in the intervention group compared with 8 in the control group (p<0.01) (low SOE).[35]
- **Other outcomes**: evidence was insufficient for alcohol-related liver problems, costs, and quality of life (no included studies).

Pregnant Women

- We did not identify any studies in pregnant women reporting outcomes for this Key Question.

Evidence in Adults

Characteristics of Included Studies

Table 25 summarizes the characteristics of the 8 trials (targeting adult populations meeting our inclusion criteria for this question. All were randomized controlled trials conducted exclusively in primary care settings. The trials generally targeted those with risky/hazardous drinking, including binge drinkers. The study conducted in rural primary care sites in Thailand also enrolled around 15 percent of subjects with alcohol dependence (based on an AUDIT score >25).[78]

Two of the studies were conducted exclusively in the United States, four in the United Kingdom, and one each in Germany and Thailand (Table 25). Most studies followed subjects for 12 months; two studies reported outcomes beyond 12 months, up to 24 months[74,93] or 48 months.[31-33,35,83]

Most studies reported a baseline alcohol consumption between 15 and 30 drinks per week. Two studies conducted in the UK[80,94] reported more than 30 drinks per week at baseline.

Table 25. Characteristics of included trials comparing behavioral counseling interventions with usual care or with one another for reducing morbidity, reducing mortality, or changing other long-term outcomes for adults with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/wk)	Quality
Anderson, 1992[80]	154 NR	12	UK	8 PC group practices	43 to 45.1	0	NR	37.9 to 38.8	Fair
Bischof et al., 2008[42,44,81] SIP study	408 30.4	12	Germany	85 general practices	35.9 to 36.8	31.9	NR	21 to 25.2	Fair
Fleming et al., 1997[31-33,35,83] Project TrEAT	774 NR*	48	US Wisconsin	17 community PC practices	NR**	38	5.6 to 11.9	18.9 to 19.1	Good
Lock, 2006[86]	127 0	12	UK	General practices	44.1	50	NR	23 to 26.48	Fair
Noknoy, 2010[78]	117 13.8 to 15.3††	6	Thailand	Rural PC units	37	8.5	100 (Thai)	15.15	Fair
Scott, 1990[92]	72 NR	12	UK	8 PC group practices	44.4 to 47.2	100	NR	25.8 to 26.7	Fair
Senft, 1997[74] Freeborn, 2000[93]	516 0	24	US Oregon	3 PC clinics in an HMO	41.9 to 43	28.1 to 31.1	17.4 to 18.7	16.5	Fair
Wallace, 1988[94]	909 NR	12	UK	47 group practices	41.7 to 44.6	29.1 to 29.8	NR	35.1 (females) and 62.2 (males)	Fair

Abbreviations: % Dep, percentage of subjects with alcohol dependence; Fem, female; Mass, HMO, health maintenance organization; Massachusetts; mths, months; N, total number randomized; NR, not reported/unclear; PC, primary care; SIP (Bischof et al), Stepped Intervention for Problem Drinkers; TrEAT, Trial for Early Alcohol Treatment; UK, United Kingdom; US, United States; wk, week; y, years;

Notes: When data were not reported for mean age, %female, %non-white, and baseline alcohol consumption for the total sample but was presented for each study group, we give the range of the means for the various study groups

*6 subjects (per medical record audit) received formal alcohol treatment during the 1-year follow up period; those may represent subjects ultimately diagnosed with alcohol dependence

**Group 1: Men, 20.2% 18-30y; 27.2% 31-40y; 23.9% 41-50y; 28.8% 51-65y; Women, 43.5% 18-30y; 25.9% 31-40y; 15.6% 41-50y; 15.0% 51-65y. Group 2: Men, 26.0% 18-30y; 25.1% 31-40y; 21.3% 41-50y; 27.7% 51-65y; Women, 35.7% 18-30y; 35.7% 31-40y; 18.2% 41-50y; 10.5% 51-65y.

††Based on AUDIT >25

Methods of screening used to identify subjects for the included trials are described in Key Question 4a and in Appendix C. Most studies used self-administered questions that assess the quantity and frequency of alcohol consumption for screening. The AUDIT and CAGE were commonly used in addition to quantity-frequency questions. The interventions of included studies for this section are described in Table 26, stratified by intervention intensity. Intervention intensity varied from brief (single contact, up to 15 minutes) to brief multi-contact (multiple contacts, up to 15 minutes each) to extended multi-contact (multiple contacts, one or more of them greater than 15 minutes).

Four studies tested interventions delivered primarily by the patient's primary care physician.[31,80,92,94] Two studies tested interventions delivered primarily by nurses or physician assistants[78,86] and two studies (contributing three interventions) tested interventions delivered

primarily by research team personnel, such as a health counselor[74] or trained psychologist.[42] Among the interventions involving patient's usual primary care physician, some used the physicians to deliver initial and any repeated intervention contacts[94] while others also used educators, counselors, or nurses for follow-up contacts.[31]

The majority of control groups involved screening/assessment followed by usual care or by the provision of a general health pamphlet. One study included additional components in the control group that could bias the results toward the null, with advice from nurses on cutting down drinking and a leaflet with daily benchmark alcohol guides.[86]

Table 26. Description of behavioral counseling interventions for improving morbidity, mortality, or other long-term outcomes for adults with alcohol misuse, by intervention intensity

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Brief	Anderson, 1992[80]	Brief advice, feedback about own consumption and norms, and a self-help booklet	PCP	In person	1	10 min
Brief	Lock, 2006[86]	Brief advice ("drink-less" protocol) on standard drink units, recommended consumption levels, benefits of cutting down, tips on reducing consumption, advice on goal-setting, action plan, and self-help booklet/diary	Nurse or PA	In person	1	5-10 min
Brief	Scott, 1990[92]	Brief advice, feedback about own consumption and norms, and a self-help booklet	PCP	In person	1	10 min
Brief	Senft, 1997[74] Freeborn, 2000[93]	30-second message from PCP and 15-minute session with health counselor immediately following PCP visit	PCP and study health counselor	In person	1	~15 min
Brief multi-contact	Fleming et al., 1997[31-33,35,83] Project TrEAT	Two visits 1 month apart with PCP and a follow-up phone call from the clinic nurse 2 weeks after each visit; workbook containing feedback regarding current health behaviors, review of prevalence of problem drinking, list of adverse effects of alcohol, worksheet on drinking cues, drinking agreement / prescription, and drinking diary cards	PCP and nurse	In person and phone	4	15 min for PCP contacts; NR for phone calls
Brief multi-contact	Noknoy, 2010[78]	Motivational enhancement protocol: brief counseling sessions using patient-centered interviewing style and considering stages of change	Nurse or PA	In person	3	15 min
Brief multi-contact	Wallace, 1988[94]	Brief advice, an information booklet ("That's the Limit"), sex-based recommendation for limiting drinking, a drinking diary, and follow up sessions	PCP	In person	1 to 5*	NR
Extended multi-contact	Bischof et al., 2008[42,44,81] SIP study	Group 1: Full Care (FC): immediate computerized post-assessment feedback and multiple sessions of counseling by psychologist	Trained psychologists from research team	Phone	4	Scheduled for 30 min each; mean received was 80.3 min

Table 26. Description of behavioral counseling interventions for improving morbidity, mortality, or other long-term outcomes for adults with alcohol misuse, by intervention intensity (continued)

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Extended multi-contact	Bischof et al., 2008[42,44,81] SIP study	Group 2: Stepped Care (SC): immediate computerized post-assessment feedback and maximum of 3 counseling sessions with psychologist. Sessions were discontinued if patients indicated consumption below study criteria and high self-efficacy to maintain desired behavior.	Trained psychologists from research team	Phone	Up to 4	Scheduled for 30-40 min each; mean received was 40 min

Abbreviations: min, minutes; mths, months; No., number; NR, not reported; OB, Obstetrician; PA, Physician Assistant; PCP, primary care physician; SIP, Screening and Intervention in Primary Care; TrEAT, Trial for Early Alcohol Treatment; US, United States; y, years

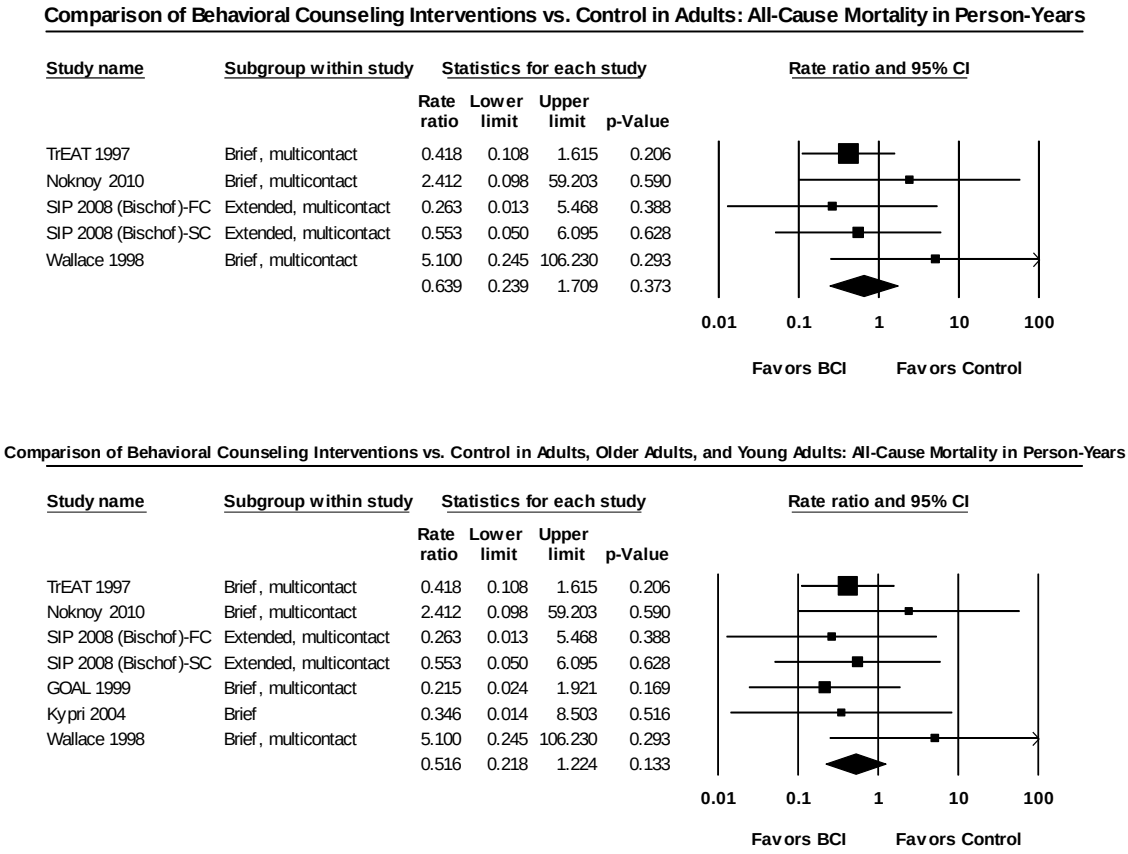
*All intervention subjects received an invitation to a 1-month follow up; other follow up was offered at 4, 7, and 10 months at the discretion of the practitioner

Mortality

Four studies enrolling adults reported any deaths (all-cause mortality) in one or more study groups.[31,32,42,78,94] The individual studies were not designed or powered to detect differences in mortality. Two of the four studies reported more deaths in the intervention group than the control group (one or two deaths in the intervention group and zero in the control group).[78,94] Of the 16 total deaths reported, none were definitely related to alcohol misuse. Just two of the studies reported causes of death; six deaths were from unspecified causes, 1 was suicide, 7 were due to cardiac or pulmonary problems, and 2 were in motor vehicle accidents.

We conducted meta-analysis using the four included studies conducted in adults for all-cause mortality for adults in person-years (Appendix E). Our meta-analysis did not find a statistically significant reduction in mortality (rate ratio 0.64, 95% CI, 0.24 to 1.7) (Figure 3). We conducted additional analyses with the addition of the included studies in older adults (GOAL)[95] and in younger adults (Kypri, 2004)[36] that reported mortality. Results trended toward favoring behavioral interventions, but remained non-statistically significant (rate ratio 0.52, 95% CI, 0.22 to 1.2) (Figure 3).

Figure 3. Meta-analysis results for all-cause mortality



Morbidity (e.g., Alcohol-Related Accidents And Injuries, Alcohol-Related Liver Problems)

Four studies reported data on accidents in adults (for data in young adults, see section below). Studies were not designed or powered to detect differences in these outcomes. Two studies (Anderson 1992 and Scott 1990) reported accident scores (from an alcohol-related problems scale), both with endpoint scores numerically favoring the intervention group.[80,92] Neither found a significant change from baseline data for the intervention group or for the control group (Appendix C). One study conducted in Thailand reported alcohol-related accidents (1 in the intervention group and 4 in the control group) and alcohol-related traffic accidents (3 in the intervention group and 5 in the control group).[78] The best available evidence comes from Project TrEAT (N=774),[32] which reported outcomes after 48 months of follow-up. The study found lower numbers of motor vehicle crashes with fatalities (0 vs. 2), motor vehicle crashes with non-fatal injuries (20 vs. 31), and motor vehicle crashes with property damage only (67 vs. 72), that were not statistically significantly different between the intervention and control groups.

No studies reported other morbidity outcomes (e.g., alcohol-related liver problems) in adults. Overall, evidence was insufficient to draw conclusions for adults for morbidity outcomes (Appendix G).

Health Care Utilization

Six studies reported utilization outcomes among secondary outcomes (Appendix G).[32,74,78,80,86,92] The majority of utilization outcomes reported revealed trends favoring lower utilization in the intervention group compared with the control group that were not statistically significant. These included mean consultations or care episodes per year,[80,92] general practitioner visits,[86], nurse practitioner visits,[86]accident and emergency visits,[86] outpatient visits by 24 months,[74,93] number of hospital days,[74,93] emergency department visits,[31,32] and visits to primary care physicians due to alcohol consumption.[78] Five of the studies reported outcomes (listed in the previous sentence) reflecting primary care utilization. Our meta-analysis for primary care practitioner utilization did not find a significant difference between intervention and control groups (WMD, -0.14 visits, 95% CI, -0.5 to 0.2) (Appendix E).

The best evidence for number of days hospitalized and number of emergency department visits (based on the quality, size, design, and duration of the study) comes from Project TrEAT. It reported a statistically significant difference in hospital days in the last 6 months for the intervention group than the control group at 6, 12, and 48 months (35 vs. 180, 91 vs. 146, and 420 vs. 664, $p<0.001$, $p<0.001$, and $p<0.05$, respectively). Two smaller studies of shorter duration reported no statistically significant difference between groups for hospitalization outcomes. Specifically, Senft and colleagues (N=516) reported a slightly lower percentage of subjects hospitalized in the intervention group than the control group at 24 months that was not significant (21.2 percent vs. 22.0 percent, $p=0.81$) and a trend toward fewer mean hospital days for those hospitalized that was not significant (4.7 vs. 6.6, $p=0.37$); Lock and colleagues (N=127) reported no significant difference between groups for hospital inpatient stays.

In Project TrEAT, the difference between groups for emergency department visits in the last 6 months did not reach statistical significance, but trended in favor of the intervention group at 6, 12, and 48 months (47 vs. 70, 60 vs. 62, and 302 vs. 376, $p>0.10$, $p>0.10$, and $p<0.10$, respectively). In a smaller 12 months study, Lock and colleagues reported fewer accident and emergency visits for the intervention group than the control, but the difference was not statistically significant.[86]

Costs

Two included studies enrolling adults reported costs.[32,33,86] One study (N=127) conducted in the UK reported numerically lower mean total health care costs (British pounds) for the nurse-led intervention group than for the control group over 12 months, but the difference was not statistically significant (263 vs. 392, p= NS; when including intervention delivery costs: 291 vs. 392, p=NS).[86]

The best evidence comes from benefit-cost analyses from Project TrEAT (N=774). Analyses using 6- and 12-month follow up data reported a total economic benefit of the brief intervention of $423,519 (95% CI, $35,947 to $884,848), including over $190,000 savings in emergency department and hospital use and almost $230,000 in avoided costs of crime and motor vehicle accidents.[33] The average per subject benefit was over $1,100 and the benefit-cost ratio was 5.6:1 (95% CI, 0.4 to 11.0), or just over $56,000 in total benefit for every $10,000 invested.[33] Using data from 48-month follow up from Project TrEAT and the societal perspective, Fleming and colleagues reported a cost per patient of $205, a benefit per patient of $7,985, for a resulting benefit-cost ratio of 39 (95% CI, 5.4 to 72.5).[32]

Legal Issues

Only one study, Project TrEAT, reported outcomes related to legal issues.[32] After 48 months, the number of the following events were not statistically significantly different between the intervention and control groups: assault/battery/child abuse (8 vs. 11), resist/obstruct officer/disorderly conduct (8 vs. 6), criminal damage/property damage (2 vs. 1), theft/robbery (3 vs. 3), and other arrests (5 vs. 9). However, the study did report a difference for controlled substance/liquor violations, with 2 in the intervention group compared with 11 in the control group ($p<0.05$).

Quality of Life

Three studies reported quality of life outcomes. Detailed data from these studies are included in Appendix C. A 12-month study of 154 men reported no difference in change in mean life quality scores between the intervention and control groups (0 vs. 0).[80] Similarly, a 12-month study that enrolled 72 women reported no difference in change in mean life quality scores between the intervention and control groups (-0.3 vs. -0.3).[92] A nurse-led intervention (N=127) reported no significant differences between the intervention and control groups at 6 or 12 months for change in SF-12 physical or mental health scores.[86]

Sick Days, Employment Stability

We did not identify any studies reporting these outcomes.

Evidence in Older Adults

Just one of the included studies (Project GOAL) focused on older adults reported outcomes relevant for this Key Question (Table 27).[34,95] Further description of the study and the intervention utilized is described in Key Question 4a.

Table 27. Characteristics of included trials comparing behavioral counseling interventions with usual care or with each other for improving morbidity, mortality, or other long-term outcomes for older adults with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/wk)	Quality
Fleming, 1999[95]	158	24	US Wisconsin	24 PC practices	NR	33.5	NR	15.54 to 16.58	Fair
Mundt, 2005[34] GOAL	0				>92% age 65-75				

Abbreviations: % Dep, percentage of subjects with alcohol dependence; Fem, female; GOAL, Guiding Older Adult Lifestyles; mths, months; N, total number randomized; NR, not reported/unclear; PC, primary care; US, United States; wk, week; y, years;

Notes: When data were not reported for mean age, %female, %non-white, and baseline alcohol consumption for the total sample but was presented for each study group, we give the range of the means for the various study groups

Morbidity and Mortality

Project GOAL reported all-cause mortality at 24 months (causes not reported), with 1 death in the intervention group and 4 in the control group (p not reported).[34,95] We incorporated this information in one of our meta-analyses for all-cause mortality described in the previous section.

The study did not report morbidity. Evidence is insufficient to draw conclusions for older adults for morbidity or mortality outcomes.

Costs

An economic analysis of Project GOAL found no significant difference in economic outcomes through 24 months.[34] The total costs of health care and social consequences were estimated to be $5,241 (95% CI, $2,995 to $7,487) per patient in the treatment group and $6,289 (95% CI, $3,549 to $9,029) per patient in the control group.

Health Care Utilization, Sick Days, Legal Issues, Employment Stability, and Quality of Life

We did not identify any studies in older adults reporting these outcomes. But, some costs of these outcomes were included in the economic analysis of Project GOAL, and it found no significant differences for hospital days, emergency department visits, office visits, medications, lab and x-ray procedures, or legal events. Overall, evidence is insufficient to draw conclusions for older adults for these outcomes.

Evidence in Young Adults or College Students

All of the studies described in Key Question 4a for young adults or college students also reported outcomes relevant for this question (Table 28). For further description of these studies and the interventions utilized see Key Question 4a.

Mortality

One of the trials (Kypri 2004)[36] reported one death in the control group and zero in the intervention group (causes not reported, insufficient evidence to make a conclusion). We incorporated this information in one of our meta-analyses for all-cause mortality described in the section on adults above.

Morbidity

A subgroup analysis of young adults (18 to 30) from Project TrEAT reported significantly fewer motor vehicle crashes with non-fatal injuries than controls (9 vs. 20, respectively; $p<0.05$) and fewer total motor vehicle events (114 vs. 149; $p<0.05$) after 48 months of follow-up.[35] Between-group differences were not statistically significant for motor vehicle crashes with fatalities (0 vs. 1) or property damage only (19 vs. 28, p= NS).

Table 28. Characteristics of included trials comparing behavioral counseling interventions with usual care or with each other for improving morbidity, mortality, or other long-term outcomes for young adults or college students with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-White	Baseline Alcohol Use (Drinks/wk)	Quality
Fleming, 2010[76] CHIPs	986 0	12	US and Canada	5 college health clinics	21	50.5 to 51.3	8.1 to 10.5	17.3 to 17.8	Good
Grossberg, 2004[35] TrEAT	226* NR	48	US Wisconsin	17 community PC practices	NR**	51	14	16.2 to 18.3	Fair*
Kypri, 2008[37] Kypri, 2007[43]	576 NR	12	New Zealand	University primary health care service	20.1 to 20.3	52	NR	NR	Good
Kypri, 2004[36]	104 NR	6	New Zealand	University student health service	19.9 to 20.4	50	NR	NR	Fair
Schaus, 2009[98]	363 0	12	US Florida	College student health center	20.6	52	22	8.38 to 9.59	Fair

Abbreviations: % Dep, percentage of subjects with alcohol dependence; CHIPs, College health Intervention Projects; Fem, female; mths, months; N, total number randomized; NR, not reported/unclear; PC, primary care; TrEAT, Trial for Early Alcohol Treatment; US, United States; wk, week; y, years;

Notes: When data was not reported for mean age, %female, %non-white, and baseline alcohol consumption for the total sample but was presented for each study group, we give the range of the means for the various study groups

*This was a subgroup analysis of TrEAT,[31] 226 of the 774 enrolled subjects were young adults (aged 18 to 30). The main study was rated good, this subgroup analysis was rated fair quality.

**21% 18 to 21, 37% 22 to 25, and 47% 26 to 30

Health Care Utilization

Two studies reported utilization outcomes.[35,76] The CHIPs study reported a composite outcome, finding no significant difference between groups for the percentage of subjects with at least one hospitalization or emergency department visit or urgent care visit or admission to local detoxification unit in the previous 6 months.[76] At baseline, between 29 percent and 30 percent of both groups reported at least one of the utilization events. Both groups showed a similar decrease in utilization by 12 months (percentages reporting at least one event at 12 months: 18.5 percent vs. 18.3 percent, p= 0.93).

The subgroup analysis of young adults from Project TrEAT reported fewer emergency department visits for the intervention group than for the control group (103 vs. 177, p<0.01).[35] It reported a lower number of days of hospitalization for the intervention group that did not reach statistical significance (131 vs. 150, p= NS).[35]

Academic, Legal, or Social Problems

Two studies conducted in New Zealand reported academic outcomes, using the Academic Role Expectations and Alcohol Scale (AREAS).[36,37] The larger (N=576) trial reported fewer academic consequences for the intervention groups than control groups at 12 months (rate ratio: single-contact intervention 0.80, 95% CI, 0.66 to 0.97; multi-contact intervention 0.75, 95% CI,

0.62 to 0.90).[37] In the smaller trial (N=104), results did not quite reach statistical significance at 6 months, but point estimates for rate ratios were similar (0.72, 95% CI, 0.51 to 1.02).[36]

The subgroup analysis of young adults from Project TrEAT reported legal events after 48 months of follow up; findings were not statistically significantly different between the intervention and control groups for total legal events (16 vs. 26), assault/battery/child abuse (6 vs. 6), resist/obstruct officer/disorderly conduct (6 vs. 3), criminal damage/property damage (1 vs. 3), theft/robbery (1 vs. 3), and other arrests (2 vs. 3). However, the study did report a difference for controlled substance/liquor violations, with 0 in the intervention group compared with 8 in the control group ($p<0.01$).[35]

Four trials reported outcome measures that reflect a composite of alcohol-related problems. The two trials conducted in New Zealand used the Alcohol Problems Scale (APS); two trials used the Rutgers Alcohol Problem Index (RAPI). Both trials reporting the APS found numerical trends favoring the intervention group; results reached significance in the smaller 6 month trial (rate ratio 0.76, 95% CI, 0.60 to 0.97), but did not quite reach statistical significance in the larger 12 month trial (rate ratio 0.82, 95% CI, 0.67 to 1.01).[36,37] The CHIPs study found a greater reduction in alcohol-related harm in favor of the experimental group at 12 months ($p=0.33$).[76] Schaus and colleagues found a similar difference at 6 months ($p= 0.028$) and 9 months ($p=0.041$).[98]

The subgroup analysis of young adults from Project TrEAT reported no difference in operating while intoxicated, or for other moving violations.[35]

Costs or Quality of Life

We did not identify any studies in young adults or college students reporting these outcomes.

Evidence in Pregnant Women

We did not find any studies meeting our inclusion/exclusion criteria for this Key Question.

Applicability

The findings are generally applicable to people with risky/hazardous or harmful drinking identified by screening in primary care settings. Most studies enrolled some subjects with binge drinking patterns of consumption. We did not identify any studies in adolescent populations, veteran's, or pregnant women, and results thus have uncertain applicability to these populations. We only identified one study in older adults, and were therefore not able to make conclusions for most outcomes for older adults. We did, however, identify a sufficient number of studies of young adults/college students and adults to draw some conclusions (of low to moderate strength) for several outcomes. Although we searched for studies conducted in settings with primary care-like relationships (e.g., infectious disease clinics for people with HIV), we did not find any, and our results have uncertain applicability to such settings/populations.

Key Question 7: To what extent do health care system influences promote or hinder effective screening and interventions for alcohol misuse?

Summary of Findings

- All interventions required sufficient support systems in order to provide screening and screening-related assessment, and in some cases, provider prompting. Such supports are likely required for effective screening and intervention.
- The country where studies were conducted (US compared with non-US) did not have a significant impact on the effectiveness of interventions for consumption outcomes.
- Interventions conducted in academic/research-oriented settings and those conducted in community-based primary care settings were both effective for reducing alcohol consumption, with data showing a trend toward greater reduction for interventions delivered in academic/research-oriented settings (WMD, -5.0 drinks/week, 95% CI, -7.6 to -2.5) than for those delivered in community-based settings (WMD, -3.2, 95% CI, -4.3 to -2.2).
- Interventions delivered by primary care providers and by research personnel were both effective for reducing alcohol consumption, with data showing a trend toward greater reduction for interventions delivered primarily by primary care providers (WMD, -4.0 drinks per week, 95% CI, -5.4 to -2.6) than for those delivered primarily by research personnel (WMD, -3.0, 95% CI, -5.0 to -1.0)
- Most interventions required training of providers and/or staff. Such training may be required for practices to deliver effective screening and interventions for alcohol misuse.

Country/Health Care System

Although non-US health care systems may be substantially different from those present in the US, we have included studies from all countries in this report because they provide valid and reliable outcome data for behavioral interventions in medical settings. RCT study settings were located in Canada, Germany New Zealand, Australia, Thailand, Spain, United States, Kenya, Mexico, Norway, United Kingdom, Russia, and Zimbabwe. For our main meta-analysis (change in consumption for adults at 12 months), we conducted subgroup analyses by country that found similar effect sizes for studies conducted in the US and for non-US studies (Appendix E). In addition, our meta-regression did not find country to be a significant contributor to the overall variance in the analysis (p= 0.27) (Appendix E). Thus, studies conducted in the US and outside of the US have found similar effectiveness of behavioral interventions for reducing alcohol consumption, on average.

Health Care Settings

Settings for the 23 RCTs were categorized as academic/research-oriented (n=5), community-based primary care (n=12), HMO (n=2) or student health clinic (N=4). Four of the US studies[31-35,38,75,83,90,91,95] and one foreign study[94] were conducted in academic/research-oriented practice settings, which may influence provider and clinic staff adherence to protocols. They reported the use of an average of four screening and/or assessment instruments. Two of the RCTs[74,82,93] were in HMO settings. One[82] used seven screening/assessment instruments and provided a single session with a PCP followed by approximately six weeks of phone counseling provided by a clinical psychology student. The other[74,93] used two screening/assessment instruments and

provided a thirty second intervention with a provider followed by 15 minutes with a trained counselor. Twelve of the studies[39,42,44,73,77-81,84-89,92,96,97] were conducted in community-based primary care settings (4 US and 7 non-US). US-based studies used slightly more screening/assessment instruments 6 versus 3.3 in the non-US studies.

Four studies[36,37,43,76,98] were conducted in university student health clinic settings. Two[36,37,43] of the four studies were in non-US settings. The US studies also reported on their training protocols which were extensive. Both also monitored adherence to protocol through the use of a form which verified that the interventionist had followed the protocol and had gained student agreement that they would decrease their alcohol use. Identification of patients was done via self-administered computerized assessment in the non-US studies.[36,37,43] These studies included one encounter of 11 to 15 minutes. Both used the AUDIT and relied on computers for both assessment and intervention.

For our main meta-analysis (change in consumption for adults at 12 months), we conducted subgroup analyses by setting to assess whether there were differences in effectiveness of interventions delivered in academic/research-oriented settings compared with community-based primary care settings. There were not enough HMO settings to assess differences and all of the interventions delivered in student health clinics were in a young adult population (which we evaluated separately from studies conducted in adults). Our subgroup analyses found a trend toward greater reduction in alcohol consumption for studies of behavioral interventions conducted in academic/research-oriented settings than for those conducted in community-based primary care settings, although confidence intervals overlap (WMD, -5.0 drinks/week, 95% CI, -7.6 to -2.5 compared with -3.2 drinks/week, 95% CI, -4.3 to -2.2) (Appendix E).

Personnel Involved with the Study

Research staff conducted the screening and screening-related assessments to identify those with alcohol misuse prior to intervention in nearly every study; most of these processes were relatively time-intensive (>30 minutes) and took place outside of the routine care encounter either in the patient waiting room or telephonically. In one study of pregnant women[39] screening and assessment lasted up to two hours. In several studies, research staff screened patients via telephone interviews and also used telephone to conduct brief follow-ups and booster sessions with patients.

Fourteen of the interventions[31-35,38,39,75-77,79,80,82,83,90-92,94-98] were delivered by a primary care physician alone or in conjunction with a health educator or nurse. Three[78,84-86] were delivered by a nurse or physician's assistant; one was conducted by a psychologist;[42,44,81] two by a researcher;[74,87-89,93] and one by unspecified interventionists.[73] Two interventions[36,37,43] were provided via a computer.

For our main meta-analysis (change in consumption for adults at 12 months), we conducted subgroup analyses by type of provider primarily delivering the intervention (primary care provider, research personnel, or nurse). We found a trend toward a greater numerical reduction in drinks per week for interventions delivered primarily by primary care providers (WMD, -4.0, 95% CI, -5.4 to -2.6) than for those delivered primarily by research personnel (WMD, -3.0, 95% CI, -5.0 to -1.0) (Appendix E). Just one intervention delivered by a nurse contributed to the analysis; the reduction in drinks per week was not statistically significant for that study (WMD, -0.2, 95% CI, -8.9 to 8.6). Our meta-regression did not find provider type to be a significant contributor to the overall variance in the analysis (Appendix E).

Incentives

Limited mention was made of the use of incentives in the included trials. One trial[39] used incentives to compensate pregnant women for completing the assessment ($50) and postpartum follow-up ($75).[39] This study also provided compensation for collaterals ($10). Another[98] paid participants up to $100 for completing study instruments ($30 at baseline; $10 each at 3, 6, and 9 months; $40 at 12 months). Project TrEAT[31-33,35,83] reported $250 compensation paid to participating physicians and $50 paid to patients. The Healthy Moms study[84,85] paid patients $150 if they completed the required procedures.

Training

Using the description of protocols provided in the references, provider and/or staff trainings were reported in most studies. Nine studies[31-33,35,38,42,44,76,78,81,83-91] reported trainings of research staff and interventionists that were thirty minutes and longer and also provided feedback, booster sessions, or weekly conference calls to maintain adherence to protocol. Five others[74,77,82,93,94,96,97] reported trainings of thirty minutes or greater but did not provide information on booster sessions. One RCT[42,44,81] reported that counselors completed a four week training in motivational interviewing.

Use of Electronic Health Records

None of the included studies reported a discussion or description of the use of electronic health records.

Discussion

In this report, we aimed to conduct a systematic review of the effectiveness of screening followed by behavioral counseling for alcohol misuse in primary care settings. In the introduction, we describe four categories of alcohol misuse: risky/hazardous drinking, harmful drinking, alcohol abuse, and alcohol dependence. It is important to note that the four categories are not all discrete categories (i.e., an individual may meet the definition for more than one category for some of these categories). For example, one study estimated that 36 percent of men and 44 percent of women classified as hazardous drinkers also met the criteria for harmful drinking.[14] It appears that the included trials of behavioral counseling generally enrolled subjects with risky/hazardous or harmful drinking, but the trials use varying terminology to describe the included populations and often enrolled heterogeneous populations—i.e., included subjects with various types of alcohol misuse. Nevertheless, the vast majority of trials excluded subjects with alcohol dependence or constructed inclusion/exclusion criteria to substantially limit the number of potential subjects with alcohol dependence. Just three studies reported that more than 10 percent of enrolled subjects had alcohol dependence.[42,78,79] It is not clear how many trials enrolled subjects with alcohol abuse, as this was generally not mentioned in the publications.

Given the heterogeneity in terminology used by the included trials and the potential overlap of some categories of alcohol misuse, our best assessment is that our overall findings from behavioral counseling intervention trials are applicable to risky/hazardous and harmful drinkers, and are unlikely to be applicable to those with alcohol dependence (because very few subjects in the included trials had alcohol dependence—although that makes applicability to those with alcohol dependence somewhat uncertain). It is uncertain whether findings are applicable to people with alcohol abuse.

Although we did not systematically review the effectiveness of the recommended treatments for alcohol dependence (e.g., 12-step programs, specialized outpatient treatment programs, and pharmacotherapy) in this report, we summarize the evidence regarding such treatments below (the section titled Treatments for Alcohol Dependence) to provide some contextual information. Because screening for alcohol misuse will inevitably identify some individuals with alcohol dependence, providers and those making recommendations need some information about whether there are effective interventions available for such individuals.

Summary of Main Findings

Screening for Alcohol Misuse

We did not find any studies directly addressing Key Question 1 *(What is the direct evidence that screening for alcohol misuse followed by a behavioral counseling intervention, with or without referral, leads to reduced morbidity, reduced mortality, or changes in other long-term outcomes?)* or Key Question 3 *(What adverse effects are associated with screening for alcohol misuse and screening-related assessment?)*. We searched for trials that randomized or assigned subjects to screening compared with another screening approach, no screening, or usual care, but none were found.

For Key Question 2 *(How do specific screening modalities compare with one another for detecting alcohol misuse?)*, we found that a number of good instruments (based on their sensitivity and specificity) are available to screen for alcohol misuse in primary care settings.

Many require as little as 1 to 2 minutes to administer (e.g., single question screens, AUDIT-C, CAGE, TWEAK, T-ACE). We present the main findings here by population.

All Adults (Age 18 or Older)

For adults, the AUDIT-C and the AUDIT have the highest reported sensitivities for detecting alcohol misuse (0.98 and 0.97, respectively). The specificity for the AUDIT-C, however, is fairly low (0.57), and a wide range of values have been reported for the sensitivity and specificity of the AUDIT. The CAGE is a good screen for some types of alcohol misuse but not others; i.e. it has very low sensitivity for detecting risky/hazardous or harmful drinking, but it appears to be a good test for detecting alcohol abuse or dependence. Single alcohol screening questions demonstrated good sensitivity (0.62 to 0.81) and specificity (0.79 to 0.93) for detecting risky/hazardous drinking among adult primary care populations.

Older Adults (Age 65 or Older)

The AUDIT-C, AUDIT, the ARPS, and shARPS instruments performed well for detecting at-risk drinking. For detecting abuse or dependence, the MAST instrument performed very well, with sensitivities over 90 percent. However, the MAST is a 22-item instrument that is very likely impractical in most primary care settings. The CAGE with a positive screen being ≥1 also performed very well (sensitivity range 0.79 to 0.88).

Young Adults and College Students

The included systematic reviews identified only one study reporting the sensitivity and specificity of a screening instrument, the full AUDIT (≥8), which performed well for identifying risky/hazardous or harmful drinking (sensitivity = 0.82; specificity = 0.78).

Pregnant Women

The T-ACE, TWEAK, and AUDIT-C had the highest sensitivity values for identifying problem drinking; for abuse and dependence, the AUDIT-C and the T-ACE had the highest sensitivities. The AUDIT-C performed better than other instruments for detecting both at-risk drinking and abuse or dependence, demonstrating both high sensitivity and high specificity.

Behavioral Counseling Interventions in Primary Care

This section summarizes the main findings regarding behavioral counseling interventions (Table 29) and their strength of evidence (SOE) from Key Questions (KQs) 4a, 4b, and 6 (*KQ 4a: How do behavioral counseling interventions, with or without referral, compare with usual care for improving intermediate outcomes for people with alcohol misuse as identified by screening?; KQ 4b: How do specific behavioral counseling approaches, with or without referral, compare with one another for improving intermediate outcomes for people with alcohol misuse as identified by screening?; KQ 6: How do behavioral counseling interventions, with or without referral, compare with one another and with usual care for reducing morbidity (e.g., alcohol-related morbidity, alcohol-related accidents and injuries), reducing mortality, or changing other long-term (6 months or longer) outcomes (e.g., health care utilization, sick days, costs, legal issues, employment stability) for people with alcohol misuse as identified by screening?*). The findings are presented by population and are summarized in Tables 30 and 32 through 34 below.

Table 29. What are brief behavioral interventions delivered in primary care settings?

- Can be defined as "a single session or multiple sessions of motivational discussion focused on increasing insight and awareness regarding substance use and motivation toward behavioral change."[20]
- Range from very brief interventions within a primary care visit to multi-contact interventions that entail multiple, often more lengthy, visits and nonvisit contacts over an extended period.[1]
- Can include the following elements: motivational interviews of varying length and number, cognitive behavioral therapy, self-completed action plans, written health education or self-help materials, requests to keep drinking diaries, written personalized feedback, follow-up telephone counseling, or exercises to complete at home.

All Adults (Age 18 or Older)

We found that behavioral counseling interventions improved self-reported alcohol consumption, binge drinking, and drinking above recommended amounts (*moderate SOE*). We found an average reduction of 3.6 drinks per week for adults receiving interventions compared with those in control groups and an 11 percent increase (absolute difference between intervention and controls) in the percentage of adults achieving recommended drinking levels over 12 months. This translates to a number needed to treat of 9 to get 1 person to change from risky/hazardous drinking to drinking recommended levels over 12 months (Table 31).

Behavioral counseling interventions also improved some health care utilization outcomes (including hospital days and costs: all *low SOE*). For most health outcomes, available evidence either found no difference between interventions and controls (e.g., mortality: *low SOE*) or was insufficient to draw conclusions about the effectiveness of behavioral interventions compared with controls (e.g., alcohol-related liver problems, alcohol-related accidents, and quality of life: *insufficient SOE*).

Table 30. Summary of effectiveness of behavioral interventions compared with controls for all adults: intermediate, health, utilization, and other outcomes

Intermediate Outcomes	Results Effect size (95% CI)	Strength of Evidence
Consumption (drinks/week)	Reduction of 3.6 (2.4 to 4.8)	Moderate
Binge drinking	12% fewer subjects reported binge drinking (7%, 16%)	Moderate
Recommended drinking levels	11% more subjects achieved (8%, 13%)	Moderate
Health Outcomes		
Mortality	Our meta-analyses did not find a reduction in all-cause mortality for adults (4 studies; rate ratio 0.64, 95% CI, 0.24 to 1.7*	Low
Alcohol-related accidents†	Evidence was insufficient to draw conclusions	Insufficient
Alcohol-related liver problems	Evidence was insufficient to draw conclusions	Insufficient
Utilization Outcomes		
Hospitalization	Fewer hospital days in the last 6 months for the intervention group compared with the control group at 6, 12, and 48 months: 35 vs. 180, 91 vs. 146, and 420 vs. 664, p<0.001, p<0.001, and p<0.05, respectively**	Low
Emergency visits	Difference between groups for visits in the past 6 months did not reach statistical significance††	Low
Primary care visits	No significant difference between intervention and control groups: WMD, -0.14 visits, 95% CI, -0.5 to 0.2	Low

Table 30. Summary of effectiveness of behavioral interventions compared with controls for all adults: intermediate, health, utilization, and other outcomes (continued)

Intermediate Outcomes	Results Effect size (95% CI)	Strength of Evidence
Costs	Over 48 months Project TrEAT reported a total economic benefit of the brief intervention of $423,519, including over $190,000 savings in emergency department and hospital use and almost $230,000 in avoided costs of crime and motor vehicle accidents. Using data from 48-month follow up, the authors reported a cost per patient of $205, and a benefit per patient of $7,985, for a resulting benefit-cost ratio of 39 (95% CI, 5.4 to 72.5).**	Low
Other Outcomes		
Legal problems	One 48-month randomized controlled trial found no significant difference between the intervention and control groups for several legal problems‡, but did report a difference for controlled substance/liquor violations, with 2 in the intervention group compared with 11 in the control group (p<0.05)**	Low
Quality of Life	Three 12-month studies (total N=353) reported no difference between intervention and control groups for general quality of life measures	Low

Note: evidence was insufficient to draw conclusions for follow-up with referrals, abstinence, sick days or employment stability. Data are reported for 12 month outcomes unless otherwise noted.

*Meta-analysis including all age groups combined (adults, older adults, and young adults/college students) also found no statistically significant reduction in mortality (6 studies; rate ratio 0.52, 95% CI, 0.22 to 1.2), although point estimates trended toward favoring behavioral interventions. Few studies reported mortality, additional studies would be needed to increase precision, and there is little long-term data.

**These data are from Project TrEAT;[31-33] the best available evidence

† "Accidents" is used here to indicate motor vehicle events and injuries

††But, results trended in favor of the intervention group at 6, 12, and 48 months: 47 vs. 70, 60 vs. 62, and 302 vs. 376, p>0.10, p>0.10, and p<0.10, respectively[31-33]

‡Legal problems included assault/battery/child abuse, resist/obstruct officer/disorderly conduct, criminal damage/property damage, theft/robbery, and other arrests

Table 31. Projected range of outcomes of screening 1,000 adults in primary care and providing a behavioral counseling intervention for those identified with risky/hazardous drinking

	Lower Estimate of Range	Upper Estimate of Range
Prevalence of risky/hazardous drinking	4%	29%
People identified with risky/hazardous drinking*	40	290
Potential behavioral interventions delivered	40	290
People achieving recommended drinking levels by 12 months with behavioral intervention**	4.4	31.9
NNT to get 1 person to change from risky/hazardous drinking to drinking recommended amounts with behavioral intervention	9.1	9.1
NNS to get 1 person to change from risky/hazardous drinking to drinking recommended amounts with behavioral intervention	227	31
People achieving recommended drinking levels by 12 months with brief multi-contact behavioral intervention†	6	43.5
NNT to get 1 person to change from risky/hazardous drinking to drinking recommended amounts	6.7	6.7
NNS to get 1 person to change from risky/hazardous drinking to drinking recommended amounts with *brief multi-contact* behavioral intervention	167	23
Prevalence of alcohol dependence	2%	9%
People identified with alcohol dependence*	20	90

Data in table are number of people unless specified as percent; the 1,000 people screened are those that have not been previously screened and have no known history of alcohol misuse.

Abbreviations: NA, not applicable; NNS, number needed to screen; NNT, number needed to treat

*Number identified from screening and screening-related assessment; A range of risky drinkers (4%–29%) has been found across multiple primary care populations, with prevalence estimates of 2.0 to 9.0 percent for alcohol dependence.[14]

**Based on absolute difference of 11% (that would achieve recommended drinking levels) from our meta-analysis including interventions of all intensity

† Based on absolute difference of 15% (that would achieve recommended drinking levels) from our subgroup meta-analysis for brief multi-contact interventions

To assess the differential effects of interventions utilizing more or less time and those utilizing single or multiple contacts, we grouped interventions by intensity, as measured by duration and number of contacts: very brief (up to 5 minutes, single contact), brief (more than 5 and up to 15 minutes, single contact), extended (beyond 15 minutes, single contact), brief multi-contact (each contact up to 15 minutes), and extended multi-contact (some contacts beyond 15 minutes).

The evidence for effectiveness in adults is strongest for brief multi-contact interventions; these studies consistently found statistically significant improvements in consumption, binge drinking, and achieving recommended drinking levels. The effect sizes for brief multi-contact interventions were greater than for other intensities (although confidence intervals generally overlapped). In addition, the best studies show that the effect of brief multi-contact interventions remains for several years of follow-up,[32,33,38] and show improvement for some utilization outcomes (fewer hospital days[32,33]) and costs (benefit-cost ratio of 39:1 over 48 months, 95% CI, 5.4, 72.5[32]).

Brief single contact interventions were effective for improving some intermediate outcomes in adult populations (i.e., achieving recommended drinking levels and reduction in drinks/week), but not others (i.e., binge drinking). Effect sizes were smaller than those for brief multi-contact

interventions for the outcomes showing benefit (e.g., 8 percent vs. 15 percent achieving recommended drinking levels and reduction of 3.7 vs. 4.4 drinks per week at 12 months). Although extended multi-contact interventions appear to be effective for improving intermediate outcomes, we did not find evidence that they are more effective than brief multi-contact interventions. Very brief interventions (up to 5 minutes, single contact) are likely not effective.

Long-term outcomes for consumption, binge drinking, and achievement of recommended drinking levels were available from two studies: Project TrEAT[32,35,83] and Project Health.[38] Both studies reported that participants in the intervention group maintained reductions in consumption or continued to reduce consumption further, but differences between intervention and control groups were no longer statistically significant by 48 months. These studies identified a relatively delayed reduction in consumption in control groups to levels achieved by the intervention group, which could reflect the natural history of alcohol consumption, the cumulative effect of yearly follow-ups with the healthcare system, attrition (if more subjects lost to follow up from the control group were risky drinkers than those lost to follow up from the intervention group), or (late) regression to the mean.

We conducted subgroup analyses to explore whether the effectiveness of interventions differed by sex, country, the person delivering the intervention, or setting. Our subgroup analyses found similar benefits for men and women and for studies conducted in the US compared with those conducted in other countries. We found a trend toward a greater reduction in consumption for interventions delivered mostly by primary care providers [weighted mean difference (WMD) 4.0 drinks/week, 95% CI, 2.6, 5.4] than for those delivered primarily by research personnel (3.0, 95% CI, 1.0, 5.0). Similarly, we found a trend toward greater reduction in consumption for interventions delivered in academic/research-oriented settings (WMD, 5.0 drinks/week, 95% CI, 2.5, 7.6) than for those delivered in community-based settings (3.2, 95% CI, 2.2, 4.3).

Older adults (Age 65 and older)

Two studies[34,95-97] enrolling only older adults provided evidence of the effectiveness of behavioral interventions for reducing consumption and improving the percentage of individuals drinking at recommended levels, but effect sizes were smaller than those found for all adults (Table 32). Evidence for health outcomes was insufficient to draw conclusions.

Table 32. Summary of effectiveness of behavioral interventions compared with controls for older adults: intermediate, health, and utilization, and other outcomes

Intermediate Outcomes	Results Effect size (95% CI)	Strength of Evidence
Consumption (drinks/week)	Reduction of 1.7 (0.6 to 2.8)	Moderate
Binge drinking	Evidence was insufficient to draw conclusions	Insufficient
Recommended drinking levels	9% more subjects achieved (2%, 16%)	Low
	Health Outcomes	
Mortality	Evidence from 1 study was insufficient to draw conclusions	Insufficient
Alcohol-related accidents†	Evidence was insufficient to draw conclusions	Insufficient
Alcohol-related liver problems	Evidence was insufficient to draw conclusions	Insufficient
	Utilization Outcomes	
Hospitalization	Evidence was insufficient to draw conclusions	Insufficient
Emergency visits	Evidence was insufficient to draw conclusions	Insufficient
Primary care visits	Evidence was insufficient to draw conclusions	Insufficient
Costs	An economic analysis of Project GOAL found no significant difference in economic outcomes through 24 months.[34] The total costs of health care and social consequences were estimated to be $5,241 (95% CI, $2,995 to $7,487) per patient in the treatment group and $6,289 (95% CI, $3,549 to $9,029) per patient in the control group	Low

Note: Evidence was insufficient to draw conclusions for follow-up with referrals, abstinence, sick days, legal issues, employment stability, and quality of life. Data are reported for 12 month outcomes unless otherwise noted.

† "Accidents" is used here to indicate motor vehicle events and injuries

Young adults and college students

Trials conducted with college students provided evidence of the effectiveness of behavioral interventions for improving intermediate outcomes and some accident, utilization, and academic outcomes (Table 33). A subgroup analysis of young adults aged 18 to 30 enrolled in Project TrEAT reported fewer motor vehicle events, hospitalization days, emergency department visits for those in the intervention group compared with the control group (low SOE).[35] Two studies of web-based interventions from New Zealand reported some effectiveness for improving academic-related outcomes.[36,37,43] Unlike studies in all adults, that generally found benefits to last for up to 3 years for intermediate outcomes, some positive outcomes of interventions for college students found at 6 months were not maintained at 12 months. This could be due to the natural history of drinking among college students or could indicate the need for additional booster sessions to maintain benefits.

Table 33. Summary of effectiveness of behavioral interventions compared with controls for young adults and college students: intermediate, health, utilization, and other outcomes

Intermediate Outcomes	Results Effect size (95% CI)	Strength of Evidence
Consumption (drinks/week)	Reduction of 1.7 (0.7 to 2.6) at 6 months; range from 1.2 to 4.1 at 12 months	Moderate
Binge drinking	0.9 fewer heavy drinking days (0.3, 1.5) over 6 months	Moderate
Recommended drinking levels	Evidence was insufficient to draw conclusions	Insufficient
	Health Outcomes	
Mortality	One trial reported one death in the control group	Insufficient
Motor vehicle events	a subgroup analysis (N=226) of young adults from Project TrEAT[35] found fewer motor vehicle crashes with non-fatal injuries for those in the intervention group than for controls (9 vs. 20, respectively; p<0.05) and fewer total motor vehicle events (114 vs. 149; p<0.05) after 48 months of follow-up	Low
Alcohol-related liver problems	Evidence was insufficient to draw conclusions	Insufficient
	Utilization Outcomes	
Hospitalization	the subgroup analysis from Project TrEAT reported a lower number of days of hospitalization for the intervention group that did not reach statistical significance (131 vs. 150, p= NS)[35]	Low
Emergency visits	the subgroup analysis from Project TrEAT reported fewer emergency department visits for the intervention group than for the control group (103 vs. 177, p<0.01).[35]	Low
Primary care visits	Evidence was insufficient to draw conclusions	Insufficient
Costs	Evidence was insufficient to draw conclusions	Insufficient
	Other Outcomes	
Academic problems	Evidence from two trials (N=576 and N=104) conducted in New Zealand suggests that behavioral interventions result in fewer consequences related to academic role expectations (rate ratio between 0.70 and 0.80).[36,37]	Moderate
Legal problems	the subgroup analysis from Project TrEAT found no significant difference between the intervention and control groups for assault/battery/child abuse, resist/obstruct officer/disorderly conduct, criminal damage/property damage, theft/robbery, and other arrests, but did report a difference for controlled substance/liquor violations, with 0 in the intervention group compared with 8 in the control group (p<0.01).[35]	Low

Note: evidence was insufficient to draw conclusions for follow-up with referrals, abstinence, or quality of life. Data are reported for 12 month outcomes unless otherwise noted.

Pregnant Women

We found just one study enrolling pregnant women (N=250)[39] that met our inclusion criteria. The study did not find a significant difference for reduction in consumption, but found higher rates of abstinence maintained for subjects who were abstinent pre-assessment for the intervention group compared with the control group (Table 34).

A previously published Cochrane review of psychological and/or educational interventions for reducing alcohol consumption among pregnant women[99] included four studies (for a total of 715 pregnant women). The review found no significant differences between groups for most outcomes, and results related to abstaining or reducing alcohol consumption were mixed. Results from some individual studies suggested that interventions may encourage women to abstain during pregnancy. The authors concluded that the evidence suggests that interventions may result in increased abstinence from alcohol, and a reduction in alcohol consumption.[99] In addition, they concluded that inconsistent results, the paucity of studies, the number of total participants, the high risk of bias in some of the studies, and the complexity of interventions limits the ability to

Table 34. Summary of effectiveness of behavioral interventions compared with controls for pregnant women: intermediate, health, utilization, and other outcomes

Intermediate Outcomes	Results Effect size (95% CI)	Strength of Evidence
Consumption (drinks/week)	Data from 1 study found no significant difference between groups; both groups had reductions in antepartum consumption	Low
Binge drinking	Evidence was insufficient to draw conclusions	Insufficient
Recommended drinking levels	Evidence was insufficient to draw conclusions	Insufficient
Abstinence	One study provided insufficient evidence for the overall sample; but found maintenance of higher rates of abstinence for the subgroup of subjects who were abstinent prior to assessment (86% vs. 72%, p= 0.04)	Insufficient; Low
	Health Outcomes	
Mortality	Evidence was insufficient to draw conclusions	Insufficient
Motor vehicle events	Evidence was insufficient to draw conclusions	Insufficient
Alcohol-related liver problems	Evidence was insufficient to draw conclusions	Insufficient
	Utilization Outcomes	
Hospitalization	Evidence was insufficient to draw conclusions	Insufficient
Emergency visits	Evidence was insufficient to draw conclusions	Insufficient
Primary care visits	Evidence was insufficient to draw conclusions	Insufficient
Costs	Evidence was insufficient to draw conclusions	Insufficient

Note: evidence was insufficient to draw conclusions for follow-up with referrals, legal problems, or quality of life; Data are reported for study endpoint, approximately 6 months.

determine the type of intervention which would be most effective for increasing abstinence or reducing consumption among pregnant women.

We included just one of the four studies from the Cochrane review in our review. The other studies included in the Cochrane review did not meet our inclusion criteria as the duration of follow up of subjects was too short (just 2 months) for some studies[100,101] or because the study was not conducted in a primary care setting.[102]

Potential Adverse Effects of Behavioral Counseling Interventions

Potential adverse effects of screening and behavioral counseling interventions for alcohol misuse have received little attention in published studies. For Key Question 5 (*What adverse effects are associated with behavioral counseling interventions, with or without referral, for people with alcohol misuse as identified by screening?*), we found no studies reporting on illegal substance use, stigma, labeling, discrimination, or interference with the doctor-patient relationship. We found limited evidence reporting no difference between intervention and control groups for smoking rates and anxiety (*low SOE*). Studies reporting increased smoking or anxiety outcomes generally did not provide actual outcome data and often had little or no description of the procedures used for measuring the outcomes.

One study reported opportunity costs of $39 for enrolled subjects due to lost work time and travel related to the intervention.[33]

The time required for interventions used in the included studies ranged from a minimum of 5 minutes to a maximum of approximately 2 hours dispersed over multiple in-person and/or telephone visits (*moderate SOE*). The brief multi-contact intervention used in Project TrEAT (which provides some of the best evidence of effectiveness of behavioral interventions for

risky/hazardous drinking in primary care) required two 15-minute visits with the primary care physician one month apart and two follow-up phone calls from a nurse.

Treatments for Alcohol Dependence

Although we did not systematically examine the efficacy/effectiveness of various treatments for alcohol dependence (AD) (e.g., pharmacotherapy, 12-step programs, and specialized outpatient treatment programs), we summarize the available evidence regarding such treatments in this section. Because screening for alcohol misuse will inevitably identify some individuals with AD, providers and those making recommendations need some information about whether there are effective interventions available for such individuals. We also summarize whether research demonstrates efficacy of pharmacotherapy for patients with AD who are identified by screening in the primary care setting) or treated in primary care settings (as opposed to treatment-seekers or those identified by other methods).

An important point, and one germane to the present review, is that very few studies have examined the efficacy of brief interventions for AD in a primary care setting. A systematic review of the literature, concluded that there was no evidence for efficacy for brief behavioral interventions in patients with AD in a primary care setting.[40] Similarly, our review did not find any studies demonstrating efficacy of behavioral interventions for people with AD in a primary care setting; studies included in our review that enrolled more than 10 percent of subjects with AD reported behavioral interventions to be less effective or ineffective compared with studies not enrolling subjects with AD. Thus, whereas the overall evidence for the effectiveness of treatment for AD is considerable,[41] the same cannot be said for the effectiveness of brief interventions for AD in primary care settings.

Treatment for AD continues to evolve as research on the effectiveness of various treatments is published, and new treatments, including pharmacotherapy, are introduced and used more frequently. Treatment for AD can be quite effective, though no single best approach has yet proven superior among the variety of available treatment options. Treatment outcomes can be affected by many factors including: (1) AD is a heterogeneous illness with considerable variability in outcome and prognosis; (2) co-morbidities: multiple physical and emotional illnesses which can influence treatment outcomes; (3) there are many forms of treatment including multiple varieties of psychosocial interventions and several pharmacological interventions; (4) there are many pathways to treatment for patients ranging from voluntary care-seeking to legally mandated treatment. This complexity contributes to variance in treatment outcomes and does not permit a simple answer to the overall question--How Effective are Treatments for Alcohol Dependence? Nevertheless, many individuals with AD, and other alcohol-use disorders, respond well to treatment and predictors of good or bad outcomes have been identified.[9] Table 35 lists common treatments for alcohol dependence.

When assessing the effectiveness of treatment for AD, the selection of the outcome measure is a key issue. Complete abstinence has long been viewed as the only meaningful indicator of treatment effectiveness, and abstinence remains the primary goal of treatment for AD as continued low-level drinking may place the patient at risk for future problematic drinking.[103]

Table 35. Treatments for alcohol dependence

• Cognitive behavioral therapy • Motivational enhancement therapy • 12-step programs (e.g., Alcoholics Anonymous) • Intensive outpatient programs using group or individual counseling • Alcoholism treatment centers (e.g., Betty Ford) • Pharmacotherapy* (disulfuram, naltrexone, acamprosate) • Detoxification (inpatient, residential, day treatment, or outpatient)

Notes: this is not an exhaustive list of all treatments that have been studied or utilized for alcohol dependence but rather includes the most common.

*Pharmacotherapy can be used in addition to psychosocial therapy but is not recommended for use alone.

Using complete abstinence as an outcome, from 15 to 35 percent of patients have been reported to achieve one year of sobriety following a variety of treatment approaches.[41] Treatment approaches reviewed have included clinical trials of disulfiram, motivational enhancement therapy, cognitive behavioral therapy, and 12-step facilitation, as well as treatment as usual within alcoholism-treatment centers. Sobriety outcomes at 3-5 years or longer have been reported to be in a similar range.[9] However, the long-term efficacies of specific treatment approaches have not been systematically compared with each other in randomized trials making interpretation and recommendations for specific interventions difficult.

Over the past 15-20 years, awareness has grown that treatment may still be beneficial even if complete abstinence is not achieved. As a result, research has used other outcomes to measure the effectiveness of treatment, which can be subsumed under the concept of harm reduction.[104] These measures include: significant increases in abstinent days or decreases in heavy drinking days, improved physical health, reductions in health care costs, and improvements in psychosocial functioning. Research using these non-abstinent outcomes provides additional evidence for the effectiveness of treatment for alcohol dependence. Miller et al. (2001)[41] analyzed 7 large multisite trials that tested the treatment approaches noted in the prior paragraph and found that whereas, in aggregate, about 25 percent of individuals maintained sobriety over one year, in the remaining non-abstinent individuals there were substantial decreases in drinking days, from 63 percent pretreatment to 25 percent post-treatment and a mean 57 percent decrease in drinks per drinking day.

In recent years, with the FDA approval of additional medications for AD, pharmacotherapy has received increasing attention. From the 1950s until the 1990s the pharmacotherapy for AD consisted of disulfiram—an aversive deterrent that produces significant physical symptoms, such as nausea, when alcohol is consumed. Disulfiram can be an effective adjunct to psychosocial treatment for AD, though its effectiveness seems to require a high degree of patient motivation, thereby limiting its overall usefulness. Since the 1990s two oral medications, naltrexone and acamprosate, and a long-acting intramuscular formulation of naltrexone have been approved by the FDA for AD. These medications target neurobiological systems thought to be involved in the pathophysiology of alcoholism, e.g. naltrexone blocks the alcohol-induced “high” in some patients presumably by blocking the action of β-endorphin which is released by alcohol consumption. In clinical trials these medications have shown evidence for efficacy in enhancing abstinence, reducing relapse to heavy drinking and reducing overall drinking behavior.[105] The effect sizes for these medications are considered low to moderate (from 0.11 to 0.16 for effects on abstinence or heavy drinking for naltrexone and acamprosate) when heterogeneous populations of patients with AD are studied which has led to efforts to identify individual predictors of response to both naltrexone and acamprosate, with some signs of success. For

example, Anton et al (2008) found that alcoholic individuals who were carriers of the Asp40 allele of the μ-opioid receptor had an 87.1 percent good outcome with naltrexone compared to only a 48.6 percent good outcome for those who received placebo whereas non-carriers demonstrated no naltrexone/placebo difference. These findings suggest that individual characteristics such as genetic polymorphisms may eventually prove of value to choosing a particular pharmacotherapy for a specific patient. The NIAAA recommends that medications be considered as part of the overall treatment approach to patients with AD along with psychosocial treatment.

Studies of pharmacotherapy for patients with AD have generally enrolled subjects responding to advertisements or those being treated in specialty alcohol treatment centers. We were unable to identify any studies that identified subjects by screening in a primary care setting or that treated subjects with pharmacotherapy in a primary care setting. Further, we were unable to identify any studies of pharmacotherapy for people with risky/hazardous drinking, harmful drinking, or alcohol abuse.

Applicability

The findings are generally applicable to people with risky/hazardous and harmful drinking identified by screening in primary care settings (see beginning of Discussion). Most studies excluded all or most potential subjects with alcohol dependence; thus, our findings for behavioral interventions in primary care settings likely do not apply to people with alcohol dependence, who probably require other treatments (e.g., referred for specialty treatment, see section on Treatments for Alcohol Dependence). Compared with the results of studies that enrolled few or no subjects with alcohol dependence, our subgroup analyses found that studies enrolling 10 percent or more subjects with alcohol dependence found behavioral interventions to be ineffective or less effective. This supports the theory that people with alcohol dependence are not likely to respond to the types of interventions evaluated in this report. Most studies enrolled some subjects with binge drinking patterns of consumption, and one study focused only on those with binge drinking.[77] Overall findings and those from the one study focused on binge drinking were consistent in finding interventions to be efficacious for reducing binge drinking.

We did not identify any studies in adolescent populations or any conducted exclusively in veterans, and the results thus have uncertain applicability to these populations. We did, however, identify a sufficient number of studies of young adults/college students and older adults to draw conclusions (of low to moderate strength) for several intermediate outcomes for these populations. Although we searched for studies conducted in settings with primary care-like relationships (e.g., infectious disease clinics for people with HIV), we did not find any, and our results have uncertain applicability to such settings/populations.

All interventions required support systems to provide screening and screening-related assessment, and in some cases, provider prompting. Screenings to identify subjects for the included studies were often extensive, multi-step processes that included face-to-face interviews lasting up to 30 minutes by research personnel. Less time would be required for screening and screening-related assessments in primary care practice; we estimate less than 2 minutes for negative screens and 5-10 minutes for positive screens, with most of the time for screening-related assessment to determine whether the patient has an alcohol use disorder as opposed to risky/hazardous or harmful drinking. Nevertheless, supports are likely required for effective screening and intervention. In addition, most interventions required training of providers and/or

staff. Such training may be required to ensure that practices conduct effective screening and interventions for alcohol misuse.

Effective interventions were generally delivered either completely in person or also included phone follow-ups. However, one study of adults in Germany demonstrated some benefits resulting from a telephone-based intervention,[42] and two studies conducted in college student populations demonstrated benefits resulting from web-based interventions delivered via computer.[36,37,43]

It is unclear whether our findings are applicable to people with comorbid medical or psychiatric conditions, and some researchers have suggested that brief behavioral interventions may be ineffective or less effective in people with comorbid psychiatric conditions. A subgroup analysis (N=88) from a study conducted in Germany found that brief interventions did not significantly reduce drinking for subjects with comorbid anxiety and/or depression.[44]

We did not find any evidence that would inform decisions about the appropriate frequency of screening (i.e., whether it should be done annually, every five years, or something else).

Limitations

The scope of this report is limited to primary care settings. Emergency departments or other health care settings may also provide opportunities to provide behavioral interventions to reduce alcohol misuse.

For Key Question 2 *("How do specific screening modalities compare with one another for detecting alcohol misuse?"),* we did not review all individual publications assessing screening instruments. Instead, we relied on previously published systematic reviews to find information on their sensitivity and specificity and filled gaps with data from other sources. In addition, our review did not attempt to systematically evaluate biomarkers for screening [e.g., gamma-glutamyl transferase (GGT) or carbohydrate deficient transferrin (CDT)].

Most of the evidence we identified in this report was in the form of intermediate outcomes that rely on self-report of alcohol use. Some studies verified self-report using collaterals, such as a family member. While there are no biomarkers accurate enough to be widely accepted to measure changes in alcohol use, self-report of alcohol use has been found to be accurate if collected carefully.[45,46] When grading the strength of evidence, we considered self-reported measures of alcohol use to be indirect (i.e., not the direct health or utilization outcomes that we are most interested in improving); thus, for situations when evidence had a low risk of bias and was consistent and precise, we graded the strength of evidence for intermediate outcomes as moderate rather than high.

It is possible that the assessments of alcohol misuse conducted in the included trials conceal therapeutic benefits of the behavioral interventions (i.e., bias results toward the null). Many studies included extensive assessment of alcohol-related behaviors, which could directly result in behavior changes. The control groups in the included studies generally reduced alcohol consumption. Some possible explanations for changes in behavior as a result of the screening and screening-related assessment include (1) increased awareness of the extent of their drinking, (2) the screening questions prompted them to discuss drinking with their primary care provider at a subsequent visit; (3) receipt of some minimal intervention, such as printed educational materials about general health or about alcohol specifically (control groups in the included studies often received some printed materials); or (4) regression to the mean. One study empirically tested whether brief assessment (without a behavioral intervention) reduces hazardous drinking by comparing brief assessment with a control that did not include

assessment. The study concluded that assessment appears to reduce hazardous drinking, but noted a potential limitation of measurement artifact due to social desirability bias.[43]

Future Research

We identified a number of gaps in the evidence, which future research could address. We identified no studies that randomized subjects or practices to screening compared with no screening to answer Key Questions 1 or 3. We found insufficient evidence to draw conclusions about the impact of screening and behavioral interventions on follow-up with referrals. We also found very few studies that measured health or utilization outcomes, with overall insufficient or low strength of evidence for the impact of behavioral interventions on mortality, morbidity, utilization, costs, and quality of life. We found very limited data on potentially harmful effects of behavioral interventions, making it difficult to determine whether interventions to reduce alcohol use lead to increases in smoking, illegal drug use, or anxiety. In addition, none of the included studies reported on stigma, labeling, discrimination, or potential interference with the doctor-patient relationship.

Although we concluded that brief multi-contact interventions have the best evidence of effectiveness, direct comparative evidence (i.e., studies directly comparing various behavioral intervention approaches) was generally insufficient to make firm conclusions about which intensity of intervention is most effective (i.e., how many visits are needed? How long do they need to be? What specific components must be included?). We found no studies evaluating a very brief (each contact 5 minutes or less) multi-contact intervention and it is unknown whether very brief interventions would be as effective as brief (each contact 15 minutes or less) multi-contact interventions. Knowing the minimum amount of time needed for an intervention to be effective is very important for busy primary care practices, where a positive screen triggering a brief intervention could mean taking up the entire time allotted for the visit to discuss alcohol misuse, and postponing the original purpose of the visit. Future studies could possibly compare the intervention delivered in Project TrEAT (two 15 minute visits with the primary care physician and follow-up calls by a nurse) that provides some of the best available long-term evidence for the effectiveness of behavioral interventions with a shorter version of the same intervention (using 5 minute or less interventions).

Future studies could provide more guidance for individualizing therapy for various populations. The included studies generally did not provide information to determine the characteristics of individuals who responded positively to interventions as opposed to those who did not. Future studies could explore whether the individuals who are reducing consumption are those who have a low risk of developing adverse health or social outcomes, a high risk, or both. Long-term studies and a better understanding of the natural history of alcohol misuse would be needed to address this question. Future studies could also explore whether people meeting criteria for alcohol abuse are more or less likely than those with risky/hazardous drinking to respond to interventions, or whether people with alcohol abuse or those with alcohol dependence receive any benefit from behavioral interventions delivered in primary care settings. Future research could also determine whether our findings are applicable to people with comorbid medical or psychiatric conditions—and could explore whether people with comorbid psychiatric conditions (e.g., anxiety, depression, or serious mental illness) respond to behavioral interventions delivered in primary care settings.

Conclusions

Behavioral counseling interventions improve intermediate outcomes (i.e., alcohol consumption, binge drinking, drinking above recommended amounts: moderate SOE) and some health care utilization outcomes (including hospital days and costs: low SOE) for adults with risky/hazardous and harmful drinking. For most health outcomes, available evidence either found no difference between interventions and controls (e.g., mortality: low SOE) or was insufficient to draw conclusions about the effectiveness of behavioral interventions compared with controls (e.g., alcohol-related liver problems, alcohol-related accidents, quality of life: insufficient SOE). Brief multi-contact interventions (usually around 15 minutes per contact) have the best evidence of effectiveness for adults (compared with single contact interventions or very brief 5 minute interventions).

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