Effective Health Care Program

Comparative Effectiveness Review
Number 64

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

Agency for Healthcare Research and Quality
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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).

AHRQ has an established network of Evidence-based Practice Centers (EPCs) that produce Evidence Reports/Technology Assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care. The EPCs now lend their expertise to the Effective Health Care Program by conducting comparative effectiveness reviews (CERs) of medications, devices, and other relevant interventions, including strategies for how these items and services can best be organized, managed, and delivered.

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 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 are essential to the Effective Health Care Program. Please visit the Web site (www.effectivehealthcare.ahrq.gov) to see draft research questions and reports or to join an email 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 email 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 health care 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.

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Peer Reviewers are invited to provide written comments on the draft report based on their clinical, content, or methodologic expertise. Peer review comments on the preliminary draft of the report are considered by the EPC in preparation of the final draft of the report. Peer Reviewers do not participate in writing or editing of the final report or other products. The synthesis of the scientific literature presented in the final report does not necessarily represent the views of individual reviewers. The dispositions of the peer review comments are documented and will, for CERs and Technical briefs, be published 3 months after the publication of the Evidence Report.

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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).

Results. A total of 23 trials and six systematic reviews were included. The trials generally enrolled subjects with risky/hazardous drinking, usually excluding those with alcohol dependence. Among adults receiving interventions, consumption decreased by 3.6 drinks per week (weighted mean difference [WMD], 3.6, 95% confidence interval [CI], 2.4 to 4.8), 12 percent fewer subjects reported heavy drinking episodes (risk difference 0.12, 95% CI, 0.07 to 0.16), and 11 percent more subjects reported drinking beneath recommended limits (risk difference, 0.11, 95% CI, 0.08 to 0.13) over 12 months compared with controls (moderate SOE). Interventions 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., accidents, injuries, alcohol-related liver problems: insufficient SOE). The best evidence of effectiveness is for brief (generally, 10 to 15 minutes) multicontact interventions.

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 heavy drinking episodes (moderate SOE) and some accident, utilization, and academic outcomes (low, low, and moderate SOE, respectively). Studies in adults found benefits lasting several years; for college students, some benefits found at 6 months were no longer significantly different for intervention versus control groups 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.

No studies randomized subjects, practices, or providers to screening and a comparator, and none of the included studies reported followup with referrals as an outcome.

Conclusions. Behavioral counseling interventions improve behavioral outcomes for adults with risky/hazardous 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 multicontact 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 [1, 4] and an estimated annual cost to society of more than $220 billion.[5, 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 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 use the definitions described in Table A.

Table A. Definitions of the spectrum of alcohol misuse

Term	Definition
Risky or hazardous use	Consumption of alcohol above recommended daily, weekly, or per occasion amounts.[1] Consumption levels that increase the risk for health consequences.
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 about 30 percent of the U.S. population is affected, with the majority of these individuals engaging in what is considered risky drinking.[3] Older studies report a range of risky drinkers from 4 to 29 percent 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] More recent data from the American Academy of Family Physicians National Research Network reveal that 21.3 percent of primary care patients reported risky/hazardous drinking (based on the three quantity and frequency questions from the Alcohol Use Disorders Identification Test [AUDIT-C]).[15] Alcohol dependence has lifetime prevalence rates on the order of 17 percent for men and 8 percent for women;[16] prevalence of current dependence (within the last 12 months and as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition [DSM-IV]) is approximately 4 percent in the general adult population.[17] Some studies have reported that one in five of those who screen positive for unhealthy alcohol use in primary care will have alcohol dependence (four in five will not).[18, 19] 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, 20]

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.[21] Maximum recommended consumption is three or fewer standard drinks per day (seven per week) for adult women and for anyone older than 65 years of age, and four or fewer standard drinks per day (14 per week) 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.[22, 23] These guidelines do not apply to certain 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 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 screen.

Behavioral interventions and patient education are often used for patients who engage in less severe alcohol misuse (i.e., risky/hazardous drinking).[1] Brief interventions, as shown in Table B, generally aim to moderate a patient's alcohol consumption to sensible levels and eliminate risky drinking practices, rather than insist on complete abstinence.

The assumption underlying brief behavioral counseling interventions in primary care is that, for identified risky 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.[26] Cross-sectional and cohort studies have consistently related high average alcohol consumption to short- or long-term health consequences.[23, 27] A meta-analysis of studies examining the association between all-cause mortality and average alcohol consumption found that men averaging at least four drinks per day and women averaging two or more drinks per day experienced significantly increased mortality relative to nondrinkers.[28] Studies also relate heavy per-occasion alcohol use (i.e., binge drinking) to acute injury risks and alcohol-related life problems.[23, 27]

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

- Behavioral counseling interventions include the range of personal counseling and related behavior-change interventions that are employed in primary care to help patients change health-related behaviors.[24]
- Counseling here denotes a cooperative mode of work demanding active participation from both patient and clinician that aims to facilitate the patient's independent initiative.[24]
- 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."[25]
- Range from very brief interventions within a primary care visit to multicontact interventions that entail multiple, often more lengthy, visits and nonvisit contacts over an extended period.[1]
- Can include the following elements: advice, feedback, motivational interviews of varying length and number, or cognitive behavioral strategies (e.g., self-completed action plans, written health education or self-help materials, drinking diaries, problem-solving exercises to complete at home).

SAMHSA = Substance Abuse and Mental Health Services Administration

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.[21, 29, 30] In everyday practice, screening and screening-related assessment procedures are necessary to identify the range of alcohol users in order to offer appropriate interventions.[31, 32]

Even so, few primary care clinicians use recommended screening protocols or offer screening and interventions, and rates of intervening for alcohol misuse remain low.[32] Most patients who misuse alcohol receive care from their primary care provider, where they represent as much as one-fifth of patients seen, a proportion similar to that seen for diabetes and hypertension.[9, 14]

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.[33] The summary of the recommendations states:

- 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

This report's main objective 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 C). 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 A).

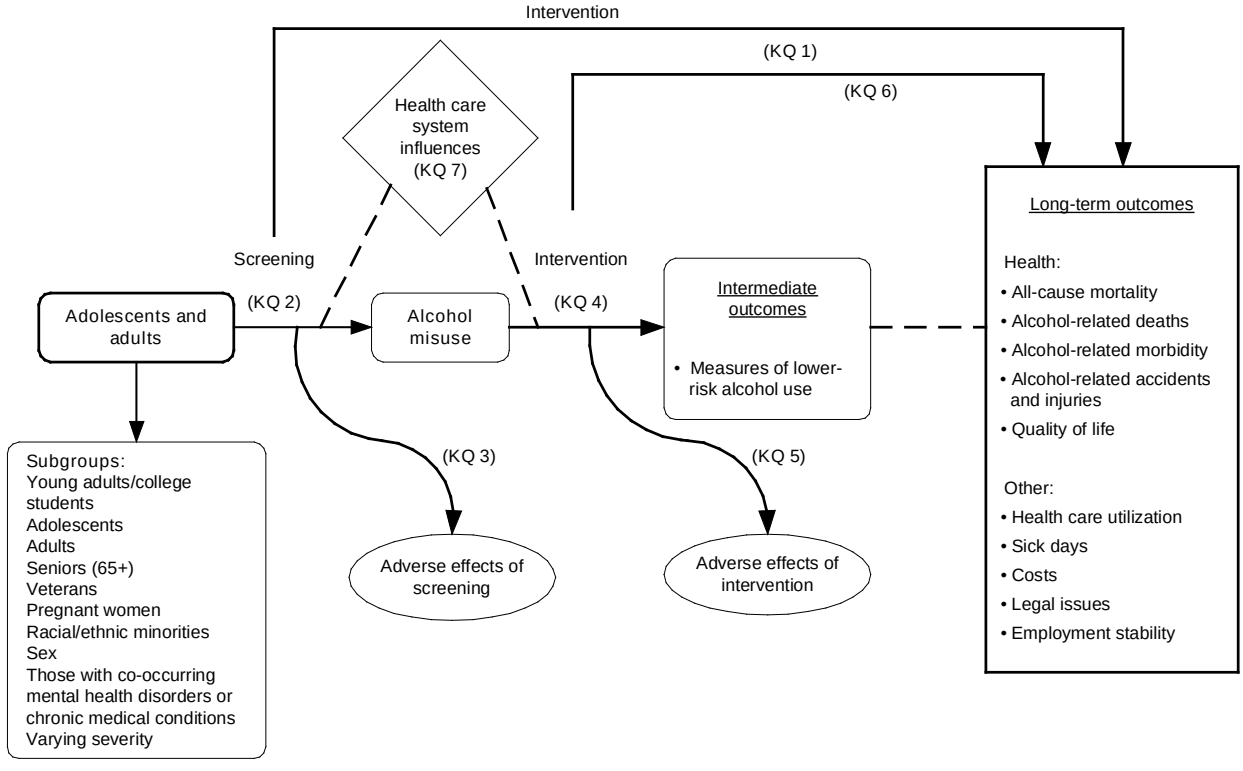
Table C. Key Questions addressed by this review

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?

KQ = Key Question

Note: Intermediate outcomes eligible for this report included the following: Rates of alcohol use (e.g., drinks per week, grams of alcohol per week), heavy drinking episodes, achieving recommended drinking limits, receipt of and followup with referrals, and abstinence from any use of alcohol (of greatest interest for pregnant women and adolescents).

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



KQ = Key Question

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 members participated in conference calls and discussions through email to review the analytic framework, Key Questions, 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 August 30, 2011. We used either Medical Subject Headings (MeSH) as search terms when available or keywords when appropriate, focusing on terms to describe the relevant population and the screening and behavioral interventions of interest. We limited searches to English-language publications.

We developed inclusion and exclusion criteria with respect to Populations, Interventions, Comparators, 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 Key Question 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 Key Questions, 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 Key Questions. Studies of at least 6 months' duration were eligible. For Key Questions 1 and 3, we searched for studies that assigned patients to screening compared with another screening approach, no screening, or usual care. For Key Questions 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 Key Question 7, studies included in any of the earlier Key Questions 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, based on those developed by the USPSTF[34] and the University of York Centre for Reviews and Dissemination,[35] 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 statistical heterogeneity in effects

between studies.[36, 37] Heterogeneity was also explored through sensitivity analyses. When quantitative analyses were not appropriate (e.g., because of clinical 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 (SOE) as high, moderate, low, or insufficient based on established methods guidance.[38] 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 6 meta-analyses or systematic reviews (Figure B). 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 SOE for each.

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?

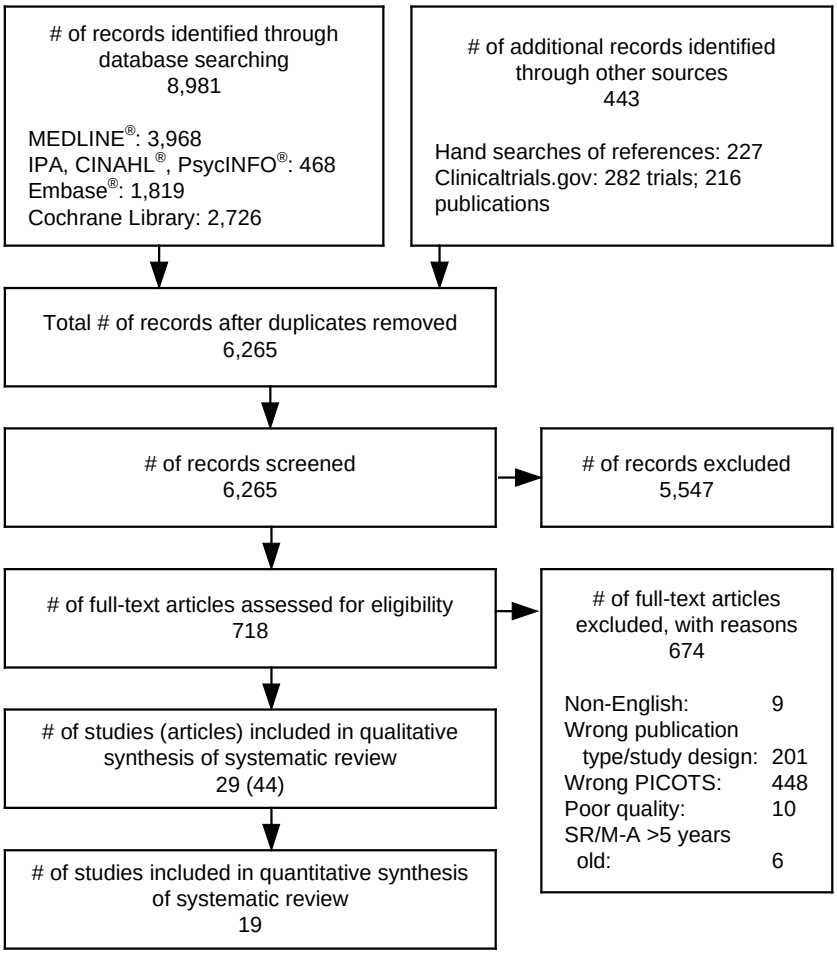
We did not find any studies directly addressing this question.

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

We found adequate evidence that several screening instruments can detect alcohol misuse in adults with acceptable sensitivity and specificity. A single-question screen (covering the past 12 months), AUDIT-C, and AUDIT appear to be the best overall instruments for screening adults for the full spectrum of alcohol misuse in primary care, considering sensitivity, specificity, and time burden. Several instruments require as little as 1 to 2 minutes to administer (e.g., single-question screens, AUDIT-C).

Single-question screens covering the past 12 months have reported sensitivities of 0.82 to 0.87 and specificities of 0.61 to 0.79 for detecting alcohol misuse in adults in primary care.

Figure B. Disposition of articles



M-A = meta-analysis; PICOTS = populations, interventions, comparators, outcomes, timing, settings or study duration; SR = systematic review

When focusing on adequately sized U.S. studies that reported sensitivity and specificity of screening for the full spectrum of alcohol misuse in primary care, data suggest that some often recommended cut-points for screening (i.e., AUDIT≥8) may need to be revised. The AUDIT had sensitivity of 0.44 to 0.51 and specificity of 0.96 to 0.97 for identifying alcohol misuse in adults using a cut-point of ≥8; more optimal balance of sensitivity and specificity was seen at cutoffs of 4 or 5. The sensitivity and specificity at a cutoff of ≥4 were 0.84 to 0.85 and 0.77 to 0.84, respectively; and at a cutoff of ≥5 were 0.70 to 0.92 and 0.73 to 0.94, respectively. Further, sex-specific cutoffs may be warranted because sensitivities for women at cutoffs of ≥4 and ≥5 were 0.47 to 0.65 and 0.35 to 0.53, respectively, but improved to 0.70 to 0.79 at ≥3 (with specificity of 0.86 to 0.87).The CAGE has very low sensitivity for detecting risky/hazardous drinking and is therefore not a good screening test for identifying risky/hazardous drinking or for screening for the full spectrum of alcohol misuse.

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 had a sensitivity of 0.82 and specificity of 0.78.

For pregnant women, the AUDIT-C performed better than other instruments for detecting both risky drinking and abuse or dependence, demonstrating both high sensitivity (0.95 or higher) and high specificity (up to 0.85).

The reference standard for the screening instruments was a structured diagnostic interview, generally including the timeline followback method[39] or similar approaches to determine the quantity/frequency of consumption.

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 several 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[40] 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 D summarizes findings for the three intermediate outcomes most commonly reported, by population. None of the included studies reported followup with referrals as an outcome.

Subgroup analyses did not identify differences between men and women. Brief multicontact interventions have the best evidence of effectiveness across populations, outcomes, and have followup data over several years. Our meta-analyses of studies in adults found very brief (up to 5 minutes) and brief (more than 5 minutes, up to 15 minutes) single-contact interventions to be ineffective for some outcomes and less effective than brief multicontact interventions for others.

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 RCTs 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).

Table D. Effectiveness and strength of evidence of behavioral interventions compared with controls for improving intermediate outcomes, by population

Population	Consumption[a] (Mean Drinks/Week)	Heavy Drinking Episodes[b]	Recommended Drinking Limits
Adults	Reduction of 3.6 (2.4 to 4.8) from baseline ~23 Moderate SOE	12% fewer subjects reported heavy drinking episodes (7%, 16%), from ~52% at baseline Moderate SOE	11% more subjects achieved (8%, 13%) Moderate SOE
Older adults	Reduction of 1.7 (0.6 to 2.8) from baseline ~16 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) from baseline ~15 Moderate SOE [c]	0.9 fewer heavy drinking days (0.3, 1.5) from ~6.2 days per month at baseline Moderate SOE [c]	Insufficient SOE
Pregnant women	Data from 1 study found no difference Low SOE	Insufficient SOE	Insufficient SOE
Adolescents	Insufficient SOE	Insufficient SOE	Insufficient SOE

SOE = strength of evidence

[a]Baseline consumption (drinks/week): adults, mean ~23, median ~19, range 8 – 62 (data from 16 trials); older adults, 15.2–16.6 (data from 2 trials); young adults/college students, mean ~15, median ~17, range 8 – 18 (2 of the 5 trials did not report baseline consumption).

[b]Heavy drinking generally defined by consumption of 5 or more standard drinks for men and 4 or more for women. Baseline % with heavy drinking episodes: adults, mean ~52, range 10 – 100.

[c]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 heavy drinking for young adults, differences were not statistically significant at 12 months (low SOE).

Notes: Data presented are effect size (95% confidence interval) 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 (difference between intervention and control groups) from our meta-analyses.

Intensity of intervention: Brief multicontact interventions have the best evidence of effectiveness. Our meta-analyses of studies in adults found (a) very brief (up to 5 minutes) single contact interventions to be ineffective for improving consumption (data from 1 very brief intervention study[41]) and less effective than brief multicontact interventions for achieving recommended drinking limits (data from 1 very brief intervention study[42]); and (b) brief single-contact interventions to be ineffective for reducing heavy drinking episodes and less effective than brief multicontact interventions for reducing consumption and achieving recommended drinking limits.

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 E).

Table E. 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

CI = confidence interval

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 F), older adults (Table G), and young adults and college students (Table H). 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., accidents, injuries, alcohol-related liver problems: insufficient SOE). Some evidence suggests that interventions improve some utilization outcomes for adults (e.g., hospital days and costs: low SOE). Our meta-analyses did not find a reduction in all-cause mortality for adults (four studies; rate ratio 0.64, 95% confidence interval [CI], 0.24 to 1.7) or for all age groups combined (adults, older adults, and young adults/college students) (six studies; rate ratio 0.52, 95% CI, 0.22 to 1.2). Point estimates trended toward favoring behavioral interventions, few studies reported mortality, and there is little long-term data; additional studies would be needed to increase precision. We did not identify any studies enrolling pregnant women reporting outcomes for this question (insufficient SOE).

Table F. Effectiveness of behavioral interventions compared with controls for adults: Health, utilization, and other outcomes

Type of Outcomes	Specific Outcome	Results Effect Size (95% CI)	Strength of Evidence
Health	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[a]).	Low
Health	Alcohol-related accidents[b]	Evidence was insufficient to draw conclusions.	Insufficient
Health	Alcohol-related liver problems	Evidence was insufficient to draw conclusions.	Insufficient
Utilization	Hospitalization	Fewer hospital days in last 6 months for 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.[c]	Low
Utilization	Emergency visits	Difference between groups for visits in past 6 months did not reach statistical significance.[d]	Low
Utilization	Primary care visits	No significant difference between intervention and control groups: WMD, -0.14 visits, 95% CI, -0.5 to 0.2.	Low
Utilization	Costs	Over 12 months Project TrEAT reported a total potential economic benefit of the brief intervention of $423,519, including more than $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 an intervention 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) (societal perspective).[c,e]	Low
Other	Legal problems	One 48-month RCT found no significant difference between the intervention and control groups for several legal problems,[f] but did report a difference for controlled substance/liquor violations, with 2 in the intervention group compared with 11 in control group (p<0.05).[c]	Low
Other	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

CI = confidence interval; N = number; RCT = randomized controlled trial; TrEAT = Trial for Early Alcohol Treatment; vs. = versus; WMD = weighted mean difference

[a] 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.

[b] "Accidents" is used here to indicate motor vehicle events and injuries.

[c] These data are from Project TrEAT;[43-45] the best available evidence.

[d] 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.[43-45]

[e] The $205 per patient cost includes $166 borne by the clinics per patient and $39 borne by patients (for lost work time and travel costs).

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

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

Table G. Effectiveness of behavioral interventions compared with controls for older adults: Health, and utilization, and other outcomes

Type of Outcome	Specific Outcome	Results Effect Size (95% CI)	Strength of Evidence
Health	Mortality	Evidence from 1 study was insufficient to draw conclusions.	Insufficient
Health	Alcohol-related accidents[a]	Evidence was insufficient to draw conclusions.	Insufficient
Health	Alcohol-related liver problems	Evidence was insufficient to draw conclusions.	Insufficient
Utilization	Hospitalization	Evidence was insufficient to draw conclusions.	Insufficient
Utilization	Emergency visits	Evidence was insufficient to draw conclusions.	Insufficient
Utilization	Primary care visits	Evidence was insufficient to draw conclusions.	Insufficient
Utilization	Costs	An economic analysis of Project GOAL found no significant difference in economic outcomes through 24 months.[46] 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 intervention group and $6,289 (95% CI, $3,549 to $9,029) per patient in the control group.	Low

CI = confidence interval, GOAL = Guiding Older Adult Lifestyle

[a] "Accidents" is used here to indicate motor vehicle events and injuries.

Notes: 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.

Table H. Effectiveness of behavioral interventions compared with controls for young adults and college students: Health, utilization, and other outcomes

Type of Outcome	Specific Outcome	Results Effect Size (95% CI)	Strength of Evidence
Health	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[47] 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	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).[47]	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).[47]	Low
	Primary care visits	Evidence was insufficient to draw conclusions.	Insufficient
	Costs	Evidence was insufficient to draw conclusions.	Insufficient
Other	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).[48, 49]	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).[47]	Low

CI = confidence interval; N = number; NS = not sufficient; TrEAT = Trial for Early Alcohol Treatment; vs. = versus

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 in which 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 (weighted mean difference [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). Just one intervention delivered by a nurse contributed to the drinks per week meta-analysis; the reduction in drinks per week was not statistically significant for that study (WMD, -0.2, 95% CI, -8.9 to 8.6). Two other studies that did not provide sufficient data for our drinks per week meta-analysis reported benefits of interventions delivered primarily by nurses,[50, 51] or by nurses and physician assistants[52] for some consumption outcomes. In addition, two interventions[48, 49, 53] conducted via computer reported some evidence of effectiveness for college students.

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. When reported, training duration ranged from as little as 15 minutes[54, 55] to as long as 6 to 8 hours,[52, 56] full-day workshops,[57] or a 4-week training in motivational interviewing principles.[58] Nine studies[43-45, 47, 50-52, 57-68] reported trainings of research staff and interventionists that were 30 minutes or longer and also provided feedback, booster sessions, or weekly conference calls to maintain adherence to protocol. Five others[69-75] reported trainings of 30 minutes or more but did not provide information on booster sessions.

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 several categories of alcohol misuse (i.e., risky/hazardous use, harmful use, alcohol abuse, and alcohol dependence). It is important to note that the 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 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 drinkers, and are unlikely to be applicable to those with alcohol dependence. It is uncertain whether findings are applicable to harmful drinkers or people with alcohol abuse.

Summary of Main Findings

Screening for Alcohol Misuse

We found adequate evidence that several screening instruments can detect alcohol misuse in adults with acceptable sensitivity and specificity. A single-question screen, AUDIT-C, and AUDIT appear to be the best overall instruments for screening adults for alcohol misuse in primary care, considering sensitivity, specificity, and time burden. Several instruments require as little as 1 to 2 minutes to administer (e.g., single-question screens, AUDIT-C). For people with positive screening tests, screening-related assessments are still necessary to determine whether an individual has risky/hazardous drinking or if they meet criteria for alcohol abuse or dependence.

None of the included systematic reviews provided information about the use of screening instruments in adolescents. Of note, our methods for identifying all potentially relevant studies for Key Question 2 have some limitations: we did not review all individual publications assessing screening instruments. Instead, we relied on previously published systematic reviews to find information, and we filled gaps with data from other sources (i.e., Technical Expert Panel members, peer and public reviewers, personal files).

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 limits 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 limits 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 I). When using effectiveness data for brief (more than 5, and up to 15 minutes) multicontact interventions, these improve to an NNT of 6.7 and range of NNS from 23 to 167.

The evidence for effectiveness in adults is strongest for brief multicontact interventions; these studies consistently found statistically significant improvements in consumption, heavy drinking episodes, and achieving recommended drinking limits. The brief multicontact interventions were generally 10 to15 minutes per contact. The effect sizes for brief multicontact

interventions were greater than for other intensities (although confidence intervals generally overlapped). In addition, the best studies show that the effect of brief multicontact interventions remains for several years of followup,[44, 45, 66] and show improvement for some utilization outcomes (fewer hospital days[44, 45]) and costs (benefit-cost ratio of 39:1 over 48 months, 95% CI, 5.4 to 72.5[44]).

Our meta-analyses of studies in adults found very brief (up to 5 minutes) and brief (more than 5, up to 15 minutes) single-contact interventions to be ineffective for some outcomes and less effective than brief multicontact interventions for others. Although extended multicontact interventions appear to be effective for improving intermediate outcomes, we did not find evidence that they are more effective than brief multicontact 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 followups 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 beneath recommended limits, but effect sizes were smaller than those found for all adults (Table B). 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 B and H), including fewer motor vehicle events, hospitalization days, and emergency department visits for those in the intervention group compared with the control group (low SOE).[47] Unlike studies in adults, which generally found benefits to last for several years for intermediate outcomes, some benefits of interventions for college students found at 6 months were no longer statistically significantly different for intervention versus control groups 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 I. 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

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

NNS = number needed to screen; NNT = number needed to treat

[a]Number identified from screening and screening-related assessment; a range of risky drinkers (4% to 29%) has been found across multiple primary care populations, with prevalence estimates of 2.0% to 9.0% for alcohol dependence.[14] The prevalence of risky drinking and alcohol dependence are not linked in this table. In other words, although the prevalence of 4% for risky drinking and 2% for alcohol dependence are in the same column (as are 29% and 9%, respectively), there are no data to suggest that the prevalence of dependence is 2% when the prevalence of risky drinking is 4%.

[b]Based on absolute difference of 11% (that would achieve recommended drinking limits) from our meta-analysis including interventions of all intensity.

[c]Based on absolute difference of 15% (that would achieve recommended drinking limits) from our subgroup meta-analysis for brief multicontact interventions.

Notes: Data in table are number of people unless specified as percentage; the 1,000 people screened are those that have not been previously screened and have no known history of alcohol misuse. The scenario in this table is optimistic, because it assumes that screening identifies all those with alcohol misuse (100% sensitive) and that all those identified with misuse potentially get an intervention. We conducted sensitivity analyses to explore how NNT and NNS would change using other assumptions. The NNT does not change much using a variety of different assumptions; it ranges from 6.7 to 18.2. Using a sensitivity of 81% for the screening instrument (representative of the single question[19]) changes the NNS range to 39 to 281 (from 31 to 227). If only half of all those with a positive screening test receive an intervention, then the NNS range increases to 63 to 455. If 90% of those with a positive screen receive an intervention, the NNS range increases to 35 to 253. If the screening instrument sensitivity is 81% and only half of those with a positive screen receive an intervention, then the NNS range increases to 155 to 1,122.

Pregnant Women

We found just one study enrolling pregnant women (N=250)[40] 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.

Our searches identified other studies focusing on pregnant women that did not meet our inclusion criteria.[76-93] Several did not take place in a primary care setting, but instead were conducted in other settings, such as those that included jails and specialized drug and alcohol treatment centers; these included, for example, the Project CHOICES study.[84] Others were excluded because they did not include a control group or because they followed participants after the intervention for less than 6 months.[82, 93] Several of these studies reported benefits of behavioral interventions for pregnant women, including reduction of alcohol consumption,[82, 93] reduced risk of an alcohol-exposed pregnancy,[84] higher rates of abstinence,[88] and better fetal and newborn outcomes (birthweights and birth lengths, and fetal mortality rates).[88]

Potential Adverse Effects of Behavioral Counseling Interventions

Published trials have given little attention to potential adverse effects of screening and behavioral counseling interventions for alcohol misuse. We found no trials 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 multicontact 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 followup phone calls from a nurse.

Although trial data are limited regarding adverse effects of screening and behavioral interventions for alcohol misuse in primary care settings, other types of studies may offer some insights. Among a group of 24 general practitioners in Denmark who were interviewed about their participation in a screening and brief intervention program for alcohol misuse, nearly all reported experiencing negative reactions from some patients.[94] Such reactions ranged from feelings of uneasiness or embarrassment to finding another physician. The physicians themselves noted that the added work of screening and brief intervention was onerous and hampered the establishment of rapport with patients. They also expressed concerns that screening identified people for whom intervention was unnecessary, yet took valuable time and resources, while at the same time failing to detect and help some for whom alcohol misuse was a real problem. However, other studies have found that patients view screening favorably, even perceiving higher quality of care when screening is followed by counseling.[95] For example, one prospective cohort study found that communication and whole-person knowledge were perceived as better among patients who were counseled about their alcohol misuse compared with those who were not counseled.[96]

Treatments for Alcohol Dependence

Although we did not systematically examine the efficacy/effectiveness of various treatments for alcohol dependence (Table J), we provide contextual information 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. However, a detailed review and comparison of treatments for alcohol dependence are beyond the scope of this review.

Table J. 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
- Pharmacotherapy[a] (disulfiram, naltrexone, acamprosate)
- Detoxification (inpatient, residential, day treatment, or outpatient)

[a]Pharmacotherapy can be used in addition to psychosocial therapy but is not recommended for use alone.
Note: this is not an exhaustive list of all treatments that have been studies or used for alcohol dependence but rather includes the most common.

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 of brief behavioral interventions for patients with alcohol dependence in a primary care setting.[97] 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,[98] 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 double-blind RCTs of pharmacotherapy that identified subjects by screening in a primary care setting or that assessed the efficacy or comparative effectiveness of pharmacotherapy in a primary care setting. Further, we were unable to identify any studies of pharmacotherapy for people with risky/hazardous drinking.

Applicability

The findings are generally applicable to people with risky/hazardous drinking identified by screening in primary care settings (see beginning of Discussion). It is uncertain whether findings are applicable to harmful drinkers or people with alcohol abuse. 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., nontraditional primary care settings such as infectious disease clinics for people with HIV), we did not find any, and our results have uncertain applicability to such settings.

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, multistep 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 to10 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 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,[58] and two studies conducted in college student populations demonstrated benefits resulting from Web-based interventions delivered via computer.[48, 49, 53]

It is unclear whether our findings are applicable to people with comorbid medical or psychiatric conditions, including those with multiple substance use disorders, 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.[60]

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 5 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.

Studies were generally not designed to assess the impact of the interventions on morbidity and mortality; their focus was primarily on behavioral outcomes. In addition, 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.[99, 100] Nevertheless, it remains a concern that social desirability bias could play a role in the results of the included studies (i.e., although self-report is from both randomized groups in these studies, the group that gets more attention and advice to decrease their drinking may be more likely to report that they decreased their drinking).

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.[53]

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, heavy drinking episodes, drinking above recommended amounts: moderate SOE) and some health care utilization outcomes (including hospital days and costs: low SOE) for adults with risky/hazardous 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 multicontact interventions (usually 10 to 15 minutes per contact) have the best evidence of effectiveness for adults (compared with very brief single-contact or brief single-contact 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,[1, 4] with an estimated annual cost to society of more than $220 billion.[5, 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 injury and violence.[10] Acute alcohol-related harm can be the result of fires, drowning, falls, homicide, suicide, motor vehicle crashes, child maltreatment, and pedestrian injuries.[11]

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.[12] 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 use the definitions described in Table 1.

Though estimating the prevalence of alcohol misuse is challenging, it has been estimated that about 30 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;[13] prevalence of current dependence (within the last 12 months and as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition [DSM-IV]) is approximately 4 percent in the general adult population.[14]

Currently, an estimated 50 percent of adults 18 years of age or older are regular drinkers.[15] 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.[16] Lastly, in a recent survey 11.8 percent of pregnant women in the United States reported recent use of alcohol.[17]

Older studies report a range of risky drinkers (4% to 29%) 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.[18] More recent data from the American Academy of Family Physicians National Research Network reveal that 21.3 percent of primary care patients reported risky/hazardous drinking (based on the three quantity and frequency questions from the AUDIT-C).[19] Approximately one in five of those who screen positive for unhealthy alcohol use in primary care will have alcohol dependence (four in five will not).[17, 20] 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.[18, 21]

Table 1. Definitions of the spectrum of alcohol misuse

Term	Definition
Risky or hazardous use	Consumption of alcohol above recommended daily, weekly, or per occasion amounts.[1] Consumption levels that increase the risk for health consequences.
Harmful use	Defined by the ICD-10[22, 23] 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)[24] 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)[24] 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)

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

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.[20] 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.[18] Prevalence of these forms of alcohol misuse generally is higher in males and younger people of all races and ethnicities.[21]

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.[25] Maximum recommended consumption is 3 or fewer standard drinks per day (7 per week) for adult women and for anyone older than 65 years of age, and 4 or fewer standard drinks per day (14 per week) 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.[26, 27]

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.[28] 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:[29] (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.

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 screen. 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 drinking).[1] Brief interventions generally aim to moderate a patient's alcohol consumption to sensible levels and to eliminate risky drinking practices, rather than to insist on complete abstinence. There is ongoing debate about the elements of a brief intervention.[30] In general, behavioral counseling interventions include the range of personal counseling and related behavior-change interventions that are employed in primary care to help patients change health-related behaviors.[31] *Counseling* here denotes a cooperative mode of work demanding active participation from both patient and clinician that aims to facilitate the patient's independent initiative.[31] 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."[32] These interventions range from very brief interventions within a primary care visit to multicontact interventions that entail multiple, often more lengthy, visits and nonvisit contacts over an extended period.[1] Brief alcohol interventions can include advice, feedback, motivational interviews of varying length and number, or cognitive behavioral strategies (e.g., self-completed action plans, written health education or self-help materials, drinking diaries, problem-solving exercises to complete at home). Interventions may be delivered via face-to-face sessions, written self-help materials, computer, or telephone counseling.

The assumption underlying brief behavioral counseling interventions in primary care is that, for identified risky 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.[33] Cross-sectional and cohort studies have consistently related high average alcohol consumption to short- or long-term health consequences.[27, 34] A meta-analysis of studies examining the association between all-cause mortality and average alcohol consumption found that men averaging at least four drinks per day and women averaging two or more drinks per day experienced significantly increased mortality relative to nondrinkers.[35] Studies also relate heavy per-occasion alcohol use ("binge drinking") to acute injury risks and alcohol-related life problems.[27, 34] Injury rates are higher for binge drinkers who consume five or more drinks on one occasion as infrequently as three to six times per year, even when average intake is not excessive.[36]

Prior U.S. 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.[37] 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 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, 37] 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.[25, 28, 38] In everyday practice, screening and screening-related assessment procedures are necessary to identify those who misuse alcohol in order to offer appropriate interventions.[39, 40]

Even so, few primary care clinicians use recommended screening protocols or offer screening and interventions, and rates of intervening for alcohol misuse remain low.[40] One study

of primary care physicians found that although most (88%) reported asking their patients about alcohol use, only 13 percent used standardized screening instruments.[40] 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.[41] 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 as much as one-fifth of patients seen, a proportion similar to the proportions seen for diabetes and hypertension.[9, 18]

In a recent clinician's guide to the NIAAA guidelines,[42] 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 those with risky alcohol use who do not meet the DSM-IV-TR criteria for abuse or dependence. In addition, most patients with a positive screening result for a drinking problem are unlikely to accept referrals for alcohol-related counseling.[43] Even if patients accept a referral and complete a rehabilitation program, only about one third will respond to treatment.[44]

Scope and Key Questions

This topic was selected by the USPSTF (through their topic prioritization process), 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.[37] 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 of 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.[37]

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 PICOTS (Populations, Interventions, Comparators, Outcomes, Timing, Settings). 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 email to review the analytic framework, KQs, and PICOTS 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 numerous 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 PICOTS 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 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). KQ 4 examines the efficacy and comparative effectiveness of behavioral counseling interventions for improving intermediate outcomes (e.g., rates of alcohol use, heavy drinking episodes). 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.

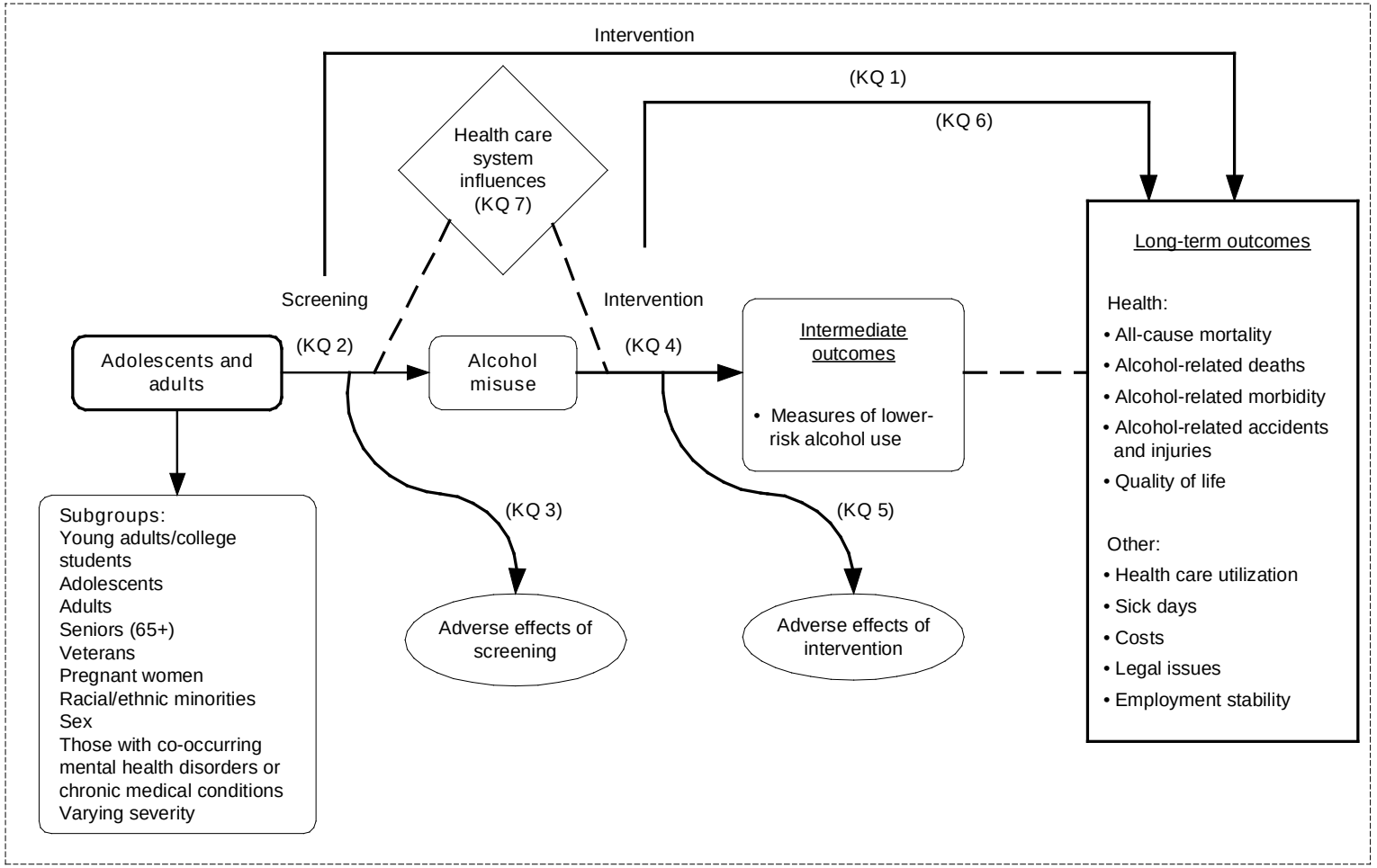
We limited the electronic searches to "human" and "English language." Sources were searched from January 1, 1985, to August 30, 2011. The start date was selected based on the earliest publication date found in previous systematic reviews (which was 1988) and expert opinion about when the earliest literature 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 our searches might have missed. We imported all citations into an EndNote® X4 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.

Any literature suggested by Peer Reviewers or from the public was investigated and, if appropriate, incorporated into the final review. Appropriateness was determined by the same methods described throughout this section.

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



KQ = Key Question

Study Selection

We developed eligibility (inclusion and exclusion) criteria with respect to patient populations, interventions, comparators, outcomes, timing, 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. We supplemented the findings with information from other sources (TEP members, Peer Reviewers, or the public) to fill in important gaps. 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 limited them to the last 5 years because we wanted to ensure that findings were sufficiently current; we did not need to rely on older systematic reviews and meta-analyses because we intended to conduct our own meta-analyses that would better reflect the current body of literature. 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

PICOTS	Criteria
Population(s)	Adults and/or adolescents (ages 12 years or older) with alcohol misuse or being screened for alcohol misuse.[a] Subgroups of interest include pregnant women, adolescents, young adults/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., advice, 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 were eligible for inclusion: • Alcohol Use Disorders Identification Test (AUDIT) and its abbreviated versions • Single-question screening recommended by NIAAA, also called the Single Alcohol Screening Question (SASQ) • 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 • 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 were 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.

Table 2. Study eligibility criteria (continued)

PICOTS	Criteria
Outcomes	Intermediate outcomes: Rates of alcohol use, reported as the mean number of drinks per week Percentage of participants without heavy drinking episodes Percentage of participants who achieve the recommended drinking limits or patterns Receipt of and followup with referrals Abstinence from any use of alcohol Health outcomes, utilization outcomes, and other end points: Alcohol-related morbidity (including, but not limited to, alcohol-related liver problems, including fatty liver disease, alcoholic hepatitis, and alcoholic cirrhosis; cancer; cardiovascular disease, such as cardiomyopathy; neuropathy; cognitive impairment; gastritis; gastric ulcers; pancreatitis; anemia) All-cause mortality Alcohol-related mortality Alcohol-related accidents and injuries (such as fires, drowning, falls, homicide, motor vehicle crashes, child maltreatment, and pedestrian injuries) Health care utilization Sick days Costs (from the societal perspective) Legal issues Employment stability Quality of life Potential adverse effects of interventions Anxiety Stigma, labeling, and/or discrimination Interference with the doctor-patient relationship Opportunity costs/time (for the patient, provider, or interventionist) Increased smoking, and/or illegal substance use
Timing	Outcome assessment at least 6 months after randomization (or from receipt of the intervention for nonrandomized 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.

Table 2. Study eligibility criteria (continued)

PICOTS	Criteria
Study Designs	For KQs 1, 3, 4, 5, 6, and 7: randomized controlled trials, nonrandomized trials with concurrent eligible controls, and recent systematic reviews[b] with or without meta-analyses. For KQ 2:[c] 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.

[a] Alcohol misuse includes risky or hazardous drinking, harmful drinking, alcohol abuse, and alcohol dependence.
[b]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, given that older reviews will not have included the more recent trials). For KQ 2, 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).
[c]For KQ 2, like the previous review for the USPSTF, we assessed screening approaches using the included systematic reviews. We supplemented the findings with information from other sources to fill important gaps. We used TEP members, Peer Reviewers, and public comments to help supplement findings. For KQ 2, unbiased comparison with a reference standard would be the strongest evidence, rather than randomized trials.
Note: In addition, we included only studies published in English, and we excluded studies that we rated poor quality (see section on Quality Assessment below).

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)[45] and the University of York Centre for Reviews and Dissemination.[46] 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 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. For each article, one of the two reviewers was always an experienced/senior investigator (DJ or RH). 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. We conducted quantitative analyses 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.[47] 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 clinical 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 for intervention groups compared with control groups. 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 in which alcohol consumption was reported in gram units, we used a conversion factor of 13.7 grams as equivalent to a standard drink.[48] 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 to estimate the mean change variance[49, 50] 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., heavy drinking episodes, achievement of recommended drinking limits) 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 multicontact (multiple contacts, up to 15 minutes each), or extended multicontact (multiple contacts, one or more of them greater than 15 minutes). We also performed subgroup analyses for men and women to assess whether intervention 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.[51] 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 heavy drinking episodes and achievement of recommended drinking limits, the percentages of patients at 12 months were compared with a risk difference. For all-cause mortality, because the followup 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).[52]

The chi-squared statistic and the I^2 statistic (the proportion of variation in study estimates due to heterogeneity) were calculated to assess statistical heterogeneity in effects between studies.[53, 54] 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 $\geq$75 percent represents considerable heterogeneity.[55] 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.[55] 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 (United States vs. non-United States), severity of alcohol misuse (studies enrolling more than 10% 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.[56] 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. For each assessment, one of the two reviewers was always an experienced/senior investigator (DJ or RH).

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

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.

[a]Owens DK, Lohr KN, Atkins D, et al. AHRQ series paper 5: Grading the strength of a body of evidence when comparing medical interventions — Agency for Healthcare Research and Quality and the Effective Health-Care Program. *J Clin Epidemiol*. 2010 May;63(5):513-23. PMID: 19595577.[56]

Applicability Assessment

We assessed applicability of the evidence following guidance from the Methods Guide for Comparative Effectiveness Reviews.[57] 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

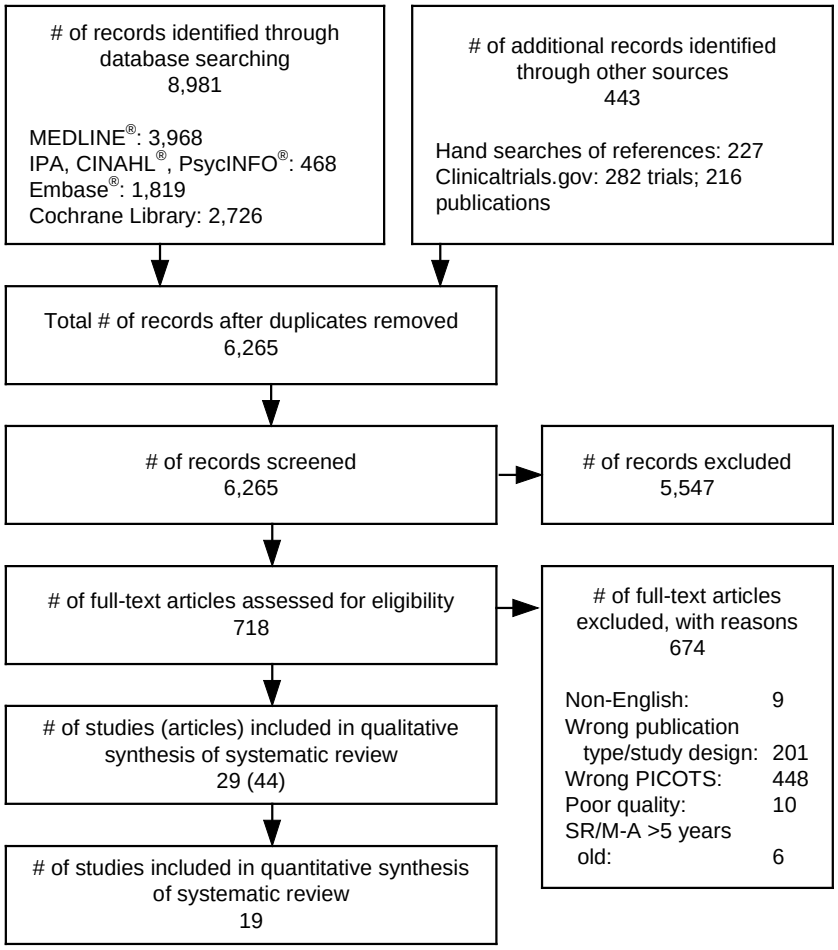
An external peer review was performed on this report. Peer Reviewers were charged with commenting on the content, structure, and format of the evidence report, providing additional relevant citations, and pointing out issues related to how we conceptualized the topic and analyzed the evidence. Our Peer 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 Scientific Resource Center placed the draft report on the AHRQ Web site (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 6 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



M-A= meta-analysis; PICOTS = populations, interventions, comparators, outcomes, timing, settings or study duration; 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 United States, 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 to 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 for any of these outcomes or for intermediate outcomes (i.e., rates of alcohol use, heavy drinking episodes, achieving recommended drinking limits, receipt of and followup with referrals, and abstinence) (insufficient strength of evidence).

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

Screening tools used 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
- The single-question screening recommended by NIAAA, or similar single-question screening (e.g., the Single Alcohol Screening Question [SASQ])
- 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
- Alcohol-Related Problems Survey (ARPS), shortened version (shARPS)
- Alcohol, Smoking and Substance Involvement Screening Test (ASSIST)

Additional description of screening tools is provided in Appendix F.

Summary of Findings

Adults

We found adequate evidence that several screening instruments can detect alcohol misuse in adults with acceptable sensitivity and specificity.

- A single-question screen (covering the past 12 months), AUDIT-C, and AUDIT appear to be the best overall instruments for screening adults for the full spectrum of alcohol misuse in primary care, considering sensitivity, specificity, and time burden.
- Single-question screens covering the past 12 months have reported sensitivities of 0.82 to 0.87 and specificities of 0.61 to 0.79 for detecting alcohol misuse in adults in primary care.[17, 58]
- When focusing on adequately sized U.S. studies that reported sensitivity and specificity of screening for the full spectrum of alcohol misuse in primary care, data suggest that some often recommended cut-points for screening (i.e., AUDIT≥8) may need to be revised.
- The AUDIT had sensitivity of 0.44 to 0.51 and specificity of 0.96 to 0.97 for identifying alcohol misuse in adults using a cut-point of ≥8; more optimal balance of sensitivity and specificity were seen at cutoffs of 4 or 5. The sensitivity and specificity at a cutoff of ≥4 were 0.84 to 0.85 and 0.77 to 0.84, respectively; and at a cutoff of ≥5 were 0.70 to 0.92 and 0.73 to 0.94, respectively. Further, sex-specific cutoffs may be warranted because sensitivities for women at cutoffs of ≥4 and ≥5 were 0.47 to 0.65 and 0.35 to 0.53, respectively, but improved to 0.70 to 0.79 at ≥3 (with specificity of 0.86 to 0.87).
- Several instruments require as little as 1 to 2 minutes to administer (e.g., single-question screens, AUDIT-C).
- The CAGE has very low sensitivity for detecting risky/hazardous drinking and is therefore not a good screening test for identifying risky/hazardous drinking.

Young Adults and College Students

- The included systematic reviews identified only one study reporting the sensitivity and specificity of a screening instrument for this group, the full AUDIT (cutoff ≥8), which reported sensitivity of 0.82 and specificity of 0.78 for identifying risky/hazardous drinking.

Pregnant Women

- The AUDIT-C performed better than other instruments with available data for detecting both at-risk drinking and abuse or dependence, demonstrating both high sensitivity (0.95 or higher) and high specificity (up to 0.85).

Adolescents

- None of the included systematic reviews provided information about the use of screening instruments in adolescents. Of note, our methods for identifying all potentially relevant studies for this Key Question have some limitations: we did not review all individual publications assessing screening instruments. Instead, we relied on previously published

systematic reviews to find information and we filled gaps with data from other sources (i.e., Technical Expert Panel members, peer and public reviewers, personal files).

Detailed Assessment

Four systematic reviews compared screening instruments for detecting alcohol misuse,[59-62] and a fifth review reported on the use of the AUDIT alone.[63] All five reviews focused on primary care populations, with two focused on all adults,[62, 63] one on adults age 60 or older, [59] one on women,[60] and one on pregnant women.[61] Outcomes of interest included the sensitivity and specificity of the screening tool to detect the full spectrum of alcohol misuse, risky/hazardous drinking, or alcohol use disorders (abuse or dependence) and cutoff scores used 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 quality (internal validity). Criteria for study quality are listed in Appendix D. We supplemented the findings of these systematic reviews with articles suggested by Technical Expert Panel members, peer and public reviewers, and personal files.[17, 37, 58, 64-67]

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, McCormick, 2008[59]	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 et al., 2007[63]	Primary care, adults, college students, older adults	13 PC 1 college health	22,195 [a]	AUDIT	At-risk drinking	Good
Bradley et al., 1998[60]	Primary care and OB, mostly women	9	Total:10,865 [a] Women: 10,522 [a]	CAGE, TWEAK, AUDIT, T-ACE	Heavy drinking Alcohol abuse or dependence	Fair
Burns et al., 2010[61]	Pregnant women	5	6,724	T-ACE, TWEAK AUDIT-C, CAGE NET, SMAST	At-risk drinking Alcohol abuse or dependence	Fair
Fiellin et al., 2000[62]	Primary care, adults	38	NR	AUDIT, CAGE SMAST, single question, QF	At-risk/ hazardous drinking Alcohol abuse or dependence	Fair

[a]These numbers do not include studies conducted in nonprimary care settings

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

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 do not have alcohol misuse being subjected to further investigation, potentially using valuable time/resources when they are not needed.

Screening for Alcohol Misuse (The Full Spectrum)

We found published data for the AUDIT, AUDIT-C, and single-screening questions reporting the sensitivity and specificity for detecting the full spectrum of alcohol misuse (from risky drinking to alcohol use disorders), which are the most relevant data for the purposes of this review (Table 5). Many studies report the sensitivity for risky drinking separately from alcohol use disorders, which may also be useful when trying to determine the best screening instrument for a particular population (Tables 6 and 7). The reference standard for the screening instruments was a structured diagnostic interview, generally including the timeline follow-back method[68] or similar approaches to determine the quantity/frequency of consumption.

Table 5. Screening instrument performance for detecting the full spectrum of alcohol misuse in U.S. primary care populations

Instrument and Cutoff Score	All Adults Sens; Spec	Women Only Sens; Spec	Men Only Sens; Spec
AUDIT ≥2	NR[a]	0.87[66] to 0.92[64]; 0.71[66] to 0.74[64b]	0.98; 0.53[64]
AUDIT ≥3	NR[a]	0.70[66] to 0.79[64]; 0.86[66] to 0.87[64b]	0.96; 0.71[64]
AUDIT ≥4	0.84[58] to 0.85[69]; 0.77[58] to 0.84[69]	0.47[66] to 0.65[64]; 0.92[66] to 0.93[64b]	0.87[70] to 0.91[64]; 0.69[71] to 0.80[64]
AUDIT ≥5	0.70 to 0.92; 0.73 to 0.94[72c]	0.35[66] to 0.53[64]; 0.95[64] to 0.98[66b]	0.77[70] to 0.81[64, 71]; 0.84[70, 71] to 0.90[64]
AUDIT ≥6	0.60[58] to 0.69[69]; 0.93[58, 69]	0.42; 0.97[64]	0.66[70] to 0.6[64, 71]; 0.90[70] to 0.92[64]
AUDIT ≥7	0.48; 0.96[58]	0.34; 0.98[64]	0.59[70] to 0.62[71]; 0.93[64] to 0.94[70, 71]
AUDIT ≥8	0.44[58] to 0.51[69]; 0.96[73] to 0.97[69]	0.27; 0.98[64]	0.54[64] to 0.58[71]; 0.95[64, 71] to 0.96[70]
AUDIT-C ≥2	0.96; 0.32[58]	0.81[66] to 0.89[64]; 0.78[64] to 0.86[66b]	0.98; 0.63[64]

Table 5. Screening instrument performance for detecting the full spectrum of alcohol misuse in U.S. primary care populations (continued)

Instrument and Cutoff Score	All Adults Sens; Spec	Women Only Sens; Spec	Men Only Sens; Spec
AUDIT-C ≥3	0.74[17] to 0.88[58]; 0.64[58] to 0.83[17]	0.60[66] to 0.73[64]; 0.91[64] to 0.96[66b]	0.92[64] to 0.95[71]; 0.60[71] to 0.79[64]
AUDIT-C ≥4	0.74[17] to 0.76[58]; 0.80[58] to 0.83[17]	0.38[66] to 0.57[64]; 0.96[64] to 0.98[66b]	0.86[64, 71]; 0.72[71] to 0.89[64]
AUDIT-C ≥5	0.63; 0.92[58]	0.36; 0.98[64]	0.68[71] to 0.72[64]; 0.90[71] to 0.96[64]
Single question: past 3 months[d]	0.62[65] to 0.80[58]; 0.74[58] to 0.93[65, 70]	0.78; 0.81[58]	0.81; 0.63[58]
Single question past 12 months[e]	0.82[17] to 0.87[58]; 0.61[58] to 0.79[17, 72]	0.81; 0.84[17]	0.83; 0.72[17]
AUDIT-3 ≥1[f]	NR[a]	0.45[66] to 0.60[64]; 0.92[64] to 0.96[66a]	0.77[71] to 0.87[64]; 0.83[71] to 0.84[64]

AUDIT = Alcohol Use Disorders Identification Test

[a]NR indicates that the instrument and cutoff score for the population were not reported by any of the studies in the body of evidence for this question.

[b]One study[66] reported sensitivity and specificity for a sex-specific modification of the AUDIT, AUDIT-C, and AUDIT-3; the study used a lower threshold for the third question, asking how often subjects had four or more drinks on an occasion in the last year (rather than six or more). The study reported the following "sex-specific" results for women for the various screening instruments and cut-points (sensitivity; specificity): AUDIT ≥2, 0.89; 0.71; AUDIT ≥3, 0.74; 0.85; AUDIT ≥4, 0.57; 0.92; AUDIT ≥5, 0.38; 0.98; AUDIT-C ≥2, 0.84; 0.85; AUDIT-C ≥3, 0.66; 0.94; AUDIT-C ≥4, 0.48; 0.99; AUDIT-3 ≥1, 0.69; 0.94.

[c]Values are ranges from race/ethnicity and sex subsets; the study did not report results from the overall sample.

[d]A study[65] conducted in a primary care setting reported sensitivity of 0.62 and specificity of 0.93 for the following single question for detecting at-risk drinking and current alcohol-use disorders: "On any single occasion during the past 3 months, have you had more than 5 drinks containing alcohol?" Another study conducted in primary care practices in Georgia reported a sensitivity of 0.80 and specificity of 0.74 for the following single question for detecting alcohol misuse, when considering a positive screen to be within the last 3 months: "When was the last time you had more than X drinks in 1 day?" where X was four for women and X was five for men.

[e]A study conducted in a primary care clinic in an urban safety net hospital reported a sensitivity of 0.82 and specificity of 0.79 for detecting unhealthy alcohol use, using the following single question (recommended by the NIAAA): "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 one or more.[26] Another study conducted in primary care practices in Georgia reported a sensitivity of 0.87 and specificity of 0.61 for the following single question for detecting alcohol misuse, when considering a positive screen to be within the last 12 months: "When was the last time you had more than X drinks in 1 day?" where X was four for women and X was five for men.

[f]This is a single question, the third question of the AUDIT. A response of ≥1 indicates having consumed six or more drinks on one occasion at least once in the past year.

Notes: One additional study[74] reported full-spectrum results from a non-U.S. primary care population (AUDIT ≥5; sensitivity = 0.84; specificity = 0.90); two additional studies reported full-spectrum results from non-U.S., nonprimary care populations (AUDIT ≥8; sensitivity = 0.41[75] to 0.67[76]; specificity = 0.96[75, 76]). One of those studies[75] also reported data using AUDIT ≥5: sensitivity = 0.78 and specificity = 0.81.

Single-question screens covering the past 12 months appear similar to the AUDIT and the AUDIT-C, with reported sensitivities of 0.82 to 0.87 and specificities of 0.61 to 0.79 for detecting the full spectrum of alcohol misuse in adults in primary care. 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.[26] Single-question screens typically ask people to report any occasions when they drank four (women) or five (men) drinks or more over a recent time period (e.g., past 12 months).

When focusing on the adequately sized U.S. studies (Table 5), data suggest that some often recommended cut-points for screening (i.e., AUDIT≥8[77]) may need to be revised. Given cultural differences in drinking patterns and drinking norms, we focused on validation studies from the

United States. Four large U.S. studies[58, 64, 66, 71, 73] (three settings: Texas, Georgia, and Seattle VAs) included appropriate detailed interview-based criterion standards for the full spectrum of alcohol misuse and adequate numbers of patients to have adequate precision for sensitivity. Some of these studies found screening thresholds of 8 on the AUDIT were so insensitive that they were not even reported. The AUDIT had sensitivity of 0.44 to 0.51 and specificity of 0.96 to 0.97 for identifying alcohol misuse in adults using a cut-point of ≥8; more optimal balance of sensitivity and specificity were seen at cutoffs of 4 or 5. The sensitivity and specificity at a cutoff of ≥4 were 0.84 to 0.85 and 0.77 to 0.84, respectively; and at a cutoff of ≥5 were 0.70 to 0.92 and 0.73 to 0.94, respectively. Further, sex-specific cutoffs may be warranted because sensitivities for women at cutoffs of ≥4 and ≥5 were 0.47 to 0.65 and 0.35 to 0.53, respectively, but improved to 0.70 to 0.79 at ≥3 (with specificity of 0.86 to 0.87).

For the AUDIT-C, the appropriate cut-points for balancing sensitivity and specificity appear to be ≥ 2 or 3 for women and ≥ 4 for men.[64]

Screening for Risky/Hazardous Drinking

Some studies reported sensitivity and specificity separately for risky drinking and for alcohol use disorders. We provide this information in this section and the following section. Data on sensitivity and specificity for the full spectrum of alcohol misuse are in the previous section. Sensitivity and specificity values for each of the screening instruments are reported in Table 6 for studies identifying risky/hazardous drinking. Where reported, cutoff scores for each instrument are also included.

Among the studies included in this report, the AUDIT appears to be the most widely assessed screening instrument. It has been studied across a variety of populations. For detecting risky drinking in adults, a wide range of sensitivities have been reported for the AUDIT at a cutoff of ≥8. The AUDIT-C had the highest reported sensitivity (0.98) for detecting risky drinking in adults. The AUDIT-C also showed excellent sensitivity and specificity for identifying risky drinking in pregnant women (0.95 and 0.85, respectively). The CAGE showed sensitivity ranging as low as 0.49 for detecting risky/hazardous drinking in adults.

Table 6. Screening instrument performance for detecting risky/hazardous 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	NR	0.93; 0.63[59]	NR	NR
shARPS	NR	0.92; 0.51[59]	NR	NR
AUDIT ≥8[a]	0.25[63] to 0.97[62]; 0.61 to 0.96[63]	0.28[59] to 0.88[63]; 0.95 to 1.00[59]	0.23; 0.97[61]	0.82; 0.78[63]
AUDIT ≥5	0.84[62] to 0.85[71]; 0.81[71] to 0.90[62]	NR	NR	NR
AUDIT ≥4	0.94; 0.66[71]	NR	NR	NR
AUDIT-C ≥3	0.98; 0.57[62b]	0.54 to 1.00; 0.81 to 0.93[59]	0.95; 0.85[61]	NR
AUDIT-C ≥4	0.91; 0.70[71b]	NR	NR	NR
CAGE ≥2	0.49 to 0.84; 0.75 to 0.97[62]	0.14 to 0.39[59c]; 0.97[59]	0.38 to 0.49; 0.92 to 0.93[60, 61]	NR
SMAST ≥2	0.68; 0.92[62]	0.48; 1.00[59d]	NR[e]	NR
NET ≥1[f]	NR	NR	0.71; 0.86[61]	NR
T-ACE ≥2[g,h]	NR	NR	0.69 to 0.92; 0.38 to 0.89[60, 61]	NR
TWEAK ≥2[g,i]	NR	NR	0.71 to 0.91; 0.73 to 0.83[60, 61]	NR
QF >7 dr/wk	0.50; 0.87[62] Women: 0.29; 0.90 Men: 0.69; 0.79[60]	NR	NR	NR

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; NET = Normal drinker, Eye-opener, Tolerance questionnaire; NR = not reported (indicates that the instrument and cutoff score for the population were not reported by any of the studies in the body of evidence for this question); QF = quantity/frequency; 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

[a]Although the range of sensitivities for the AUDIT at a cutoff ≥8 includes a value as low as 0.25, five of eight 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.[62]

[b]Results are from a VA General Medicine Clinic population.[62, 71]

[c]For older adults, CAGE with a positive screen being ≥1 has a sensitivity ranging from 0.79 to 0.88.[59]

[d]For older adults, SMAST-G ≥3 has sensitivity = 0.52 and specificity = 0.96.[59]

[e]For pregnant women, SMAST ≥3 has sensitivity = 0.11 and specificity = 0.96.[61]

[f]For pregnant women, NET ≥2 has sensitivity = 0.61 and specificity = 0.87 and NET ≥3 has sensitivity = 0.24 and specificity = 0.99.[61]

[g]Combined results for all the definitions of "tolerance" in T-ACE and TWEAK (including "high" and "hold").

[h]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.[60, 61]

[i]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.[60, 61]

Screening for Abuse/Dependence

Table 7 presents results for the sensitivity and specificity of the screening instruments for detecting alcohol abuse or dependence across the various populations.

Table 7. 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
ACI	0.28; 0.86[62]	NR	NR
AUDIT ≥8[a]	0.61 to 0.96; 0.85 to 0.96[62]	0.33; 0.91[59]	0.23; 0.9[61]
AUDIT-C ≥3	0.90; 0.45[62]	NR	0.96 to 1.00; 0.71[61]
CAGE ≥2	0.77 to 0.94; 0.79 to 0.97[62] Women: 0.38; 0.92[60] Men: 0.47; 0.93	0.63; 0.82[62]	NR
HSS	0.78; 0.71[62]	NR	NR
LAST ≥2	0.63; 0.93[62]	NR	NR
MAST ≥4[b]	NR	0.91; 0.84[59]	NR
MAST-G ≥5	NR	0.70; 0.80[62]	NR
SMAST ≥2[c]	1.00; 0.85[62]	NR	NR
SAAST ≥3	0.13 to 0.69; 0.67 to 0.95[62]	NR	NR
SDDS-PC	0.38 to 0.75; 0.97 to 0.99[62]	NR	NR
Single question: past 3 months[d]	0.77[58]; 0.60[58]	NR	NR
Single question past 12 months[e]	0.87[58] to 0.88[17]; 0.49[58] to 0.67[17]	NR	NR
T-ACE ≥2	NR	NR	0.60 to 0.88; 0.37 to 0.66[61]
TWEAK ≥3	0.75; 0.90[62]	NR	NR
QF >20 dr/wk	0.20; 0.97[62] Women: 0.07; 0.99 Men: 0.36; 0.93[60]	NR	NR
QF >4 dr/day	0.47; 0.96[62]	NR	NR
QF (unspecified)		0.48; 0.76[62]	NR

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; MAST-G = Michigan Alcoholism Screening Test – geriatric version; NR = not reported (indicates that the instrument and cutoff score for the population were not reported by any of the studies in the body of evidence for this question); 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

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

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

[c]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.

[d]A study conducted in primary care practices in Georgia reported a sensitivity of 0.77 and specificity of 0.60 for the following single question for detecting a current alcohol use disorder, when considering a positive screen to be within the last 3 months: "When was the last time you had more than X drinks in 1 day?" where X was four for women and X was five for men.

[e]A study conducted in a primary care clinic in an urban safety net hospital reported a sensitivity of 0.88 and specificity of 0.67 for detecting a current alcohol use disorder, using the following single question (recommended by the NIAAA): "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. Another study conducted in primary care practices in Georgia reported a sensitivity of 0.87 and specificity of 0.49 for the following single question for detecting a current alcohol use disorder, when considering a positive screen to be within the last 12 months: "When was the last time you had more than X drinks in 1 day?" where X was four for women and X was five for men.

Note: 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.

In general, several of the screening instruments had adequate 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 at a cutoff of ≥8) 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 at a cutoff of ≥3), 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. However, the CAGE identifies lifetime abuse or dependence, and most patients in whom alcohol abuse is detected in primary care using the CAGE questionnaire are either actively addressing their substance abuse or are in recovery.[78] The range of sensitivity reported for single-question screens was from 0.77 to 0.88 for detecting alcohol abuse or dependence, depending on whether the past 3 or 12 months was considered.

Some studies have reported the probability of alcohol dependence based on scores from screening instruments.[79] From a family medicine clinic population including 392 men and 927 women with mean ages of 46 and 42 years, respectively, the AUDIT was found to have a post-screening probability of alcohol dependence of 87 percent for men for scores from 15-40 and 94 percent for women for scores from 13-40; the AUDIT-C was found to have a post-screening probability of alcohol dependence of 75 percent for men and 88 percent for women for scores from 10-12; AUDIT-3 (the 3rd question of the AUDIT, asking the frequency of drinking ≥6 drinks) was found to have a post-screening probability of alcohol dependence of 58 percent for men for scores from 3-4 and 88 percent for women for scores of 4; and a single question about the number of days drinking ≥5 drinks over the past month was found to have a post-screening probability of alcohol dependence of 83 percent for responses from 14-30 and 38 percent for women for responses from 3-30. The probability of alcohol dependence was much lower for lower scores.

The tables in this Key Question include information on instruments designed to screen only for alcohol misuse (either for the full spectrum or for part of the spectrum). Another instrument that deserves mention here is the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST),[80] developed by the WHO to screen for all psychoactive substances, including alcohol, smoking, and other substances. The ASSIST is relatively brief, composed of eight questions or items, covering 10 substances: tobacco, alcohol, cannabis, cocaine, amphetamine-type stimulants, inhalants, sedatives, hallucinogens, opioids, and "other drugs." The development, reliability, and feasibility of the ASSIST, which were published in 2002, were based on a multinational sample from Australia, Brazil, Ireland, India, Israel, the Palestinian Territories, Puerto Rico, the United Kingdom, and Zimbabwe.[81] A total of 236 volunteer participants completed test and retest interviews. Sixty percent of the sample was recruited from alcohol and drug abuse treatment facilities, and the rest were from general medical settings and psychiatric facilities. A subsequent study enrolled 1,047 subjects (350 from drug treatment and 697 from primary health care settings) from seven countries, including the United States, to examine validity of the ASSIST.[82] The study reported discriminative validity of the ASSIST (to discriminate between substance use, abuse, and dependence), as well as concurrent validity, demonstrated by significant correlations between ASSIST scores and scores from other validated instruments, including the AUDIT ($r = 0.82$).

Instrument Burden

The practitioner and patient time burdens are important considerations when choosing a screening instrument. The instruments included in our report varied from 1 to 60 questions, and administration time for the various instruments ranged from less than 1 minute to 16 minutes (Table 8). Briefer questionnaires may be more feasible to administer in a busy practice and are less likely to disrupt the flow of patients.

Some of the screening instruments can be asked by interview, some by self-administration or interview, and some are not feasible without either electronic forms or other aids (e.g., the AUDIT or ASSIST that require selecting across multiple responses and scoring).

Table 8. 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	Oral, written, computer	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

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; MAST-G = short Michigan Alcoholism Screening Test – geriatric version; NET = Normal drinker, Eye-opener, Tolerance questionnaire; shARPS = Alcohol-Related Problems Survey – shortened version; 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 harmful substance 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 several 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 multicontact interventions have the best evidence of effectiveness across populations, outcomes, and have followup data over several years. Our meta-analyses of studies in adults found very brief (up to 5 minutes) and brief (more than 5, up to 15 minutes) single-contact interventions to be ineffective for some outcomes and less effective than brief multicontact interventions for others. Table 9 summarizes findings for the three intermediate outcomes most commonly reported, by population.

Adults

- **Consumption:** Behavioral interventions resulted in a greater reduction in quantity of alcohol consumed than controls at 12 months (weighted mean difference [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 multicontact, and extended multicontact interventions than for controls. We found similar results for studies **conducted in the United States** 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.
- **Heavy drinking episodes:** Behavioral interventions resulted in 12 percent more subjects reporting no heavy drinking episodes 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 multicontact and extended multicontact 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.

Table 9. Summary of effectiveness and strength of evidence of behavioral interventions compared with controls for improving intermediate outcomes, by population

Population	Consumption[a] (Mean Drinks/Week)	Heavy Drinking Episodes[b]	Recommended Drinking Limits
Adults	Reduction of 3.6 (2.4 to 4.8) from baseline ~23 Moderate SOE	12% fewer subjects reported heavy drinking episodes (7%, 16%) from ~52% at baseline Moderate SOE	11% more subjects achieved (8%, 13%) Moderate SOE
Older adults	Reduction of 1.7 (0.6 to 2.8) from baseline ~16 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) from baseline ~15 Moderate SOE[c]	0.9 fewer heavy drinking days (0.3, 1.5) from ~6.2 days per month at baseline Moderate SOE[c]	Insufficient SOE
Pregnant women	Data from 1 study found no difference Low SOE	Insufficient SOE	Insufficient SOE
Adolescents	Insufficient SOE	Insufficient SOE	Insufficient SOE

SOE = strength of evidence

[a]Baseline consumption (drinks/week): adults, mean ~23, median ~19, range 8 – 62 (data from 16 trials); older adults, 15.2 to 16.6 (data from two trials); young adults/college students, mean ~15, median ~17, range 8 to 18 (two of the five trials did not report baseline consumption).

[b]Heavy drinking generally defined by consumption of five or more standard drinks for men and four or more for women. Baseline % with heavy drinking episodes: adults, mean ~52, range 10 – 100.

[c]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 heavy drinking for young adults, differences were not statistically significant at 12 months (low 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 (difference between intervention and control groups) from our meta-analyses.

Intensity of intervention: Brief multicontact interventions have the best evidence of effectiveness. Our meta-analyses of studies in adults found (1) very brief (up to 5 minutes) single-contact interventions to be ineffective for improving consumption (data from one very-brief-intervention study[83]) and less effective than brief multicontact interventions for achieving recommended drinking limits (data from one very-brief-intervention study[84]); and (2) brief single-contact interventions to be ineffective for reducing heavy drinking episodes and less effective than brief multicontact interventions for reducing consumption and achieving recommended drinking limits.

- **Recommended drinking limits achieved:** 11 percent more subjects receiving interventions achieved recommended drinking limits by 12 months compared with controls (risk difference 0.11, 95% 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 limits was numerically greatest for the brief multicontact interventions (15% compared with 8%for very brief and brief interventions at 12 months), but the confidence intervals overlap.
- **Followup 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.[84-86] 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).
- **Heavy drinking episodes:** evidence was insufficient to make a conclusion (insufficient SOE).
- **Recommended drinking limits achieved:** 9 percent more subjects in the intervention groups than in control groups achieved recommended drinking limits by 12 months (risk difference 0.09, 95% CI, 0.02 to 0.16, low SOE).
- **Followup 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[87] to 4.1[88] drinks per week, moderate SOE).
- **Heavy drinking episodes:** 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 (rate ratio [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 limits achieved:** None of the included studies reported (insufficient SOE).
- **Followup 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).
- **Heavy drinking episodes:** None of the included studies reported (insufficient SOE).
- **Recommended drinking limits achieved:** None of the included studies reported (insufficient SOE).
- **Followup 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% vs. 72%, p=0.04, low SOE).

Evidence in Adults

Characteristics of Included Studies

Table 10 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 RCTs conducted exclusively in primary care settings except for the WHO study,[84] 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. One study conducted in Spain enrolled exclusively those with "binge drinking."[89] 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.[83, 90, 91] These included a study conducted in 85 general practices in Germany with 30.4 percent meeting criteria for dependence (by DSM-IV diagnostic interview),[90] a study conducted in rural primary care sites in Thailand with around 15 percent (based on an AUDIT score >25),[91] 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).[83]

Table 10. 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, Scott,1992[92]	154 NR	12	U.K.	8 PC group practices	43 to 45.1	0	NR	37.9 to 38.8	Fair
WHO Brief Intervention Study, 1996[84]	1,559 0	9	8, including U.S.	Outpatient medical settings	35.9 to 36.9	19.2	NR	NR	Fair
Bischof et al., 2008[90] Grothues et al., 2008[93] Reinhardt al., 2008[94] SIP study	408 30.4	12	Germany	85 general practices	35.9 to 36.8	31.9	NR	21 to 25.2	Fair
Curry et al., 2003[95]	307 NR	12	U.S. Wash. State	23 PCPs in an HMO, urban clinic	47	35	20	14.2	Fair
Fleming et al., 1997[88, 96-99] Project TrEAT	774 NR[a]	48	U.S. Wisconsin	17 community PC practices	NR[b]	38	5.6 to 11.9	18.9 to 19.1	Good
Fleming et al., 2008[100, 101] Healthy Moms	235 NR	6	U.S. Wisconsin	34 OB practices	Median 28	100	18.3	8 to 8.5[c]	Good
Lock et al., 2006[102]	127 0	12	U.K.	General practices	44.1	50	NR	23 to 26.48	Fair
Maisto et al., 2001[103-105] ELM	301 NR	12	U.S. Penn.	12 PC clinics	45.6	30.2	23.3	15.5 to 18.6	Fair
Noknoy et al., 2010[91]	117 13.8 to 15.3[d]	6	Thailand	Rural PC units	37	8.5	100 (Thai)	15.15	Fair
Ockene et al., 1999[106-108] Project Health	530 2	48	U.S. 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 et al., 1995[83] Alcoholscreen	378 35[e]	12	Australia	40 PC practices	37.7	43	NR	38.5	Fair

Table 10. Characteristics of included trials comparing behavioral counseling interventions with usual care for improving intermediate outcomes for adults with alcohol misuse (continued)

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Non-white	Baseline Alcohol Use (Drinks/wk)	Quality
Rubio et al., 2010[89]	752 0	12	Spain	20 PC centers in Madrid	NR, >70% were 31-40	34.7	NR	26.90 to 27.42	Fair
Saitz et al., 2003[86] SIP	312 NR[f]	6	U.S. 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, Anderson, 1990[109]	72 NR	12	U.K.	8 PC group practices	44.4 to 47.2	100	NR	25.8 to 26.7	Fair
Senft et al., 1997[85] Freeborn et al., 2000[110]	516 0	24	U.S. 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 et al., 1988[111]	909 NR	12	U.K.	47 group practices	41.7 to 44.6	29.1 to 29.8	NR	35.1 (females) and 62.2 (males)	Fair

% 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 intervention 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; U.K. = United Kingdom; U.S. = United States; Wash = Washington; WHO = World Health Organization; wk = week; y = years

[a]Six subjects (per medical record audit) received formal alcohol treatment during the 1-year followup period; those may represent subjects ultimately diagnosed with alcohol dependence.

[b]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.

[c]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 whether brief intervention could reduce drinking in this population.

[d]Based on AUDIT >25.

[e]Percentages with moderate physical dependence based on the 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).

[f]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 alcohol dependence).

Note: When data were not reported for mean age, %female, % nonwhite, 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.

Seven studies were conducted exclusively in the United States, four in the United Kingdom, and one each in Germany, Thailand, Australia, and Spain (Table 10). Most studies followed subjects for 6 to 12 months; three studies reported outcomes beyond 12 months, up to 24 months,[85, 110] or 48 months.[88, 96-99, 106, 107]

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.[100] Women represented 30 percent or more of study participants in all U.S. studies. Rates of nonwhite participants were not reported in many studies, and were usually low when reported (generally 4% to 23%), except for two trials—one conducted in Thailand[91] (100% Thai) and one conducted in an urban academic practice (80-82% nonwhite).[86]

Most studies reported a baseline alcohol consumption between 15 and 30 drinks per week. Two studies conducted in the United Kingdom[92, 111] and one from Australia[83] 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.[100] 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[111] 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 11, stratified by intervention intensity. Intervention intensity varied from very brief (single contact, 5 minutes or less) to brief (single contact, more than 5 and up to 15 minutes) to brief multicontact (multiple contacts, up to 15 minutes each) to extended multicontact (multiple contacts, one or more of them greater than 15 minutes). The most common were brief interventions, used by six studies, and brief multicontact interventions, included in seven studies. Four trials included multiple intervention arms.[83, 84, 90, 93, 94, 103-105]

The majority of studies tested interventions delivered primarily by the patient's primary care physician (9 of 16 studies; 10 of 20 interventions).[83, 88, 89, 92, 95-99, 106-109, 111] Three studies tested interventions delivered primarily by nurses,[91, 100-102] three studies (contributing five interventions) tested interventions delivered primarily by research team personnel such as a health counselor or trained psychologist,[85, 90, 93, 94, 103-105, 110] and one study from the WHO group (contributing two interventions) tested interventions delivered by various clinic staff.[84] Among the interventions involving the patient's usual primary care physician, some used the physicians to deliver initial and any repeated intervention contacts whereas 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,[83] forwarding screening/assessment results to a physician,[103] or advice from nurses on cutting down drinking and a leaflet with daily benchmark alcohol guides.[102]

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.[86] 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 11. 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 et al., 1995[83] 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[84]	Group 1: Advice, illustrated pamphlet	Various clinic staff	In person	1	5 min
Brief	Anderson, Scott, 1992[92]	Brief advice, feedback about own consumption and norms, and a self-help booklet	PCP	In person	1	10 min
Brief	Lock et al., 2006[102]	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[103-105] 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, Anderson, 1990[109]	Brief advice, feedback about own consumption and norms, and a self-help booklet	PCP	In person	1	10 min
Brief	Senft et al., 1997[85] Freeborn et al., 2000[110]	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[84]	Group 2: Brief intervention, 30-page illustrated problem-solving manual	Various clinic staff	In person	1	15 min
Brief multi-contact	Curry et al., 2003[95]	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 for PCP; mean 14 min for phone calls
Brief multi-contact	Fleming et al., 1997[88, 96-99] Project TrEAT	Two visits 1 month apart with PCP and a followup 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

Table 11. 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	Fleming et al., 2008[100, 101] Healthy Moms	Two visits, each with phone followup; 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 et al., 2010[91]	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	Ockene et al., 1999[106-108] Project Health	Tailored consultation with clinician plus followup visit. Counseling entailed talking about number of drinks per week, heavy drinking episodes, 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 et al., 2010[89]	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 et al., 1988[111]	Brief advice, an information booklet ("That's the Limit"), sex-based recommendation for limiting drinking, a drinking diary, and followup sessions.	PCP	In person	1 to 5[a]	NR[b]
Extended multi-contact	Bischof et al., 2008[90] Grothues et al., 2008[93] Reinhardt et al., 2008[94] SIP study	Group 1: Full Care (FC): immediate computerized post-assessment feedback and multiple sessions of counseling by psychologist.	Trained psychol-ogists from research team	Phone	4	Scheduled for 30 min each; mean received was 80.3 min
Extended multi-contact	Bischof et al., 2008[90, 93, 94] 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 psychol-ogists from research team	Phone	Up to 4	Scheduled for 30-40 min each; mean received was 40 min

Table 11. 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
Extended multi-contact	Richmond et al., 1995[83] Alcoholscreen	Group 1: "Alcoholscreen" program: 5 short consultations (introduction, patient education, 3 followups) 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 (followup visits)
Extended multi-contact	Maisto et al., 2001[103-105] 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
NR/ Unknown[c]	Saitz et al., 2003[86] SIP	Providing physicians with positive alcohol screening results and specific recommendations for their patients at a visit.	PCP	In person	NR/ Unknown[c]	NR/ Unknown[c]

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; WHO = World Health Organization

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

[b]Not reported in the article; per the author, they trained them to do "up to 15 minutes," and he believes they were generally 10-15 minutes (Paul Wallace, personal email communication, December 2011).

[c]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 12. 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 multicontact (by 3.5 drinks per week at 6 months and 4.4 drinks per week at 12 months) and extended multicontact 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 multicontact interventions had moderate statistical heterogeneity (Table 12). 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,[111] 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 more than 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 multicontact interventions among all adults at 12 months.

Table 12. Mean change in drinks per week for behavioral counseling interventions compared with controls: Summary of meta-analyses for adults

Population	Intensity	Timing	N	WMD[a]	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, multicontact	12 months	5	-4.4	-6.1, -2.7	58
Adults	Extended, multicontact	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, multicontact	6 months	6	-3.5	-4.9, -2.1	48
Adults	Extended, multicontact	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

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
[a]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% 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[83] 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.[86] 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.

Two studies reported long-term alcohol consumption up to 48 months: Project TrEAT[96, 98, 99] and Project Health.[106, 107] 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 a 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 followups 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 followup, 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 followup.[107] 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 nondifferential).

Heavy Drinking Episodes

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, 12 percent more

subjects (absolute difference) reported no heavy drinking episodes by 12 months compared with control groups. Subgroup analyses for men and women found similar results.

Table 13. Percentage of subjects with no heavy drinking episodes for behavioral counseling interventions compared with controls: Summary of meta-analyses for adults

Population	Intensity	Timing	N	Risk Difference[a]	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, multicontact	12 months	4	0.11	0.06, 0.16	42
Adults	Extended, multicontact	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[b]

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

[a]Positive numbers favor behavioral counseling interventions and reflect the absolute difference between groups for the percentage of subjects with no heavy drinking episodes.

[b]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 I^2 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.'[89]

Note: Only two studies reported the outcome at 6 months; both were brief multicontact (risk difference 0.09, 95% CI, 0.02 to 0.16).

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

The study from Saitz and colleagues described in the previous section stratified results by faculty and resident physicians.[86] 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, 30 to 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 outcomes up to 48 months were reported by two studies: Project TrEAT[96, 98, 99] and Project Health.[106, 107] Project TrEAT found a significant reduction in the number of people who reported heavy drinking episodes, 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%vs. 70.7%, $p<0.01$, at 36 months) but was not statistically significantly different at 48 months (63.8% vs. 70.4%, $p<0.10$).[98] In Project Health, differences in heavy episodes per month between the intervention and control groups were not significant at 48 months.[107] 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 Limits Achieved

Results of our meta-analyses are summarized in Table 14 (additional details and forest plots are provided in Appendix E). Among adults receiving behavioral interventions, 11 percent more subjects (absolute difference) achieved recommended drinking limits by 12 months compared with control groups; subgroup analyses for men and women found similar magnitude of benefit.

Table 14. Percentage of subjects achieving recommended drinking limits for behavioral counseling interventions compared with controls: Summary of meta-analyses for adults

Population	Intensity	Timing	N	Risk Difference[a]	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, multicontact	12 months	6	0.15	0.11, 0.19	28
Adults	Extended, multicontact	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, multicontact	6 months	4	0.15	0.11, 0.19	7
Adults	Extended, multicontact	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

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

[a]Positive numbers favor behavioral counseling interventions and reflect the absolute difference between groups for the percentage of subjects achieving recommended drinking limits.

Note: Only two studies reported data to contribute to a subgroup analysis for adult men at 6 months; both were brief multicontact (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 multicontact (risk difference 0.19, 95% CI, 0.11 to 0.26).

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

Two studies reported long-term data up to 48 months: Project TrEAT[96, 98, 99] and Project Health.[106, 107] Project TrEAT showed 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% vs. 34.6%, $p<0.01$, at 36 months), but it was not statistically significantly different at 48 months (22.4% vs. 26.4%, p= NS).[98] 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 followup.[107] 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.

Followup 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.[84-86] 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 0 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).[84] 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).[85] 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 15 summarizes the characteristics of included publications targeting older adult populations. We included two RCTs that enrolled exclusively older adults: Project GOAL[112, 113] and the Healthy Living As You Age (HLAYA) study.[114, 115] In addition, we identified one subgroup analysis of subjects 65 years or older enrolled in the Early Lifestyle Modification (ELM) study, an RCT included in the previous section on adults.[105]

Table 15. 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 et al., 1999[112] Mundt et al., 2005[113] GOAL	158 0	24	U.S. Wisconsin	24 PC practices	NR >92% age 65-75	33.5	NR	15.54 to 16.58	Fair
Lin et al., 2010[114] Moore, et al., 2011[115] HLAYA	631 NR	12	U.S. Calif.	PC practices (145 PCPs)	68.4	29	13	15.2	Fair

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 intervention and control groups; NR = not reported/unclear; PC = primary care; PCP = primary care physician; Penn = Pennsylvania; U.S. = United States; wk = week; y = years

The subgroup analysis of ELM[103, 104] 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. Because of the high risk of bias in this subgroup analysis of 45 subjects, we determined that the

best evidence in older adults was from Project GOAL and HLAYA; thus we focus on the evidence from those two trials below.

The studies generally targeted those with risky/hazardous drinking. Project GOAL included men consuming more than 11 drinks per week and women consuming more 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 3 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 three to four times per week.

Both trials were conducted exclusively in the United States. Study duration ranged from 12 months for HLAYA[105, 114, 115] to 24 months for Project GOAL.[112, 113] 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 two or more times in the last 3 months or 3 or more per occasion for women).[112] It also included a 30-minute face-to-face assessment using the Time Line Follow-Back (TLFB) method to determine whether 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.[115]

The interventions of included studies for this section are described in Table 16, organized by intervention intensity. Project GOAL included a brief multicontact intensity intervention[112, 113] (multiple contacts, up to 15 minutes each), and HLAYA included an extended multicontact intervention[105, 114, 115] (multiple contacts, one or more of them longer than 15 minutes).

Table 16. 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 multicontact	Fleming et al., 1999[112] Mundt et al., 2005[113] 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 multicontact	Lin et al., 2010[114] Moore, 2011[115] 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

GOAL = Guiding Older Adult Lifestyles; HLAYA = Healthy Living As You Age; min = minutes; No. = number; NR = not reported/unclear; PCP = primary care physician

Project GOAL tested an intervention delivered by the patient's primary care physician[112, 113] and HLAYA tested an intervention delivered by the physician and a health educator.[114, 115]

Project GOAL and HLAYA used control groups receiving screening/assessment followed by usual care and the provision of a general health booklet.[112-115]

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[112, 113] reported a decrease of more than 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[114, 115] 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.

Heavy Drinking Episodes

Project GOAL and the HLAYA study both reported measures of heavy drinking episodes for subjects in the intervention group at 12 months. In Project GOAL[112, 113] about 69 percent of subjects in the intervention group reported no heavy 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 1 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).[114, 115]

Recommended Drinking Limits Achieved

Both trials focusing on older adults reported some measure of whether recommended drinking limits were achieved. Project GOAL[112, 113] 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% vs. 65.7%, $p<0.005$ at 12 months). The differences were not statistically significant at 24 months ($p<0.1$). The HLAYA study[114, 115] 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 that interventions resulted in a greater percentage of subjects achieving recommended drinking limits compared with controls (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.

Followup 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 17 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 RCTs (five publications)[87, 116-119] and one subgroup analysis of subjects age 18 to 30 from Project TrEAT.[88] The mean age of enrolled populations in the four trials was approximately 20.

The studies generally targeted those with risky/hazardous drinking. 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).[116-118] 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).[87] 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.[119] The subgroup analysis of Project TrEAT[88] 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.

Table 17. 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 et al., 2010[87] CHIPs	986 0	12	U.S. and Canada	5 college health clinics	21	50.5 to 51.3	8.1 to 10.5	17.3 to 17.8	Good
Grossberg et al., 2004[88] TrEAT	226[a] NR	48	U.S. Wisc.	17 community PC practices	NR[b]	51	14	16.2 to 18.3	Good[a]
Kypri et al., 2008[116] Kypri et al., 2007[117]	576 NR	12	New Zealand	University primary health care service	20.1 to 20.3	52	NR	NR	Good
Kypri et al., 2004[118]	104 NR	6	New Zealand	University student health service	19.9 to 20.4	50	NR	NR	Fair
Schaus et al., 2009[119]	363 0	12	U.S. Florida	College student health center	20.6	52	22	8.38 to 9.59	Fair

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

[a]This was a subgroup analysis of TrEAT,[96] 226 of the 774 enrolled subjects were young adults (age 18 to 30).

[b]21% 18 to 21, 37% 22 to 25, and 47% 26 to 30.

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).[87, 88, 119] Other studies did not collect or report information to allow the determination of whether any subjects met criteria for alcohol dependence.[116-118]

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.[87, 116-119] For the subgroup analysis of Project TrEAT, outcomes were reported out to 48 months.[88] One trial reported a baseline alcohol use of about 17 drinks per week,[87] one about 9 drinks per week,[119] and two trials did not report baseline alcohol use.[116-118] The subgroup analysis from Project TrEAT reported a baseline alcohol use of about 17 drinks per week.[88]

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,[87, 88, 119] and two relied primarily on an AUDIT score of 8 or more with or without quantity-frequency criteria in addition.[116-118] 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,[119] 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.[87]

The interventions of included studies for this section are described in Table 18, organized by intervention intensity. Three trials evaluated interventions delivered in person by the PCP,[87, 88, 119] and two evaluated Web-based interventions that were self-administered via computer.[116-118]

Table 18. 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 et al., 2008[116] Kypri et al., 2007[117]	Web-based assessment and personalized feedback on drinking	Self	Computer	1	10-15 min
Brief	Kypri et al., 2004[118]	Web-based assessment and personalized feedback on drinking	Self	Computer	1	10-15 min
Brief multicontact	Fleming et al., 2010[87] CHIPs	Two visits 1 month apart with PCP and a followup phone call or email 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

Table 18. Description of behavioral counseling interventions for improving intermediate outcomes for young adults or college students with alcohol misuse, by intervention intensity (continued)

Intensity	Study	Intervention	Delivered By	Delivery Method	No. of Contacts	Length of Each Contact
Brief multicontact	Grossberg et al., 2004[88] TrEAT	Two visits 1 month apart with PCP and a followup 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 multicontact	Kypri et al., 2008[116] Kypri et al., 2007[117]	Web-based assessment and personalized feedback on drinking	Self	Computer	3	10-15 min
Extended multicontact	Schaus et al., 2009[119]	Motivational intervention sessions that combined patient-centered motivational interviewing and cognitive-behavioral skills training + booklet on alcohol prevention	PCP	In person	2	20 min

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

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.[116-118] Control groups in the CHIPs study[87] and Project Health[88] received a general health booklet; the control group in the study by Schaus and colleagues received an alcohol problems–prevention booklet.[119]

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[87, 88, 119] 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%). 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).[116-118]

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[87] to 4.1[88] 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.

The subgroup analysis from Project TrEAT[88] reported long-term results beyond 12 months. 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).

Heavy Drinking Episodes

Not enough studies reported the percentage of subjects with or without heavy drinking episodes to conduct quantitative synthesis. However, the three studies assessing in-person interventions reported the number of episodes of heavy drinking in the past month[87, 88, 119] and the two studies (contributing three comparisons) assessing Web-based screening and intervention reported the rate ratio of episodic heavy drinking.[116-118] 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 multidose group vs. placebo 0.71, 95% CI, 0.51 to 1.01).[116, 117]

The subgroup analysis from Project TrEAT[88] reported long-term results beyond 12 months. 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 Limits Achieved

None of the included studies reported this outcome.

Followup 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 19). The study randomized 250 pregnant women with a gestational age of 28 weeks or less to a comprehensive assessment only or a comprehensive assessment followed by a behavioral intervention.[120]

Table 19. 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 et al., 1999[120]	250 0 current[a]	About 6[b]	U.S. Mass.	Obstetric practices	30.7	100	22	Mean drinks per drinking day: 0.6 to 0.9[c]	Fair

% Dep = percentage of subjects with alcohol dependence; Fem = female; Mass. = Massachusetts; mths = months; N = total number randomized/assigned to intervention and control groups; U.S. = United States; wk = week; y = years

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

[b]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.

[c]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[120] is described in Table 20. We categorized the intensity as extended because 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 20. 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 et al., 1999[120]	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 U.S. Surgeon General recommendation	PCP and researcher	In person	1	2-hr assessment; 45-min intervention

hr = hour; min = minute; No. = number; PCP = primary care physician; U.S. = 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).

Heavy Drinking Episodes

The study did not report this outcome.

Recommended Drinking Limits Achieved

The study did not report this outcome.

Followup 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% vs. 72%, p= 0.04).

Applicability

The findings are generally applicable to people with risky/hazardous drinking identified by screening in primary care settings. It is uncertain whether findings are applicable to harmful drinkers or people with alcohol abuse. 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 heavy episodic drinking patterns of consumption, and one study focused only on those with binge drinking.[89] Overall findings and those from the one study focused on binge drinking were consistent in finding interventions to be efficacious for reducing heavy episodic 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 followups, but two studies conducted with college student populations demonstrated benefits of Web-based interventions delivered via computer.[116-118]

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 multicontact, and extended multicontact.

Four RCTs 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 multicontact intervention (insufficient SOE). No studies compared a brief multicontact intervention with an extended multicontact intervention (insufficient SOE). No studies used 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 multicontact 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 limits at 12 months.
- **Brief interventions compared with extended multicontact 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 multicontact compared with extended multicontact 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 multicontact 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 multidose 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 21). All were multiarm (more than two study groups) RCTs conducted exclusively in primary care settings except for the WHO study,[84] 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. Two of the four studies reported more than 10 percent of included subjects likely having some degree of alcohol dependence.[83, 90] These included a study conducted in 85 general practices in Germany with 30.4 percent meeting criteria

for dependence (by DSM-IV diagnostic interview)[90] 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.[83]

One study was conducted exclusively in the United States, one was multinational including the United States, and one each in Germany and Australia (Table 21). Studies followed subjects for up to 12 months. The mean age ranged from 35 to 46 years. Women represented 19 to 43 percent of study participants. Rates of nonwhite participants were reported in only one study (23.3%).[103]

Two studies reported baseline alcohol consumption between 15 and 30 drinks per week,[90, 103] 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.[83]

The interventions compared in the included studies for this section are described in Table 22. Two studies directly compared a very brief intervention with one of greater intensity.[83, 84] The WHO brief intervention study compared 5 minutes of simple advice with a 15-minute brief intervention of counseling about drinking, using 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.[84] 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.[83]

Table 21. 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[84]	1,559 0	9	8, including U.S.	Outpatient medical settings	35.9 to 36.9	19.2	NR	NR	Fair
Bischof et al., 2008[90] 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[103] ELM	301 NR	12	U.S. Penn.	12 PC clinics	45.6	30.2	23.3	15.5 to 18.6	Fair
Richmond et al., 1995[83] Alcoholscreen	378 35[a]	12	Australia	40 PC practices	37.7	43	NR	38.5	Fair

% 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; U.S. = United States; WHO = World Health Organization; wk = week; y = years

[a]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).

Note: When data were not reported for mean age, %female, % nonwhite, 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.

Table 22. 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[84]	Very brief	Group 1: Advice, illustrated pamphlet	Various clinic staff	In person	1	5 min
WHO Brief Intervention Study, 1996[84]	Brief	Group 2: Brief intervention, 30-page illustrated problem-solving manual	Various clinic staff	In person	1	15 min
Richmond et al., 1995[83] Alcoholscreen	Very brief	Group 2: Physician advice and a self-help manual (after assessment)	PCP	In person	1	5 min
Richmond et al., 1995[83] Alcoholscreen	Extended multicontact	Group 1: "Alcoholscreen" program: 5 short consultations (introduction, patient education, 3 followups) 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 (followup visits)
Maisto et al., 2001[103] 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
Maisto et al., 2001[103] ELM	Extended multicontact	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[90] SIP study	Extended multicontact	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[90] SIP study	Extended multicontact	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

ELM = Early Lifestyle Modification; min = minutes; No. = number; NR = not reported; PCP = primary care physician; SIP = Screening and Intervention in Primary Care; U.S. = United States; WHO = World Health Organization; y = years

The ELM study compared a brief intervention with a motivational enhancement (ME) intervention (an extended multicontact intensity intervention).[103] 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 multicontact by our criteria.[90] 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.

Intermediate Outcomes

All four studies reported some intermediate outcome measures of interest (Table 23). All four reported measures of alcohol consumption with reductions in both intervention groups, one reported measures of heavy episodic drinking, and two reported measures of abstinence. No studies reported followup with referrals. For many of the outcomes reported, statistical testing to compare the different behavioral interventions was not reported. Among the studies that reported 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. However, 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 23. Intermediate outcomes for behavioral counseling interventions compared in head-to-head trials for adults with alcohol misuse

Comparison	Study Duration	Alcohol Consumption	Heavy Drinking Episodes	Recommended Limits Achieved	Abstinence
Very brief vs. Brief	WHO Brief Intervention Study, 1996[84] 9 mths	% of subjects decreasing average daily amount[a] 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[a] Men VB: 21 vs. B: 17 Women VB: 27 vs. B: 25	% abstinent[a] Men VB: 5 vs. B: 8 Women VB: 7 vs. B: 12
Very brief vs. Extended multicontact	Richmond et al., 1995[83] Alcoholscreen 12 mths	Reduction in weekly consumption at 12 months[a] VB: -2.1 vs. EM: -7.0	NR	% drinking above recommended limits (% change from baseline) at *12 months:* VB: 77.1 (-2.1) vs. EM: 76.0 (-7.3), p= NS	NR
Brief vs. Extended multicontact	Maisto et al., 2001[103] 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 multicontact vs. Extended multicontact	Bischof et al., 2008[90] 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, reported only for subgroups[b]	NR	NR

B = brief intervention up to 15 minutes; ELM = Early Lifestyle Modification; EM = extended multicontact 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; vs. = versus; WHO = World Health Organization

[a]p-values or confidence intervals not reported.

[b]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 limits in those receiving a very brief intervention as well as those receiving an extended multicontact intervention.[83] Both point estimates favored the extended multicontact group, but between-group differences either were not reported or were not statistically significant (Table 23).

The ELM study reported a reduction in the number of drinks in the last 30 days for both groups (brief and extended multicontact), without a statistically significant difference between groups (the confidence intervals for the two groups overlapped).[103] 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 23).

The SIP study reported a reduction of grams of alcohol consumed per day for two variations on extended multicontact interventions (full care and stepped care) that was not significantly different (p=0.217).[90] The study also reported heavy episodic drinking outcomes by subgroup (but not for the overall sample) (Table 23).

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 24).[116, 117] 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 4 weeks (four for women, six for men).[116-118]

Table 24. 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	% Nonwhite	Baseline Alcohol Use (Drinks/wk)	Quality
Kypri, 2008[116, 117]	576 NR	12	New Zealand	University primary health care service	20.1 to 20.3	52	NR	NR	Good

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

Note: When data were not reported for mean age, %female, % nonwhite, and baseline alcohol consumption for the total sample but were 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 multicontact intervention (Table 25). Both interventions were Web based, self-administered by subjects via computer.[116, 117] 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 25. 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 et al., 2008[116] Kypri et cal., 2007[117]	Brief	Web-based assessment and personalized feedback on drinking	Self	Computer	1	10-15 min
Kypri et al., 2008[116] Kypri et cal., 2007[117]	Brief multi-contact	Web-based assessment and personalized feedback on drinking	Self	Computer	3	10-15 min

min = minutes; No. = number

Intermediate Outcomes

The study reported measures of alcohol consumption and heavy drinking episodes 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: RR, 0.77; 95% CI, 0.63 to 0.95; brief multicontact: 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 multicontact intervention (RR, 0.87, 95% CI, 0.71 to 1.06).

For heavy drinking episodes in the past 2 weeks, the multicontact 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 multicontact 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,[92, 96, 99, 109, 111-113] all of which reported information about smoking and two of which reported anxiety.[92, 109] We found no evidence of direct harms, aside from opportunity costs associated with the interventions.

Anxiety

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

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

- No studies addressed these outcomes (insufficient SOE).

Opportunity Costs/Time

- One 1997 study reported about $39 in personal costs (worth approximately $53 in 2011–2012) for enrolled subjects due to lost work time and travel.
- 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).

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 in personal costs for lost work time and travel for study-related visits.[97]

Across studies, the amount of time that participants invested in the interventions ranged from very brief (up to 5 minutes during a single interaction)[83, 84] 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.[92, 96, 109, 111] 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 included just one sentence stating that there was no change in the mean number of cigarettes smoked,[96] no changes in the reported frequencies of cigarette consumption,[92, 109] or that cigarette consumption had dropped slightly in both groups.[111]

Two studies reported anxiety changes among individuals undergoing interventions for alcohol misuse. After the intervention, mean anxiety level was slightly higher in men [92]but slightly lower in women[109] than compared with 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.[112, 113] Similarly, smoking status did not differ in women receiving behavioral interventions compared with those receiving usual care in Project TrEAT.[99]

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 whether 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 (four studies; RR, 0.64, 95% CI, 0.24 to 1.7) or for all age groups combined (adults, older adults, and young adults/college students) (six studies; RR, 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 (using 6- and 12-month follow up) reported a total potential economic benefit of the brief intervention of $423,519, including more than $190,000 savings in emergency department and hospital use and almost $230,000 in avoided costs of crime and motor vehicle accidents.[97] The average per subject benefit was more than $1,100 and the benefit-cost ratio was 5.6:1 (95% CI, 0.4 to 11.0).[97] Using data from the 48-month follow up, the authors reported an intervention cost per patient of $205, and a benefit per patient of $7,985, for a resulting benefit-cost ratio of 39 (95% CI, 5.4 to 72.5).[98] (low SOE).
- **Legal issues:** one 48-month study (Project TrEAT) found no significant difference between the intervention and control groups for assault/battery/child abuse, resist/obstruct officer/disorderly conduct, criminal damage/property damage, theft/robbery, and other arrests, but reported a difference for controlled substance/liquor violations, with 2 in the intervention group compared with 11 in the control group ($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).[92, 102, 109]
- **Sick days, employment stability:** evidence was insufficient to draw conclusions.

Older Adults

- **Morbidity and mortality:** Evidence from one 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.[113] 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 intervention 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[88] 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 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).[88]
- **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).[88]
- **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 (RR between 0.70 and 0.80, moderate SOE).[116, 118]
- **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).[88]
- **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 26 summarizes the characteristics of the eight trials (targeting adult populations) meeting our inclusion criteria for this question. All were RCTs conducted exclusively in primary care settings. The trials generally targeted those with risky/hazardous drinking. 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).[91]

Two of the studies were conducted exclusively in the United States, four in the United Kingdom, and one each in Germany and Thailand (Table 26). Most studies followed subjects for 12 months; two studies reported outcomes beyond 12 months, up to 24 months[85, 110] or 48 months.[88, 96-99]

Table 26. 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	% Nonwhite	Baseline Alcohol Use (Drinks/wk)	Quality
Anderson, Scott, 1992[92]	154 NR	12	U.K.	8 PC group practices	43 to 45.1	0	NR	37.9 to 38.8	Fair
Bischof et al., 2008[90] Grothues et al., 2008[93] Reinhardt et al., 2008[94] 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[96] Fleming et al., 2000[97] Fleming et al., 2002[98] Grossberg et al., 2004[88] Manwell et al., 2000[99] Project TrEAT	774 NR[a]	48	U.S. Wisconsin	17 community PC practices	NR[b]	38	5.6 to 11.9	18.9 to 19.1	Good
Lock et al., 2006[102]	127 0	12	U.K.	General practices	44.1	50	NR	23 to 26.48	Fair
Noknoy et al., 2010[91]	117 13.8 to 15.3[c]	6	Thailand	Rural PC units	37	8.5	100 (Thai)	15.15	Fair
Scott, Anderson, 1990[109]	72 NR	12	U.K.	8 PC group practices	44.4 to 47.2	100	NR	25.8 to 26.7	Fair
Senft et al., 1997[85] Freeborn et al., 2000[110]	516 0	24	U.S. 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 et al., 1988[111]	909 NR	12	U.K.	47 group practices	41.7 to 44.6	29.1 to 29.8	NR	35.1 (females) and 62.2 (males)	Fair

% Dep = percentage of subjects with alcohol dependence; Fem = female; HMO = health maintenance organization; 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; U.K. = United Kingdom; U.S. = United States; wk = week; y = years

[a]Six subjects (per medical record audit) received formal alcohol treatment during the 1-year followup period; those may represent subjects ultimately diagnosed with alcohol dependence.

[b]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.

[c]Based on AUDIT >25.

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

Most studies reported a baseline alcohol consumption between 15 and 30 drinks per week. Two studies conducted in the United Kingdom[92, 111] reported more than 30 drinks per week at baseline.

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 27, stratified by intervention intensity. Intervention intensity varied from brief (single contact, up to 15 minutes) to brief multicontact (multiple contacts, up to 15 minutes each) to extended multicontact (multiple contacts, one or more of them longer than 15 minutes).

Table 27. 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, Scott, 1992[92]	Brief advice, feedback about own consumption and norms, and a self-help booklet	PCP	In person	1	10 min
Brief	Lock et al., 2006[102]	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, Anderson, 1990[109]	Brief advice, feedback about own consumption and norms, and a self-help booklet	PCP	In person	1	10 min
Brief	Senft et al., 1997[85] Freeborn et al., 2000[110]	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[88, 96-99] Project TrEAT	Two visits 1 month apart with PCP and a followup 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 et al., 2010[91]	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 et al., 1988[111]	Brief advice, an information booklet ("That's the Limit"), sex-based recommendation for limiting drinking, a drinking diary, and followup sessions	PCP	In person	1 to 5[a]	NR[b]

Table 27. 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 multicontact	Bischof et al., 2008[90, 93, 94] SIP study	Group 1: Full Care: 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 multicontact	Bischof et al., 2008[90, 93, 94] SIP study	Group 2: Stepped Care: 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

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; U.S. = United States; y = years

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

[b]Not reported in the article; per the author, they trained them to do "up to 15 minutes," and he believes they were generally 10–15 minutes (Paul Wallace, personal email communication, December 2011).

Four studies tested interventions delivered primarily by the patient's primary care physician.[92, 96, 109, 111] Two studies tested interventions delivered primarily by nurses or physician assistants,[91, 102] and two studies (contributing three interventions) tested interventions delivered primarily by research team personnel, such as a health counselor[85] or trained psychologist.[90] Among the interventions involving patient's usual primary care physician, some used the physicians to deliver initial and any repeated intervention contacts[111] whereas others also used educators, counselors, or nurses for followup contacts.[96]

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.[102]

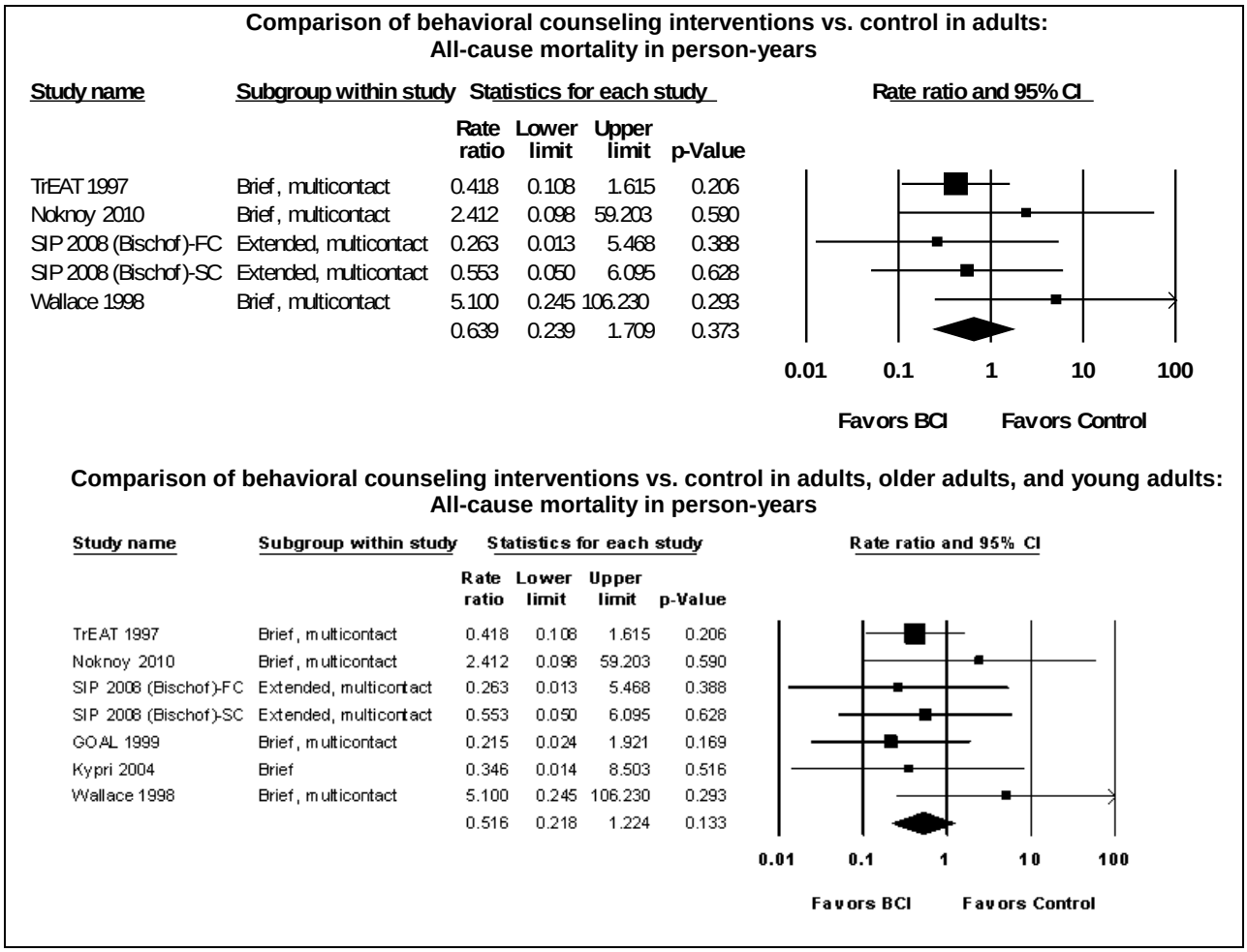
Mortality

Four studies enrolling adults reported any deaths (all-cause mortality) in one or more study groups.[90, 91, 96, 98, 111] 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).[91, 111] Of the 16 total deaths reported, none were definitely related to alcohol misuse. Just two of the studies reported causes of death; 6 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 (RR, 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)[112] and in

younger adults[118] that reported mortality. Results trended toward favoring behavioral interventions but remained nonstatistically significant (RR, 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.[92, 109] 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).[91] The best available evidence comes from Project TrEAT (N=774),[98] which reported outcomes after 48 months of followup. The study found lower numbers of motor vehicle crashes with fatalities (0 vs. 2), motor vehicle crashes with nonfatal 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).[85, 91, 92, 98, 102, 109] 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,[92, 109] general practitioner visits,[102] nurse practitioner visits,[102] accident and emergency visits,[102] outpatient visits by 24 months,[85, 110] number of hospital days,[85, 110] emergency department visits,[96, 98] and visits to primary care physicians due to alcohol consumption.[91] 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 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). 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% vs. 22.0%, $p=0.81$) 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-month study, Lock and colleagues reported fewer accident and emergency visits for the intervention group than the control, but the difference was not statistically significant.[102]

Costs

Two included studies enrolling adults reported costs.[97, 98, 102] One study[102] (N=127) conducted in the United Kingdom 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).[102] The health economic evaluation in this study included both National Health Service resource costs and individuals' personal costs (e.g., time and transportation costs).

The best evidence comes from benefit-cost analyses from Project TrEAT (N=774), conducted from the societal perspective. Analyses using 6- and 12-month followup data reported a total potential economic benefit of the brief intervention of $423,519 (95% CI, $35,947 to $884,848), including more than $190,000 savings in emergency department and hospital use and almost $230,000 in avoided costs of crime and motor vehicle accidents.[97] The average per

subject benefit was more than $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.[97] Using data from the 48-month followup from Project TrEAT and the societal perspective, Fleming and colleagues reported an intervention 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).[98]

Legal Issues

Only one study, Project TrEAT, reported outcomes related to legal issues.[98] After 48 months, the number of the following events was 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 reported a difference for controlled substance/liquor violations: 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).[92] 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).[109] 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.[102]

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 28).[112, 113] Further description of the study and the intervention used is provided in Key Question 4a.

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).[112, 113] 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.

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 older adults with alcohol misuse

Study	N % Dep	Duration (mths)	Country	Setting	Mean Age (y)	% Fem	% Nonwhite	Baseline Alcohol Use (Drinks/wk)	Quality
Fleming, 1999[112] Mundt, 2005[113] GOAL	158 0	24	U.S. Wisconsin	24 PC practices	NR >92% age 65-75	33.5	NR	15.54 to 16.58	Fair

% 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; U.S. = United States; wk = week; y = years

Note: When data were not reported for mean age, %female, % nonwhite, 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.

Costs

An economic analysis of Project GOAL found no significant difference in economic outcomes through 24 months.[113] 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 intervention 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 29). For further description of these studies and the interventions utilized see Key Question 4a.

Mortality

One of the trials (Kypri 2004)[118] 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.

Table 29. 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 et al., 2010[87] CHIPs	986 0	12	U.S. and Canada	5 college health clinics	21	50.5 to 51.3	8.1 to 10.5	17.3 to 17.8	Good
Grossberg et al., 2004[88] TrEAT	226[a] NR	48	U.S. Wisconsin	17 community PC practices	NR[b]	51	14	16.2 to 18.3	Fair[c]
Kypri et al., 2008[116] Kypri et al., 2007[117]	576 NR	12	New Zealand	University primary health care service	20.1 to 20.3	52	NR	NR	Good
Kypri et al., 2004[118]	104 NR	6	New Zealand	University student health service	19.9 to 20.4	50	NR	NR	Fair
Schaus et al., 2009[119]	363 0	12	U.S. Florida	College student health center	20.6	52	22	8.38 to 9.59	Fair

% 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; U.S. = United States; wk = week; y = years

[a]This was a subgroup analysis of TrEAT,[96] 226 of the 774 enrolled subjects were young adults (age 18 to 30). The main study was rated good, this subgroup analysis was rated fair quality.

[b]21% 18 to 21, 37% 22 to 25, and 47% 26 to 30.

[c]This was a subgroup analysis of TrEAT.[96] The main study was rated good, and this subgroup analysis was rated fair quality.

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

Morbidity

A subgroup analysis of young adults (18 to 30) from Project TrEAT reported significantly fewer motor vehicle crashes with nonfatal 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 followup.[88] 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).

Health Care Utilization

Two studies reported utilization outcomes.[87, 88] 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.[87] 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% vs. 18.3%, 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, $p<0.01$).[88] It reported a lower number of days of hospitalization for the intervention group that did not reach statistical significance (131 vs. 150, p=NS).[88]

Academic, Legal, or Social Problems

Two studies conducted in New Zealand reported academic outcomes, using the Academic Role Expectations and Alcohol Scale (AREAS).[116, 118] The larger trial (N=576) reported fewer academic consequences for the intervention groups than control groups at 12 months (RR: single-contact intervention 0.80, 95% CI, 0.66 to 0.97; multicontact intervention 0.75, 95% CI, 0.62 to 0.90).[116] 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).[118]

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 reported a difference for controlled substance/liquor violations: 0 in the intervention group compared with 8 in the control group ($p<0.01$).[88]

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 (RR, 0.76, 95% CI, 0.60 to 0.97) but did not quite reach statistical significance in the larger 12-month trial (RR, 0.82, 95% CI, 0.67 to 1.01).[116, 118] The CHIPs study found a greater reduction in alcohol-related harm in favor of the experimental group at 12 months ($p=0.33$).[87] Schaus and colleagues found a similar difference at 6 months ($p= 0.028$) and 9 months ($p=0.041$).[119]

The subgroup analysis of young adults from Project TrEAT reported no difference in operating while intoxicated, or for other moving violations.[88]

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 drinking identified by screening in primary care settings. Most studies enrolled some subjects with heavy episodic drinking patterns of consumption. We did not identify any studies in adolescent populations, veterans, or pregnant women, and results thus have uncertain applicability to these populations. We identified only one study in older adults and therefore were unable to make conclusions for most outcomes for older adults. We identified a sufficient number, however, 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 in which 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 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-U.S. health care systems may be substantially different from those in the United States, 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 Australia, Canada, Germany, Kenya, Mexico, New Zealand, Norway, Russia, Spain, Thailand, United States, United Kingdom, 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 United States and for non-U.S. 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 United States and outside of the United States 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 U.S. studies[86, 88, 96-99, 106-108, 112, 113] and one foreign study[111] 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[85, 95, 110] were in HMO settings. One[95] used seven screening/assessment instruments and provided a single session with a PCP followed by approximately 6 weeks of phone counseling

provided by a clinical psychology student. The other[85, 110] used two screening/assessment instruments and provided a 30-second intervention with a provider followed by 15 minutes with a trained counselor. Twelve of the studies[83, 84, 89-94, 100-105, 109, 114, 115, 120] were conducted in community-based primary care settings (4 U.S. and 7 non-U.S.). U.S.-based studies used slightly more screening/assessment instruments 6 versus 3.3 in the non-U.S. studies.

Four studies[87, 116-119] were conducted in university student health clinic settings. Two[116-118] of the four studies were in non-U.S. settings. The U.S. studies also reported on their training protocols, which were extensive. Both also monitored adherence to protocol through the use of a form verifying 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-U.S. studies.[116-118] 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. The number of HMO settings was insufficient 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,[120] screening and assessment lasted up to 2 hours. In several studies, research staff screened patients via telephone interviews and also used telephone to conduct brief followups and booster sessions with patients.

Fourteen of the interventions[83, 86-89, 92, 95-99, 106-109, 111-115, 119, 120] were delivered by a primary care physician alone or in conjunction with a health educator or nurse. Three[91, 100-102] were delivered by a nurse or physician assistant; one was conducted by a psychologist;[90, 93, 94] two by a researcher;[85, 103-105, 110] and one by unspecified interventionists.[84] Two interventions[116-118] conducted in college students were provided via a computer, and both reported some evidence of effectiveness.

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). Two other studies that did not provide sufficient data for our main

meta-analysis reported benefits of interventions delivered primarily by nurses[100, 101] or by nurses and physician assistants[91] for some consumption outcomes. 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[120] used incentives to compensate pregnant women for completing the assessment ($50) and postpartum followup ($75).[120] This study also provided compensation for collaterals ($10). Another[119] 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[88, 96-99] reported $250 compensation paid to participating physicians and $50 paid to patients. The Healthy Moms study[100, 101] paid patients $150 if they completed the required procedures.

Training

Of the 23 RCTs we included in this report, 16 included at least some mention of training. Provider and/or staff trainings were reported in most studies. When reported, training duration ranged from as little as 15 minutes[92, 109] to as long as 6 to 8 hours,[91, 119] full-day workshops,[87] or a 4-week training in motivational interviewing principles.[90] Nine studies[87, 88, 90, 91, 93, 94, 96-108] reported trainings of research staff and interventionists that were 30 minutes and longer and also provided feedback, booster sessions, or weekly conference calls to maintain adherence to protocol. Five others[85, 89, 95, 110, 111, 114, 115] reported trainings of 30 minutes or more but did not provide information on booster sessions. One RCT[90, 93, 94] reported that counselors completed a 4-week training in motivational interviewing.

The type of training received was often described fairly briefly, possibly due to space limitations. For example, in Project TrEAT,[96] physicians "were trained to administer the intervention protocol through role playing and general skills techniques in educational programs…also received additional training in booster sessions that occurred at least twice during the trial." Some studies provided much greater detail. For example, in Project Health,[106] "training generally occurred in 2 sessions…a 2-hour small-group session and a 10 to 20 minute individual tutorial session 2 to 6 weeks after the group session. In addition, at the beginning of the recruitment period research assistants generally gave a brief (1-2 minute) refresher orientation to providers about their use of the intervention tools (i.e., goal statement, tip sheets) just before a study patient was seen. In total, providers received about 2.5 to 3 hours of training."

Use of Electronic Health Records

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

Limitations

This question was confined to examining RCTs that were included in the other questions in this report (RCTs primarily examining the efficacy or effectiveness of screening and brief intervention). This report does not address the dissemination and implementation literature that may shed further light on health care system influences that promote or hinder effective screening and interventions for alcohol misuse.

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 several categories of alcohol misuse (i.e., risky/hazardous drinking, harmful drinking, alcohol abuse, and alcohol dependence). It is important to note that the 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.[18] It appears that the included trials of behavioral counseling generally enrolled subjects with risky/hazardous 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.[83, 90, 91] It is not clear how many trials enrolled subjects with alcohol abuse, because 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 drinkers; they 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 harmful drinkers or 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 adequate evidence that several screening instruments can detect alcohol misuse in adults with acceptable sensitivity and specificity. A single-question

screen (covering the past 12 months), AUDIT-C, and AUDIT appear to be the best overall instruments for screening adults for the full spectrum of alcohol misuse in primary care, considering sensitivity, specificity, and time burden. Several instruments require as little as 1 to 2 minutes to administer (e.g., single question screens, AUDIT-C). We present the main findings here by population.

All Adults (Age 18 or Older)

Single-question screens covering the past 12 months have reported sensitivities of 0.82 to 0.87 and specificities of 0.61 to 0.79 for detecting alcohol misuse in adults in primarycare[17, 58]—similar operating characteristics compared with longer questionnaires, supporting the use of the single-question screen endorsed by the NIAAA.[26] Single-question screens typically ask people to report any occasions when they drank four (women) or five (men) drinks or more over a recent time period (past 12 months).

When focusing on adequately sized U.S. studies that reported sensitivity and specificity of screening for the full spectrum of alcohol misuse in primary care, data suggest that some often recommended cut-points for screening (i.e., AUDIT≥8) may need to be revised. The AUDIT had sensitivity of 0.44 to 0.51 for identifying the full spectrum of alcohol misuse in adults using a cut-point of ≥8; more optimal balance of sensitivity and specificity were seen at cutoffs of 4 or 5 (at a cutoff of ≥4: 0.84 to 0.85 and 0.77 to 0.84, respectively; and at a cutoff of ≥5: 0.70 to 0.92 and 0.73 to 0.94, respectively). Further, sex-specific cutoffs may be warranted as sensitivities for women at cutoffs of ≥4 and ≥5 were quite low (0.47 to 0.65 and 0.35 to 0.53, respectively), but improved at ≥3 (to 0.70 to 0.79 with specificity of 0.86 to 0.87).

Young Adults and College Students

The included systematic reviews identified only one study reporting the sensitivity and specificity of a screening instrument for this group, the full AUDIT (≥8), which reported a sensitivity of 0.82 and specificity of 0.78 for identifying risky/hazardous drinking.

Pregnant Women

The AUDIT-C performed better than other instruments with available data for detecting both at-risk drinking and abuse or dependence, demonstrating both high sensitivity (0.95 or higher) and high specificity (up to 0.85).

Adolescents

None of the included systematic reviews provided information about the use of screening instruments in adolescents. Note that our methods for identifying all potentially relevant studies for this Key Question have some limitations: we did not review all individual publications assessing screening instruments. Instead, we relied on previously published systematic reviews to find information and we filled in gaps with data from other sources (i.e., Technical Expert Panel members, peer and public reviewers, personal files).

Behavioral Counseling Interventions in Primary Care

This section summarizes the main findings regarding behavioral counseling interventions (Table 30) 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 31 and 33 through 35 below.

Table 30. What are brief behavioral counseling interventions delivered in primary care settings?

- Behavioral counseling interventions include the range of personal counseling and related behavior-change interventions that are employed in primary care to help patients change health-related behaviors.[31]
- "Counseling" here denotes a cooperative mode of work demanding active participation from both patient and clinician that aims to facilitate the patient's independent initiative.[31]
- 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."[32]
- Range from very brief interventions within a primary care visit to multicontact interventions that entail multiple, often more lengthy, visits and nonvisit contacts over an extended period.[1]
- Can include the following elements: advice, feedback, motivational interviews of varying length and number, or cognitive behavioral strategies (e.g., self-completed action plans, written health education or self-help materials, drinking diaries, problem-solving exercises to complete at home).

Table 31. Summary of effectiveness of behavioral interventions compared with controls for all adults: Intermediate, health, utilization, and other outcomes

Type of Outcome	Specific Outcome	Results Effect Size (95% CI)	Strength of Evidence
Intermediate	Consumption (drinks/week)	Reduction of 3.6 (2.4 to 4.8).	Moderate
	Heavy drinking episodes	12% fewer subjects reported heavy drinking episodes (7%, 16%).	Moderate
	Recommended drinking limits	11% more subjects achieved (8%, 13%).	Moderate
Health	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.[a]	Low
	Alcohol-related accidents[b]	Evidence was insufficient to draw conclusions.	Insufficient
	Alcohol-related liver problems	Evidence was insufficient to draw conclusions.	Insufficient
Utilization	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.[c]	Low
	Emergency visits	Difference between groups for visits in the past 6 months did not reach statistical significance.[d]	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 31. Summary of effectiveness of behavioral interventions compared with controls for all adults: intermediate, health, utilization, and other outcomes (continued)

Type of Outcome	Specific Outcome	Results Effect Size (95% CI)	Strength of Evidence
Utilization (continued)	Costs	Over 12 months Project TrEAT reported a total potential 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 an intervention cost per patient of $205, and a benefit per patient of $7,985, for a resulting benefit-cost ratio of 39 (95% CI, 5.4 to 72.5) (societal perspective).[c,e]	Low
Other	Legal problems	One 48-month RCT found no significant difference between the intervention and control groups for several legal problems,[f] but did report a difference for controlled substance/liquor violations, with 2 in the intervention group compared with 11 in the control group ($p<0.05$).[c]	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

CI = confidence interval; N = number; RCT = randomized controlled trial; TrEAT = Trial for Early Alcohol Treatment; vs. = versus; WMD = weighted mean difference

[a]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; RR, 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 are little long-term data. A previously published meta-analysis (Cuijpers, 2004) reported an RR of mortality of 0.47 (95% CI, 0.25 to 0.89). That analysis included 4 studies: Fleming et al., 1999 (Project GOAL), Fleming et al., 2002 (Project TrEAT), Wutzke et al., 2002 (WHO study), and Chick et al., 1985. Our meta-analysis included the first two of these studies. We excluded Chick, 1985 because the study enrolled patients in hospital wards and was not conducted in a primary care setting by enrolling those identified by screening in primary care. We included Wutzke, 2002 in a sensitivity analysis only, but not in the main analysis (Appendix E). Even with the addition of Wutzke, our meta-analysis did not reach statistical significance, but it did trend further in that direction (Appendix E). We included 4 studies in our meta-analysis for all adults that the Cuijpers 2004 meta-analysis did not include; most of these were newly published since 2004 (Wallace et al., 1998; Noknoy, 2010; SIP/Bischof, 2008; and Kypri, 2004).

[b] "Accidents" is used here to indicate motor vehicle events and injuries.

[c]These data are from Project TrEAT;[96-98] the best available evidence.

[d]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.[96-98]

[e]The $205 per patient cost includes $166 borne by the clinics per patient and $39 borne by patients (for lost work time and travel costs).

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

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

All Adults (Age 18 or Older)

We found that behavioral counseling interventions improved self-reported alcohol consumption, heavy episodic 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 limits 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 beneath recommended limits over 12 months (Table 32).

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 32. 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

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

NNS = number needed to screen; NNT = number needed to treat

[a]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.[18] The prevalence of risky drinking and alcohol dependence are not linked in this table. In other words, although the prevalence of 4% for risky drinking and 2% for alcohol dependence are in the same column (as are 29% and 9%, respectively), there are no data to suggest that the prevalence of dependence is 2% when the prevalence of risky drinking is 4%.

[b]Based on absolute difference of 11% (that would achieve recommended drinking limits) from our meta-analysis including interventions of all intensity.

[c]Based on absolute difference of 15% (that would achieve recommended drinking limits) from our subgroup meta-analysis for brief multicontact interventions.

Notes: Data in table are number of people unless specified as percentage; the 1,000 people screened are those that have not been previously screened and have no known history of alcohol misuse. The scenario in this table is optimistic, because it assumes that screening identifies all those with alcohol misuse (100% sensitive) and that all those identified with misuse potentially get an intervention. We conducted sensitivity analyses to explore how NNT and NNS would change using other assumptions. The NNT does not change much using a variety of different assumptions; it ranges from 6.7 to 18.2. Using a sensitivity of 81% for the screening instrument (representative of the single question[17]) changes the NNS range to 39 to 281 (from 31 to 227). If only half of all those with a positive screening test receive an intervention, then the NNS range increases to 63 to 455. If 90% of those with a positive screen receive an intervention, the NNS range increases to 35 to 253. If the screening instrument sensitivity is 81% and only half of those with a positive screen receive an intervention, then the NNS range increases to 155 to 1,122.

To assess the differential effects of interventions using more or less time and those using 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 multicontact (each contact up to 15 minutes), and extended multicontact (some contacts beyond 15 minutes).

The evidence for effectiveness in adults is strongest for brief multicontact interventions; these studies consistently found statistically significant improvements in consumption, heavy drinking episodes, and achieving recommended drinking limits. The brief multicontact interventions were generally 10-15 minutes per contact. The effect sizes for brief multicontact interventions were greater than for other intensities (although confidence intervals generally overlapped). In addition, the best studies show that the effect of brief multicontact interventions remains for several years of followup,[97, 98, 107] and show improvement for some utilization

outcomes (fewer hospital days[97, 98]) and costs (benefit-cost ratio of 39:1 over 48 months, 95% CI, 5.4, 72.5[98]).

Brief single-contact interventions were effective for improving some intermediate outcomes in adult populations (i.e., achieving recommended drinking limits and reduction in drinks/week), but not others (i.e., heavy drinking episodes). Effect sizes were smaller than those for brief multicontact interventions for the outcomes showing benefit (e.g., 8% vs. 15% achieving recommended drinking limits and reduction of 3.7 vs. 4.4 drinks per week at 12 months). Although extended multicontact interventions appear to be effective for improving intermediate outcomes, we did not find evidence that they are more effective than brief multicontact interventions. Very brief interventions (up to 5 minutes, single contact) are likely not effective.

Long-term outcomes for consumption, heavy drinking episodes, and achievement of recommended drinking limits were available from two studies: Project TrEAT[88, 98, 99] and Project Health.[107] 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 followups with the health care system, attrition (if more subjects lost to followup 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 United States 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 to 5.4] than for those delivered primarily by research personnel (3.0, 95% CI, 1.0 to 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 to 7.6) than for those delivered in community-based settings (3.2, 95% CI, 2.2 to 4.3).

Older Adults (Age 65 or Older)

Two studies[112-115] enrolling only older adults provided evidence of the effectiveness of behavioral interventions for reducing consumption and improving the percentage of individuals drinking beneath recommended limits, but effect sizes were smaller than those found for all adults (Table 33). Evidence for health outcomes was insufficient to draw conclusions.

Table 33. Summary of effectiveness of behavioral interventions compared with controls for older adults: Intermediate, health, and utilization, and other outcomes

Type of Outcomes	Specific Outcomes	Results Effect Size (95% CI)	Strength of Evidence
Intermediate	Consumption (drinks/week)	Reduction of 1.7 (0.6 to 2.8)	Moderate
	Heavy drinking episodes	Evidence was insufficient to draw conclusions	Insufficient
	Recommended drinking limits	9% more subjects achieved (2%, 16%)	Low
Health	Mortality	Evidence from 1 study was insufficient to draw conclusions	Insufficient
	Alcohol-related accidents[a]	Evidence was insufficient to draw conclusions	Insufficient
	Alcohol-related liver problems	Evidence was insufficient to draw conclusions	Insufficient
Utilization	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.[113] 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 intervention group and $6,289 (95% CI, $3,549 to $9,029) per patient in the control group.	Low

CI = confidence interval; GOAL = Guiding Older Adult Lifestyles

[a]"Accidents" is used here to indicate motor vehicle events and injuries.

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

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 34). A subgroup analysis of young adults ages 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).[88] Two studies of Web-based interventions from New Zealand reported some effectiveness for improving academic-related outcomes.[116-118] Unlike studies in all adults, that generally found benefits to last for several years for intermediate outcomes, some positive outcomes of interventions for college students found at 6 months were no longer statistically significantly different between intervention and control groups 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 34. Summary of effectiveness of behavioral interventions compared with controls for young adults and college students: Intermediate, health, utilization, and other outcomes

Type of Outcomes	Specific Outcomes	Results Effect Size (95% CI)	Strength of Evidence
Intermediate	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
	Heavy drinking episodes	0.9 fewer heavy drinking days (0.3, 1.5) over 6 months	Moderate
	Recommended drinking limits	Evidence was insufficient to draw conclusions	Insufficient
Health	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[88] 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	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).[88]	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).[88]	Low
	Primary care visits	Evidence was insufficient to draw conclusions	Insufficient
	Costs	Evidence was insufficient to draw conclusions	Insufficient
Other	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 (RR between 0.70 and 0.80).[116, 118]	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).[88]	Low

CI = confidence interval; N = number; NS = not sufficient; RR = rate ratio; TrEAT = Trial for Early Alcohol Treatment; vs. = versus

Note: Evidence was insufficient to draw conclusions for followup 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)[120] 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 35).

A previously published Cochrane Review of psychological and/or educational interventions for reducing alcohol consumption among pregnant women[121] 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

Table 35. Summary of effectiveness of behavioral interventions compared with controls for pregnant women: Intermediate, health, utilization, and other outcomes

Type of Outcomes	Specific Outcomes	Results Effect Size (95% CI)	Strength of Evidence
Intermediate	Consumption (drinks/week)	Data from 1 study found no significant difference between groups; both groups had reductions in antepartum consumption	Low
	Heavy drinking episodes	Evidence was insufficient to draw conclusions	Insufficient
	Recommended drinking limits	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	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	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

CI = confidence interval
Note: Evidence was insufficient to draw conclusions for followup with referrals, legal problems, or quality of life; data are reported for study endpoint, approximately 6 months.

in increased abstinence from alcohol, and a reduction in alcohol consumption.[121] 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 determine the type of intervention that 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 because the duration of follow up of subjects was too short (just 2 months) for some studies[122, 123] or because the study was not conducted in a primary care setting.[124]

Our searches identified other studies focusing on pregnant women that did not meet our inclusion criteria.[122-139] Several did not take place in a primary care setting, but instead were conducted in other settings, such as those that included jails and specialized drug and alcohol treatment centers; these included, for example, the Project CHOICES study.[133] Others were excluded because they did not include a control group or because they followed participants after the intervention for less than 6 months.[122, 131] Several of these studies reported benefits of behavioral interventions for pregnant women, including reduction of alcohol consumption,[122, 131] reduced risk of an alcohol-exposed pregnancy,[133] higher rates of abstinence,[124] and better fetal and newborn outcomes (birthweights and birth lengths, and fetal mortality rates).[124]

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.[97]

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 multicontact 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 followup phone calls from a nurse.

Although trial data are limited regarding adverse effects of screening and behavioral interventions for alcohol misuse in primary care settings, other types of studies may offer some insights. Among a group of 24 general practitioners in Denmark who were interviewed about their participation in a screening and brief intervention program for alcohol misuse, nearly all reported experiencing negative reactions from some patients.[74] Such reactions ranged from feelings of uneasiness or embarrassment to finding another physician. The physicians themselves noted that the added work of screening and brief intervention was onerous and hampered the establishment of rapport with patients. They also expressed concerns that screening identified people for whom intervention was not necessary, yet took valuable time and resources, while at the same time failing to detect and help some for whom alcohol misuse was a real problem. However, other studies have found that patients view screening favorably, even perceiving higher quality of care when screening is followed by counseling.[140] For example, one prospective cohort study found that communication and whole-person knowledge were perceived as better among patients who were counseled about their alcohol misuse compared with those who were not counseled.[141]

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 provide contextual information 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 effective interventions are available for such individuals. However, a detailed review and comparison of treatments for alcohol dependence is beyond the scope of this review. 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 of efficacy for brief behavioral interventions in patients with AD in a primary care setting.[142] 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,[143] 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 the following: (1) AD is a heterogeneous illness with considerable variability in outcome and prognosis; (2) comorbidities: multiple physical and emotional illnesses can influence treatment outcomes; (3) there are many forms of treatment, including multiple varieties of psychosocial interventions and several pharmacological interventions; (4) patients have many pathways to treatment, 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 36 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 given that continued low-level drinking may place the patient at risk for future problematic drinking.[144]

Table 36. 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
- Pharmacotherapy[a] (disulfiram, naltrexone, acamprosate)
- Detoxification (inpatient, residential, day treatment, or outpatient)

[a]Pharmacotherapy can be used in addition to psychosocial therapy but is not recommended for use alone.
Note: This is not an exhaustive list of all treatments that have been studied or used for alcohol dependence but rather includes the most common.

Using complete abstinence as an outcome, from 15 to 35 percent of patients have been reported to achieve 1 year of sobriety following a variety of treatment approaches.[143] 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 to 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 one another in randomized trials, making interpretation and recommendations for specific interventions difficult.

Over the past 15 to 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.[145] These measures include significant increases in abstinent days or decreases in heavy drinking episodes, improved physical health, reductions in health care costs, and improvements in psychosocial functioning. Research using these nonabstinent outcomes provides additional

evidence for the effectiveness of treatment for alcohol dependence. Miller et al. (2001)[143] analyzed seven 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 1 year, in the remaining nonabstinent 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 Food and Drug Administration (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.[146] The average 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,[146] 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 with only a 48.6 percent good outcome for those who received placebo, whereas noncarriers demonstrated no naltrexone/placebo difference. Kim et al. (2009) and Oslin et al. (2003) also reported that the Asp40 allele was predictive of improved naltrexone response in alcohol dependence whereas Gerlenter et al. (2007) did not find this relationship. Mitchell et al. (2007) and Arias et al. (2008) failed to find an association of the Asp40 allele with treatment response to naltrexone or nalmefene in heavy drinkers. While clearly requiring additional confirmation and extension, 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 double-blind randomized controlled trials (RCTs) of pharmacotherapy that identified subjects by screening in a primary care setting or that assessed the efficacy or comparative effectiveness of pharmacotherapy in a primary care setting. Further, we were unable to identify any studies of pharmacotherapy for people with risky/hazardous drinking.

Applicability

The findings are generally applicable to people with risky/hazardous drinking identified by screening in primary care settings (see beginning of Discussion). It is uncertain whether findings

are applicable to harmful drinkers or people with alcohol abuse. 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 heavy episodic drinking patterns of consumption, and one study focused only on those with binge drinking.[89] Overall findings and those from the one study focused on binge drinking were consistent in finding interventions to be efficacious for reducing heavy episodic 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., nontraditional primary care settings such as infectious disease clinics for people with HIV), we did not find any, and our results have uncertain applicability to such settings.

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, multistep 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 to10 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 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,[90] and two studies conducted in college student populations demonstrated benefits resulting from Web-based interventions delivered via computer.[116-118]

It is unclear whether our findings are applicable to people with comorbid medical or psychiatric conditions, including those with multiple substance use disorders, 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.[93]

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 5 years, or another interval).

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)].

Studies were generally not designed to assess the impact of the interventions on morbidity and mortality; their focus was primarily on behavioral outcomes. In addition, 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 no biomarkers are 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.[73, 147] Nevertheless, it remains a concern that social desirability bias could play a role in the results of the included studies (i.e., although self-report is from both randomized groups in these studies, the group that gets more attention and advice to decrease their drinking may be more likely to report that they decreased their drinking). 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.[117]

Key Question 7 was confined to examining RCTs that were included in the other questions in this report (RCTs primarily examining the efficacy or effectiveness of screening and brief intervention). This report does not address dissemination and implementation literature that may shed further light on health care system influences that promote or hinder effective screening and interventions for alcohol misuse.

Future Research

We identified numerous gaps in the evidence, which future research could address. We identified no studies that randomized subjects, providers, or practices to screening compared with no screening to answer Key Questions 1 or 3. A cluster RCT of practices/health centers could perhaps address this gap in the literature. We found insufficient evidence to draw conclusions about the impact of screening and behavioral interventions on followup with referrals. Future studies could assess referral to treatment for alcohol dependence for people identified by screening in primary care, evaluating whether they follow up with referrals and whether it works when they get there. 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. Also, none of the included studies reported on stigma, labeling, discrimination, or potential interference with the doctor-patient relationship.

Although we concluded that brief multicontact 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) multicontact intervention, and it is unknown whether very brief multicontact interventions would be as effective as the brief multicontact interventions identified in this report (generally 10 to15 minutes per contact). 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 take up the entire allotted time for the visit to discuss alcohol misuse—and might mean 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 followup 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 interventions of 5 minutes or less).

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.

Finally, we found no double-blind RCTs of pharmacotherapy for alcohol dependence that identified subjects by screening in a primary care setting or that assessed the efficacy or

comparative effectiveness of pharmacotherapy in a primary care setting. Future studies could fill this void in the literature.

Conclusions

Behavioral counseling interventions improve intermediate outcomes (i.e., alcohol consumption, heavy episodic 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 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 multicontact interventions (generally 10 to 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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Appendix A. Search Strategy

MEDLINE®:

Search	Most Recent Queries	Result
#1	Search "Alcohol-Related Disorders"[Mesh]	86771
#2	Search "Alcohol Drinking"[Mesh]	41573
#3	Search "Alcoholism"[Mesh]	61181
#4	Search "drinking behavior"[MeSH Terms]	46604
#5	Search problem drink*	2021
#6	Search heavy drink*	3931
#7	Search alcohol problem*	2639
#8	Search risk drink*	563
#9	Search at-risk drink*	234
#10	Search alcohol depend*	6983
#11	Search excessive drink*	610
#12	Search excessive alcohol*	1501
#13	Search "alcohol consumption"[All Fields]	21680
#14	Search alcohol addiction*	596
#15	Search #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14	132104
#17	Search "Randomized Controlled Trial"[Publication Type] OR "Randomized Controlled Trials as Topic"[Mesh] OR "Single-Blind Method"[Mesh] OR "Double-Blind Method"[Mesh] OR "Random Allocation"[Mesh]	437318
#18	Search #15 AND #17	4529
#19	Search "meta-analysis"[Publication Type] OR "meta-analysis as topic"[MeSH Terms] OR "meta-analysis"[All Fields]	45475
#20	Search #15 AND #19	583
#21	Search "Comparative Study"[Publication Type]	1498440
#22	Search #15 AND #21	13766
#23	Search ("review"[Publication Type] AND "systematic"[tiab]) OR "systematic review"[All Fields] OR ("review literature as topic"[MeSH AND "systematic"[tiab])	38090
#24	Search #15 AND #23	417
#25	Search #18 OR #20 OR #22 OR #24	17884
#27	Search "alcohol reduction"	67
#28	Search brief intervention*	1393
#29	Search early intervention*	8437
#30	Search minimal intervention*	506
#31	Search alcohol therap*	33
#32	Search alcohol treatment*	1444
#33	Search harm reduc*	2065
#34	Search "screening"[All Fields] AND alcohol	9987
#35	Search "counseling"[All Fields] AND alcohol	1912
#36	Search controlled drink*	189
#37	Search "intervention"[All Fields]	248640
#38	Search secondary prevention*	9795
#39	Search "general practitioner's advice"[All Fields]	2
#40	Search "Mass Screening"[MeSH]	83521
#41	Search "Counseling"[MeSH]	27836
#42	Search "Psychotherapy"[MeSH]	130426
#43	Search "Evidence-Based Practice"[Mesh]	42726
#44	Search naltrexone	7002
#45	Search revia	7003
#46	Search vivitrol	8
#47	Search acamprosate	398
#48	Search campral	398
#49	Search disulfiram	3524
#50	Search antabuse	3594
#51	Search ("health education"[MeSH Terms] OR "health education"[All Fields]) AND ("pamphlets"[MeSH Terms] OR "pamphlets"[All Fields])	1948

Search	Most Recent Queries	Result
#52	Search "counseling"[All Fields] AND drink*	947
#53	Search "screening"[All Fields] AND drink*	3181
#54	Search #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53	533938
#60	Search #15 Limits: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Clinical Trial, Phase I, Clinical Trial, Phase II, Clinical Trial, Phase III, Clinical Trial, Phase IV, Comparative Study, Controlled Clinical Trial, Multicenter Study	19163
#61	Search #25 OR #60	20264
#62	Search #61 AND #54	3749
#63	Search ((#62) AND "1985/01/01"[Publication Date] : "3000"[Publication Date]) AND "0"[Publication Date] : "3000"[Publication Date]	3483
#64	Search #63 Limits: Humans, English Sort by: Author	3178
Search	**PubMed Search for Additional Articles 2.2.2011**	Result
#1	Search SBIRT[tiab]	29
#2	"drinking"[tiab] OR "drinkers"[tiab]	65791
#3	"alcohol"[tiab]	144585
#4	"counseling"[tiab]	14185
#5	(#2 AND #3 AND #4) AND "1985/0101"[Publication Date] : "3000"[Publication Date]) AND "0"[Publication Date] : "3000"[Publication Date] Sort by: Author	107
#6	"randomized controlled trial"[tiab]	17092
#7	(#2 AND #3 AND #6) AND "1985/01/01"[Publication Date] : "3000"[Publication Date]) AND "0"[Publication Date] : "3000"[Publication Date]	150
#8	#1 OR #5 OR #7	281

Note: On February 25, 2011, we added the search term "Alcohol Deterrents"[MeSH], which resulted in 28 (all non-duplicate) abstracts.

Note: On March 7, 2011, per a TEP member's suggestion, we added the terms risky alcohol*, risky drink*, alcohol misuse, alcohol abuse, hazardous alcohol*, hazardous drink*, harmful alcohol*, and harmful drink* which resulted in 428 (77 nonduplicate) abstracts.

Note: On April 28, 2011, we amended the protocol to exclude studies of pharmacotherapy for alcohol dependence. However, because our scope included pharmacotherapy at the time of the searches, the pharmaceutical-related terms remain in the search strategy above.

A search with analogous terms was performed in the following databases:
IPA, CINAHL®, and PsycINFO® (2/1/2011) = 468 (164 after duplicates removed)

Embase® (2/1/2011) = 1,753 (1,060 after duplicates removed)

Cochrane (1/31/2011) = 2,570 (1,257 after duplicates removed)

Total references identified by the main searches = 8,706

The following update searches were performed on August 29, 2011

MEDLINE®:

Search	Most Recent Queries	Result
#1	Search "Alcohol-Related Disorders"[Mesh] OR "Alcohol Drinking"[Mesh] OR "Alcoholism"[Mesh] OR “drinking behavior"[MeSH Terms] OR problem drink* OR heavy drink* OR alcohol problem* OR risk drink* OR at-risk drink* OR alcohol depend* OR excessive drink* OR excessive alcohol* OR "alcohol consumption"[All Fields] OR alcohol addiction* OR risky alcohol* OR risky drink* OR "alcohol misuse"[tiab] OR "alcohol abuse"[tiab] OR hazardous alcohol* OR hazardous drink* OR harmful alcohol* OR harmful drink* OR “SBIRT”[tiab] OR (("drinking"[tiab] OR "drinkers"[tiab]) AND "alcohol"[tiab])	141968
#2	Search "alcohol reduction" OR brief intervention* OR early intervention* OR minimal intervention* OR alcohol therap* OR alcohol treatment* OR harm reduc* OR ("screening"[All Fields] AND alcohol) OR ("counseling"[All Fields] AND alcohol) OR controlled drink* OR "intervention"[All Fields] OR secondary prevention* OR "general practitioner's advice"[All Fields] OR "Mass Screening"[MeSH] OR "Counseling"[MeSH] OR "Psychotherapy"[MeSH] OR "Evidence-Based Practice"[Mesh] OR (("health education"[MeSH Terms] OR "health education"[All Fields]) AND ("pamphlets"[MeSH Terms] OR "pamphlets"[All Fields])) OR “Alcohol Deterrents”[MeSH] OR ("screening"[All Fields] AND drink*) OR ("counseling"[All Fields] AND drink*)	549311
#3	Search #1 AND #2	16041
#4	Search "Randomized Controlled Trial"[Publication Type] OR "Randomized Controlled Trials as Topic"[Mesh] OR "Single-Blind Method"[Mesh] OR "Double-Blind Method"[Mesh] OR "Random Allocation"[Mesh]	453968
#5	Search "meta-analysis"[Publication Type] OR "meta-analysis as topic"[MeSH Terms] OR "meta-analysis"[All Fields]	49653
#6	Search "Comparative Study"[Publication Type]	1526061
#7	Search ("review"[Publication Type] AND "systematic"[tiab]) OR "systematic review"[All Fields] OR ("review literature as topic"[MeSH AND "systematic"[tiab])	42341
#8	Search ((#3 AND (#4 OR #5 OR #6 OR #7)) AND "2011/01/01"[Entrez Date] : "3000"[Entrez Date]) AND "0"[Entrez Date] : "3000"[Entrez Date]	69
#9	Search #3 Limits: Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Clinical Trial, Phase I, Clinical Trial, Phase II, Clinical Trial, Phase III, Clinical Trial, Phase IV, Comparative Study, Controlled Clinical Trial, Multicenter Study	3494
#10	Search ((#9) AND "2011/01/01"[Entrez Date] : "3000"[Entrez Date]) AND "0"[Entrez Date] : "3000"[Entrez Date]	51
#11	Search #8 OR #10	72
#12	Search #11 Limits: Humans, English	59

Searches with analogous terms and publication dates in the year 2011 were performed on August 29, 2011 in the following databases:

IPA, CINAHL®, and PsycINFO® = 4

Embase® = 84

Cochrane = 173

Total additional references identified by the update searches = 320; 275 remained after duplicates were removed.

Handsearches of the following references yielded 227 articles

Ballesteros J, Duffy JC, Querejeta I, et al. Efficacy of brief interventions for hazardous drinkers in primary care: systematic review and meta-analyses. Alcohol Clin Exp Res 2004 Apr;28(4):608-18. PMID: 15100612.

Beich A, Thorsen T, Rollnick S. Screening in brief intervention trials targeting excessive drinkers in general practice: systematic review and meta-analysis. BMJ 2003 Sep 6;327(7414):536-42. PMID: 12958114.

Bertholet N, Daeppen JB, Wietlisbach V, et al. Reduction of alcohol consumption by brief alcohol intervention in primary care: systematic review and meta-analysis. Arch Intern Med 2005 May 9;165(9):986-95. PMID: 15883236.

Cuijpers P, Riper H, Lemmers L. The effects on mortality of brief interventions for problem drinking: a meta-analysis. Addiction 2004 Jul;99(7):839-45. PMID: 15200579.

Drummond C, Coulton S, James D, et al. Effectiveness and cost-effectiveness of a stepped care intervention for alcohol use disorders in primary care: pilot study. Br J Psychiatry 2009 Nov;195(5):448-56. PMID: 19880936.

Fleming MF, Balousek SL, Grossberg PM, et al. Brief physician advice for heavy drinking college students: a randomized controlled trial in college health clinics. J Stud Alcohol Drugs 2010 Jan;71(1):23-31. PMID: 20105410.

Kaner EF, Beyer F, Dickinson HO, et al. Effectiveness of brief alcohol interventions in primary care populations. Cochrane Database Syst Rev 2007(2):CD004148. PMID: 17443541.

Lin JC, Karno MP, Tang L, et al. Do health educator telephone calls reduce at-risk drinking among older adults in primary care? Journal of General Internal Medicine 2010;25(4):334-9. PMID: 2010-05760-012. First Author & Affiliation: Lin, James C.

Moore AA, Blow FC, Hoffing M, et al. Primary care-based intervention to reduce at-risk drinking in older adults: a randomized controlled trial. Addiction 2011 Jan;106(1):111-20. PMID: 21143686.

Stade BC, Bailey C, Dzendoletas D, et al. Psychological and/or educational interventions for reducing alcohol consumption in pregnant women and women planning pregnancy. Cochrane Database Syst Rev 2009(2):CD004228. PMID: 19370597.

A search of clinicaltrials.gov yielded 282 trials that resulted in 216 publications

Total references from main and update searches, handsearches, and the clinicaltrials.gov search, minus duplicates = 6,265

Appendix B. List of Excluded Studies

Wrong language

Andreasson S, Eklund AB. [Alcohol abuse prevention in health care services: screening methods and motivational counseling]. Läkartidningen 1999 Mar 31;96(13):1594-8. PMID: 10218343.

Ballesteros J, Arino J, Gonzalez-Pinto A, et al. [Effectiveness of medical advice for reducing excessive alcohol consumption. Meta-analysis of Spanish studies in primary care]. Gac Sanit 2003 Mar-Apr;17(2):116-22. PMID: 12729538.

Fernandez San Martin MI, Bermejo Caja CJ, Alonso Perez M, et al. [Effectiveness of brief medical counseling to reduce drinkers' alcohol consumption]. Aten Primaria 1997 Feb 28;19(3):127-32. PMID: 9264626.

Larrosa Saez P, Vernet Vernet M, Sender Palacios MJ, et al. [Intervention for alcoholism control among chronic drinkers in primary care]. Aten Primaria 2000 Apr 30;25(7):489-92. PMID: 10851754.

Lopez-Marina V, Pizarro Romero G, Alcolea Garcia R, et al. [Screening and effectiveness evaluation of a brief intervention in risk drinkers seen in primary health care]. Aten Primaria 2005 Sep 30;36(5):261-8. PMID: 16194494.

Minozzi S, Grilli R. Revisione sistematica degli studi sulla efficacia degli interventi di prevenzione primaria dell'abuso di alcool fra gli adolescenti [The systematic review of studies on the efficacy of interventions for the primary prevention of alcohol abuse among adolescents] (Structured abstract). Epidemiologia e Prevenzione 1997(3):180-8. DARE-11998003207.

Rumpf HJ, Bischof G, Freyer-Adam J, et al. [Assessment of problematic alcohol use]. Dtsch Med Wochenschr 2009 Nov;134(47):2392-3. PMID: 19911327.

Segura Garcia L, Gual Sole A, Montserrat Mestre O, et al. [Detection and handling of alcohol problems in primary care in Catalonia]. Aten Primaria 2006 May 31;37(9):484-8. PMID: 16756871.

Struzzo P. [Prevention of alcohol-related problems. From therapy to primary health care: experience at the Udine "Healthy City"]. Recenti Prog Med 1999 Feb;90(2):69-72. PMID: 10208095.

Wrong publication type or study design

Acamprosate (Campral) for alcoholism. Conn Med 2005 Apr;69(4):227-8. PMID: 15926637.

Acamprosate facilitates the maintenance of abstinence in alcohol-dependent patients after alcohol withdrawal. Drugs and Therapy Perspectives 2006;22(3):1-4.

Acamprosate for the maintenance of abstinence in alcohol dependence. British Journal of Clinical Governance 1999;4(4):161-5.

Ades J, Lejoyeux M. Clinical evaluation of acamprosate to reduce alcohol intake. Alcohol Alcohol Suppl 1993;2:275-8. PMID: 7748311.

Alexander CN, Robinson P, Rainforth M. Treating and preventing alcohol, nicotine, and drug abuse through transcendental meditation: A review and statistical meta-analysis. Alcoholism Treatment Quarterly 1994;11(1-2):13-87.

Allen JP, Litten RZ. Alcoholics with collateral psychopathology: Issues and research findings. Alcoholism 1998;34(1-2):47-56.

Amaro H, Arevalo S, Gonzalez G, et al. Needs and scientific opportunities for research on substance abuse treatment among Hispanic adults. Drug and Alcohol Dependence 2006;84(SUPPL.):S64-S75.

Andersen M, Paliwoda J, Kaczynski R, et al. Integrating Medical and Substance Abuse Treatment for Addicts Living with HIV/AIDS: Evidence-Based Nursing Practice Model. American Journal of Drug and Alcohol Abuse 2003;29(4):847-59.

Angelini M, Brahmbhatt Y. A review of the pharmacologic options for the treatment of alcohol dependence. Formulary 2007;42(1):14-31.

Annis HM. A cognitive-social learning approach to relapse: pharmacotherapy and relapse prevention counselling. Alcohol Alcohol Suppl 1991;1:527-30. PMID: 1845593.

Anton RF, Swift RM. Current pharmacotherapies of alcoholism: A U.S. perspective. American Journal on Addictions 2003;12(SUPPL. 1):S53-S68.

Anton RF. Pharmacologic approaches to the management of alcoholism. Journal of Clinical Psychiatry 2001;62(SUPPL. 20):11-7.

Arthur D. Alcohol-related problems: a critical review of the literature and directions in nurse education. Nurse Educ Today 1998 Aug;18(6):477-87. PMID: 9847741.

Assanangkornchai S, Srisurapanont M. The treatment of alcohol dependence. Current Opinion in Psychiatry 2007;20(3):222-7.

Babor TF, Grant M, Acuda W, et al. A randomized clinical trial of brief interventions in primary care: summary of a WHO project. Addiction 1994 Jun;89(6):657-60; discussion 60-78. PMID: 8069168.

Babor TF, McRee BG, Kassebaum PA, et al. Screening, Brief Intervention, and Referral to Treatment (SBIRT): toward a public health approach to the management of substance abuse. Subst Abus 2007;28(3):7-30. PMID: 18077300.

Babor TF. Avoiding the horrid and beastly sin of drunkenness: Does dissuasion make a difference? Journal of consulting and clinical psychology 1994;62(6):1127-40.

Back SE, Jackson JL, Sonne S, et al. Alcohol dependence and posttraumatic stress disorder: differences in clinical presentation and response to cognitive-behavioral therapy by order of onset. J Subst Abuse Treat 2005 Jul;29(1):29-37. PMID: 15979529.

Barth KS, Malcolm RJ. Disulfiram: An old therapeutic with new applications. CNS and Neurological Disorders - Drug Targets 2010;9(1):5-12.

Bates ME, Bowden SC, Barry D. Neurocognitive impairment associated with alcohol use disorders: Implications for treatment. Experimental and clinical psychopharmacology 2002;10(3):193-212.

Beresford TP, Martin B. The evidence for drug treatment of alcohol dependence in liver transplant patients. Current Opinion in Organ Transplantation 2007;12(2):176-81.

Berglund M. A better widget? Three lessons for improving addiction treatment from a meta-analytical study. Addiction 2005 Jun;100(6):742-50. PMID: 15918803.

Bjornsson E, Nordlinder H, Olsson R. Clinical characteristics and prognostic markers in disulfiram-induced liver injury. J Hepatol 2006 Apr;44(4):791-7. PMID: 16487618.

Blow FC, Walton MA, Barry KL, et al. The relationship between alcohol problems and health functioning of older adults in primary care settings. J Am Geriatr Soc 2000 Jul;48(7):769-74. PMID: 10894315.

Bradley KA, Bush KR, McDonell MB, et al. Screening for problem drinking: comparison of CAGE and AUDIT. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. J Gen Intern Med 1998 Jun;13(6):379-88. PMID: 9669567.

Bradley KA, DeBenedetti AF, Volk RJ, et al. AUDIT-C as a brief screen for alcohol misuse in primary care. Alcohol Clin Exp Res 2007 Jul;31(7):1208-17. PMID: 17451397.

Bradley KA, Kivlahan DR, Zhou XH, et al. Using alcohol screening results and treatment history to assess the severity of at-risk drinking in Veterans Affairs primary care patients. Alcohol Clin Exp Res 2004 Mar;28(3):448-55. PMID: 15084903.

Brandsma JM, Pattison EM. The outcome of group psychotherapy alcoholics: an empirical review. Am J Drug Alcohol Abuse 1985;11(1-2):151-62. PMID: 3904411.

Brewer C. Supervised disulfiram is more effective in alcoholism than naltrexone or acamprosate - Or even psychotherapy: How it works and why it matters. Adicciones 2005;17(4):285-96.

Broyles LM, Gordon AJ. SBIRT implementation: moving beyond the interdisciplinary rhetoric. Subst Abus 2010 Oct;31(4):221-3. PMID: 21038175.

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Appendix C. Evidence Tables

Evidence Table 1. Characteristics of included randomized controlled trials

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Anderson & Scott, 1992[1] United Kingdom None Foundation or nonprofit	**Level of Randomization** Patient **Sample Sizes** Randomized & anayzed Overall: 154 G1: 80 G2: 74	Traditional primary care 12 months	**Instrument(s)** Screening: QF Assessment: QF **Administered by** Self
Babor, 1996[2] United States, Australia, Kenya,Mexico, Norway, United Kingdom, Russia, Zimbabwe WHO Brief Intervention Multiple	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 1559 G1: 563 G2: 503 G3: 491	Mixed primary care and primary care-like 9 months	**Instrument(s)** NR **Administered by** Mixed
Bischof et al., 2008[3] Grothues et al., 2008[4] Reinhardt et al., 2008[5] Germany Stepped Intervention for Problem Drinkers Government	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 408 G1: 131 G2: 138 G3: 139	Traditional primary care 12 months	**Instrument(s)** Screening: AUDIT, LAST Assessment: M-CIDI, QF **Administered by** Researcher/Study team

Evidence Table 1. Characteristics of included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Chang et al., 1999[6] United States None Government	**Level of Randomization** Patient **Sample Sizes** Randomized Overall: 250 G1: 123 G2: 127 Analyzed Overall: 247 G1: NR G2: NR	Obstetrics Varied	**Instrument(s)** Screening: T-ACE Assessment: SCID (DSM-III-R), Addiction Severity Index, AUDIT, SMAST, TLFB, Alcohol Craving Scale,Global Assessment of Functioning, Situational Confidence Questionnaire **Administered by** Self
Curry et al., 2003[7] United States None Government	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 307 G1: 151 G2: 156	Traditional primary care 12 months	**Instrument(s)** Screening: AUDIT, QF, single binge question, single drinking/driving question **Administered by** Researcher/Study team

Evidence Table 1. Characteristics of included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] United States Project TrEAT Government	**Level of Randomization** Patient **Sample Sizes** Full sample: Randomized & analyzed Overall: 774 G1: 392 G2: 382 Subgroups: Men G1: 244 G2: 238 Women G1: 148 G2: 144 Women ages18-40 G1: 103 G2: 102 Young adults ages18-30 G1: 114 G2:112	Traditional primary care 48 months	**Instrument(s)** Screening: CAGE, QF Assessment: TLFB **Administered by** • Self (screening) • Researcher/Study team (subsequent face-to-face interview)

Evidence Table 1. Characteristics of included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Fleming et al., 1999[13] Mundt et al., 2005[14] United States Guiding Older Adult Lifestyles Multiple	**Level of Randomization** Patient **Sample Sizes** Randomized Overall: 158 G1: 87 G2: 71 Analyzed Overall: 145 G1: 78 G2: 67	Traditional primary care 24 months	**Instrument(s)** Screening: modified HSS, CAGE Assessment:TLFB **Administered by** Self
Fleming, et al., 2008[15] Wilton, et al., 2009[16] United States Healthy Moms Government	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 235 G1: 122 G2: 113	Traditional primary care 6 months	**Instrument(s)** Screening: QF, T-ACE Assessment: TLFB **Administered by** Mixed (screening by clinic staff; assessment by researchers/study team)
Fleming et al., 2010[17] United States, Canada College Health Intervention Multiple	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 986 G1: 493 G2: 493	Student health clinic 12 months	**Instrument(s)** Screening: CAGE, QF Assessment: TLFB **Administered by** Mixed (Initial screening health survey administered by clinic staff, research staff, or college health class instructor; questionnaire presumably self-administered; TLFB later conducted by researchers/study team)

Evidence Table 1. Characteristics of included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Kypri et al., 2004[18] New Zealand None Government	**Level of Randomization** Patient **Sample Sizes** Randomized Overall: 104 G1: 51 G2: 53 Analyzed Overall: 94 G1: 47 G2: 47	Student health clinic 6 months	**Instrument(s)** Screening: AUDIT, QF **Administered by** Self
Kypri et al., 2007[19] Kypri et al., 2008[20] New Zealand None Government	**Level of Randomization** Patient **Sample Sizes** Randomized Overall: 576 G1: 138 G2: 145 G3: 146 G4: 147 Analyzed at 6 months Overall: 482 G1: 114 G2: 122 G3: 124 G4: 122 Analyzed at 12 months Overall: 486 G1: 113 G2: 121 G3: 126 G4: 126	Student health clinic 12 months	**Instrument(s)** Screening: AUDIT **Administered by** Self

Evidence Table 1. Characteristics of included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Lin et al., 2010[21] Moore et al., 2010[22] United States Healthy Living As You Age Multiple	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 631 G1: 310 G2: 321	Traditional primary care 12 months	**Instrument(s)** Screening: CARET **Administered by** Researcher/Study team
Lock et al., 2006[23] United Kingdom None Government	**Level of Randomization** Practice (multiple providers) **Sample Sizes** Randomized & analyzed Overall: 127 G1: 67 G2: 60	Traditional primary care 12 months	**Instrument(s)** **Screening: AUDIT** **Administered by** Clinic staff
Maisto et al., 2001[24] Maisto et al., 2001[25] Gordon et al., 2003[26] United States Early Lifestyle Modification Study Government	**Level of Randomization** Patient **Sample Sizes** Randomized Overall: 301 G1: 100 G2: 101 G3: 100 Analyzed Overall: 232 G1: 74 G2: 73 G3: 85 Older adults: Overall: 45 G1: 15 G2: 18 G3: 12	Traditional primary care 12 months	**Instrument(s)** Screening: AUDIT, QF Assessment: ADS, AUDIT, TLFB, DrInC, SOCRATES **Administered by** Researcher/Study team

Evidence Table 1. Characteristics of included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Noknoy et al., 2010[27] Thailand None Foundation or nonprofit	**Level of Randomization** Patient **Sample Sizes** Randomized Overall: 117 G1: 59 G2: 58 Analyzed Overall: 92 G1: 51 G2: 41	Traditional primary care 6 months	**Instrument(s)** Screening: AUDIT Assessment: QF **Administered by** Clinic staff
Ockene et al., 1999[28] Ockene et al., 2009[29] Reiff-Hekking et al., 2005[30] United States Project Health Government	**Level of Randomization** Practice (multiple providers) **Sample Sizes** Randomized Overall: 530 G1: 274 G2: 256 Analyzed at 6 months Overall: 481 G1: 248 G2: 233 Analyzed at 12 months Overall: 447 G1: 235 G2: 212 Analyzed at 4 years Overall: 333 G1: 169 G2: 164	Academic medical center 48 months	**Instrument(s)** Screening: QF, CAGE Assessment: TLFB **Administered by** Researcher/Study team

Evidence Table 1. Characteristics of included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Richmond et al., 1995[31] Australia None Government	**Level of Randomization** Individual provider **Sample Sizes** Randomized & analyzed Overall: 378 G1: 96 G2: 96 G3: 93 G4: 93	Traditional primary care 12 months	**Instrument(s)** Screening: QF Postrandomization assessment: QF; MAST; CDP **Administered by** Self
Rubio et al., 2010[32] Spain None Foundation or nonprofit	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 752 G1: 371 G2: 381 Men: G1: 243 G2: 248 Women: G1: 128 G2: 133	Traditional primary care 12 months	**Instrument(s)** Screening: AUDIT Assessment: TLFB **Administered by** Primary care provider

Evidence Table 1. Characteristics included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Saitz et al., 2003[33] United States Screening and Intervention in Primary Care Multiple	**Level of Randomization** Individual provider **Sample Sizes** Randomized Overall: 312 G1: 168 G2: 144 Analyzed G1: varied by outcome out of possible 134 that completed 6 month interview G2: varied by outcome out of possible 102 that completed 6 month interview	Academic medical center 6 months	**Instrument(s)** Screening: CAGE, QF **Administered by** Researcher/Study team

Evidence Table 1. Characteristics of included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Schaus et al., 2009[34] United States None Government	**Level of Randomization** Patient **Sample Sizes** Randomized Overall: 363 G1: 181 G2: 182 Analyzed at 6 months Overall: 209 G1: 95 G2: 114 Analyzed at 9 months Overall: 213 G1: 98 G2: 115 Analyzed at 12 months Overall: 236 G1: 111 G2: 125	Student health clinic 12 months	**Instrument(s)** Screening: QF Assessment: TLFB **Administered by** Researcher/Study team
Scott & Anderson, 1990[35] United Kingdom None Foundation or nonprofit	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 72 G1: 33 G2: 39	Traditional primary care 12 months	**Instrument(s)** Screening: QF Assessment: QF **Administered by** Self

Evidence Table 1. Characteristics included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Randomization Sample Sizes	Study Setting Study Duration	Screening and Assessment
Senft et al., 1997[36] Freeborn et al., 2000[37] United States None Government	**Level of Randomization** Patient **Sample Sizes** Randomized & analyzed Overall: 516 G1: 260 G2: 256	Traditional primary care 24 months	**Instrument(s)** Screening: AUDIT, QF **Administered by** Self
Wallace et al., 1998[38] United Kingdom None Multiple	**Level of Randomization** Patient (randomization stratified by sex and by level of concern expressed about personal drinking) **Sample Sizes** Randomized Overall: 909 G1: 450 G2: 459 Analyzed Overall: 907 G1: 448 G2: 459 Men: G1: 318 G2: 322 Women: G1: 130 G2: 137	Traditional primary care 12 months	**Instrument(s)** Screening: QF, CAGE Assessment: TLFB **Administered by** Self

Abbreviations: ADS = Alcohol Dependence Scale; AUDIT = Alcohol Use Disorders Identification Test; CAGE = Cut down, Annoyed, Guilty, Eye opener questionnaire; CARET = Comorbidity Alcohol Risk Evaluation Tool; CDP = carbohydrate deficient transferrin; DrINC = Drinker Inventory of Consequences; DSM-III-R = *Diagnostic and Statistical Manual of Mental Disorders* (3rd Edition, Revised); G = group; HSS = Health Screening Survey; LAST = Lübeck Alcohol dependence and abuse Screening Test; M-CIDI = Munich-Composite International Diagnostic Interview; MAST = Michigan Alcoholism Screening Test; NR = not reported; QF = quantity/frequency; SCID = Structured Clinical Interview for DSM ; SMAST = short Michigan Alcoholism Screening Test; SOCRATES = Stages of Change Readiness and Treatment Eagerness Scale; T-ACE = Tolerance, Annoyed, Cut-down, Eye-opener questionnaire; TLFB = Timeline Followback; TrEAT = Trial for Early Alcohol Treatment; WHO = World Health Organization

Evidence Table 2. Characteristics of samples from included randomized controlled trials

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Anderson & Scott, 1992[1] United Kingdom None Foundation or nonprofit	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** NR **Screening Instrument Score, Mean (SD)** NR **Subgroups** Men only	**Age, Mean (SD)** Overall: NR G1:45.1 (1.9) G2:43.0 (2.0) **Nonwhite or Minority Group,** NR **Female, %** 0	**Drinks Per Week, Mean (SD)*** From interview Overall:NR G1: 37.9 G2: 38.8 From HSQ Overall: NR G1: 31.2 G2: 33.0 *Drinks/week calculated by dividing g/wk by 13.7 NR
Babor, 1996[2] United States, Australia, Kenya,Mexico, Norway, United Kingdom, Russia, Zimbabwe WHO Brief Intervention Multiple	**Sample Includes Those With Alcohol Dependence** No **Portion of Dependent Persons** NA **Screening Instrument Score, Mean (SD)** NR **Subgroups** None	**Age, Mean (SD)** Overall: NR Men: 36.9 Women: 35.9 **Nonwhite or Minority Group, %** NR **Female, %** Overall: 19.2 G1: 18.4 G2: 22.1 G3: 17.2	

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Bischof et al., 2008[3] Grothues et al., 2008[4] Reinhardt et al., 2008[5] Germany Stepped Intervention for Problem Drinkers Government	**Sample Includes Those With Alcohol Dependence** Yes **Portion of Dependent Persons, %** Overall: 30.4 G1: 38.2 G2: 27.5 G3: 25.9 Other categories Abuse: 14.5 At-risk: 27.5 Binge: 27.7 **Screening Instrument Score, Mean (SD)** Overall: AUDIT: 9.1 (5.9) LAST: 1.6 (1.6) G1: NR G2: NR **Subgroups** Men or women only; those with comorbid depression/anxiety	**Age, Mean (SD)** Overall: NR G1: 36.8 (13.5) G2: 36.8 (13.2) G3: 35.9 (13.7) **Nonwhite or Minority Group, %** NR **Female, %** Overall: 31.9 G1: 32.1 G2: 31.9 G3: 31.7 **Other Characteristics** % with comorbid depression/anxiety Overall: 21.6 G1: 22.1 G2: 21.7 G3: 20.9 Overall: Depression only: 8.6 Anxiety only: 7.4 Both depression and anxiety: 5.6	**Drinks Per Week, Mean (SD)*** Overall: NR G1: 25.0 G2: 24.0 G3: 20.9 Alcohol dependence G1: 38.8 G2: 40.6 G3: 40.6 Alcohol abusers/at-risk drinkers G1: 22.5 G2: 24.9 G3: 18.8 Binge drinkers G1: 7.4 G2: 7.2 G3: 6.7 *Drinks per week calculated by dividing g by 13.7 to get drinks/day and then mulitplying by 7 for drinks/week

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Chang et al., 1999[6] United States None Government	**Sample Includes Those With Alcohol Dependence** No **Portion of Dependent Persons** NA **Screening Instrument Score, Mean (SD)** NR **Subgroups** Pregnant women • Mean (SD) # weeks of antepartum drinking: 22.4 (5.6) weeks • Gestational age required to be <28 weeks @ study entry • Mean (SD) gestation @ baseline: 16 (4.6) weeks	**Age, Mean (SD)** Overall: 30.7 (5.4) G1: NR G2: NR **Nonwhite or Minority Group, %** Overall: 22 G1: NR G2: NR **Female, %** 100	**Drinks Per Week, Mean (SD)** NR **Other Measures, Mean (SD)** Mean drinks per drinking day while pregnant (including abstainers) G1: 0.6 (1.1) G2: 0.9 (1.5) Mean drinks per drinking day while pregnant (excluding abstainers) G1: 2.1 (1.5) G2: 1.5 (1.2)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Curry et al., 2003[7] United States None Government	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** NR **Screening Instrument Score, Mean (SD)** AUDIT Overall: NR G1: 5.71 (0.24) G2: 5.52 (0.23) **Subgroups** None	**Age, Mean (SD)** Overall: 47 G1: 48.3 (1.1) G2:45.6 (1.1) **Nonwhite or Minority Group, %** Overall: 20 G1: 20 G2: 20 **Female, %** Overall: 35 G1: 36 G2: 35	**Drinks Per Week, Mean (SD)** Overall: 14.2 G1: 14.9 (0.82) G2: 13.6 (0.83) **Other Measures, Mean (SD), %** Chronic drinking Overall: 43 G1: 45 G2: 40 Binge drinking Overall: 33 G1: 34 G2: 32 Drinking and driving Overall: 55 G1: 51 G2: 60

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] United States Project TrEAT Government	**Sample Includes Those With Alcohol Dependence** Unclear **Portion of Dependent Persons** Patients who attended treatment in the past, those with withdrawal symptoms, and those who had been advised to cut down in the past were excluded. 6 subjects received formal treatment in an alcohol treatment program during the 1-year followup period **Screening Instrument Score, Mean (SD)** NR **Subgroups** • Men • Women • Young adults 18-30 (Manwell et al., 2004[12]) • Women 18-40 (Grossberg et al., 2000[11])	**Age (years), Mean (SD), %** Overall: NR Men 18-30 G1: 20.2 G2: 26.0 31-40 G1: 27.2 G2: 25.1 41-50y G1: 23.9 G2: 21.3 51-65 G1: 28.8 G2: 27.7 Women 18-30 G1: 43.5 G2: 35.7 31-40 G1: 25.9 G2: 35.7 41-50 G1: 15.6 G2: 18.2 51-65 G1: 15.0 G2: 10.5	**Drinks Per Week, Mean (SD)** Overall: NR G1: 19.14 (12.26) G2: 18.94 (11.84) Men G1: 21.67 (12.85) G2: 21.95 (12.39) Women G1: 15.05 (10.02) G2: 15.69 (10.13) Women 18-40 G1: 14.08 (9.22) G2: 14.87 (8.81) Young adults 18-30 G1: 16.2 (11.2) G2: 18.3 (12.1) **Other Measures, Mean (SD)** % patients with a binge episode; mean (SD) binge episodes in previous 30 days; G1: 85.5; 5.65 (5.95) G2: 86.6; 5.34 (5.03) Men G1: 85.1; 6.13 (6.58) G2: 87.2; 5.40 (4.98) Women G1: 86.1; 4.88 (4.70) G2: 85.7; 5.23 (5.13) Women 18-40 G1: 93.2; 5.10 (3.70) G2: 91.2; 5.49 (4.33)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)		**Nonwhite or Minority Group, %** Overall: NR Men G1: 5.6 G2: 7.4 Women G1: 11.9 G2: 11.5 Women 18-40 G1: 15 G2: 14 **Female, %** Overall: 38 G1: 37.8 G2: 37.7	Young adults 18-30 G1: 96.0; 5.9 (4.0) G2: 96.0; 6.3 (4.3) Drinking excessively in previous week, % G1: 47.48 G2: 48.09 Men G1: 45.67 G2: 44.69 Women G1: 50.39 G2: 53.57 Women 18-40 G1: 45.6 G2: 53.0 Young adults 18-30 G1: 39 G2: 46

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Fleming et al., 1999[13] Mundt et al., 2005[14] United States Guiding Older Adult Lifestyles Multiple	**Sample Includes Those With Alcohol Dependence** No **Portion of Dependent Persons** NA **Screening Instrument Score, Mean (SD)** NR **Subgroups** Older adults	**Age, Mean (SD), %** Overall: NR Age 65-75 G1: 92.0 G2: 96.9 Age ≥76 G1: 8.0 G2: 3.1 **Nonwhite or Minority Group, %** NR **Female, %** Overall: 33.5 G1: 35.6 G2: 31.0 **Other Characteristics** % with daily activity limitations Overall: NR G1: 18 G2: 30	**Drinks Per Week, Mean (SD)** Overall: NR G1: 15.54 (7.65) G2: 16.58 (11.49) **Other Measures, Mean (SD)** # of binge drinking episodes in previous 30 days G1: 3.38 (7.05) G2: 4.15 (8.47) Binge drinking in previous 30 days, % G1: 48.72 G2: 40.30 Drinking excessively in previous 7 days, %: G1: 29.49 G2: 29.85

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Fleming, et al., 2008[15] Wilton, et al., 2009[16] United States Healthy Moms Government	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** **Screening Instrument Score, Mean (SD)** NR **Subgroups** Postpartum women	**Age, Mean (SD), %** Overall: Median = 28 18-21 Median: 15.3 G1: 15.6 G2: 15.0 22-25 Median: 17.9 G1: 18.0 G2: 17.7 26-30 Median: 30.6 G1: 32.8 G2:28.3 31-35 Median: 21.3 G1: 18.0 G2: 24.8 36-40 Median: 12.8 G1: 12.3 G2: 13.3 41+ Median: 2.1 G1: 3.3 G2: 0.9 **Nonwhite or Minority Group, %** Overall: 18.3 G1: 16.4 G2: 20.4	**Drinks Per Week, Mean (SD)** NR **Other Measures, Mean (SD)** Total # drinks in the previous 28 days G1: 34.0 (22.8) G2: 32.2 (16.2) # of drinking days in past 28 days G1: 10.3 (6.8) G2: 10.4 (7.2) # of heavy drinking days, past 28 days G1: 3.5 (3.8) G2: 3.1 (3.3)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Fleming, et al., 2008[15] Wilton, et al., 2009[16] (continued)		**Female, %** 100 **Other Characteristics** % depressed at baseline (Edinburgh Postpartum Depression Scale >= 10) Overall:38.7 G1: 39.3 G2: 38.1	
Fleming et al., 2010[17] United States, Canada College Health Intervention Projects Multiple	**Sample Includes Those With Alcohol Dependence** No **Portion of Dependent Persons** NA **Screening Instrument Score, Mean (SD)** NR **Subgroups** College students	**Age, Mean (SD)** Overall: 21 G1: 21 (2.2) G2: 20.8 (2.3) **Nonwhite or Minority Group, %** Overall: NR G1: 10.5 G2:8.1 **Female, %** Overall: NR G1: 50.5 G2: 51.3	**Drinks Per Week, Mean (SD)*** Overall: NR G1: 17.8 G2: 17.3 *Drinks per week calculated by dividing # drinks in past 28 days by 4 **Other Measures, Mean (SD)** # of drinking days in the past 28 days G1: 11.7 (5.0) G2: 11.8 (4.9) # of heavy drinking days in the past 28 days G1: 7.2 (3.7) G2: 7.1 (3.3) RAPI score Overall: NR G1: 15.2 (10.4) G2: 15.9 (10.7)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Kypri et al., 2004[18] New Zealand None Government	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** **Screening Instrument Score, Mean (SD)** AUDIT: Overall: 16.6 CI (15.5 to 17.7) G1: 16.6 (5.7) G2: 16.6 (6.0) **Subgroups** College students	**Age, Mean (SD)** Overall: NR G1: 19.9 (1.4) G2: 20.4 (1.8) **Nonwhite or Minority Group, %** NR **Female, %** Overall: 50 G1: NR G2: NR	NR
Kypri et al., 2007[19] Kypri et al., 2008[20] New Zealand None Government	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** **Screening Instrument Score, Mean (SD)** AUDIT: Overall: NR G1: 14.9 (5.1) G2: 14.7 (4.7) G3: 15.1 (5.5) G4: 14.9 (5.0) **Subgroups** College students	**Age, Mean (SD)** Overall: NR G1: 20.1 (1.9) G2: 20.1 (1.9) G3: 20.1 (2.2) G4: 20.3 (1.8) **Nonwhite or Minority Group, %** NR **Female, %** Overall: 52.0 G1: 51.4 G2: 52.4 G3: 52.1 G4: 52	NR

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Lin et al., 2010[21] Moore et al., 2010[22] United States Healthy Living As You Age Multiple	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** Screening Instrument Score, Mean (SD) CARET Overall: 2.9 (1.7) G1: 2.9 (1.7) G2: 3.0 (1.7) **Subgroups** Older adults	**Age, Mean (SD)** Overall: 68.4 (6.9) G1: 68.7 (6.8) G2: 68.1 (6.9) **Nonwhite or Minority Group, %** Overall: 13 G1: 12 G2: 13 **Female, %** Overall: 29 G1: 28 G2: 30	**Drinks Per Week, Mean (SD)** Overall:15.2 (7.3) G1: 15.1 (7.2) G2: 15.2 (7.4) **Other Measures, Mean (SD)** At least 1 heavy drinking day in past 7 days, % Overall: 34 G1:34 G2:34
Lock et al., 2006[23] United Kingdom None Government	**Sample Includes Those With Alcohol Dependence** No **Portion of Dependent Persons** NA **Screening Instrument Score, Mean (SD)** AUDIT Overall: 9.9 (5.1) G1: 10.6 (4.7) G2: 10.3 (5.6) **Subgroups** None	**Age, Mean (SD)** Overall: 44.1 (15.3) G1:42.7 (15.5) G2:45.7 (14.9) **Nonwhite or Minority Group, %** NR **Female, %** Overall: 50 G1: 51 G2: 48 **Practice clusters differed as follows:** Average # of GPs per practice G1: 4 (2.0) G2: 3 (1.5) p=0.049 # hours worked by nurses G1: 29.1 (9.1) G2: 23.6 (7.2) p=0.041	**Drinks Per Week, Mean (SD)** Overall: NR G1: 23.0 (20.7) G2: 26.5 (29.8)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Maisto et al., 2001[24] Maisto et al., 2001[25] Gordon et al., 2003[26] United States Early Lifestyle Modification Study Government	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** **Screening Instrument Score, Mean (SD)** NR **Subgroups** Older adults	**Age, Mean (SD)** Overall: 45.6 (15.0) G1: 46.2 (15.0) G2: 45.5 (15.2) G3: 45.0 (15.1) **Nonwhite or Minority Group, %** Overall: 23.3 G1: 27 G2: 23 G3: 19 **Female, %** Overall: 30.2 G1: 32 G2: 32 G3: 27 **Of the subset of older adults (65+), %** Overall Female: 13 Nonwhite: 31	**Drinks Per Week, Mean (SD)*** G1: 18.6 G2: 15.5 G3: 18.6 *Drinks/week calculated by dividing # drinks in last 30 days by 4.2857 **Other Measures, Mean (SD)** # drinks per drinking day: G1: 5.5 (4.0) G2: 5.3 (3.0) G3: 6.3 (4.1) # of days abstained (last 30 days): G1: 15.8 (9.5) G2: 16.7 (8.9) G3: 16.4 (9.5) # of drinks last 30 days: G1: 79.9 (80.6) G2: 66.3 (57.1) G3: 79.8 (91.7) ADS score G1: 5.4 (2.3) G2: 4.9 (2.5) G3: 5.2 (2.4) **Of the subset of older adults (65+), %** # days abstained (last 30 days): 11.6 # drinks per week: 13.2 # drinks last 30 days: 56.6 # drinks per drinking day: 4.1

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Noknoy et al., 2010[27] Thailand None Foundation or nonprofit	**Sample Includes Those With Alcohol Dependence** Yes **Portion of Dependent Persons** % with AUDIT >25: Overall NR G1: 15.3 G2: 13.8 **Screening Instrument Score, Mean (SD)** AUDIT Overall: 17.4 (6.5) G1: 18.00 (6.82) G2: 16.77 (6.20) **Subgroups** None	**Age, Mean (SD)** Overall: 37 (10) G1: 36.83 (10.21) G2: 37.09 (9.88) **Nonwhite or Minority Group, %** (all patients were Thai) **Female, %** Overall: 8.5 G1: 10.1 **G2: 6.9**	**Drinks Per Week, Mean (SD)** During previous month Overall: 15.2 (17.7) G1: 17.2 (18.9) G2: 13.1 (16.4) During previous week Overall: 11.9 (16.2) G1: 13.3 (15.4) G2: 10.6 (17.0) **Other Measures, Mean (SD)** # drinks per day in previous month Overall: 6.39 (3.97) G1: 6.46 (4.11) G2: 6.31 (3.86) # drinks per day in previous week Overall: 4.75 (4.27) G1: 5.19 (4.30) G2: 4.31 (4.23) # episodes of bingeing in previous week Overall; NR G1: 1.00 (1.49) G2: 0.88 (1.54) **Other Characteristics** Serum GGT Overall: NR G1: 50.90 (36.29) G2: 63.60 (50.22)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Ockene et al., 1999[28] Ockene et al., 2009[29] Reiff-Hekking et al., 2005[30] United States Project Health Government	**Sample Includes Those With Alcohol Dependence** Yes **Portion of Dependent Persons, %** 2 **Screening Instrument Score, Mean (SD)** NR Subgroups Men or women only	**Age, Mean (SD)** Overall: NR G1: 44.2 (13.9) G2: 43.5 (14.0) **Nonwhite or Minority Group, %** Overall: NR G1: 4.3 G2: 6.6 **Female, %** Overall: NR G1: 32.1 G2: 38.7	**Drinks Per Week, Mean (SD)** Overall: NR G1: 18.9 (14.4) G2: 16.6 (12.4)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Richmond et al., 1995[31] Australia None Government	**Sample Includes Those With Alcohol Dependence** Yes **Portion of Dependent Persons, %** 65% = "low dependence" (Ph score 0-4) G1: 62 G2: 75 G3: 58 35% = "moderate dependence" (Ph score 5-14) G1:38 G2:25 G3:42 **Screening Instrument Score, Mean (SD)** MAST: Overall: 4.5 (4.0) G1: 5.5 (4.5) G2: 3.8 (3.8) G3: 4.2 (3.5) **Subgroups** Men or women only	**Age, Mean (SD)** Overall: 37.7 (13.9) G1: 38.6 (14.3) G2: 39.2 (14.4) G3: 33.9 (12.0) G4: 39.0 (14.3) **Nonwhite or Minority Group, %** NR **Female, %** Overall: 43 G1: 43 G2: 43 G3: 47 G4: 39	**Drinks Per Week, Mean (SD)** In last 3 months: G1: 36.3 (18.1) G2: 38.7 (26.4) G3: 34.7 (18.2) G4: 37.5 (19.9) Past 7-days: G1: 43.9 (28.3) G2: 38.5 (23.1) G3: 37.3 (28.0) **Other Measures, Mean (SD), %** Drinking above recommended levels: G1: 83.3 G2:79.2 G3: 73.1 G4: NA Physical dependence score: Overall: 3.8 (2.5) GGT Overall: NR G1: 34.9 (43.0) G2: 57.0 (78.6) G3: 40.7 (52.0)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Rubio et al., 2010[32] Spain None Foundation or nonprofit	**Sample Includes Those With Alcohol Dependence** No **Portion of Dependent Persons** NA **Screening Instrument Score, Mean (SD)** NR **Subgroups** • Men or women only • Only binge drinkers	**Age, Mean (SD)** NR **Nonwhite or Minority Group, %** NR **Female, %** Overall: 34.7 G1: 34.5 G2: 34.9	**Drinks Per Week, Mean (SD)** Overall: G1: 27.42 (9.43) G2: 26.90 (9.76) Men G1: 28.90 (9.79) G2: 28.22 (10.03) Women G1: 24.49 (7.95) G2: 24.52 (8.80) **Other Measures, Mean (SD)** # binge drinking episodes in last 30 days Overall G1: 2.95 (2.33) G2: 2.95 (2.27) Men G1:3.59 (2.38) G2: 3.51 (2.43) Women G1: 2.39 (1.76) G2: 2.52 (1.89) 100% binged in last 30 days and drank excessively in last 7 days

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Saitz et al., 2003[33] United States Screening and Intervention in Primary Care Multiple	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** NR **Screening Instrument Score, Mean (SD)** NR **Subgroups** None	**Age, Mean (SD)** Overall: NR G1: 43.7 (13.0) G2: 42.2 (12.9) **Nonwhite or Minority Group, %** Overall: NR G1: 80 G2: 82 Significantly more Latino participants in control group **Female, %** Overall: NR G1: 43 G2: 29 Significant difference in gender makeup between groups	**Drinks Per Week, Mean (SD)** NR **Other Measures, Mean (SD)** Drinks per drinking day Overall: NR G1: 5.6 (5.3) G2: 5.5 (4.2) Reporting >= 1 alcohol problem, %: Overall: NR G1: 68 G2: 68 Alcohol Dependence Scale score Overall: NR G1: 7.5 (7.8) G2: 7.4 (6.5)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Schaus et al., 2009[34] United States None Government	**Sample Includes Those With Alcohol Dependence** No **Portion of Dependent Persons** NA **Screening Instrument Score, Mean (SD)** NR **Subgroups** College students	**Age, Mean (SD)** Overall: 20.6 (2.7) G1: 20.5 (2.8) G2: 20.6 (2.7) **Nonwhite or Minority Group, %** Overall: 22 G1: 22 G2: 23 **Female, %** Overall: 52 G1: 52 G2: 52	**Drinks Per Week, Mean (SD)** Overall: NR G1: 8.38 (7.43) G2: 9.59 (8.36) **Other Measures, Mean (SD)** # drinks per sitting: Overall: NR G1: 4.69 (2.24) G2: 4.90 (2.38) # heavy drinking days in past 30 days Overall: 5.2 (4.7) G1: 5.04 (4.53) G2: 5.42 (4.93) Typical BAC Overall: 0.08 (0.05) G1: 0.076 (0.047) G2: 0.080 (0.048) Peak BAC Overall: 0.15 (0.08) G1: 0.144 (0.082) G2: 0.158 (0.086) Drinks per drinking day Overall: NR G1: 4.69 (.168) G2: 4.90 (.176) Peak # drinks in a sitting: Overall: NR G1: 8.15 (4.41) G2: 8.68 (4.36)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Schaus et al., 2009[34] (continued)			# times drunk in a typical week Overall: NR G1: 1.14 (1.14) G2: 1.11 (1.20) # times taken foolish risks G1: 5.43 (10.0) G2: 6.58 (11.9) Drinking category: Nonheavy G1: 20 G2: 18 Heavy: G1: 62 G2: 60 Heavy and frequent G1: 18 G2: 23 Alcohol-related harms 23-item RAPI score G1: 14.1 (12.9) G2: 16.1 (12.9) # times drove after at least 3 drinks G1: 4.7 (9.8) G2: 7.8 (16.9) p<0.01 # times taken foolish risks G1: 5.43 (10.0) G2: 6.58 (11.9)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Scott & Anderson, 1990[35] United Kingdom None Foundation or nonprofit	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** **Screening Instrument Score, Mean (SD)** NR **Subgroups** Women only	**Age, Mean (SD)** Overall: NR G1:44.4 (2.4) G2:47.2 (2.2) **Nonwhite or Minority Group, %** NR **Female, %** 100	**Drinks Per Week, Mean (SD)** Mean (SE) From interview Overall: NR G1: 35.3 (1.6) G2: 36.6 (1.7) From HSQ Overall: NR G1: 31.8 (2.4) G2: 30.2 (1.6) **Other Measures, Mean (SD)** Abnormal Edinburgh Hospital Study Dependence Score, % Overall: NR G1: 73 G2: 41

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Senft et al., 1997[36] Freeborn et al., 2000[37] United States None Government	**Sample Includes Those With Alcohol Dependence** No **Portion of Dependent Persons** NA **Screening Instrument Score, Mean (SD)** AUDIT G1: 10.6 (3.4) G2: 10.5 (3.5) **Subgroups** Men or women only	**Age, Mean (SD)** Overall: NR G1: 41.9 (13.6) G2:43.0 (15.2) **Nonwhite or Minority Group, %** Overall: NR G1: 17.4 G2:18.7 **Female, %** Overall: NR G1: 28.1 G2:31.1 **Other Characteristics** # health and medical care visits in year prior to enrollment, if one or more visits: G1: 7.4 (7.4) G2: 8.8 (9.7)	**Drinks Per Week, Mean (SD)** NR **Other Measures, Mean (SD)** Drinking days/week G1: 3.3 (2.1) G2:3.5 (2.2) Drinks/drinking day G1: 5.0 (3.3) G2: 4.7 (3.5) >=6 drinks/occasion at least weekly, % G1: 27.3 G2: 29.5 Seriously considering cutting down on drinking, % G1: 59 G2: 55 Currently advised by MD to avoid alcohol, % G1: 15 G2: 15

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics0
Wallace et al., 1998[38] United Kingdom None Multiple	**Sample Includes Those With Alcohol Dependence** Unclear/not reported **Portion of Dependent Persons** **Screening Instrument Score, Mean (SD)** NR **Subgroups** Men or women only	**Age, Mean (SD)** Men, Mean (SE) G1: 41.7 (0.8) G2: 41.8 (0.8) Women, Mean (SE) G1: 43.0 (1.3) G2: 44.6 (1.3) **Nonwhite or Minority Group, %** NR **Female, %** Overall: NR G1: 29.1 G2: 29.8	**Drinks Per Week, Mean (SD)** From interview; mean (SE): Overall: NR Men G1: 62.2 (1.6) G2: 63.7 (1.9) Women G1: 35.1 (1.5) G2: 36.8 (1.7) **Other Measures, Mean (SD)** Drinks/wk from health survey questionnaire QF items; mean (SE) Overall: NR Men G1: 49.6 (1.2) G2: 51.2 (1.2) Women G1: 28.6 (1.3) G2: 29.2 (1.1) # (%) expressing concern about drinking Overall:NR Men G1:173 (54.2) G2:168 (52.2) Women G1:70 (53.4) G2:70 (51.1)

Evidence Table 2. Characteristics of samples from included randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Sample Characteristics	Baseline Demographic Characteristics	Baseline EtOH Consumption Characteristics
Wallace et al., 1998[38] (continued)			GGT, Mean (SE): Overall:NR Men G1:27.8 (1.4) G2:26.7 (1.3) Women G1:13.7 (1.4) G2:12.0 (1.0)

Abbreviations: AUDIT = Alcohol Use Disorders Identification Test; BAC = blood alcohol content; CARET = Comorbidity Alcohol Risk Evaluation Tool; EtOH = ethanol; G = group; g = grams; GGT = gamma glutamyl transferase; GP = general practitioner; LAST = Lübeck Alcohol dependence and abuse Screening Test; MAST = Michigan Alcoholism Screening Test; MD = medical doctor; NA = not applicable; NR = not reported; QF = quantity/frequency; RAPI = Rutgers Alcohol Problem Index; SD = standard deviation; SE = standard error; TrEAT = Trial for Early Alcohol Treatment; WHO = World Health Organization; wk = week

Evidence Table 3. Intervention and control components from randomized controlled trials

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Anderson & Scott, 1992[1] United Kingdom None Foundation or nonprofit	**Interventions** G1: Brief advice, feedback about blood work & consumption. Also included norms and a self-help booklet G2: Usual care	**Interventionist** G1: PCP G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 1 G2: NA **Length of each contact** G1: 10 minutes G2: NA **Duration of Intervention** G1: Single session G2: NA
Babor, 1996[2] United States, Australia, Kenya,Mexico, Norway, United Kingdom, Russia, Zimbabwe WHO Brief Intervention Multiple	**Interventions** G1: Brief intervention (varied by site), with some sites offering additional "extended counseling" G2: Simple advice G3: Health interview (outcomes assessment)	**Interventionist** G1: Clinic staff G2: Clinic staff G3: NA **Delivery Method** G1: In-person G2: In-person G3: NA **Tailored to Patient** G1: No G2: No G3: NA	**Number of contacts** G1: 1 G2: 1 G3: NA **Length of each contact** G1: 15 minutes G2: 5 minutes G3: NA **Duration of Intervention** G1: Single session G2: Single session G3: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Bischof et al., 2008[3] Grothues et al., 2008[4] Reinhardt et al., 2008[5] Germany Stepped Intervention for Problem Drinkers Government	**Interventions** G1: Full Care: immediate computerized postassessment feedback and brief counseling by psychologist G2: Stepped Care: immediate computerized postassessment 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. G3: General health booklet	**Interventionist** G1: Researcher G2: Researcher G3: NA **Delivery Method** G1: Telephone G2: Telephone G3:NA **Tailored to Patient** G1: Yes G2: Yes G3: NA	**Number of contacts** G1: 4 G2: 4 G3: NA **Length of each contact** G1: 30 minutes Mean (SD) total counseling minutes received: 80.3 (40.3) G2: 30 minutes Mean (SD) total counseling minutes received: G2: 40.0 (41.2); Difference in total counseling minutes significant at p<0.001 G3: NA **Duration of Intervention** G1: 6 months G2: Up to 6 months G3: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Chang et al., 1999[6] United States None Government	**Interventions** G1: Assessment and BI: 1) review of general health and course of pregnancy; 2) review of lifestyle changes made since pregnancy; 3) articulation of drinking goals while pregnant; 4) identification of circumstances in which she might be tempted to drink; 5) identify alternatives to drinking in such situations; 6) summary of session, emphasizing drinking goal, motivation, risk situations, and alternatives; 7) take-home manual with tailored notes; communication about U.S. Surgeon General recommendation G2: Assessment only (DSM-III-R SCID interview, Addiction Severity Index, AUDIT, SMAST, TLFB, Alcohol Craving Scale, Global Assessment of Functioning, Situational Confidence Queestionnaire)	**Interventionist** G1: Mixed: The intervention was delivered by the first author who is a researcher and also a PCP at the lone study site. In addition, the assessment was completed by a research assistant. G2: Researcher **Delivery Method** G1: In-person G2: In-person **Tailored to Patient** G1: Yes G2: No	**Number of contacts** G1: 1 G2: 1 **Length of each contact** G1: 2-hour assessment + 45-minute intervention G2: 2-hour assessment **Duration of Intervention** G1: Single session G2: Single session
Curry et al., 2003[7] United States None Government	**Interventions** G1: Brief motivational message from PCP during regularly scheduled visit; self-help manual; written personalized feedback; up to 3 outreach phone counseling calls G2: Usual care	**Interventionist** G1: Mixed: All intervention components except phone counseling were delivered by PCP; phone calls made by research staff G2: NA **Delivery Method** G1: In-person, telephone G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: Up to 4 G2: NA **Length of each contact** G1: 1-5 minutes during office visit; mean phone call duration was 14 minutes G2: NA **Duration of Intervention** G1: Single PCP session; 6 weeks phone counseling G2: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] United States Project TrEAT Government	**Interventions** G1: BI: Two 15-minute visits 1 month apart delivered by physician and a followup phone call from the clinic nurse 2 weeks after each physician 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, drinking diary cards, followup phone call from clinic nurse G2: General health booklet	**Interventionist** G1: PCP, nurse G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 4: 2 intervention and 2 followup G2: NA **Length of each contact** G1: 15 minutes G2: NA **Duration of Intervention** G1: 1 month G2: NA
Fleming et al., 1999[13] Mundt et al., 2005[14] United States Guiding Older Adult Lifestyles Multiple	**Interventions** G1: 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 G2: General health booklet	**Interventionist** G1: PCP, nurse G2: NA **Delivery Method** G1: In-person, telephone G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 4 G2: NA **Length of each contact** G1: 10-15 minutes (PCP contacts), NR for nurse calls G2: NA **Duration of Intervention** G1: 1 month G2: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Fleming, et al., 2008[15] Wilton, et al., 2009[16] United States Healthy Moms Government	**Interventions** G1: BI and reinforcement session, each with phone followup; BI was 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, drinking diary cards G2: General health booklet + usual care	**Interventionist** G1: 90% of interventions were conducted by the clinic nurses; the other 10% were delivered by the obstetrician. G2: NA **Delivery Method** G1: In-person, telephone G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 4 G2: NA **Length of each contact** G1: 15 minutes G2: NA **Duration of Intervention** G1: 8 weeks G2: NA
Fleming et al., 2010[17] United States, Canada College Health Intervention Multiple	**Interventions** G1: BI from a manual containing 24 intervention strategies, including 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 G2: General health booklet + usual care	**Interventionist** G1: PCP G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 4: 2 intervention and 2 followup G2: NA **Length of each contact** G1: 15 minutes G2: NA **Duration of Intervention** G1: Intervention: 1 month Intervention + followups: 2 months G2: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Kypri et al., 2004[18] New Zealand None Government	**Interventions** G1: Electronic BI - web-based assessment and personalized feedback on drinking G2: Computer-based assessment + usual care (pamphlet)	**Interventionist** G1: Self-administered G2: Self-administered; **ComputerDelivery Method** G1: Computer G2: Computer **Tailored to Patient** G1: Yes G2: No	**Number of contacts** G1: 1 G2: 1 **Length of each contact** G1: 10-15 min (mean duration 11.2 min) G2: Mean duration 3.4 minutes **Duration of Intervention** G1: Single session G2: Single session
Kypri et al., 2007[19] Kypri et al., 2008[20] New Zealand None Government	**Interventions** G1: Single electronic BI session consisting of web-based assessment and personalized feedback on drinking G2: Multiple electronic BI sessions consisting of web-based assessment and personalized feedback on drinking G3: Usual care (pamphlet) G4: Usual care (pamphlet) + 4 week followup assessment	**Interventionist** G1: Self-administered G2: Self-administered G3: NA G4: NA **Delivery Method** G1: Computer G2: Computer G3: NA G4: NA **Tailored to Patient** G1: Yes G2: Yes G3: NA G4: NA	**Number of contacts** G1: 1 G2: 3 G3: NA G4: NA **Length of each contact** G1: 10-15 minutes G2: 10-15 minutes G3: NA G4: NA **Duration of Intervention** G1: Single session G2: 6 months G3: NA G4: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Lin et al., 2010[21] Moore et al., 2010[22] United States Healthy Living As You Age Multiple	**Interventions** G1: 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 G2: General health booklet	**Interventionist** G1: Mixed:Intervention was delivered by both PCP (face-to-face intervention session) and health educator (phone followup and reinforcement) G2: NA **Delivery Method** G1: In-person, telephone G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 4: 1 main in-person session; 3 additional phone sessions G2: NA **Length of each contact** G1: 15-20 minutes G2: NA **Duration of Intervention** G1: 8 weeks G2: NA
Lock et al., 2006[23] United Kingdom None Government	**Interventions** G1: 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 G2: Usual care (nurses' usual advice on cutting down drinking and a leaflet with daily benchmark alcohol guides and basic advice)	**Interventionist** G1: Nurse G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: No G2: NA	**Number of contacts** G1: 1 G2: NA **Length of each contact** G1: 5-10 minutes G2: NA **Duration of Intervention** G1: Single session G2: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Maisto et al., 2001[24] Maisto et al., 2001[25] Gordon et al., 2003[26] United States Early Lifestyle Modification Study Government	**Interventions** G1: Brief advice: emphasized feedback from baseline results and implications for drinking, coupled with advice regarding a goal to reduce or stop alcohol consumption. Minimal elaboration. G2: 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 G3: Usual care: participant's MD was given selected feedback from screening and assessment	**Interventionist** G1: Researcher G2: Researcher G3: NA **Delivery Method** G1: In-person G2: In-person G3: NA **Tailored to Patient** G1: Yes G2: Yes G3: NA	**Number of contacts** G1: 1 G2: 3 G3: NA **Length of each contact** G1: 10-15 minutes G2: 15-45 minutes G3: NA **Duration of Intervention** G1: Single session G2: 6 weeks G3: NA
Noknoy et al., 2010[27] Thailand None Foundation or nonprofit	**Interventions** G1: Motivational enhancement protocol (brief counseling sessions using patient-centered interviewing style and considering stages of change) G2: Assessment only	**Interventionist** G1: Nurse G2: Clinic staff **Delivery Method** G1: In-person G2: In-person **Tailored to Patient** G1: Yes G2: No	**Number of contacts** G1: 3 G2: NA **Length of each contact** G1: 15 minutes G2: NA **Duration of Intervention** G1: 6 weeks G2: NA
Ockene et al., 1999[28] Ockene et al., 2009[29] Reiff-Hekking et al., 2005[30] United States Project Health Government	**Interventions** G1: Health booklet; patients' alcohol consumption info, intervention algorithm, and patient education materials to patient's chart at regular office visit; PCP-delivered counseling involved talking about number of drinks per week, binge drinking, or both. G2: General health booklet + usual care	**Interventionist** G1: PCP G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 2 G2: NA **Length of each contact** G1: 5-10 minutes G2: NA **Duration of Intervention** G1: NR G2: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Richmond et al., 1995[31] Australia None Government	**Interventions** G1: "Alcoholscreen" program: 5 short consultations (introduction, patient education, 3 followups) designed to reduce drinking to recommended limits. Consisted of self-help manual, daily alcohol diary, 15-20 minute personalized patient education and counseling G2: Minimal intervention: brief advice and self-help manual G3: Assessment only; no intervention Assessment by researcher, in-person, single-session G4: Screening only; no assessment, no intervention Screening was self-administered in PCP office	**Interventionist** G1: PCP G2: PCP G3: NA G4: NA **Delivery Method** G1: In-person G2: In-person G3:NA G4:NA **Tailored to Patient** G1: Yes G2: Unclear/not reported G3: NA G4: NA	**Number of contacts** G1: 5 G2: 1 G3: NA G4: NA **Length of each contact** G1: Intervention: 15-20 minutes Followups: 5-25 minutes G2: 5 minutes (estimated) G3: NA G4: NA **Duration of Intervention** G1: 5 months G2: Single session G3: NA G4:NA
Rubio et al., 2010[32] Spain None Foundation or nonprofit	**Interventions** G1: 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) + phone reinforcement by nurse + general health booklet G2: General health booklet + usual care	**Interventionist** G1: PCP G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: No G2: NA	**Number of contacts** G1: 2 G2: NA **Length of each contact** G1: 10-15 minutes G2: NA **Duration of Intervention** G1: Intervention: 4 weeks Intervention + followup: 8 weeks G2: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Saitz et al., 2003[33] United States Screening and Intervention in Primary Care Multiple	**Interventions** G1: Report attached to patient's chart, including: patient's alcohol screening results, a preliminary assessment, and specific recommendations[1] (see comment). G2: Usual care: providers received no information	**Interventionist** G1: PCP G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 1 G2: NA **Length of each contact** G1: NR G2: NA **Duration of Intervention** G1: Single session G2: NA
Schaus et al., 2009[34] United States None Government	**Interventions** G1: Brief motivational intervention sessions that combined patient-centered motivational interviewing and cognitive-behavioral skills training + booklet on alcohol prevention G2: Alcohol problem prevention booklet + usual care	**Interventionist** G1: PCP (One of four people: 2 MDs, 1 PA, 1 NP) G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 2 G2: NA **Length of each contact** G1: 20 minutes G2: NA **Duration of Intervention** G1: 2 weeks G2: NA

[1] PCP also given the predictive value of CAGE based on the prevalence of alcohol abuse or dependence in the practice, definitions of hazardous drinking, an approach for patients who are not ready to change, a list of abuse or dependence symptoms, and referral information. To increase counseling rates, Post-it note attached to the encounter form asking physicians to indicate whether alcohol was discussed and, if not, why.

Specific recommendations were given, depending on patient's level of drinking:

"Drinking hazardous amounts but no affirmative CAGE responses": 1) consider advising safe drinking limits, 2) consider providing patients w/ pamphlet on how to cut down on drinking

"No hazardous drinking but affirmative CAGE response": 1) consider advising abstinence, 2) provide pamphlet, 3) refer to addiction treatment
"Hazardous drinking plus affirmative CAGE response": 1) consider advising abstinence, 2) refer to addiction treatment

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Scott & Anderson, 1990[35] United Kingdom None Foundation or nonprofit	**Interventions** G1: Brief advice, feedback about blood work & consumption. Also included norms and a self-help booklet G2: Usual care	**Interventionist** G1: PCP G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 1 G2: NA **Length of each contact** G1: 10 minutes G2: NA **Duration of Intervention** G1: Single session G2: NA
Senft et al., 1997[36] Freeborn et al., 2000[37] United States None Government	**Interventions** G1: Two-part motivational session: 30-second message from PCP and 15-minute session with health counselor immediately following PCP visit. Counseling session included: gathering additional info about QF and giving feedback compared with national norms; explaining effects of alcohol use and teaching ways to estimate blood alcohol level; recommending limits and/or abstinence; suggestiong options for reducing drinking; creating low-risk drinking plan; building self-confidence to succeed G2: Usual care	**Interventionist** G1: Mixed: 30-second message could have been delivered by MD, NP or PA; 15-minute counseling was delivered by research staff G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 1 G2: NA **Length of each contact** G1: 15 minutes G2: NA **Duration of Intervention** G1: Single session G2: NA

Evidence Table 3. Intervention and control components from randomized controlled trials (continued)

Author, Year Country Trial Name Funding Source	Intervention	Interventionist Delivery Method Tailored to Patient	Contacts
Wallace et al., 1998[38] United Kingdom None Multiple	**Interventions** G1: Brief advice + information booklet ("That's the Limit") + sex-based recommendation for limiting drinking (U/wk) + drinking diary +f/up sessions G2: Usual care: no advice from GP unless the patient requested or the patient's lab results indicated substantial liver function impairment	**Interventionist** G1: PCP G2: NA **Delivery Method** G1: In-person G2: NA **Tailored to Patient** G1: Yes G2: NA	**Number of contacts** G1: 1 to 5: all received an invitation to a 1-month f/up; other f/up was offered at 4, 7, and 10 months at the discretion of the GP G2: NA **Length of each contact** G1: 10-15 minutes G2: NA **Duration of Intervention** G1: NR G2: NA

Abbreviations: AUDIT = Alcohol Use Disorders Identification Test; BAC = blood alcohol content; BI = brief intervention; CAGE = Cut down, Annoyed, Guilty, Eye opener questionnaire; DSM-III-R = *Diagnostic and Statistical Manual of Mental Disorders* (3rd Edition, Revised); f/up = followup; G = group; g = grams; GGT = gamma glutamyl transferase; GHQ = General Health Questionnaire; GP = general practitioner; MD = medical doctor; min = minutes; NA = not applicable; NP = Nurse Practitioner; NR = not reported; NS = not significant; PA = Physician Assistant; PCP = primary care provider; SCID = Structured Clinical Interview for DSM; SD = standard deviation; SE = standard error; SMAST = short Michigan Alcoholism Screening Test; TLFB = Timeline Followback; TrEAT = Trial for Early Alcohol Treatment; WHO = World Health Organization

Evidence Table 4. Outcomes by study

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Anderson & Scott, 1992[1] United Kingdom None Foundation or nonprofit	**Change in drinks per week, mean (SD)** G1: -11.5 G2: -6.7 p<0.06 **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** G1: 77.5 G2: 60.8 p<0.05 **Achieving moderate/safe drinking, %** G1: 18 G2: 5 p<0.05 **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** with abnormal dependence score (change from baseline), % G1: 23.8 (-17.5) G2: 36.5 (-5.4) **Subgroup analyses** All results are for men	**Morbidity** with abnormal accident score (change from baseline), % G1: 2.5 (+1.2) G2: 8.1 (+0) p=NS **Mortality** NR **Health care utilization** Mean (SE) consultations/year G1: 3.3 (0.6) G2: 4.0 (0.6) p=NS Change in mean consultations/year G1: +0.3 G2: +1.3 Mean (SE) episodes/year G1: 1.8 (0.3) G2: 2.2 (0.3) Change in mean episodes/year G1: -0.3 G2: -0.4 **Quality of life** Change in mean life quality score: G1: 0 G2:0 p=NS	**Harms** Change in mean anxiety score (though anxiety was not designated as a harm measure a priori) G1: +2.2 G2: -2.4 No significant changes in reported frequencies of taking exercise, dieting to lose weight, or cigarette consumption over the duration of the trial or between treatment and control groups.	Change in mean Short GHQ score: G1: -0.1 G2: +0.1 Change in mean affect balance score: G1: +0.4 G2: -0.1 % (change from baseline) with abnormal health score G1: 41.9 (-3.1) G2: 36.5 (-0.5) p=NS

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Anderson & Scott, 1992[1] (continued)			Change in mean life satisfaction score: G1: +1.8 G2: -2.2 p=NS % (change from baseline) with abnormal social score: G1: 15.0 (-10) G2: 18.9 (-12.2) Change in mean GGT G1: +6.6 G2: -1.8 Change in mean MCV G1: +0.2 G2: -0.3 Change in mean BAC G1: -2.2 G2: -2.1		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Babor, 1996[2] United States, Australia, Kenya,Mexico, Norway, United Kingdom, Russia, Zimbabwe WHO Brief Intervention Multiple	**Change in drinks per week, mean (SD)** NR **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** NR **Achieving moderate/safe drinking, %** Men @ 9 months G1: 43 G2: 43 G3: 35 Women @ 9 months G1: 39 G2: 43 G3: 35 **Abstinent, %** Men @ 9 months G1: 8 G2: 5 G3: 2 Women @ 9 months G1: 12 G2: 7 G3: 4	**Receipt of and followup with referrals** NR **Other outcomes** Decreasing average daily drinking, % Men @ 9 months G1: 40.3 G2: 40.8 G3: 29.0 Women @ 9 months G1: 45.1 G2: 43.2 Without hazardous daily consumption, % Men @ 9 months G1: 53 G2: 51 G3: 42 p=0.01 Women @ 9 months G1: 43 G2: 46 G3: 40 p=NS **Subgroup analyses** NA	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** NR	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Bischof et al., 2008[3] Grothues et al., 2008[4] Reinhardt et al., 2008[5] Germany Stepped Intervention for Problem Drinkers Government	**Change in drinks per week, mean (SD)** G1: -6.64 G2: -6.23 G3: -3.22 p=NS **Change in drinks per drinking day, mean (SD)** G1: -0.95 G2:-0.89 G1 vs. G2 p=0.217 G1/G2: -0.92 G3: -0.46 G1/G2 vs. G3 p=0.048 Women: G1/G2 vs. G3: -35.5% (p=0.039) Men: G1/G2 vs. G3: -9.6% (p=0.564) **Not bingeing, %** Among abusers/at-risk: G1: 77.6 G2: 78.0 G1 vs. G2 p=1.00 G1/G2: 75.0 G3: 58.7% G1/G2 vs. G3 p=0.039 **Achieving moderate/safe drinking, %** G2 only Male: 25.0 Female: 26.7 p=.898	**Receipt of and followup with referrals** NR **Other outcomes, %** Help-seeking at followup: Among dependents: G1: 20.0 G2: 18.4 G1 vs. G2 p=1.00 G1/G2: 19.3 G1/G2 vs. G3G3: 11.1 p=0.694 Among abusers/at-risk: G1: 4.1 G2: 3.4 G1 vs. G2 p=1.00 G1/G2: 3.7 G3: 1.6 G1/G2 vs. G3 p=0.653 Responding to stepped care - G2 ONLY (achievement of safe drinking), %: @ 2nd visit Women: 40 Men: 24.4 p=0.089	**Morbidity** NR **Mortality** Causes not specified G1: 0 G2: 1 G3: 2 **Health care utilization** NR **Quality of life** NR	**Harms** NR	Drinks per week calculated by dividing g by 13.7 to get drinks/day and then mulitplying by 7 for drinks/week

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Bischof et al., 2008[3] Grothues et al., 2008[4] Reinhardt et al., 2008[5] (continued)	**Abstinent, %** NR	**Subgroup analyses** BY SEVERITY OF ALCOHOL MISUSE Not bingeing, % Among dependents at baseline: G1: 61.2 G2: 51.4 G1 vs. G2 p=0.387 G1/G2: 45.5 G3: 50.0 G1/G2 vs. G3 p=0.694 Among bingers at baseline: G1: 80.6 G2: 72.5 G1 vs. G2 p=0.577 G1/G2: 67.1 G3: 72.5 G1/G2 vs. G3 p=0.672 Change in drinks per day Among dependents: G1: -1.4 G2: -0.96 G1 vs. G2 p=0.793 G1/G2: -1.2 G3: -1.3 (57.5) G1/G2 vs. G3 p=0.617 Among abusers/at-risk: G1: -1.3 G2: -1.4 G1 vs. G2 p=0.283 G1/G2: -1.3 G3: -0.27 G1/G2 vs. G3 p=0.002			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Bischof et al., 2008[3] Grothues et al., 2008[4] Reinhardt et al., 2008[5] (continued)		Among bingers: G1: +0.27 G2: -0.15 G1 vs. G2 p=0.009 G1/G2: +0.03 G3: +0.02 G1/G2 vs. G3 p=0.283 BY COMORBID MENTAL HEALTH CONDITION Change in mean drinks per day: With depression and/or anxiety G1: -2.1 G2: -1.1 G3: -1.6 G1/G2 vs. G3 p=0.92 No mental health comorbidity G1: -0.61 G2: -0.65 G3: -0.19 G1/G2 vs. G3 p=0.03 Comorbidity coefficient (95% CI)= +0.594 (0.175 to 1.013); p<0.01 With depression only G1: -2.6 G2: -0.95 G3: +0.03 G1/G2 vs. G3 p=0.75			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Bischof et al., 2008[3] Grothues et al., 2008[4] Reinhardt et al., 2008[5] (continued)		With no depression G1: -0.67 G2: -0.67 G3: -0.22 G1/G2 vs. G3 p=0.03 With anxiety only G1: +0.0036 G2: -2.5 G3: -2.3 G1/G2 vs. G3 p=0.72 With no anxiety G1: -0.74 G2: -0.67 G3: -0.22 G1/G2 vs. G3 p=0.03			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Chang et al., 1999[6] United States None Government	**Change in drinks per week, mean (SD)** NR **Change in drinks per drinking day, mean (SD)** Excluding patients who maintained abstinence through end of study From baseline to delivery: G1: -0.3 G2: -0.4 p=NS During antepartum period: Values NR p=NS **Not bingeing, %** NR **Achieving moderate/safe drinking, %** NR **Abstinent, %** 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% vs. 72%, p=0.04).	**Receipt of and followup with referrals** NR **Other outcomes** # of drinking episodes in antepartum period: G1: 0.7 G2: 1.0 p=0.12 RR of antepartum alcohol consumption: Overall: 0.80; p=0.33 Women abstinent before assessment: 0.60; p=0.20 Women nonabstinent before assessment: 1.02; p=0.95 **Subgroup analyses** NR	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** Birthweight of infants, g: G1: 3360 G2: 3406 p=NS	**Harms** NR	Mean # weeks of antepartum drinking was 22.4 (5.6) weeks; gestational age required to be <28 weeks @ study entry; mean gestation @ baseline was 16 (4.6) weeks

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Curry et al., 2003[7] United States None Government	**Change in drinks per week, mean (SD)** G1: -4.33 G2: -2.06 p=NR **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** G1: 86 G2: 81 p=0.35 **Achieving moderate/safe drinking, %** G1: 57 G2: 43 p=0.048 **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** Chronic drinking (change from baseline), % G1: 28 (-17) G2: 28 (-12) p=NR Drinking & driving (change from baseline), % G1: 20 (-31) G2: 35 (-25) p=NR **Subgroup analyses** NR	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** NR	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] United States Project TrEAT Government	**Change in drinks per week, mean (SD)** Overall@ 6 months G1: -7.57 G2: -3.96 Overall @ 12 months G1: -7.66 G2: -3.48 Overall treatment difference over 48 months: p=0.0018 Men @ 6 months G1: -7.83 G2: -4.83 @ 12 months G1: -8.05 G2: -5.09 Overall treatment difference @ 12 months: p<0.01 Women @ 6 months G1: -7.14 G2: -4.15 @ 12 months G1: -7.02 G2: -2.49 Overall treatment difference @ 12 months: p<0.05 **Change in drinks per drinking day, mean (SD)** NR	**Receipt of and followup with referrals** NR **Other outcomes** # binge episodes in previous 30 days Overall @ 6 months G1: 2.88 (4.86) G2: 3.93 (4.80) p<0.005 @ 12 months G1: 3.07 (5.23) G2: 4.21 (5.52) p<0.005 Overall treatment effect @ 48 months p=0.0002 Men @ 6 months G1: 3.33 (5.35) G2: 4.37 (5.29) p<0.025 @ 12 months G1: 3.43 (5.52) G2: 4.48 (5.66) p<0.05 Women @ 6 months G1: 2.14 (3.94) G2: 3.22 (3.80) p<0.02	**Morbidity** Full sample @ 48 months/young adults (18-30) @ 48 months Motor vehicle crash with fatalities G1: 0/0 G2: 2/1 p=NS Motor vehicle crash with nonfatal injuries G1: 20/9 G2: 31/20 P = NS/p<0.05 Motor vehicle crash with property damage only G1: 67/19 G2: 72/28 p=NS Operating while intoxicated G1: 25/8 G2: 25/10 p=NS Other moving violations G1: 169/78 G2: 177/81 p=NS Total motor vehicle events G1: 281/114 G2: 307/149 p=NS/p<0.05	**Harms** Total patient cost per patient (travel, lost work): $38.97 No significant change in the mean number of cigarettes smoked after 12 months for men or women in either group. (Values NR)	No significant changes in general health rating or depressive symptoms after 12 months in either group.

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)	**Not bingeing, %** Overall @ 6 months G1: 39.5 G2: 27.2 p<0.01 @ 12 months G1: 42.6 G2: 28.5 p<0.01 @ 24 months: G1: 37.5 G2: 25.6 p<0.01 @ 36 months: G1: 38.5 G2: 29.3 p<0.01 @ 48 months: G1: 36.2% G2: 29.6% p<0.10 Overall treatment difference p=0.0004 Men @ 6 months G1: 34.8 G2: 25.6 p<0.05 @ 12 months G1: 40.6 G2: 25.2 p<0.01	@ 12 months G1: 2.50 (4.70) G2: 3.79 (5.27) p<0.02 **Subgroup analyses** Change in mean (SD) drinks/week Women 18-40 only@ 6 months G1: -6.58 G2: -4.30 p=0.53 @ 12 months G1: -6.72 G2: -3.06 p=0.09 @ 24 months G1: -7.05 G2: -3.88 p=0.01 @ 36 months G1: -6.94 G2: --5.50 p=0.08 @ 48 months G1: -6.60 G2: -4.93 p=0.27	**Mortality** Overall: 10 G1: 3 (1 suicide, 2 myocardial infarction) G2: 7 (2 motor vehicle accidents; 5 coronary artery disease or respiratory failure) **Health care utilization** # ED visits in last 6 months Full sample @ 6months G1: 47 G2: 70 p>0.10 @ 12 months G1: 60 G2: 62 p>0.10 @ 48 months G1: 302 G2: 376 p>0.10 Men @ 6 months G1: 29 G2: 46 p>0.10 @ 12 months G1: 33 G2: 39 p>0.10		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)	@ 24 months: G1: 38.1 G2: 27.3 p<0.05 @ 36 months: G1: 38.5 G2: 31.5 p=NS @ 48 months: G1: 36.9 G2: 27.3 p<0.05 Overall treatment difference p=0.002 Women @ 6 months G1: 46.6 G2: 29.9 p<0.01 @ 12 months G1: 45.3% G2: 32.6% p< <0.05 @ 24 months: G1: 38.5 G2: 23.6 p<0.01 @ 36 months: G1: 43.2 G2: 25.0 p<0.01	Repeated measures for overall treatment effect: p=0.0039 Pregnant women G1: -10.1 G2: -3.4 p<0.05 Young adults 18-30 @ 6 months G1: -6.8 G2: -4.0 @ 12 months G1: -7.4 G2: -3.3 @ 24 months G1: -7.3 G2: -3.8 @ 36 months G1: -6.8 G2: -4.4 @ 48 months G1: -7.6 G2: -6.7 Overall treatment difference: p<0.002	Women @ 6 months G1: 18 G2: 24 p>0.10 @ 12 months G1: 27 G2: 23 p>0.10 Women 18-40 @ 6 months G1: 14 G2: 20 p=0.39 @ 12 months G1: 23 G2: 21 p=0. 84 @ 24 months G1: 23 G2: 27 p=0.82 @ 36 months G1: 35 G2: 32 p=0.70		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)	@ 48 months: G1: 38.5 G2: 32.6 p=NS Overall treatment difference p=0.0023 **Achieving moderate/safe drinking, %** Overall @ 6 months G1: 78.1 G2: 67.5 p<0.01 @ 12 months G1: 79.9 G2: 66.5 p<0.01 @ 24months: G1: 74.7 G2: 67.0 p<0.01 @ 36 months: G1: 76.8 G2: 65.4 p<0.01 @ 48 months: G1: 77.6 G2: 73.6 p=NS Overall treatment difference p=0.0005	Not bingeing in previous 30 days, % Women 18-40 @ 6 months G1: 40.8 G2: 24.5 p=0.01 @ 12 months G1: 39.8 G2: 26.5 p=0.03 @ 24 months G1: 31.1 G2: 18.6 p=0.03 @ 36 months G1: 35.9 G2: 24.5 p=0.06 @ 48 months G1: 32.0 G2: 30.4 p=0.71 Young adults 18-30 @ 6 months G1: 94 G2: 16 @ 12 months G1: 94 G2: 12 @ 24 months G1: 24 G2: 15	@ 48 months G1: 11 G2: 20 p=0.14 Young adults 18-30 @ 48 months ED visits G1: 103 G2: 177 p<0.01 # days hospitalized in last 6 months Full sample @ 6 months G1: 35 G2: 180 p<0.001 @ 12 months G1: 91 G2: 146 p<0.001 @ 48 months G1: 420 G2: 664 p<0.05 Men @ 6 months G1: 29 G2: 159 p<0.001 @ 12 months G1: 65 G2: 118 p<0.001		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)	Men @ 6 months G1: 76.6 G2: 70.2 p=NS @ 12 months G1: 79.9% G2: 68.1% p<0.01 @ 24 months: G1: 74.6 G2: 67.6 p=NS @ 36 months: G1: 75.0 G2: 66.4 p<0.05 @ 48 months: G1: 75.8 G2: 76.0 p=NS Overall treatment difference p=0.046 Women @ 6 months G1: 80.4 G2: 63.2 p<0.01 @ 12 months G1: 79.7 G2: 63.9 p<0.01	@ 36 months G1: 30 G2: 24 @ 48 months G1: 34 G2: 19 Overall p<0.01 Drinking excessively in past 30 days, % Women 18-40 @ 6 months G1: 80.6 G2: 68.6 p=0.09 @ 12 months G1: 80.6 G2: 69.6 p=0.11 @ 24 months G1: 82.5 G2: 67.6 p=0.02 @ 36 months G1: 85.4 G2: 67.6 p=0.004 @ 48 months G1: 85.4 G2: 73.5 p=0.05	Women @ 6 months G1: 6 G2: 21 p<0.001 @ 12 months G1: 26 G2: 16 p<0.001 Women 18-40 @ 6 months G1: 6 G2: 16 p=0.26 @ 12 months G1: 22 G2: 16 p=0.65 @ 24 months G1: 30 G2: 34 p=0.52 @ 36 months G1: 39 G2: 28 p=0.84 @ 48 months G1: 26 G2: 53 p=0.27		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)	@ 24 months: G1: 75.0 G2: 66.0 p<0.10 Women @ 36 months: G1: 79.7 G2: 63.9 p<0.01 @ 48 months: G1: 80.4 G2: 69.4 p<0.05 Overall treatment difference p=0.0021 **Abstinent, %** NR	Pregnant women @ 48 months G1: 1.5 G2: 4.2 p<0.05 # binge episodes in past 30 days Women 18-40 @ 6 months G1: 2.23 (3.02) G2: 3.54 (3.75) p=0.13 @ 12 months G1: 2.27 (2.86) G2: 3.69 (4.65) p=0.11 @ 24 months G1: 3.04 (4.23) G2: 5.10 (5.75) p=0.03 @ 36 months G1: 2.98 (4.46) G2: 4.18 (4.50) p=0.28 @ 48 months G1: 2.95 (3.78) G2: 4.51 (5.68) p=0.14	Young adults 18-30 @ 48 months G1: 131 G2: 150 p=NS **Quality of life** LEGAL EVENTS Full sample @ 48 months/ages 18-30 @ 48 months Assault, battery, child abuse G1:8/6 G2:11/6 p=NS Resist or obstruct office, disorderly conduct G1: 8/6 G2: 6/3 p=NS Controlled substance, liquor violation G1: 2/0 G2: 11/8 p<0.05/p<0.01 Criminal or property damage G1: 2/1 G2: 1/3 p=NS		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)		Young adults 18-30 @ 6 months G1: 82 G2: 70 @ 12 months G1: 83 G2: 65 @ 24 months G1: 86/86/85 G2: 70/65/80 Overall p<0.01	Theft, robbery G1: 3/1 G2: 3/3 p=NS Other arrests G1: 5/2 G2: 9/3 p=NS Total legal events G1: 28/16 G2: 41/26 COSTS PER PATIENT Screening: $3.43 Assessment: $2.60 Primary intervention visit: $26.19 Intervention followup visit: $26.19 Telephone followup: $2.51 Provider training (one-time total cost): $8,839 Total clinic cost per patient: $165.65 Total patient cost per patient (travel, lost work): $38.97 Overall cost per patient: $205 Postbaseline ED visit costs ($): G1: 49,008 G2: 60,456		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)			Difference (95% CI): 11,448 (-6,412 to 32,060) Postbaseline hospitalizations costs ($): G1: 115,920 G2: 299,920 Difference (95% CI): 184,000 (23,920 to 389,160) Total postbaseline health care costs ($): G1: 164,928 G2: 360,376 Difference (95% CI): (36 to 734; 428 to 375) Postbaseline health care cost per study patient ($): G1: 421 G2: 943 Difference (95% CI): 523 (94 to 1,093) All legal event costs ($) G1: 26,255 G2: 45,188 Difference (95% CI): 18,963 (-25,188 to 70,907) All motor vehicle event costs ($): G1: 446,153 G2: 655,261		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] (continued)			Difference (95% CI): 209,108 (-128,468 to 751,202) All legal events and accidents costs ($) G1: 472,378 G2: 700,449 Difference (95% CI): 228,071 (-191,419 to 757,303) Legal event and accident cost per patient ($) G1: 1,206 G2: 1,834 Difference (95% CI): 629 (-488 to 1,932) Benefit of intervention: $423,519 (95% CI: $35,947 to $884,848) Reduced ED and hospitalization benefit: $195,448 Lower crime and motor vehicle accidents benefit: $228,071 Benefit per study patient: $1,151 (95% CI, $92 to $2,257) Net benefit per patient: $947 Benefit-cost ratio: 5.6:1 (95% CI, 0.4 to 11.0)		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12]			Net benefit for managed care organization per patient: $523; benefit-cost ratio: 3.2:1 (95% CI, 0.6 to 6.6)		

(continued)

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1999[13] Mundt et al., 2005[14] United States Guiding Older Adult Lifestyles Multiple	**Change in drinks per week, mean (SD)** @ 6 months G1: -5.49 G2: -0.49 p<0.001 @ 12 months G1: -5.62 G2: -0.31 p<0.001 @ 24 months G1: -5.0 G2: -2.0 p<0.05 **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** In previous 30 days @ 6 months: G1: 67.95 G2: 58.21 p=NS In previous 30 days @ 12 months: G1: 69.23 G2: 50.75 p<0.025	**Receipt of and followup with referrals** NR **Other outcomes** # binge drinking episodes in previous 30 days - mean (SD): @ 6 months: G1: 2.47 (6.96) G2: 4.79 (9.36) p<0.05 @ 12 months: G1: 1.83 (5.94) G2: 5.36 (9.25) p<0.005 Change in # binge drinking episodes in previous 30 days (mean) @ 6 months: G1: -0.91 G2: +0.64 @ 12 months: G1: -1.55 G2: +1.21 Mean (SD) # heavy drinking episodes in previous 30 days @ 6 months G1: 1.82 (4.4) G2: 4.42 (8.8) p<0.05	**Morbidity** No significant changes in accidents or injuries for either group. **Mortality** # @ 24 months (causes unspecified) G1: 1 G2: 4 p=NR **Health care utilization** NR **Quality of life** All costs are @ 24 months Cost of intervention, $/patient G1: 236 G2: 3 Cost to clinic, $/patient G1: 197 G2: 3 Cost to patient, $/patient G1: 39 G2: 0	**Harms** No significant changes in tobacco use for either group. Patient costs = $39/patient for G1 and $3/patient for G2	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1999[13] Mundt et al., 2005[14] (continued)	**Achieving moderate/safe drinking, %** In previous 7 days @ 6 months: G1: 84.6 G2: 68.7 p<0.025 @ 12 months: G1: 84.6 G2: 65.7 p<0.005 @ 24 months: G1: 83.1 G2: 69.4 p<0.10 **Abstinent, %** NR	Mean (SD) # heavy drinking episodes in previous 30 days @ 12 months G1: 1.11 (2.4) G2: 5.46 (9.4) p<0.001 @ 24 months G1: 2.05 (5.1) G2: 3.94 (8.9) p=NS Change in # heavy drinking episodes in previous 30 days (mean) @ 6 months: G1: -1.52 G2: -0.19 @ 12 months: G1: -2.23 G2: +0.85 @ 24 months: G1: -1.29 G2: -0.67 **Subgroup analyses** All results are for older adults	Cost of hospitalizations, $/patient (95% CI) G1: 2,755 (1,664 to 3,846) G2: 3,433 (1,666 to 5,200) Cost of ED visits, $/patient (95% CI) G1: 94 (61 to 127) G2: 83 (50 to 116) Cost of Rx and OTC medications, $/patient (95% CI) G1: 225 (163 to 287) G2: 216 (165 to 267) Cost of clinic visits, $/patient (95% CI) G1: 157 (102 to 212) G2: 153 (95 to 211) Outpatient lab and x-ray procedures, $/patient (95% CI) G1: 29 (11 to 47) G2: 39 (12 to 66) Total health care utilization, $/patient (95% CI) G1: 3,260 (2,128 to 4,392) G2: 3,924 (2,100 to 5,748)		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 1999[13] Mundt et al., 2005[14] (continued)			Cost of motor vehicle accidents, $/patient (95% CI) G1: 1,613 (0 to 3,553) G2: 103 (0 to 242) Cost of life-years lost, $/patient (95% CI) G1: 368 (0 to 1089) G2: 2,261 (0 to 4,522) Total other social consequences, $/patient (95% CI) G1: 1,981 (0 to 4,039) G2: 2,364 (105 to 4,623) Total health care and social consequences, $/patient (95% CI) G1: 5,241 (2,995 to 7,487) G2: 6,289 (3,549 to 9,029)		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming, et al., 2008[15] Wilton, et al., 2009[16] United States Healthy Moms Government	**Change in drinks per week, mean (SD)** G1: -3.6 G2: -1.3 p=0.013 **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** NR **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** Change in number of drinking days in past 28 days G1: -3.4 G2: -1.2 p=0.024 Change in number of heavy drinking days, past 28 days (4 or more drinks) G1: -1.8 G2: -0.5 p=0.019 **Subgroup analyses** All results for postpartum women.	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** Mean change in EPDS score G1: -2.0 (p<0.001) G2: -0.41 (p=0.342) p=NR Change in percent depressed over time from baseline (>9 on EPDS) G1: -13.4% (p=0.04) G2: -3.7% (p=0.54) Total change is significant p<0.05 Experimental group (coefficient, SE): -1.46 (0.612); p=0.018; 95% CI, -2.67 to -0.258	**Harms** NR	Converted from consumption in last 28 days by dividing by 4.

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 2010[17] United States, Canada College Health Intervention Multiple	**Change in drinks per week, mean (SD)** At 6 months G1: -4.5 G2: -3.0 At 12 months G1: -4.8 G2: -3.6 p=NR % change baseline to 12 months G1: -27.2% G2: -21.0% Overall treatment group effect coefficient (SE) over time: -4.7 (2.0); p=0.018 **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** Mean number of heavy drinking days @ 6 months G1: 5.3 (4.2) G2: 5.8 (4.1) @ 12 months G1: 5.3 (4.3) G2: 5.5 (3.7) Change baseline to 12 months G1: -26.3 G2: -23.3	**Receipt of and followup with referrals** NR **Other outcomes** Mean number of drinking days in the past 28 days @ 6 months G1: 9.9 (5.8) G2: 10.4 (5.5) @ 12 months G1: 9.9 (5.8) G2: 10.3 (5.5) Change baseline to 12 months, % G1: -15.4 G2: -12.6 Mean change in drinking days baseline to 6 months G1: -1.8 G2: -1.4 p=NR Mean change in drinking days baseline to 12 months G1: -1.8 G2: -1.5 p=NR	**Morbidity** NR **Mortality** NR **Health care utilization** people with at least one hospitalization or ED visit or UC visit or admission to a local detox unit in previous 6 months, % @ 6 months G1: 20.1 G2: 19.9 p=0.937 @ 12 months G1: 18.5 G2: 18.3 p=0.934 % Change baseline to 6 months G1: -9.1 G2: -9.7 p=NR % Change baseline to 12 months G1: -10.7 G2: -11.3 p=NR **Quality of life** NR	**Harms** NR	Converted from # drinks in past 28 days by dividing by 4

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Fleming et al., 2010[17] (continued)	Mean change in number of heavy drinking days Baseline to 6 months G1: -1.9 G2: -1.3 Baseline to 6/12 months G1: -1.9 G2: -1.6 Overall treatment group effect over time, p=0.148 **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	Overall treatment group effect over time, p=0.53 RAPI score @ 6 months G1: 9.7 (8.9) G2: 11.0 (9.4) @ 12 months G1: 7.8 (7.5) G2: 9.1 (8.8) Mean change baseline to 6 months G1: -5.5 G2: -4.9 Mean change baseline to 12 months G1: -7.4 G2: -6.8 Overall treatment group difference across time, p=0.033 **Subgroup analyses** All results are for college students.			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Kypri et al., 2004[18] New Zealand None Government	**Change in drinks per week, mean (SD)** NR **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** Frequency of very episodic heavy drinking Ratio of geometric group means (95% CI): 0.85 (0.59 to 1.22) **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** Lower frequency of drinking (# drinking days in previous 2 weeks): G1 vs G3: 0.84 (0.67 to 1.06); NS Typical occasion quantity: G1 vs G2: 1.02 (0.81 to 1.27); NS Less total consumption: G1 vs G2: 0.90 (0.70 to 1.18); NS **Subgroup analyses** All results are for college students	**Morbidity** NR **Mortality** Deaths (cause not specified): G1: 0 G2: 1 **Health care utilization** NR **Quality of life** Number of Problems on the Alcohol Problems Scale (personal, social, sexual, legal consequences of Heavy drinking) (rate ratio with 95% CI): G1 vs G2: 0.76 (CI, 0.60 to 0.97) p=0.03 Score on the Academic Role Expectations and Alcohol Scale (rate ratio with 95% CI): G1 vs G2: 0.72 (CI, 0.51 to 1.02) NS	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Kypri et al., 2007[19] Kypri et al., 2008[20] New Zealand None Government	**Change in drinks per week, mean (SD)** NR **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** # of episodes of episodic heavy drinking (>80g for women and >120g for men) in the past 2 weeks (rate ratio with 95% CI): @ 6 months: G1 vs G3: 0.78 (0.55 to 1.12), p=0.18 G2 vs G3: 0.65 (0.45 to 0.93), p=0.02 @ 12 months: G1 vs G3: 0.75 (0.53 to 1.07), p=0.12 G2 vs G3: 0.71 (0.51 to 1.01), p=0.06 **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** # of drinking days in past 2 weeks (rate ratio with 95% CI): @ 6 months: G1 vs G3: RR: 0.79 (0.68 to 0.94), p=0.008 G2 vs G3: RR: 0.85 (0.73 to 1.00), p=0.05 @ 12 months: G1 vs G3: 0.86 (0.74 to 1.01), p=0.07 G2 vs G3: 0.92 (0.79 to 1.07), p=0.28 # of drinks per typical drinking occasion in the past 4 weeks (rate ratio with 95% CI): @ 6 months: G1 vs G3: 0.93 (0.80 to 1.08), p=0.33 G2 vs G3: 0.85 (0.73 to 0.98), p=0.02 @ 12 months: G1 vs G3: 0.95 (0.82 to 1.09), p=0.47 G2 vs G3: 0.87 (0.75 to 1.01), p=0.06	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** Score on the Academic Role Expectations and Alcohol Scale (rate ratio with 95% CI): @ 6 months: G1 vs G3: RR: 0.76 (0.64 to 0.91), p=0.003 G2 vs G3: RR 0.78 (0.65 to 0.93), p=0.005 @ 12 months: G1 vs G3: RR: 0.80 (0.66 to 0.97), p=0.02 G2 vs G3: RR: 0.75 (0.62 to 0.90), p=0.002 Number of Problems on the Alcohol Problems Scale (personal, social, sexual, legal consequences of Heavy drinking) (rate ratio with 95% CI): @ 6 months: G1 vs G3: 0.86 (0.70 to 1.06), p=0.17 G2 vs G3: 0.87 (0.71 to 1.07), p=0.20	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Kypri et al., 2007[19] Kypri et al., 2008[20] (continued)		Total drinks in the past 2 weeks (rate ratio with 95% CI): @ 6 months: G1 vs G3: RR: 0.77 (0.63 to 0.95), p=0.02 G2 vs G3: RR: 0.79 (0.64 to 0.97), p=0.02 @ 12 months: G1 vs G3: RR: 0.77 (0.63 to 0.95), p=0.01 G2 vs G3: RR: 0.87 (0.71 to 1.06), p=0.16 AUDIT scores (median, range; linear regression coefficient with 95% CI): @ 12 months: G1:12 (2-27) G2:12 (4-28) G3:14 (2-30) G4: 13 (1-29) G1 - G3: -2.17 (-1.10 to -3.24), p<0.001 G2 - G3: -2.02 (-0.97 to -3.10), p<0.001 **Subgroup analyses** All results are for college students.	@ 12 months: G1 vs G3: 0.82 (0.67 to 1.01), p=0.07 G2 vs G3: 0.81 (0.66 to 1.00), p=0.05		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Lin et al., 2010[21] Moore et al., 2010[22] United States Healthy Living As You Age Multiple	**Change in drinks per week, mean (SD)** G1: -5.7 G2: -4.5 p<0.05 OR (95% CI): 0.87 (0.76 to 0.99) **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** % with one or more heavy drinking days in the past 7 days OR (95% CI): 0.89 (0.4 to 1.97) **Achieving moderate/safe drinking, %** % at risk drinker @ 12 months OR (95% CI): 0.68 (0.36 to 1.26) **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** Change in CARET Risk Score G1: -1.52 G2: -1.37 OR (95% CI): 0.89 (0.73 to 1.09) Adherence to protocol among intervention group: Completion of no followup calls: 19.7% Completion of 1 or 2 followup calls: 30% Completion of all 3 followup calls: 50.3% Baseline risk score was significant predictor of achieving no at-risk outcome @ 12 months: OR (95%) = 0.70 (0.55 to 0.88)	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** NR	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Lin et al., 2010[21] Moore et al., 2010[22] (continued)		# of health educator followup calls NS associated with achieving not at-risk outcome @ 12 months. **Subgroup analyses** All results are for older adults			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Lock et al., 2006[23] United Kingdom None Government	**Change in drinks per week, mean (SD)** At 6 months: G1: -1.46 (12.09) G2: -2.60 (27.83) Treatment difference (95% CI): 1.14 (-9.61 to 11.89) p = 0.83 At 12 months: G1: -1.45 (13.70) G2: -1.26 (20.62) Treatment difference (95% CI): -0.19 (-9.02 to 8.64) p = 0.97 **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** NR **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** Drinking Problems Index: @ 6 mo: G1: -0.34 (2.85) G2: +0.96 (8.06) Treatment difference (95% CI): -1.31 (-4.42 to 1.80) @ 12 mo: G1: -0.97 (3.97) G2: +0.33 (6.13) -1.30 (-3.84 to 1.24) AUDIT score @ 6 mo G1: -1.11 (6.00) G2: -0.28 (9.48) Treatment difference (95% CI): -0.82 (-4.84 to 3.19) **Subgroup analyses** NR	**Morbidity** NR **Mortality** NR **Health care utilization** General practitioner visits: G1:2.77 (1.57) G2: 2.97 (1.87 p=NS Nurse practitioner visits: G1: 1.89 (1.6) G2: 2.00 (1.69) p=NS Accident & emegency visits: G1: 0.36 (0.50) G2: 0.43 (0.665) p=NS Hospital inpatient stays: G1: 0.37 (0.52) G2: 0.31 (0.63) p=NS Hospital outpatient visits: G1: 1.46 (1.45) G2: 1.44 (1.38) p=NS **Quality of life** SF-12 Physical Health 6 months: G1: +0.43 (5.01) G2: +1.00 (6.38)	**Harms** Patient costs (British pounds), mean (SD) G1: 0.48 (0.88) G2: 2.12 (5.18) p=NS	

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Lock et al., 2006[23] (continued)			Treatment difference (95% CI): -0.57 (-3.37 to 2.23) 12 months: G1:-0.59 (5.38) G2: -1.01 (7.33) Treatment difference (95% CI): +0.41 (-2.75 to 3.57) SF-12 Mental Health 6 months: G1: +0.84 (6.86) G2: +0.96 (9.18) Treatment difference (95% CI): -0.12 (-4.08 to 3.84) 12 months: G1: +2.18 (9.68) G2: +1.59 (10.05) Treatment difference (95% CI): +0.58 (-4.23 to 5.39) Total health care costs (British pounds), mean (SD) G1: 263.16 (359.04) G2: 392.06 (970.52) p=NS Total Health care costs plus intervention delivery costs (British pounds), mean (SD) G1: 291.73 (359.04) G2: 392.06 (970.52) p=NS		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Maisto et al., 2001[24] Maisto et al., 2001[25] Gordon et al., 2003[26] United States Early Lifestyle Modification Study Government	**Change in drinks per week, mean (SD)** 6 months: G1: -7.2 G2: -4.8 G3: -3.2 12 months: G1: -7.8 G2: -5.1 G3: -3.3 **Change in drinks per drinking day, mean (SD)** 6 months: G1: -1.3 G2: -0.9 G3: -0.9 12 months: G1: -1.55 (-2.32, -0.79) G2: -1.30 (-1.96, -0.64) G3: -1.48 (-2.11, -0.85) **Not bingeing, %** NR **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** # of days abstained: @ 6 months: G1: +2.7 G2: +3.1 G3: +1.8 @ 12 months: G1: +2.54 (0.53 to 4.56) G2: +3.58 (1.58 to 5.57) G3: +1.16 (0.34 to 2.67) # days consuming 1-6 drinks: @ 6 months: G1: -0.20 G2: -2.4 G3: -1.2 @ 12 months: G1: -0.34 (-2.40 to 1.73) G2: -2.53 (-4.66 to -0.4) G3: -0.75 (-2.24 to 0.74)	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** NR	**Harms** NR	Drinks per month converted to drinks/week by dividing by 4.2857 Important to note that in the older adults, G1 patients consumed more than double the amount per month as G2 and G3; partial explanation for large discrepancy in results RESULTS BY SCREENING INSTRUMENT, regardless of treatment group change in # drinks in last week: AUDIT-positive only: -3.7 QF-positive only: -4.6 QF- and AUDIT-positive: -10.4 change in # drinks per drinking day: AUDIT-positive only: -1.08 QF-positive only: -1.03

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Maisto et al., 2001[24] Maisto et al., 2001[25] Gordon et al., 2003[26] (continued)		**Subgroup analyses** OLDER ADULTS (65+) # of drinks per week @ 6 months: G1: -14.0 G2: -7.3 G3: -2.8 p=NS @ 9 months: G1: -16.3 G2: -5.4 G3: -1.4 p=NS @ 12 months: G1: -15.9 G2: -6.1 G3: -3.2 p=NS Days abstained @ 6 months: G1: +7.5 G2: +5.7 G3: +0.8 p=NS @ 9 months: G1: -8.3 G2: -4.0 G3: -0.1 p=NS @ 12 months: G1: +4.9 G2: +4.5 G3: 2.0 p=NS			QF- and AUDIT-positive: -1.92 DrInC total score (direction of improvement??) AUDIT-positive only: -0.68 QF-positive only: +0.47 QF- and AUDIT-positive: +0.29 Coping Behaviors Inventory (direction of improvement??) AUDIT-positive only: -1.25 QF-positive only: -0.82 QF- and AUDIT-positive: -2.89

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Maisto et al., 2001[24] Maisto et al., 2001[25] Gordon et al., 2003[26] (continued)		# of drinks per drinking day @ 6 months: G1: -1.3 G2: -0.8 G3: -1.5 p=NS @ 9 months: G1: -1.8 G2: -0.4 G3: -1.6 p=NS @ 12 months: G1: -2.4 G2: -0.9 G3: -1.0 p=NS # days consuming 1-6 drinks: @ 6 months G1: -0.5 G2: -4.8 G3: -0.7 p=NR @ 9 months G1: -1.1 G2: -4.8 G3: -0.1 p=NR @ 12 months G1: +2.4 G2: -4.0 G3: -1.8 p=NS			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Noknoy et al., 2010[27] Thailand None Foundation or nonprofit	**Change in drinks per week, mean (SD)** G1: -8.55 G2: +0.69 p=0.035 **Change in drinks per drinking day, mean (SD)** G1: -2.931 G2: +0.29 p=0.270 **Not bingeing, %** NR **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** # binge drinking episodes in previous week - mean (SD): @ 6 months G1: 0.45 (1.38) G2: 0.95 (1.69) p=0.121 **Subgroup analyses** NR	**Morbidity** Alcohol-related accidents: G1: 1 G2: 4 Alcohol-related traffic accidents: G1: 3 G2: 5 **Mortality** G1: 1 (stroke) G2: 0 **Health care utilization** Visit to PCP due to alcohol consumption: G1: 0 G2: 3 **Quality of life** NR	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Ockene et al., 1999[28] Ockene et al., 2009[29] Reiff-Hekking et al., 2005[30] United States Project Health Government	**Change in drinks per week, mean (SD)** 6 months G1: -6.0 (11.2) G2: -3.1 (10.2) p=0.003 12 months G1: -5.7 G2: -3.0 p=0.08 Men @ 6 months G1: -5.6 (12.5) G2: -2.9 (11.9) p=0.05 Women @ 6 months G1: -6.8 (8.0) G2: -3.5 (7.0) p=0.003 Change (95% CI) adjusted for age, sex and baseline consumption: At 6 months: G1: -5.8 (-7.03 to -4.57) G2: -3.4 (-4.69 to -2.11) Treatment difference: -2.4 (-.20 to -0.60); p=0.001 At 12 months G1: -5.7 (-7.19 to -4.29) G2: -3.2 (-4.72 to -1.73) Treatment difference: -2.6 (-4.53 to -0.27) p=0.03	**Receipt of and followup with referrals** NR **Other outcomes** Mean (95% CI) binge drinking episodes per month (adjusted for age, gender, baseline consumption) @ 6 months G1 (N=248): -1.8 (-2.41 to -1.19) G2 (N=233): -1.0 (-1.63 to -0.37) Treatment difference: -0.8 (-1.68 to 0.08) p=0.09 @ 12 months G1 (N=235): -2.0 (-2.58 to -1.37) G2 (N=210): -1.6 (-2.19 to -0.89) Treatment difference: -0.4 (-1.33 to -0.45) Achieving safe consumption and not bingeing, %: @ 6 months G1: 39 G2: 28 OR (95% CI): 1.60 (1.09 to 2.34) p=0.02	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** NR	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Ockene et al., 1999[28] Ockene et al., 2009[29] Reiff-Hekking et al., 2005[30] (continued)	**Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** Of patients who were binge drinkers (with or without excessive weekly consumption) at baseline, %: At 6 months G1: 40 G2: 35 OR (95% CI): 1.24 (0.81 to 1.90) p=0.32 At 12 months G1: 55 G2: 49 OR (95% CI): 1.37 (0.86 to 2.12) p=0.18 **Achieving moderate/safe drinking, %** Of excessive drinkers (with or without bingeing) at baseline: At 6 months G1: 54 G2: 39 OR (95% CI): 1.83 (1.20 to 2.78) p=0.01 At 12 months G1: 54 G2: 49 OR (95% CI): 1.60 (1.00 to 2.54) p=0.05 **Abstinent, %** NR	@ 12 months G1: 42 G2: 29 OR (95% CI): 1.58 (0.99 to 2.52) p=0.06 Treatment x time results from model of log drinks per week + 1, using LOCF: @ 6 month:s (95% CI): 0.84 (0.71 to 0.98) @ 12 months: 0.80 (0.68 to 0.95) @ 48 months: 0.95 (0.81 to 1.12) Treatment x time interaction difference p=0.03 Male vs. female: 1.7 (1.4, 1.9) p<0.0001 Treatment x time results from model of log binges per month + 1, using LOCF: @ 6 months (95% CI): 0.82 (0.70 to 0.96) @ 12 months: 0.87 (0.74 to 1.01) @ 48 months: 1.01 (0.86 to 1.18)			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Ockene et al., 1999[28] Ockene et al., 2009[29] Reiff-Hekking et al., 2005[30] (continued)		Treatment x time interaction difference p=0.02 Male vs. female: 1.4 (1.2 to 1.6) p<0.0001 **Subgroup analyses** NR			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Richmond et al., 1995[31] Australia None Government	**Change in drinks per week, mean (SD)** Overall @ 6 months: G1: -7.0 G2: -4.0 G3: -4.9 p=NS Overall @ 12 months: G1: -7.0 G2: -2.1 G3: - 4.8 p=NS Men @ 6 months: G1: -12.5 G2: -5.5 G3: -8.8 p=NS Men @ 12 months: G1: -10.1 G2: -2.2 G3: - 9.7 p=NS Women @ 6 months: G1: -0.7 G2: -1.9 G3: -0.9 p=NS Women @ 12 months: G1: -0.5 G2: -1.9 G3: +0.1 p=NS	**Receipt of and followup with referrals** NR **Other outcomes** drinking above recommended levels (change from baseline), % @ 6 months: G1: 74.0 (-9.3) G2: 74.0 (-5.2) G3: 71.0 (-2.1) G4: 69.9 (NR) p=NS @ 12 months: G1: 76.0 (-7.3) G2: 77.1 (-2.1) G3: 78.5 (+5.4) G4: NR p=NS Change in MAST score: @ 6 months: G1: -1.3 G2+G3: +0.1 p<0.05	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** NR	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Richmond et al., 1995[31] (continued)	**Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** NR **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	Attendance at followup intervention visits among those assigned to G1, %: 1st visit: 49 2nd visit: 29 3rd visit: 8 4th visit: 7 5th visit: 4 **Subgroup analyses** NR			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Rubio et al., 2010[32] Spain None Foundation or nonprofit	**Change in drinks per week, mean (SD)** Overall G1: -8.22 G2: -4.66 p<0.001 Men G1: - 7.05 G2: -4.47 p<0.05 Women G1: -10.29 G2: -5.1 p<0.001 **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** Overall G1: 47.71 G2: 32.81 p<0.001 Men G1: 42.39 G2: 33.47 p<0.05 Women G1: 57.82 G2: 31.58 p<0.001	**Receipt of and followup with referrals** NR **Other outcomes** # of binge drinking episodes in last 30 days @ 12 months Overall G1: 1.14 G2: 1.56 p<0.001 Men G1: 1.36 G2: 1.72 p<0.05 Women G1: 0.72 G2: 1.26 p<0.001 **Subgroup analyses** All results are for binge drinkers (with or without other measure of excessive consumption)	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** NR	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Rubio et al., 2010[32] (continued)	**Achieving moderate/safe drinking, %** 12 months Overall G1: 52.03 G2: 33.34 p<0.001 Men G1: 48.15 G2: 31.46 p<0.01 Women G1: 59.38 G2: 34.59 p<0.001 **Abstinent, %** NR				

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Saitz et al., 2003[33] United States Screening and Intervention in Primary Care Multiple	**Change in drinks per week, mean (SD)** NR **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** Results are stratified by type of provider seen Faculty MDs G1: 49 G2: 58 Resident MDs G1: 56 G2: 36 **Achieving moderate/safe drinking, %** Results are stratified by type of provider seen Faculty MDs G1: 50 G2: 50 Resident MDs G1: 47 G2: 31 **Abstinent, %** Results are stratified by type of provider seen Faculty MDs G1: 22 G2: 26	**Other outcomes** Results are stratified by type of provider seen Mean (95% CI) drinking days in past 30 days Faculty MDs G1: 8.8 (7.5 to 10.1) G2: 10.0 (7.8 to 12.2) Resident MDs G1: 9.9 (7.7 to 12.1) G2: 9.0 (4.7 to 13.3) Mean # (95% CI) binge drinking days in past 30 days Faculty MDs G1: 4.7 (3.8 to 5.7) G2: 4.2 (2.8 to 5.6) Resident MDs G1: 3.9 (2.4 to 5.5) G2: 5.2 (1.6 to 8.8) Mean (95% CI) drinks per drinking day Faculty MDs G1: 6.0 (4.3 to 7.7) G2: 6.5 (4.4 to 8.6)	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** NR	**Harms** NR	Baseline data given for intervention and control groups, but results presented by provider type in each group, not overall by group. Cannot calculate changes for all outcomes.

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Saitz et al., 2003[33] (continued)	Resident MDs G1: 18 G2: 5	Resident MDs G1: 3.8 (1.9 to 5.7) G2: 11.6 (5.4 to 17.7) Patient received safe drinking limit advice, % Faculty MDs G1: 26 G2: 8 var NR Resident MDs G1: 19 G1: 6 var NR Patient had a discussion about drinking, % Faculty MDs G1: 74 G2: 51 var NR Resident MDs G1: 51 G1: 70 var NR Patient received advice about drinking, % Faculty MDs G1: 64 G2: 42			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Saitz et al., 2003[33] (continued)		Resident MDs G1: 38 G1: 59 Patient received counseling about drinking, % Faculty MDs G1: 56 G2: 41 Resident MDs G1: 29 G1: 46 Patient received advice to cut down, % Faculty MDs G1: 46 G2: 34 Resident MDs G1: 25 G1: 35 Patient received advice to quit, % Faculty MDs G1: 14 G2: 11 Resident MDs G1: 13 G1: 12 **Subgroup analyses** NR			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Schaus et al., 2009[34] United States None Government	**Change in drinks per week, mean (SD)** @ 6 months G1: -2.22 G2: -0.69 p=0.007 @ 9 months G1: -2.26 G2: -2.12 p=0.134 @12 months G1: -1.93 G2: -2.33 p=0.700 Overall treatment difference trend p=0.032 **Change in drinks per drinking day, mean (SD)** Change in avg drinks per sitting: @ 6 months G1: -0.872 G2: -0.341 p=0.027 @ 9 months G1: -0.708 G2: -0.891 p=0.928 @ 12 months G1: -0.721 G2: -0.857 p=0.757 Overall treatment difference trend p=0.064	**Receipt of and followup with referrals** NR **Other outcomes** Change in typical BAC @ 6 months G1: -0.019 G2: -0.007 p=0.002 @ 9 months G1: -0.017 G2: -0.018 p=0.603 @ 12 months G1: -0.016 G2: -0.020 p=0.937 Overall treatment difference trend p=0.018 Change in peak BAC @ 6 months G1: -0.036 G2: -0.013 p<0.001 @ 9 months G1: -0.034 G2: -0.036 p=0.309	**Morbidity** NR **Mortality** NR **Health care utilization** NR **Quality of life** Change in RAPI Sum score @ 6 months G1: -9.14 G2: -9.55 p=0.028 @ 9 months G1: -9.52 G2: -9.93 p=0.041 @ 12months G1: -8.30 G2: -8.74 p=0.556 Overall treatment difference trend p=0.030 Change in # times drove after >=3 drinks @ 6 months G1: -3.80 G2: -6.61 p=0.549	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Schaus et al., 2009[34] (continued)	**Not bingeing, %** Change in # heavy episodic drinking days per month @6 months G1: -1.12 G2: -0.09 p=0.031 @ 9 months G1: -1.10 G2: -0.63 p=0.534 @ 12 months G1: -0.700 G2: -1.05 p=0.942 Overall treatment difference trend p=0.102 **Achieving moderate/safe drinking, %** NR **Abstinent, %** NR	@ 12 months G1: -0.031 G2: -0.040 p=0.646 Overall treatment difference trend p=0.006 Change in peak # drinks in a sitting @ 6 months G1: -1.63 G2: -0.70 p=0.005 @ 9 months G1: -1.44 G2: -1.76 p=0.626 @ 12 months G1: -1.44 G2: -1.76 p=0.700 Overall treatment difference trend p=0.046 Change in # times drunk in a typical week @ 6 months G1: -0.427 G2: -0.01 p=0.003	@ 9 months G1: -3.66 G2: -6.44 p= 0.998 @ 12 months G1: -2.45 G2: -4.24 p= 0.542 Overall treatment difference p=0.136 Change in # times taken foolish risks @ 6 months G1: -3.89 G2: -4.86 p=0.685 @ 9 months G1: -4.04 G2: -4.35 p=0.485 @ 12 months G1: -2.29 G2: -1.78 p=0.261 Overall treatment difference trend p=0.036		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Schaus et al., 2009[34] (continued)		@ 9 months G1: -0.204 G2: +0.22 p=0.078 @ 12 months G1: +0.17 G2: +0.59 p=0.727 Overall treatment difference trend p<0.001 **Subgroup analyses** All results are for college students			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Scott & Anderson, 1990[35] United Kingdom None Foundation or nonprofit	**Change in drinks per week, mean (SD)** G1: -11.6 G2: -10.0 p=NS **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** G1: 88 G2: 85 p=NS **Achieving moderate/safe drinking, %** G1: 27 G2: 26 p=NS **Abstinent, %** NR	**Receipt of and followup with referrals** NR **Other outcomes** With abnormal dependence score (change from baseline), % G1: 39 (-34) G2: 33 (-8) **Subgroup analyses** All results are for women.	**Morbidity** % (change from baseline) with abnormal accident score G1: 0 (-3) G2: 3 (-2) p=NS **Mortality** NR **Health care utilization** Mean (SE) consultations/year G1: 3.9 (0.7) G2: 5.9 (1.0) p=NS Change in mean consultations/year G1: -0.9 G2: +0.4 Mean (SE) episodes/year G1: 2.4 (0.5) G2: 4.2 (0.9) Change in mean episodes/year G1: -0.9 G2: -0.1 **Quality of life** Change in mean life quality score: G1: -0.3 G2: -0.3 p=NS	**Harms** Change in mean anxiety score (though anxiety was not designated as a harm measure a priori) G1: -2.3 G2: -4.8 No significant changes in reported frequencies of taking exercise, dieting to lose weight, or cigarette consumption over the duration of the trial or between treatment and control groups.	* Change in mean Short GHQ score: G1: +0.9 G2: -1.5 Change in mean affect balance score: G1: +0.6 G2: +0.3 With abnormal health score (change from baseline), % G1: 47 (-12) G2: 47 (-7) p=NS

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Scott & Anderson, 1990[35] (continued)			Change in mean life satisfaction score: G1: -14.9 G2: -12.7 p=NS With abnormal social score (change from baseline), %: G1: 15 (-6) G2: 8 (-10) Change in mean GGT G1: +0.1 G2: -4.2 Change in mean MCV G1: -1.1 G2: -0.4 Change in mean BAC G1: -1.1 G2: -1.4		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Senft et al., 1997[36] Freeborn et al., 2000[37] United States None Government	**Change in drinks per week, mean (SD)** NR **Change in drinks per drinking day, mean (SD)** @ 6 months: G1: -1.7 G2: -1.2 p=0.13 @12 months: G1: -1.4 G2: -1.4 p=0.20 **Not bingeing, %** NR **Achieving moderate/safe drinking, %** @ 6 months: G1: 79 G2: 71 p=0.06 @12 months: G1: 80 G2: 73 p=0.07 **Abstinent, %** At both 6 and 12 months: range=8%-11% across groups; difference NS	**Receipt of and followup with referrals** NR **Other outcomes** Change in drinking days/week, past 6 months overall @ 6 months G1: -0.5 G2: -0.2 p = 0.02 No difference between those who received the full intervention and those who received less. overall @ 12 months G1: -0.6 G2: -0.4 p = 0.04 Those who received full intervention reported significantly (p<0.05) fewer drinking days per week.	**Morbidity** NR **Mortality** NR **Health care utilization** # outpatient visits (mean): Full sample @ 12 months: G1: 10.7 G2: 10.3 p=0.38 @ 24 months: G1: 17.7 G2: 18.3 p=0.47 Men G1: 17.7 G2: 16.3 p=0.21 Women G1: 17.6 G2: 22.5 p=0.10 Hospitalized, %: Full sample: @ 12 months G1: 15 G2: 14 p=0.70	**Harms** NR	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Senft et al., 1997[36] (continued)		Mean # drinking days/week: Women: @ 6 months G1: 2.1 G2: 2.8 @ 12 months G1: 2.0 G2: 2.7 Men: @ 6 months G1: 3.1 G2: 3.6 p=0.04 @ 12 months G1: 2.9 G2: 3.2 p=0.12 Mean # drinks, past 3 months: Overall @ 6 months G1: 176 G2: 216 p=0.04 Overall @ 12 months G1: 157 G2: 179 p=0.13	@ 24 months G1: 21.2 G2: 22.0 p=0.81 Men G1: 24.1 G2: 20.6 p=0.43 Women G1: 13.7 G2: 25.3 p=0.07 If ≥ 1 hospitalization, mean # days Full sample G1: 4.7 G2: 6.6 p=0.37 Men G1: 4.5 G2: 9.1 p=0.32 Women G1: 5.5 G2: 2.0 p=0.09 **Quality of life** NR		

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Senft et al., 1997[36] (continued)		Women only @ 6 months G1: 124 G2: 140 p=0.29 @ 12 months G1: 107 G2: 111 p=0.43 Men only @ 6 months G1: 195 G2: 251 p=0.03 @ 12 months G1: 176 G2: 210 p=0.08 Receipt of intervention components (of those in the intervention arm): • 88% received clinician message; • 79% attended counseling session; • 70% received message and attended counseling;			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Senft et al., 1997[36] (continued)		• 2% received no intervention elements **Subgroup analyses** NR			

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Wallace et al., 1998[38] United Kingdom None Multiple	**Change in drinks per week, mean (SD)** Change (SE) Men @ 6 months: G1: -15.5 (1.5) G2: -8.2 (1.5) p<0.001 @ 12 months: G1: -18.2 (1.5) G2: - 8.1 (1.6) p<0.001 Women @ 6 months: G1: -10.3 (1.3) G2: -8.0 (1.6) p=NS @ 12 months: G1: -11.5 (1.6) G2: -6.3 (2.0) p<0.05 **Change in drinks per drinking day, mean (SD)** NR **Not bingeing, %** NR **Achieving moderate/safe drinking, %** In previous 7 days Men @ 6 months: G1: 40.9 G2: 23.6 p<0.001	**Receipt of and followup with referrals** NR **Other outcomes** Proportions with excessive alcohol consumption by number of GP sessions attended (change in GGT) Men 0: 79.2 (+0.4) 1: 65.1 (-2.4) 2: 51.2 (+0.05) 3: 41.5 (-5.2) 4: 40.7 (-6.6) Women 0: 66.7 (+0.1) 1: 72.2 (-0.1) 2: 54.5 (-0.2) 3: 40.0 (+0.8) 4: 31.3 (+0.8) Within individual change in GGT at 12 months Men G1: -2.4 G2: +1.1 p<0.01	**Morbidity** NR **Mortality** Causes not specified: G1: 2 G2: 0 **Health care utilization** NR **Quality of life** NR	**Harms** Cigarette consumption dropped slightly among men and women in both groups but did not differ between groups. No evidence that smoking increased as alcohol consumption fell. No significant change in reported frequency of exercise or dieting to lose weight	

Evidence Table 4. Outcomes by study (continued)

Author, Year Country Trial Name Funding Source	Drinking Outcomes	Referrals, Other Related Outcomes, Subgroups	Health and QOL Outcomes	Harms	Other
Wallace et al., 1998[38] (continued)	Men @ 12 months: G1: 43.7 G2: 25.5 p<0.001 Women @ 6 months: G1: 46.9 G2: 26.3 p<0.001 Women @ 12 months: G1: 47.7 G2: 29.2 p<0.05 **Abstinent, %** **NR**	Women G1: +0.3 G2: +0.5 NR/NS Change in systolic BP: Men G1: - 6.8mm HG G2: -4.7mmHg p<0.05 Among those in the treatment group, the proportion who attended 1,2,3,4 sessions Men, % 1: 83.3 2: 57.2 3: 31.4 4: 18.6 Women, % 1: 92.3 2: 65.4 3: 40.0 4: 24.6 **Subgroup analyses** Proportion of pts with excessive EtOH consumption at 12 months higher among those who were heavier smokers at start (Men chi square = 9.7 p<0.01; Women 3.7 p=0.06)			

Abbreviations: AUDIT = Alcohol Use Disorders Identification Test; BAC = blood alcohol content; CARET = Comorbidity Alcohol Risk Evaluation Tool; CI = confidence interval; ED = emergency department; EPDS = Edinburgh Postnatal Depression Score; EtOH = ethanol; G = group; g = grams; GGT = gamma glutamyl transferase; GHQ = General Health Questionnaire; GP = general practitioner; LOCF = last observation carried forward; MAST = Michigan Alcoholism Screening Test; MCV = mean corpuscular volume; MD = medical doctor; NA = not applicable; NR = not reported; NS = not significant; OR = odds ratio; OTC = over the counter; PCP = primary care provider; QF = quantity/frequency; QOL = quality of life; RAPI = Rutgers Alcohol Problem Index; Rx = prescription; SD = standard deviation; SE = standard error; SF = 12-Item Short-Form Survey; TrEAT = Trial for Early Alcohol Treatment; UC = usual care; WHO = World Health Organization

Evidence Table 5. Data for KQ 2 from systematic reviews

Author, Year Funding Source Aim of Review Studies included in Review	Inclusion/Exclusion Criteria	Screening Instruments	Outcomes	Conclusions Limitations
Berks, 2008[39] Other or NR Not explicit: to determine appropriate alcohol screening tests in older adult (60+) population **Number of Studies** 9 (8 analyzed together with 1 separate) **Number of patients** 6,353	**Inclusion** • English studies focusing on screening in 60+ year olds • Patients presenting to primary care **Exclusion** • Excluded if gave average age but no cutoff, no gold-standard comparator, allowed test result to influence decision to perform gold-standard, if included data insufficient for calculation of sensitivity and specificity	CAGE MAST MAST-G SMAST AUDIT AUDIT AUDIT-C ARPS shARPS SMAST-G	CAGE for abuse/dependence: >=1 sens: 79-88%, spec: 56-88% CAGE for hazardous/excessive: >=1 sens: 31-60%, spec: 92-100% >=2 sens: 14-39%, spec: 97-97.1% MAST for abuse/dependence: >=4: sens 91%, spec 84% >=3 sens: 64-97%, spec: 67-79% MAST-G for abuse/dependence: cutoff>=5: sens 70-91%, spec 81-84% 2 studies compared MAST with CAGE: one showed MAST slightly better, other showed CAGE was better SMAST for heavy drinking: cutoff >=2: sens 48%, spec 100% AUDIT for abuse/dependence: >=8: sens 33%, spec 91% AUDIT for hazardous: >=8: sens 67%, spec 95% AUDIT-C for hazardous: >=3: sens 100%, spec 81% Moore 2002: ARPS for hazardous: unclear cutoff: sens 93%, spec 63% shARPS for hazardous: unclear cutoff: sens 92%, spec 51% AUDIT for hazardous: >=8 sens 28%, spec 100% SMAST-G for hazardous: >=2 sens 52%, spec 96%	**Conclusions** • AUDIT appears superior to others for hazardous (AUDIT-C as good or better than AUDIT), CAGE appears better for abuse/dependence screening • If age-specific definitions of hazardous/harmful needed then ARPS and variations are superior. **Limitations** • Narrative synthesis of included studies. No meta-analysis conducted.

Evidence Table 5. Data for KQ 2 from systematic reviews (continued)

Author, Year Funding Source Aim of Review Studies included in Review	Inclusion/Exclusion Criteria	Screening Instruments	Outcomes	Conclusions Limitations
Berner, 2007[40] Government Assess diagnostic accuracy of AUDIT for detection of at risk drinking **Number of Studies** 23 (27 articles) included in review, 19 for meta-analysis **Number of patients** 25,940 total, 23,190 in meta-analysis	**Inclusion** • AUDIT compared with reference standard of at-risk consumption assessed by quantity/frequency and/or heavy episodic drinking frequency • Used 10 item AUDIT • Compared with same reference in all subjects regardless of result • AUDIT not used as reference standard • Rreference test performed within 1 month • AUDIT performed by >50% of participants **Exclusion** • NA	AUDIT	AUDIT cutoff 8 points: • Primary care (8 studies): sens 0.31-0.89, spec 0.83-0.96, pooled LR+: 6.78, LR-: 0.40, OR: 18.3 • Inpatient: se 0.93, sp 0.94, LR+: 15.07, LR-: 0.08, OR: 198.0 ED: • SE: 0.72 • SP: 0.88 • LR+: 6.09 • LR-: 0.32 • OR: 19.1 University: • SE: 0.82 • Spec: 0.88 • LR+: 3.73 • LR-: 0.23 • OR: 15.99 Older adults: • SE: 0.55-0.83 • SP: 0.96 (pooled) • LR+: 20.11 • LR-: 0.33 • OR: 59.8	**Conclusions** • AUDIT use restricted to primary care, inpatients, older adults **Limitations** • Large heterogeneity in studies partly explained by setting, thus could not pool 17 studies together

Evidence Table 5. Data for KQ 2 from systematic reviews (continued)

Author, Year Funding Source Aim of Review Studies included in Review	Inclusion/Exclusion Criteria	Screening Instruments	Outcomes	Conclusions Limitations
Bradley, 1998[41] Government Describe performance of alcohol screening questionnaires for heavy drinking/abuse/dependence in females in general clinical populations in the U.S. **Number of Studies** 9 (13 articles) **Number of patients** 12,407 total (includes females and males) About 10,883 women	**Inclusion** • Studies with women comparing brief alcohol screening with valid standard for heavy drinking/abuse/ dependence in U.S. general clinical population • Screening questionnaires with 10 or less items • Limited to studies in U.S. **Exclusion** • Studies outside of U.S. or not published in English • Excluded nonclinical and special clinical populations • Studies without valid comparison group • Excluded data regarding screening for ICD harmful use • Excluded studies using self-administered questions for estimates of typical quantity/frequency as reference standard	CAGE TWEAK AUDIT T-ACE BMAST NET	CAGE for abuse/dependence: >=2: auROC 0.84-0.92 in mainly black populations, se 0.38-0.50 in mainly white populations TWEAK and AUDIT for abuse/dependence: se: <0.80, auROC 0.87-0.93 AUDIT for heavy drinking: auROC 0.87 TWEAK and T-ACE heavy drinking before pregnancy: auROC 0.84-0.87 in black OB patients No pooling of data due to subjective heterogeneity (but not statistically assessed) Primary care only: CAGE >=2 for abuse/dependence in 80% black population: se 0.74, sp 0.93 CAGE >=2 for abuse/dependence in 93% white population: se 0.38, sp 0.92 AUDIT for abuse/dependence: auROC 0.87-0.93 AUDIT for heavy drinking: auROC 0.86-0.87	**Conclusions** • CAGE, AUDIT, TWEAK performed best for identifying dependence in black women (TWEAK best for white women) and that AUDIT was the only screening test assessed for identifying heavy drinking in nonobstetric population but was effective • Brief screens may be less sensitive for abuse/dependence among women because consumption questions based on male drinking • Appears no statistical differences in performance based on auROC for females vs males • Alcohol screening performance may vary by ethnicity **Limitations** • Mentions heterogeneity but does not quantify

Evidence Table 5. Data for KQ 2 from systematic reviews (continued)

Author, Year Funding Source Aim of Review Studies included in Review	Inclusion/Exclusion Criteria	Screening Instruments	Outcomes	Conclusions Limitations
Burns, 2010[42] Academic Investigate performance of brief alcohol screening questionnaires to identify problem drinking in pregnant women **Number of Studies** 5 **Number of patients** 6,724	**Inclusion** • Cohort/cross sectional studies comparing brief alcohol screening instruments with reference criteria using structured interviews to detect at-risk drinking/abuse/dependency in pregnant women receiving prenatal care • Included only brief screening questionnaires • Reference standard based on quantity/frequency from structured interview (AUDADIS or timeline follow-back) or clnical diagnoses from DSM or ICD-10 **Exclusion** • Excluded case-control studies • Excluded studies that used methods other than structured interview as referent (biomarkers, self-administered questionnaires)	TWEAK T-ACE CAGE NET AUDIT AUDIT-C SMAST	At-risk drinking: • T-ACE: se 0.69-0.88, sp 0.71-0.89 • TWEAK: se 0.71-0.91, sp 0.73-0.83 • AUDIT-C se 0.95, sp 0.85 • CAGE >=2: se 0.38-0.49, sp 0.92-0.93 • NET >=1: se 0.71, sp 0.86 • SMAST: se 0.11, sp 0.96 • T-ACE and TWEAK higher auROC vs CAGE and NET • TWEAK, T-ACE, AUDIT-C highest sensitivities for at-risk • T-ACE, TWEAK lower PPVs than AUDIT-C • CAGE and SMAST performed poorly vs. others for identifying at-risk Abuse/dependence: • AUDIT-C >=3: dependece: se 1, sp 0.71. AUD: se 0.96, sp 0.71 • AUDIT >=8: lifetime dependency performed poorly • AUDIT had higher auROC than T-ACE, SMAST	**Conclusions** • T-ACE, TWEAK, AUDIT-C have promise for screening for prenatal at risk drinking and AUDIT-C may be helpful to identify dependency/abuse. • CAGE did not perform well.

Evidence Table 5. Data for KQ 2 from systematic reviews (continued)

Author, Year Funding Source Aim of Review Studies included in Review	Inclusion/Exclusion Criteria	Screening Instruments	Outcomes	Conclusions Limitations
Fiellin, 2000[43] Multiple Evaluate accuracy of screening methods for alcohol problems in primary care **Number of Studies** 38 11 for at-risk/hazardous/harmful drinking 27 for abuse/dependence **Number of patients** NR	**Inclusion** • Published in peer-reviewed journal • Studies in English • Primary care setting • Reported performance (sens/spec) of screening methods compared with a criterion standard (structured interview) **Exclusion** • Studies not in English or were performed outside of primary care • Studies that did not report performance of screening methods • Excluded reviews, letters, editorials • Excluded studies that did not have comparators	AUDIT and AUDIT variations CAGE MAST 2-question QF General health screen Clinical/lab indicators	At-risk/hazardous/harmful: • AUDIT >=8 most effective for at-risk/hazardous/harmful: se 0.51-0.97, sp 0.78-0.96 • CAGE >=2 for at-risk/hazardous/harmful: se 0.14 - 0.84, sp 0.74-0.97 • SMAST >=2: se 0.68, sp 0.92 • Single question screen for problem drinking: se 0.62, sp 0.93 • CDT for heavy drinking: se 0.39-0.69, sp 0.29-0.81 • GGT for heavy drinking: se 0.77, sp 0.81 in one study but limited utility for MCV, AST, ALT Abuse/dependence: • CAGE most effective for abuse/dependence: se 0.43-0.94, sp 0.70-0.97 • CAGE >=2 for abuse/dependence: se 0.21-0.94, sp 0.77-0.97 • CAGE >=1 for abuse/dependence: se 0.60-0.71, sp 0.84-0.88 • AUDIT for abuse/dependence: se 0.33-0.93, sp 0.89-0.97 • SMAST >=2 for abuse/dependence: se 0.48-1, sp 0.85-0.97 • Cyr/Wartman: se 0.48-0.91, sp 0.76- 0.93 (vs MAST as referent) • Single question: se 0.40-0.70, sp 0.93-0.99 • TWEAK: se 0.75, sp 0.90 • quantity-frequency: se 0.20- 0.50, sp 0.87-0.97 based on cutoff • Alcohol Clinical Index: se 0.28, sp 0.86 • Health Screening Survey: se 0.78, sp 0.71	**Conclusions** • AUDIT was most effective for at-risk, hazardous, harmful • CAGE was most effective for abuse and dependence • Formal screening instruments performed better than QF questions **Limitations** • Authors state few studies performed comparisons among multiple screening instruments

Abbreviations: ALT = alanine transaminase; ARPS = Alcohol-Related Problems Survey; AST = aspartate transaminase; AUDADIS = Alcohol Use Disorder and Associated Disabilities Interview Schedule; AUDIT = Alcohol Use Disorders Identification Test; AUDIT-C = Alcohol Use Disorders Identification Test - Consumption; auROC = area under receiving operator characteristic; BMAST = brief Michigan Alcohol Screening Test; CAGE = Cut down, Annoyed, Guilty, Eye

opener questionnaire; CDP = carbohydrate deficient transferrin; DSM = *Diagnostic and Statistical Manual of Mental Disorders*; ED = emergency department; GGT = gamma glutamyl transferase; ICD = International Classification of Diseases; LR = likelihood ratio; MAST = Michigan Alcoholism Screening Test; MAST-G = Michigan Alcoholism Screening Test – geriatric version; NET = Normal drinker, Eye opener, Tolerance questionnaire; OR = odds ratio; NR = not reported; PC = primary care; QF = quantity/frequency; RCT = randomized controlled trial; se = sensitivity; shARPS = shortened Alcohol-Related Problems Survey; SMAST = short Michigan Alcoholism Screening Test; SMAST-G = short Michigan Alcoholism Screening Test – geriatric version; sp = specificity; T-ACE = Tolerance, Annoyed, Cut-down, Eye-opener questionnaire; TWEAK = Tolerance; Worried; Eye opener; Amnesia; Kut down

Evidence Table 6. Data for KQ 1 through 7 from systematic review

Author, Year Funding Source Aim of Review Studies Included in Review	Inclusion/Exclusion Criteria	Outcomes	Notes
Kaner, 2007[44] Government To assess effectiveness of brief intervention in primary care setting to reduce alcohol consumption, also to assess if difference in outcomes for trials conducted in research setting vs. routine practice setting **Number of Studies** 29 total trials (24 general practice, 5 ED) 22 or 25 studies included in meta-analysis (unclear: search strategy in Figure 1 different from abstract) **Number of Patients** 7619	**Inclusion criteria** • RCTs including cluster RCTs • Patients presenting to PC not specifically for alcohol treatment whose drinking is identified as excessive or harmful • Brief intervention up to 4 sessions vs. comparator (usual care or extended intervention) **Exclusion criteria** • Excluded trials with referrals for specialist care	• BI group had lower alcohol consumption at followup of one year or more vs. usual care: mean difference -38 g/week, (CI, -54 to -23). heterogeneity (I^2=57%) - about 4-5 drinks/week. • BI in men: -57 g/week (CI, -89 to -25). I2=56% for subgroup of 6 or 8 studies, n=2307 • BI in women: -10 g/week (CI, -48 to 29). I^2=45% • No difference in longer treatment exposure or trials that were less clinically representative • No difference in efficacy vs effectiveness trials • extended intervention trended towards a reduction but was nonsignificant: -28 g/week (CI, -62 to 6) • No difference in frequency of binge drinking for BI vs control for 3 trials that reported this information (mean: -0.3, CI, -0.6 to 0.0 binges/week) • No difference in number of drinking days/week for BI vs control for 3 trials (mean: -0.04, CI, -0.5 to 0.4 drinking days/week) • No difference in intensity of drinking for BI vs control for 5 trials (mean: -3.1, CI, -8.8 to 2.6 grams/drinking day) • No difference in GGT for BI vs controls for 3 trials (mean: -1.1, CI, -3.9 to 1.7 IU/L)	• Extended intervention defined as one that is unlikely to occur in primary care due to length or intensity • Effect of BI clear in men at one year, but not in women • Longer duration of counselling likely has little additional effect • Unclear if inclusion criteria included those with dependency - included trials usually attempted to exclude dependents but some did not report exclusion criteria • Substantial heterogeneity among trials in settings (PC vs ED), populations, screening instrument, baseline consumption, intervention

Evidence Table 6. Data for KQ 1 through 7 from systematic review (continued)

Author, Year Funding Source Aim of Review Studies Included in Review	Inclusion/Exclusion Criteria	Outcomes	Notes
Kaner, 2007[44] (continued)		• Heavy drinkers reported in 9 trials, not in meta-analysis because of different definitions among trials of heavy drinking • 4 trials reported % of binge drinkers, overall reduction in % of binge drinkers in BI vs control group (RD, -11%, CI, -19 to -3%) Adverse effects: • Crawford 2004: reported 0.5 fewer ED visits for BI group vs control during year after randomization • Gentillelo 1999: reported 47% reduction in new injuries requiring ED or trauma readmission for BI vs control, but no difference in death rate • Longabaugh 2001: reported those in extended intervention group had fewer Drinker Inventory of Consequences scores at one year vs controls • Romelsjo 1989: reported no difference in 'alcohol problem index' for BI vs controls HRQoL: • Crawford 2004: no difference in GHQ/EQ-5D scores at 12 months • Lock 2006: no difference in DPI, SF-12 scores at 12 months Cost: • Lock 2006: no difference in total healthcare cost including delivery cost for BI vs control	•

BI = brief intervention; CI = confidence interval; ED = emergency department; EQ = EuroQoL; g = grams; GHQ = General Health Questionnaire; IU/L = international units per liter; PC = primary care; RCT = randomized controlled trial; RD = risk difference

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44. Kaner EF, Beyer F, Dickinson HO, et al. Effectiveness of brief alcohol interventions in primary care populations. Cochrane Database Syst Rev. 2007(2):CD004148. PMID: 17443541.

Appendix D. Quality Criteria

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 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. For each article, one of the two reviewers was always an experienced/senior investigator (DJ or RH). 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.

Systematic Reviews

Criteria:

- Is the review based on a focused question of interest?
- Did the search strategy employ a comprehensive, systematic literature search?
- Are eligibility criteria for studies clearly described?
- Did at least 2 people independently review studies?
- Did authors use a standard method of critical appraisal before including studies?
- Was publication bias assessed?
- Was heterogeneity assessed and addressed?
    - Was the approach used to synthesize the information adequate and appropriate?

Randomized Controlled Trials

Criteria:

- Were randomization and allocation concealment adequate?
- Were groups similar at baseline?
- Were outcome assessors masked?
- Were care providers masked?
- Were patients masked?
- Was overall attrition 20 percent or higher?
- Was differential attrition 15 percent or higher?
- Did the study use intention-to-treat analysis?
- Were outcome measures equal, valid, and reliable?

Table D-1. Quality ratings for efficacy/effectiveness trials

First Author, Year Trial Name	Randomization Adequate	Allocation Concealment Adequate	Groups Similar at Baseline	Outcome Assessors Masked	Care Providers Masked	Patients Masked	Overall Attrition ≥20%	Differential Attrition ≥15%	Study Used ITT Analyses	Outcome Measures Equal, Valid. and Reliable	Efficacy/ Effectiveness Quality Rating
Anderson & Scott, 1992[1] NA	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	Fair
Babor, 1996[2] WHO Brief Intervention	Yes	Yes	Unclear/ NR	Unclear/ NR	No	Yes	Yes	Unclear/ NR	Yes	Yes	Fair
Bischof et al., 2008[3] Grothues et al., 2008[4] Reinhardt et al., 2008[5] SIP	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Fair
Chang et al., 1999[6] NA	Yes	Unclear/NR	No	Yes	Unclear/ NR	No	No	No	Unclear/ NR	Yes	Fair
Curry et al., 2003[7] NA	Unclear/NR	Unclear/NR	Yes	Yes	No	No	Yes	No	Modified ITT	Yes	Fair
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] Project TrEAT	Yes	Unclear/NR	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Good
Fleming et al., 1999[13] Mundt et al., 2005[14] GOAL	Unclear/NR	Unclear/NR	Yes	Unclear/NR	Yes	Yes	No	No	No	Yes	Fair

First Author, Year Trial Name	Randomization Adequate	Allocation Concealment Adequate	Groups Similar at Baseline	Outcome Assessors Masked	Care Providers Masked	Patients Masked	Overall Attrition ≥20%	Differential Attrition ≥15%	Study Used ITT Analyses	Outcome Measures Equal, Valid. and Reliable	Efficacy/ Effectiveness Quality Rating
Fleming, et al., 2008[15] Wilton, et al., 2009[16] Healthy Moms	Yes	Unclear/NR	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Good
Fleming et al., 2010[17] CHIPs	Yes	Unclear/NR	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Good
Kypri et al., 2004[18] NA	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Fair
Kypri et al., 2007[19] Kypri et al., 2008[20] NA	Yes	Yes	Yes	Yes	Unclear/NR	Yes	No	No	No	Yes	Good
Lin et al., 2010[21] Moore et al., 2010[22] HLAYA	Yes	Yes	Yes	Yes	No	No	No	Yes	Modified ITT	Yes	Fair
Lock et al., 2006[23] NA	Unclear/NR	Unclear/NR	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Fair
Maisto et al., 2001a[24] Maisto et al., 2001b[25] Gordon et al., 2003[26] ELM	Yes	No	Yes	Yes	Unclear/NR	No	Yes	Yes	No	Yes	Fair
Noknoy et al., 2010[27] NA	Yes	Yes	Yes	Yes	Unclear/NR	Yes	No	No	No	Yes	Fair

First Author, Year Trial Name	Randomization Adequate	Allocation Concealment Adequate	Groups Similar at Baseline	Outcome Assessors Masked	Care Providers Masked	Patients Masked	Overall Attrition ≥20%	Differential Attrition ≥15%	Study Used ITT Analyses	Outcome Measures Equal, Valid. and Reliable	Efficacy/ Effectiveness Quality Rating
Ockene et al., 1999[28] Ockene et al., 2009[29] Reiff-Hekking et al., 2005[30] Project Health	Yes	Unclear/NR	No	Yes	No	Yes	No	No	No	Yes	Fair
Richmond et al., 1995[31] NA	Yes	Unclear/NR	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Fair
Rubio et al., 2010[32] NA	Yes	Unclear/NR	Yes	Yes	No	Unclear/NR	No	No	Yes	Yes	Fair
Saitz et al., 2003[33] SIP	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Fair
Schaus et al., 2009[34] NA	Yes	Yes	Yes	No	No	No	Yes	No	No	Yes	Fair
Scott & Anderson, 1990[35] NA	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	Fair
Senft et al., 1997[36] Freeborn et al., 2000[37] NA	Unclear/NR	Unclear/NR	Yes	Yes	Unclear/NR	No	No	Unclear/NR	Yes	Yes	Fair
Wallace et al., 1998[38] NA	Unclear/NR	Unclear/NR	Yes	Yes	No	No	No	Unclear/NR	Modified ITT	Yes	Fair

Abbreviations: ELM = Early Lifestyle Modification; GOAL = Guiding Older Adults Lifestyles; HLAYA = Healthy Living As You Age; ITT = intent-to-treat; NA = not applicable; NR = not reported; SIP (Bischof, et al) = Stepped Intervention for Problem Drinkers; SIP (Saitz, et al.) = Screening and Intervention in Primary Care; TrEAT = Trial for Early Alcohol Treatment.

Comments on efficacy/effectiveness trials rated "poor" (high risk of bias):

Aalto et al., 2000[39]:

- 34% overall loss to followup, with large differences between groups (that could affect results), possibly because of small sample sizes;
- No approach to handling missing data in analyses;
- Unclear blinding of participants or outcome assessors
- Unclear intervention delivery.
- Inadequate allocation concealment, with intervening physician "drawing a card" to assign randomization condition to patients during intervention

-
- Aalto et al., 2001[40]:
  - 32% overall loss to followup, with large differences between groups (that could affect results), possibly because of small sample sizes;
  - No approach to handling missing data in analyses;
  - Unclear blinding of participants or outcome assessors
  - Unclear intervention delivery;
  - Inadequate allocation concealment, with intervening physician "drawing a card" to assign randomization condition to patients during intervention.

Babor et al., 2006[41]:

- High risk of selection bias and confounding due to attrition;
- 65% or more of those eligible for 3 month followup did not complete 3-month followup, and less than half of those intended to be sampled for 3-month followup completed 3-month followup;
- The study was randomized by clinic/practice, but analyzed at the individual level;
- Unable to determine if groups were similar at baseline for important potential confounders;
- Unable to separate results for zone 1 vs. zone 2 vs. zone 3;
- By design, only some of those enrolled were actually contacted for followup.

Beich et al., 2007[42]:

- High risk of bias due to attrition;
- High risk of selection bias due to inability to maintain comparable groups;
- Over 50% of subjects in the intervention group and over 23% of subjects in the control group did not complete the secondary baseline questionnaire with recall of drinking behavior information;
- The endpoint (1 year followup) was completed by only 53.8% of the intervention group and 64.4% of the control group.
-
- Cordoba et al., 1998[43]:
  - 270/546 excluded from analysis (49%) because of loss to followup or nonadherence to protocol (60/270). Therefore, not intention-to-treat analysis (completers analysis);
  - Unit of randomization was the primary care practice; unit of analysis was the patient;
  -
- Drummond et al., 2009[44]:
  - Differential attrition: 10.3% for minimal intervention group vs. 28% for stepped care;
  - Data analysis states that it was ITT, but from the results tables it appears that they only analyzed the completers and did not do anything to address missing data/imputation;
  - As described by the authors sample size calculations, this is an underpowered pilot study.
-
- Heather et al, 1987[45]:
  - Media-recruited problem drinkers received 2 levels of self-help intervention;
  - Attrition rate 55% with differences between groups;
  - No replacement of missing values in analysis.
  - Also, perhaps should be excluded for wrong setting/population because of media, rather than primary care, recruitment of subjects
-

- McIntosh et al., 1997[46]:
  - Inadequate power for analyses, including all participants at baseline; thus, results reported by sex subgroups must be underpowered. They determined 50 patients would be needed in each group to detect a 10% effect; they didn't have 50 subjects in each group---just 40 in the "physician intervention" group; and the study found no difference, but they didn't have an adequate number of subjects in each group to detect a small difference.
  - Unclear allocation concealment
  - Baseline differences between groups, including differences in alcohol quantity and frequency measures, particularly among women;
-
- Romelsjo et al., 1989[47]:
  - Masking of general practitioner not assured;
  - Significant postrandomization exclusion (151/258 participants);
  - Inclusion criteria not adequately applied, resulting in missing most eligible persons based on drinking (and not laboratory levels);
  - Noncomparable groups assembled at baseline with respect to alcohol consumption and problems, and no adjustment for differences;
  - Does not appear to be intention-to-treat analysis because some cases followed up were not included in reported analyses;
  - No statistical testing of results reported.
  -
- Vinson et al., 2000[48]:
  - High risk of selection bias and difficult to assess risk of selection bias with no data reported for comparability of groups at baseline;
  - Data analysis unclear, unable to determine what was done for the missing data/attrition and whether ITT or completers analysis;
  - Very little data reported overall;
  - Significant changes to protocol during the study and between those enrolled in 1992 and 1993;
  - Randomization in 1992 not described enough to determine if appropriate;
  - Group Ns not reported;
  - Only half of eligible patients enrolled.

Table D-2. Quality ratings for Harms trials

Author, Year Trial Name	Harms Pre-specified and Defined	Ascertainment Techniques for Harms Adequately Described	Ascertainment Techniques for Harms Equal, Valid, and Reliable	Duration of Followup Adequate for Harms Assessment?	Harms Assessment Quality Rating
Anderson & Scott, 1992[1] NA	Mixed	No	Mixed	Yes	Fair
Fleming et al., 1997[8] Fleming et al., 2000[9] Fleming et al., 2002[10] Grossberg et al., 2000[11] Manwell et al., 2004[12] Project TrEAT	No	No	NR	Yes	Fair
Fleming et al., 1999[13] Mundt et al., 2005[14] United States GOAL	Yes	No	Yes	Yes	Fair
Scott & Anderson, 1990[35] United Kingdom NA	Mixed	No	Mixed	Yes	Fair
Wallace et al., 1998[38] United Kingdom NA	Yes	No	No	Yes	Fair

Abbreviations: GOAL = Guiding Older Adults Lifestyles; NA = not applicable; TrEAT = Trial for Early Alcohol Treatment.

Table D-3. Quality ratings for systematic reviews (KQ 2)

First Author, Year	Review Based on a Focused Question of Interest	Search Strategy Employed a Comprehensive, Systematic, Literature Search	Eligibility Criteria for Studies Clearly Described	At Least 2 People Independentl y Reviewed Studies	Authors Used a Standard Method of Critical Appraisal Before Including Studies	Publicatio n Bias Assessed	Heterogeneit y Assessed and Addressed	Approach Used to Synthesize Information Adequate and Appropriate	Quality Rating
Berks, 2008[49]	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Fair
Berner, 2007[50]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Good
Bradley, 1998[51]	Yes	Yes	Yes	Yes	Yes	No	CND	Yes	Fair
Burns, 2010[52]	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Fair
Fiellin, 2000[53]	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Fair

Abbreviations: CND = cannot determine.

Table D-4 Quality ratings for systematic reviews (all other KQs)

First author, year	Review based on a focused question of interest	Search strategy employed a comprehensive, systematic, literature search	Eligibility criteria for studies clearly described	At least 2 people independently review studies	Authors used a standard method of critical appraisal before including studies	Publication bias assessed	Heterogeneity assessed and addressed	Approach used to synthesize information adequate and appropriate	Quality Rating
Kaner, 2007[54]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Good

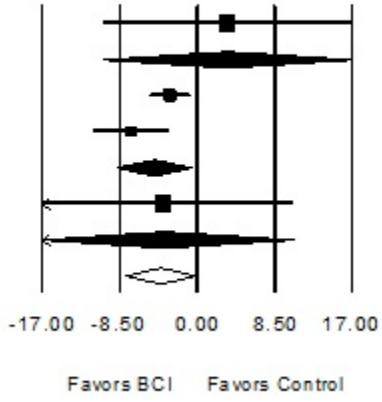
Appendix E. Quantitative Analysis Results

Change in drinks/week

Drinks/week BI vs. control: adult men, 6 months

Comparison of behavioral counseling interventions vs. control in adult men: 6 month change in alcohol consumption (drinks/weeks)

Group by Subgroup within study	Study name	Subgroup within study	Difference in means	Lower limit	Upper limit	p-Value
_Very Brief	Richmond 1995	_Very Brief	3.300	-10.365	16.965	0.636
_Very Brief			3.300	-10.365	16.965	0.636
Brief, multicontact	TrEAT 1997	Brief, multicontact	-3.000	-5.222	-0.778	0.008
Brief, multicontact	Wallace 1998	Brief, multicontact	-7.300	-11.458	-3.142	0.001
Brief, multicontact			-4.776	-8.926	-0.626	0.024
Extended, multicontact	Richmond 1995	Extended, multicontact	-3.700	-17.936	10.536	0.610
Extended, multicontact			-3.700	-17.936	10.536	0.610
Overall			-4.066	-7.890	-0.241	0.037

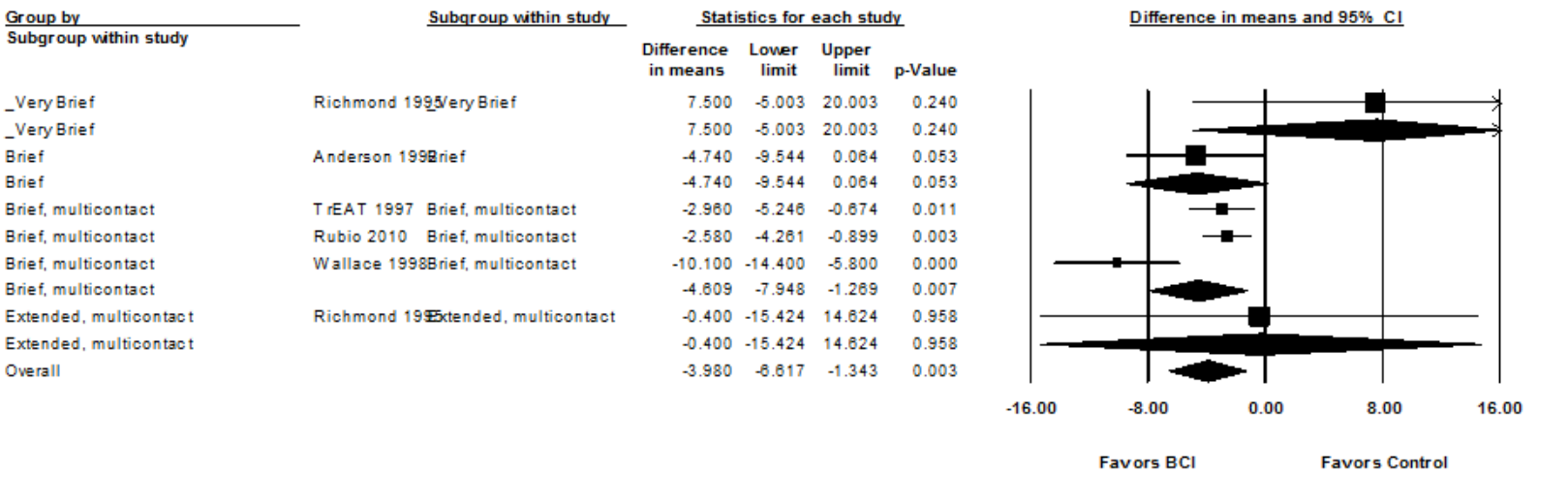


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	0	1.000	0.000
Brief, multicontact	3.195	1	0.074	68.703
Extended, multicontact	0.000	0	1.000	0.000
Overall	4.256	3	0.235	29.519

Model	**Study name**	**Intensity**	Statistics with study removed			
			WMD	**Lower limit**	**Upper limit**	**p-Value**
	Richmond 1995	_Very Brief	0.000	0.000	0.000	1.000
Random			3.300	-10.365	16.965	0.636
	TrEAT 1997	Brief, multicontact	-7.300	-12.837	-1.763	0.010
	Wallace 1998	Brief, multicontact	-3.000	-5.222	-0.778	0.008
Random			-4.776	-8.926	-0.626	0.024
	Richmond 1995	Extended, multicontact	-3.700	-17.936	10.536	0.610
Random			-3.700	-17.936	10.536	0.610
Random	Overall		-4.066	-7.890	-0.241	0.037

Drinks/week BI vs. control: adult men, 12 months

Comparison of behavioral counseling interventions vs. control in adult men: 12 month change in alcohol consumption (drinks/week)



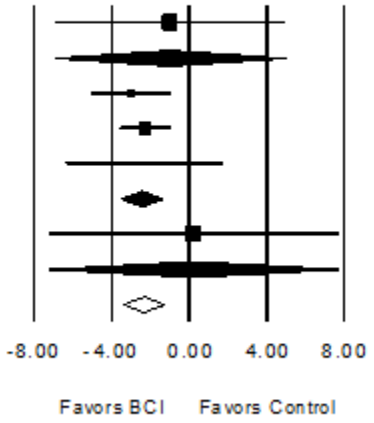
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	0	1.000	0.000
Brief	0.000	0	1.000	0.000
Brief, multicontact	10.380	2	0.006	80.732
Extended, multicontact	0.000	0	1.000	0.000
Overall	13.745	5	0.017	63.622

Model	Study name	Intensity	Statistics with study removed			
			WMD	Lower limit	Upper limit	p-Value
	Richmond 1995	_Very Brief	0.000	0.000	0.000	1.000
Random			7.500	-5.003	20.003	0.240
	Anderson 1992	Brief	-4.740	-11.112	1.632	0.145
Random			-4.740	-9.544	0.064	0.053
	TrEAT 1997	Brief, multicontact	-5.878	-11.482	-0.274	0.040
	Rubio 2010	Brief, multicontact	-6.146	-11.663	-0.628	0.029
	Wallace 1998	Brief, multicontact	-2.713	-4.067	-1.359	0.000
Random			-4.609	-7.948	-1.269	0.007
	Richmond 1995	Extended, multicontact	-0.400	-15.424	14.624	0.958
Random			-0.400	-15.424	14.624	0.958
Random	Overall		-3.980	-6.617	-1.343	0.003

Drinks/week BI vs. control: adult women, 6 months

Comparison of behavioral counseling interventions vs. control in adult women: 6 month change in alcohol consumption

Group by Subgroup within study	Study name	Subgroup within study	Statistics for each study: Difference in means	Lower limit	Upper limit	p-Value
_Very Brief	Richmond 1995	_Very Brief	-1.000	-6.964	4.964	0.742
_Very Brief			-1.000	-6.964	4.964	0.742
Brief, multicontact	TrEAT 1997	Brief, multicontact	-2.990	-5.070	-0.910	0.005
Brief, multicontact	Healthy Moms 2008	Brief, multicontact	-2.275	-3.591	-0.959	0.001
Brief, multicontact	Wallace 1998	Brief, multicontact	-2.300	-6.365	1.765	0.267
Brief, multicontact			-2.467	-3.539	-1.394	0.000
Extended, multicontact	Richmond 1995	Extended, multicontact	0.200	-7.297	7.697	0.958
Extended, multicontact			0.200	-7.297	7.697	0.958
Overall			-2.370	-3.415	-1.325	0.000



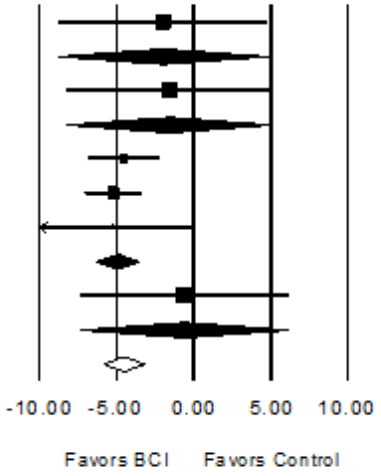
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	0	1.000	0.000
Brief, multicontact	0.331	2	0.847	0.000
Extended, multicontact	0.000	0	1.000	0.000
Overall	1.017	4	0.907	0.000

Model	Study name	Intensity	Statistics with study removed			
			WMD	Lower limit	Upper limit	p-Value
	Richmond 1995	_Very Brief	0.000	0.000	0.000	1
Random			-1.000	-6.964	4.964	0.742434
	TrEAT 1997	Brief, multicontact	-2.277	-3.529	-1.026	3.62E-04
	Healthy Moms 2008	Brief, multicontact	-2.847	-4.698	-0.995	2.58E-03
	Wallace 1998	Brief, multicontact	-2.479	-3.591	-1.368	1.24E-05
Random			-2.467	-3.539	-1.394	6.53E-06
	Richmond 1995	Extended, multicontact	0.200	-7.297	7.697	0.958301
Random			0.200	-7.297	7.697	0.958301
Random			-2.370	-3.415	-1.325	8.82E-06

Drinks/week BI vs. control: adult women, 12 months

Comparison of behavioral counseling interventions vs. control in adult women: 12 month change in alcohol consumption (drinks/week)

Group by Subgroup within study	Study name	Subgroup within study	Statistics for each study: Difference in means	Lower limit	Upper limit	p-Value
_Very Brief	Richmond 1995	_Very Brief	-2.000	-8.798	4.798	0.564
_Very Brief			-2.000	-8.798	4.798	0.564
Brief	Scott 1990	Brief	-1.600	-8.227	5.027	0.636
Brief			-1.600	-8.227	5.027	0.636
Brief, multicontact	TrEAT 1997	Brief, multicontact	-4.530	-6.858	-2.202	0.000
Brief, multicontact	Rubio 2010	Brief, multicontact	-5.190	-7.035	-3.345	0.000
Brief, multicontact	Wallace 1998	Brief, multicontact	-5.200	-10.252	-0.148	0.044
Brief, multicontact			-4.955	-6.346	-3.565	0.000
Extended, multicontact	Richmond 1995	Extended, multicontact	-0.600	-7.336	6.136	0.861
Extended, multicontact			-0.600	-7.336	6.136	0.861
Overall			-4.551	-5.859	-3.242	0.000



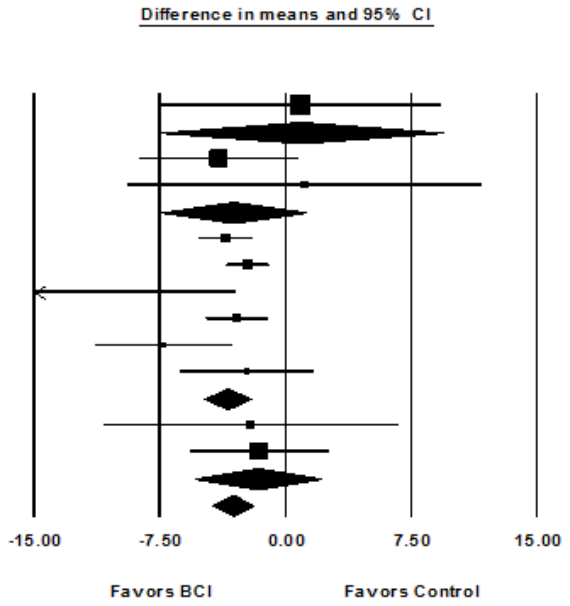
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	0	1.000	0.000
Brief	0.000	0	1.000	0.000
Brief, multicontact	0.199	2	0.905	0.000
Extended, multicontact	0.000	0	1.000	0.000
Overall	3.149	2	0.677	0.000

Model	Study name	Intensity	Statistics with study removed			
			WMD	Lower limit	Upper limit	p-Value
	Richmond 1995	_Very Brief	0.000	0.000	0.000	1.000
Random			-2.000	-8.798	4.798	0.564
	Scott 1990	Brief	-1.600	-8.227	5.027	0.636
Random			-1.600	-8.227	5.027	0.636
	TrEAT 1997	Brief, multicontact	-5.191	-6.924	-3.458	0.000
	Rubio 2010	Brief, multicontact	-4.647	-6.762	-2.533	0.000
	Wallace 1998	Brief, multicontact	-4.935	-6.381	-3.489	0.000
Random			-4.955	-6.346	-3.565	0.000
	Richmond 1995	Extended, multicontact	-0.600	-7.336	6.136	0.861
Random			-0.600	-7.336	6.136	0.861
Random	Overall		-4.551	-5.859	-3.242	0.000

Drinks/week BI vs. control: adults, 6 months

Comparison of behavioral counseling interventions vs. control in adults: 6 month change in alcohol consumption (drinks/week)

Group by Subgroup within study	Study name	Subgroup within study	Difference in means	Lower limit	Upper limit	p-Value
_Very Brief	Richmond 1995	_Very Brief	0.900	-7.531	9.331	0.834
_Very Brief			0.900	-7.531	9.331	0.834
Brief	ELM 2001	Brief	-3.990	-8.748	0.768	0.100
Brief	Lock 2006	Brief	1.140	-9.506	11.786	0.834
Brief			-3.136	-7.480	1.209	0.157
Brief, multicontact	TrEAT 1997	Brief, multicontact	-3.610	-5.241	-1.979	0.000
Brief, multicontact	Healthy Moms 2008	Brief, multicontact	-2.275	-3.591	-0.959	0.001
Brief, multicontact	Noknoy 2010	Brief, multicontact	-9.240	-15.516	-2.964	0.004
Brief, multicontact	Project Health 1999	Brief, multicontact	-2.900	-4.818	-0.982	0.003
Brief, multicontact	Wallace 1998 (Men)	Brief, multicontact	-7.300	-11.458	-3.142	0.001
Brief, multicontact	Wallace 1998 (Women)	Brief, multicontact	-2.300	-6.365	1.765	0.267
Brief, multicontact			-3.507	-4.898	-2.116	0.000
Extended, multicontact	Richmond 1995	Extended, multicontact	-2.100	-10.940	6.740	0.642
Extended, multicontact	ELM 2001	Extended, multicontact	-1.586	-5.786	2.614	0.459
Extended, multicontact			-1.681	-5.474	2.113	0.385
Overall			-3.187	-4.425	-1.950	0.000



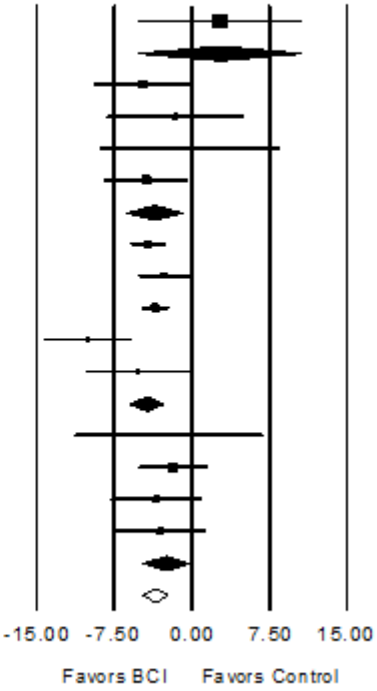
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	0	1.000	0.000
Brief	0.000	0	1.000	0.000
Brief, multicontact	9.672	5	0.085	48.305
Extended, multicontact	0.000	0	1.000	0.000
Overall	11.171	8	0.192	28.385

Model	Study name	Intensity	Statistics with study removed			
			WMD	Lower limit	Upper limit	p-Value
	Richmond 1995	_Very Brief	0.000	0.000	0.000	1.000
Random			0.900	-7.531	9.331	0.834
	ELM 2001	Brief	1.140	-9.619	11.899	0.835
	Lock 2006	Brief	-3.990	-8.950	0.970	0.115
Random			-3.136	-7.480	1.209	0.157
	TrEAT 1997	Brief, multicontact	-3.295	-4.702	-1.887	0.000
	Healthy Moms 2008	Brief, multicontact	-3.812	-5.111	-2.514	0.000
	Noknoy 2010	Brief, multicontact	-2.992	-3.855	-2.129	0.000
	Project Health 1999	Brief, multicontact	-3.568	-4.998	-2.138	0.000
	Wallace 1998 (Men)	Brief, multicontact	-2.923	-3.796	-2.050	0.000
	Wallace 1998 (Women)	Brief, multicontact	-3.446	-4.673	-2.220	0.000
Random			-3.507	-4.898	-2.116	0.000
	Richmond 1995	Extended, multicontact	-1.586	-6.068	2.896	0.488
	ELM 2001	Extended, multicontact	-2.100	-11.063	6.863	0.646
Random			-1.681	-5.474	2.113	0.385
Random			-3.187	-4.425	-1.950	0.000

Drinks/week BI vs. control: adults, 12 months

Comparison of behavioral counseling interventions vs. control in adults: 12 month change in alcohol consumption (drinks/week)

Group by Subgroup within study	Study name	Subgroup within study	Difference in means	Lower limit	Upper limit	p-Value
_Very Brief	Richmond 1995	_Very Brief	2.700	-5.212	10.612	0.504
_Very Brief			2.700	-5.212	10.612	0.504
Brief	Anderson 1992 (Men)	Brief	-4.740	-9.544	0.064	0.053
Brief	Scott 1990 (Women)	Brief	-1.600	-8.227	5.027	0.636
Brief	Lock 2006	Brief	-0.190	-8.935	8.555	0.966
Brief	ELM 2001	Brief	-4.430	-8.545	-0.315	0.035
Brief			-3.660	-6.349	-0.970	0.008
Brief, multicontact	TrEAT 1997	Brief, multicontact	-4.180	-5.887	-2.473	0.000
Brief, multicontact	Project Health 1999	Brief, multicontact	-2.700	-5.156	-0.244	0.031
Brief, multicontact	Rubio 2010	Brief, multicontact	-3.560	-4.898	-2.222	0.000
Brief, multicontact	Wallace 1998 (Men)	Brief, multicontact	-10.100	-14.400	-5.800	0.000
Brief, multicontact	Wallace 1998 (Women)	Brief, multicontact	-5.200	-10.252	-0.148	0.044
Brief, multicontact			-4.407	-6.084	-2.730	0.000
Extended, multicontact	Richmond 1995	Extended, multicontact	-2.200	-11.331	6.931	0.637
Extended, multicontact	ELM 2001	Extended, multicontact	-1.811	-5.182	1.560	0.292
Extended, multicontact	SIP 2008 (Bischof)-FC	Extended, multicontact	-3.420	-7.826	0.986	0.128
Extended, multicontact	SIP 2008 (Bischof)-SC	Extended, multicontact	-3.010	-7.430	1.410	0.182
Extended, multicontact			-2.546	-4.767	-0.325	0.025
Overall			-3.573	-4.758	-2.389	0.000

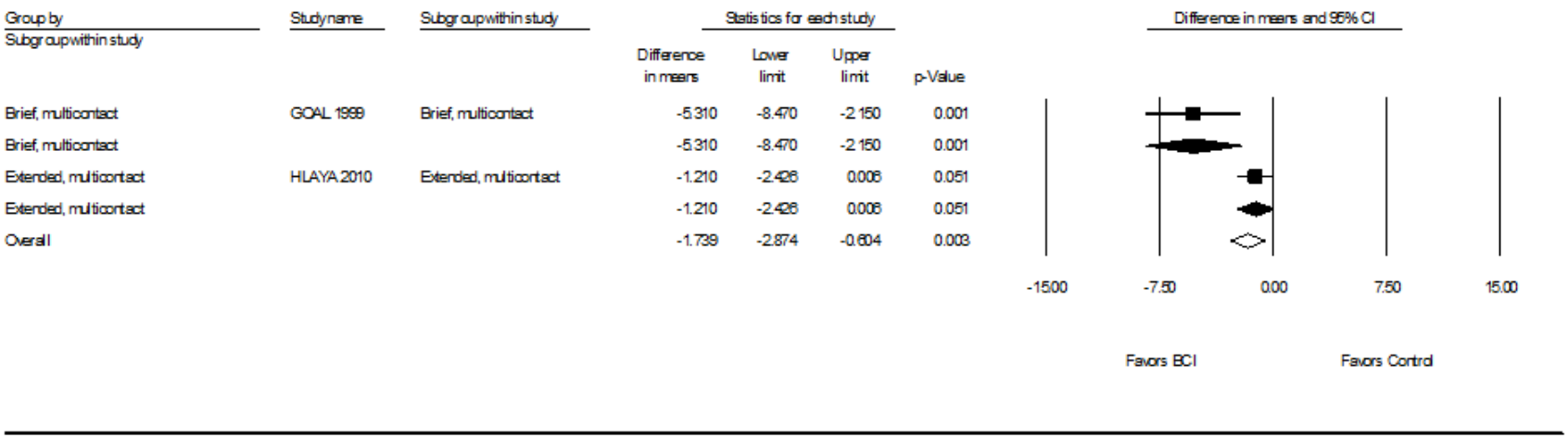


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	0	1.000	0.000
Brief	1.305	3	0.728	0.000
Brief, multicontact	9.478	4	0.050	57.797
Extended, multicontact	0.382	3	0.944	0.000
Overall	15.066	13	0.303	13.714

Model	**Study name**	**Intensity**	**Statistics with study removed**			
			WMD	**Lower limit**	**Upper limit**	**p-Value**
	Richmond 1995	_Very Brief	0.000	0.000	0.000	1.000
Random			2.700	-5.212	10.612	0.504
	Anderson 1992 (Men)	Brief	-3.091	-6.508	0.325	0.076
	Scott 1990 (Women)	Brief	-4.031	-7.129	-0.932	0.011
	Lock 2006	Brief	-3.999	-6.958	-1.039	0.008
	ELM 2001	Brief	-3.029	-6.728	0.670	0.108
Random			-3.660	-6.349	-0.970	0.008
	TrEAT 1997	Brief, multicontact	-4.231	-5.818	-2.643	0.000
	Project Health 1999	Brief, multicontact	-4.510	-5.900	-3.119	0.000
	Rubio 2010	Brief, multicontact	-4.637	-6.383	-2.891	0.000
	Wallace 1998 (Men)	Brief, multicontact	-3.681	-4.632	-2.731	0.000
	Wallace 1998 (Women)	Brief, multicontact	-4.110	-5.402	-2.817	0.000
Random			-4.407	-6.084	-2.730	0.000
	Richmond 1995	Extended, multicontact	-2.595	-5.070	-0.119	0.040
	ELM 2001	Extended, multicontact	-3.103	-6.168	-0.039	0.047
	SIP 2008 (Bischof)-FC	Extended, multicontact	-2.269	-5.065	0.528	0.112
	SIP 2008 (Bischof)-SC	Extended, multicontact	-2.414	-5.203	0.374	0.090
Random			-2.546	-4.767	-0.325	0.025
Random	Overall		-3.573	-4.758	-2.389	0.000

Drinks/week BI vs. control: older adults, 12 months

Comparison of behavioral counseling interventions vs. control in older adults: 12 month change in alcohol consumption (drinks/week)

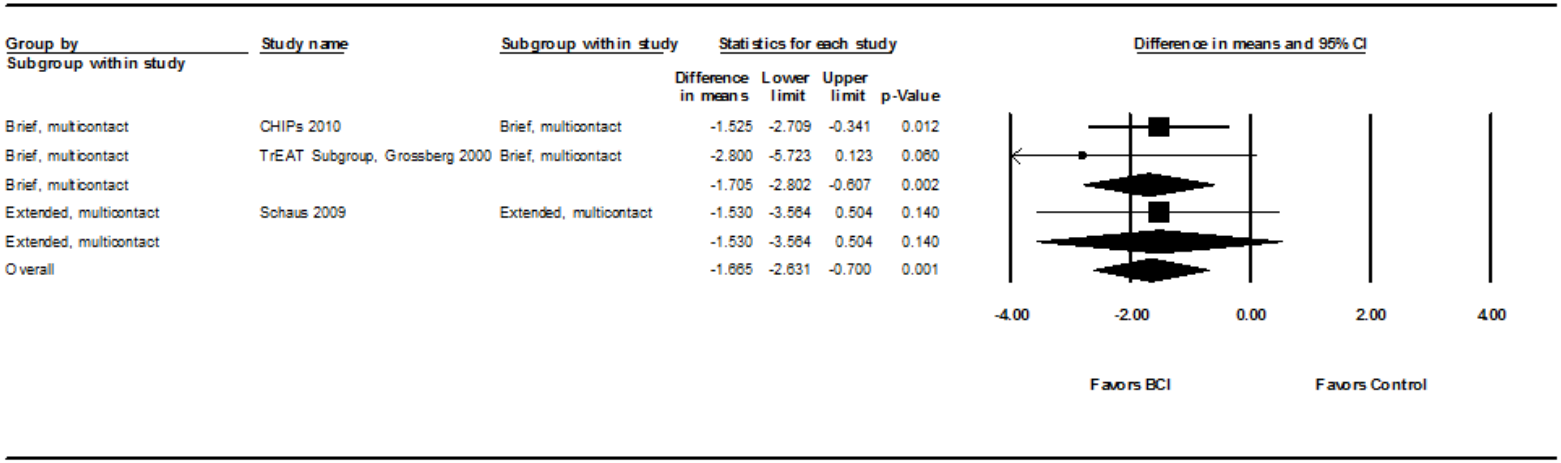


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief, multicontact	0.000	0	1.000	0.000
Extended, multicontact	0.000	0	1.000	0.000
Overall	5.631	1	0.018	82.241

Model	Study name	Intensity	Statistics with study removed			
			WMD	Lower limit	Upper limit	p-Value
	GOAL 1999	Brief, multicontact	0.000	0.000	0.000	1.000
Random			-5.310	-8.470	-2.150	0.001
	HLAYA 2010	Extended, multicontact	-1.210	-2.426	0.006	0.051
Random			-1.210	-2.426	0.006	0.051
Random			-1.739	-2.874	-0.604	0.003

Drinks/week BI vs. control: young adults, 6 months

Comparison of behavioral counseling interventions vs. control in young adults: 6 month change in alcohol consumption (drinks/week)



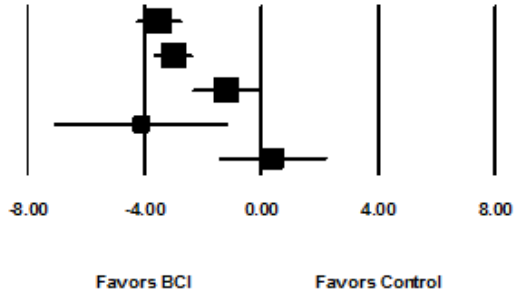
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief, multicontact	0.628	1	0.428	0.000
Extended, multicontact	0.000	0	1.000	0.000
Overall	0.650	2	0.723	0.000

Model	Study name	Intensity	Statistics with study removed			
			WMD	Lower limit	Upper limit	p-Value
	CHIPs 2010	Brief, multicontact	-2.800	-5.723	0.123	0.060
	TrEAT Subgroup, Grossberg 2000	Brief, multicontact	-1.525	-2.709	-0.341	0.012
Random			-1.705	-2.802	-0.607	0.002
	Schaus 2009	Extended, multicontact	-1.530	-3.564	0.504	0.140
Random			-1.530	-3.564	0.504	0.140
Random		Overall	-1.665	-2.631	-0.700	0.001

Drinks/week BI vs. control: young adults, 12 months

Comparison of behavioral counseling interventions vs. control in young adults: 12 month change in alcohol consumption (drinks/week)

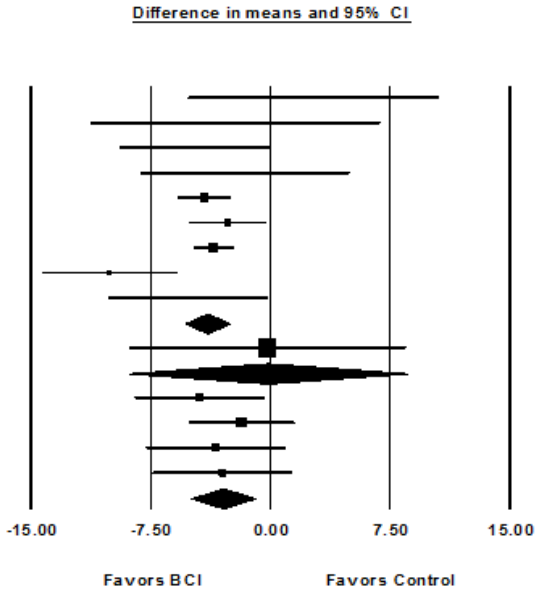
Study name	Subgroup within study	Difference in means	Lower limit	Upper limit	p-Value
Kypri 2008	Brief	-3.500	-4.307	-2.693	0.000
Kypri 2008	Brief, multicontact	-3.000	-3.687	-2.313	0.000
CHIPs 2010	Brief, multicontact	-1.200	-2.367	-0.033	0.044
TrEAT Subgroup, Gross berg 2000	Brief, multicontact	-4.100	-7.100	-1.100	0.007
Schaus 2009	Extended, multicontact	0.400	-1.464	2.264	0.674



Drinks/week BI vs. control by intervention provider: adults, 12 months

Comparison of behavioral counseling interventions vs. control, by provider subgroup: 12 month change in alcohol consumption (drinks/week)

Group by Comparison	Study name	Subgroup within study	Provider	Difference in means	Lower limit	Upper limit	p-Value
1.00	Richmond 1995	_Very Brief	1.000	2.700	-5.212	10.612	0.504
1.00	Richmond 1995	Extended, multicontact	1.000	-2.200	-11.331	6.931	0.637
1.00	Anderson 1992 (Men)	Brief	1.000	-4.740	-9.544	0.064	0.053
1.00	Scott 1990 (Women)	Brief	1.000	-1.600	-8.227	5.027	0.636
1.00	TrEAT 1997	Brief, multicontact	1.000	-4.180	-5.887	-2.473	0.000
1.00	Project Health 1999	Brief, multicontact	1.000	-2.700	-5.156	-0.244	0.031
1.00	Rubio 2010	Brief, multicontact	1.000	-3.560	-4.898	-2.222	0.000
1.00	Wallace 1998 (Men)	Brief, multicontact	1.000	-10.100	-14.400	-5.800	0.000
1.00	Wallace 1998 (Women)	Brief, multicontact	1.000	-5.200	-10.252	-0.148	0.044
1.00				-4.000	-5.419	-2.581	0.000
2.00	Lock 2006	Brief	2.000	-0.190	-8.935	8.555	0.966
2.00				-0.190	-8.935	8.555	0.966
3.00	ELM 2001	Brief	3.000	-4.430	-8.545	-0.315	0.035
3.00	ELM 2001	Extended, multicontact	3.000	-1.811	-5.182	1.560	0.292
3.00	SIP 2008 (Bischof)-E1	Extended, multicontact	3.000	-3.420	-7.826	0.986	0.128
3.00	SIP 2008 (Bischof)-E2	Extended, multicontact	3.000	-3.010	-7.430	1.410	0.182
3.00				-3.008	-5.009	-1.007	0.003



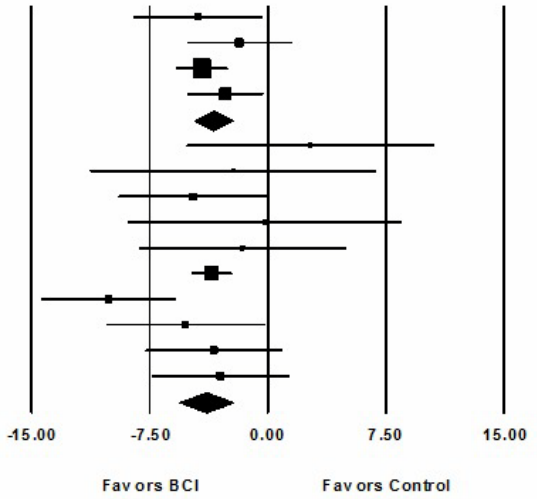
Provider subtypes:
1.000 = Primary care physician
2.000 = Nurse
3.000 = Researcher

12-month Adult - Provider Subgroup				
Heterogeneity Statistics				
Intensity	Q-value	df (Q)	P-value	I-squared
PCP	12.886	8	0.116	37.918
Nurse	0.000	0	1.000	0.000
Researcher	0.977	3	0.807	0.000

Drinks/week BI vs. control by country: adults, 12 months

Comparison of behavioral counseling interventions vs. control, by country subgroup: 12 month change in alcohol consumption (drinks/week)

Group by Comparison	Study name	Subgroup within study	Country	Statistics for each study: Difference in means	Lower limit	Upper limit	p-Value
1.00	ELM 2001	Brief	1.000	-4.430	-8.545	-0.315	0.035
1.00	ELM 2001	Extended, multicontact	1.000	-1.811	-5.182	1.560	0.292
1.00	TrEAT 1997	Brief, multicontact	1.000	-4.180	-5.887	-2.473	0.000
1.00	Project Health 1999	Brief, multicontact	1.000	-2.700	-5.156	-0.244	0.031
1.00				-3.511	-4.745	-2.276	0.000
2.00	Richmond 1995	_Very Brief	2.000	2.700	-5.212	10.612	0.504
2.00	Richmond 1995	Extended, multicontact	2.000	-2.200	-11.331	6.931	0.637
2.00	Anderson 1992 (Men)	Brief	2.000	-4.740	-9.544	0.064	0.053
2.00	Lock 2006	Brief	2.000	-0.190	-8.935	8.555	0.966
2.00	Scott 1990 (Women)	Brief	2.000	-1.600	-8.227	5.027	0.636
2.00	Rubio 2010	Brief, multicontact	2.000	-3.560	-4.898	-2.222	0.000
2.00	Wallace 1998 (Men)	Brief, multicontact	2.000	-10.100	-14.400	-5.800	0.000
2.00	Wallace 1998 (Women)	Brief, multicontact	2.000	-5.200	-10.252	-0.148	0.044
2.00	SIP 2008 (Bischof)-EC	Extended, multicontact	2.000	-3.420	-7.826	0.986	0.128
2.00	SIP 2008 (Bischof)-SC	Extended, multicontact	2.000	-3.010	-7.430	1.410	0.182
2.00				-3.947	-5.673	-2.221	0.000



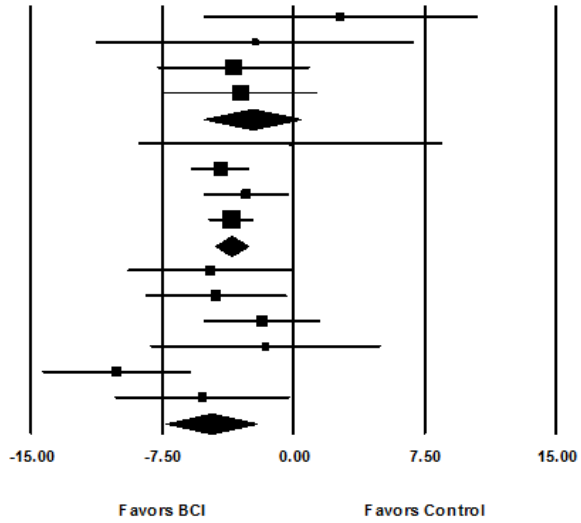
Country subtypes:
1.000 = United States only
2.000 = includes non-United States

12-month Adult - Country Subgroup				
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
U.S,	2.177	3	0.537	0.000
Non-U.S.	12.748	9	0.174	29.398

Drinks/week BI vs. control by alcohol dependence: adults, 12 months

Comparison of behavioral counseling interventions vs. control, by alcohol dependent subgroup: 12 month change in alcohol consumption (drinks/week)

Group by Comparison	Study name	Subgroup within study	Alcohol Dependent	Statistics for each study			
				Difference in means	Lower limit	Upper limit	p-Value
1.00	Richmond 1995	_Very Brief	1.000	2.700	-5.212	10.612	0.504
1.00	Richmond 1995	Extended, multicontact	1.000	-2.200	-11.331	6.931	0.637
1.00	SIP 2008 (Bischof)-FC	Extended, multicontact	1.000	-3.420	-7.826	0.986	0.128
1.00	SIP 2008 (Bischof)-SC	Extended, multicontact	1.000	-3.010	-7.430	1.410	0.182
1.00				-2.399	-5.166	0.367	0.089
2.00	Lock 2006	Brief	2.000	-0.190	-8.935	8.555	0.966
2.00	TrEAT 1997	Brief, multicontact	2.000	-4.180	-5.887	-2.473	0.000
2.00	Project Health 1999	Brief, multicontact	2.000	-2.700	-5.156	-0.244	0.031
2.00	Rubio 2010	Brief, multicontact	2.000	-3.560	-4.898	-2.222	0.000
2.00				-3.584	-4.546	-2.622	0.000
3.00	Anderson 1992 (Men)	Brief	3.000	-4.740	-9.544	0.064	0.053
3.00	ELM 2001	Brief	3.000	-4.430	-8.545	-0.315	0.035
3.00	ELM 2001	Extended, multicontact	3.000	-1.811	-5.182	1.560	0.292
3.00	Scott 1990 (Women)	Brief	3.000	-1.600	-8.227	5.027	0.636
3.00	Wallace 1998 (Men)	Brief, multicontact	3.000	-10.100	-14.400	-5.800	0.000
3.00	Wallace 1998 (Women)	Brief, multicontact	3.000	-5.200	-10.252	-0.148	0.044
3.00				-4.729	-7.323	-2.134	0.000



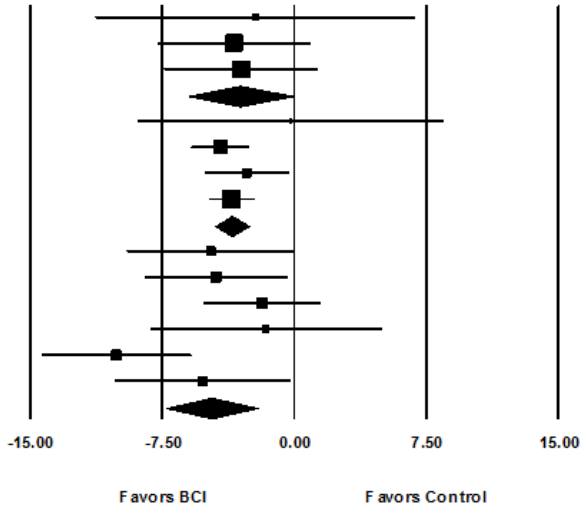
Alcohol dependence subtypes:
1.000 = Study included dependent people
2.000 = Study did not include dependent people
3.000 = Unclear whether study included dependent people

12-month Adult - Alcohol Dependent Subgroup				
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Yes	1.877	3	0.598	0.000
No	1.546	3	0.672	0.000
NR/Unclear	9.764	5	0.082	48.790

Drinks/week BI vs. control by alcohol dependence: adults, 12 months; very brief removed

Comparison of behavioral counseling interventions vs. control, by alcohol dependent subgroup: 12 month change in alcohol consumption (drinks/week)

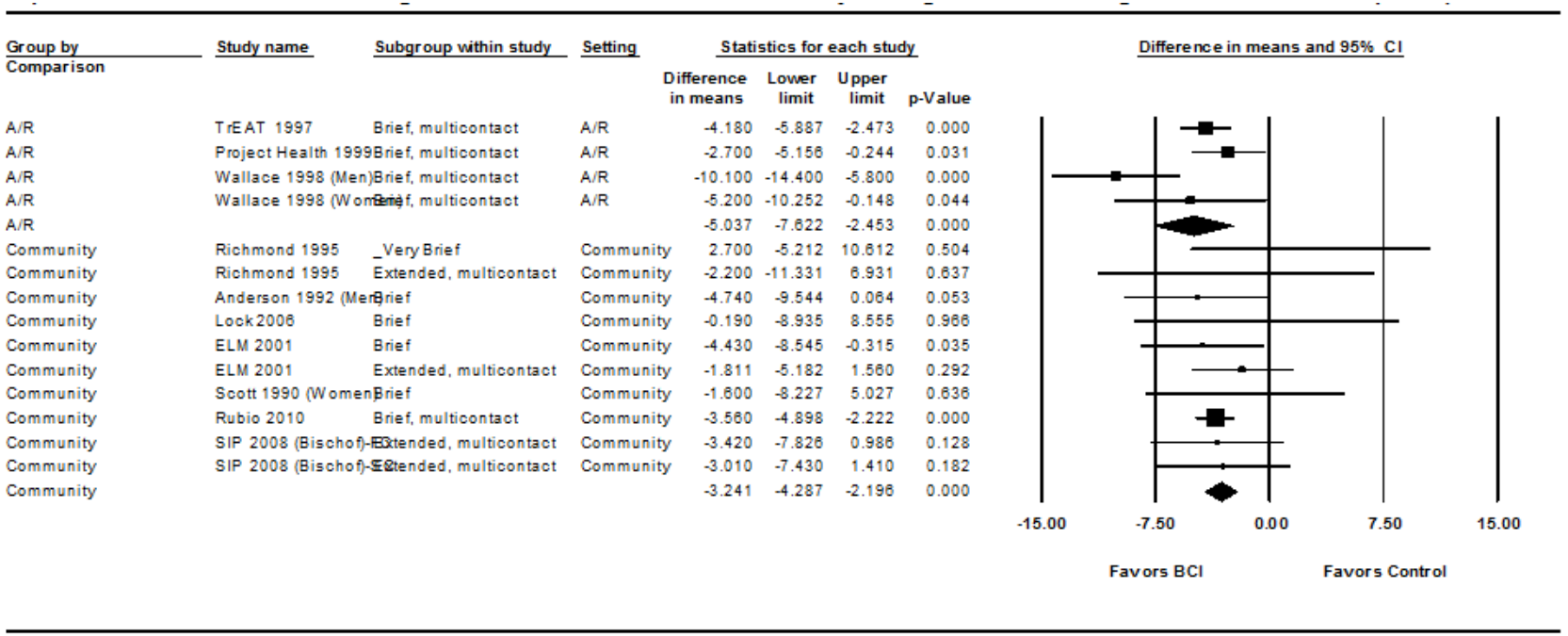
Group by Comparison	Study name	Subgroup within study	Alcohol Dependent	Statistics for each study			
				Difference in means	Lower limit	Upper limit	p-Value
1.00	Richmond 1995	Extended, multicontact	1.000	-2.200	-11.331	6.931	0.637
1.00	SIP 2008 (Bischof)-FC	Extended, multicontact	1.000	-3.420	-7.826	0.986	0.128
1.00	SIP 2008 (Bischof)-SC	Extended, multicontact	1.000	-3.010	-7.430	1.410	0.182
1.00				-3.109	-6.062	-0.157	0.039
2.00	Lock 2006	Brief	2.000	-0.190	-8.935	8.555	0.966
2.00	TrEAT 1997	Brief, multicontact	2.000	-4.180	-5.887	-2.473	0.000
2.00	Project Health 1999	Brief, multicontact	2.000	-2.700	-5.156	-0.244	0.031
2.00	Rubio 2010	Brief, multicontact	2.000	-3.560	-4.898	-2.222	0.000
2.00				-3.584	-4.546	-2.622	0.000
3.00	Anderson 1992 (Men)	Brief	3.000	-4.740	-9.544	0.064	0.053
3.00	ELM 2001	Brief	3.000	-4.430	-8.545	-0.315	0.035
3.00	ELM 2001	Extended, multicontact	3.000	-1.811	-5.182	1.560	0.292
3.00	Scott 1990 (Women)	Brief	3.000	-1.600	-8.227	5.027	0.636
3.00	Wallace 1998 (Men)	Brief, multicontact	3.000	-10.100	-14.400	-5.800	0.000
3.00	Wallace 1998 (Women)	Brief, multicontact	3.000	-5.200	-10.252	-0.148	0.044
3.00				-4.729	-7.323	-2.134	0.000



Alcohol dependence subtypes:
1.000 = Study included dependent people
2.000 = Study did not include dependent people
3.000 = Unclear whether study included dependent people

Drinks/week BI vs. control by practice setting: adults, 12 months

Comparison of behavioral counseling interventions vs. control in adults, by setting: 12 month change in alcohol consumption (drinks/week)



Practice setting subtypes:
A/R = academic or research
Community = private or community-based practice

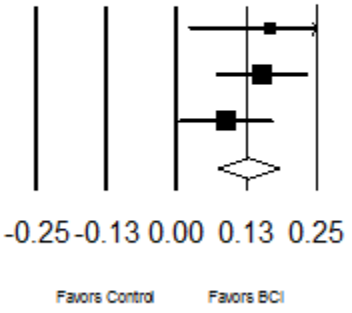
12-month Adult - Setting Subgroup				
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
A/R	8.747	3	0.033	65.702
Community	4.540	9	0.872	0.000

Binge drinking

Risk of binge BI vs. control: adult men, 12 months

Comparison of behavioral counseling interventions vs. control in adult men: no binge alcohol use at 12 months

Study name	Subgroup within study	Statistics for each study				Risk difference and 95% CI
		Risk difference	Lower limit	Upper limit	p-Value	
Anderson 1992	Brief	0.167	0.023	0.311	0.023	
TrEAT 1997	Brief, multicontact	0.154	0.071	0.237	0.000	
Rubio 2010	Brief, multicontact	0.089	0.004	0.175	0.041	
		0.129	0.074	0.184	0.000	



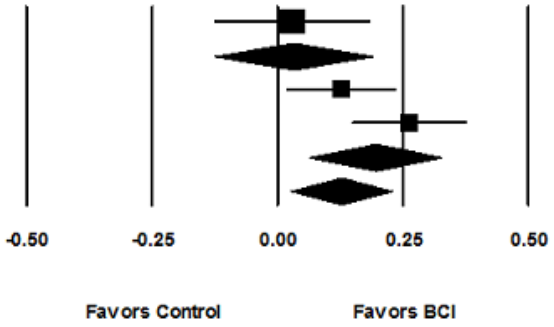
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief	0.000	0	1.000	0.000
Brief, multicontact	1.140	1	0.286	12.284
Overall	1.451	2	0.484	0.000

Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	Anderson 1992	Brief	0.000	0.000	0.000	1.000
Random			0.167	0.023	0.311	0.023
	TrEAT 1997	Brief, multicontact	0.089	0.004	0.175	0.041
	Rubio 2010	Brief, multicontact	0.154	0.071	0.237	0.000
Random			0.123	0.059	0.186	0.000
Random		Overall	0.130	0.072	0.188	0.000

Risk of binge BI vs. control: adult women, 12 months

Comparison of behavioral counseling interventions vs. control in adult women: no binge alcohol use at 12 months

Group by Subgroup within study	Study name	Subgroup within study	Risk difference	Lower limit	Upper limit	p-Value
Brief	Scott 1990	Brief	0.030	-0.128	0.188	0.709
Brief			0.030	-0.128	0.188	0.709
Brief, multicontact	TrEAT 1997	Brief, multicontact	0.127	0.016	0.238	0.025
Brief, multicontact	Rubio 2010	Brief, multicontact	0.262	0.146	0.379	0.000
Brief, multicontact			0.193	0.061	0.326	0.004
Overall			0.126	0.024	0.227	0.015

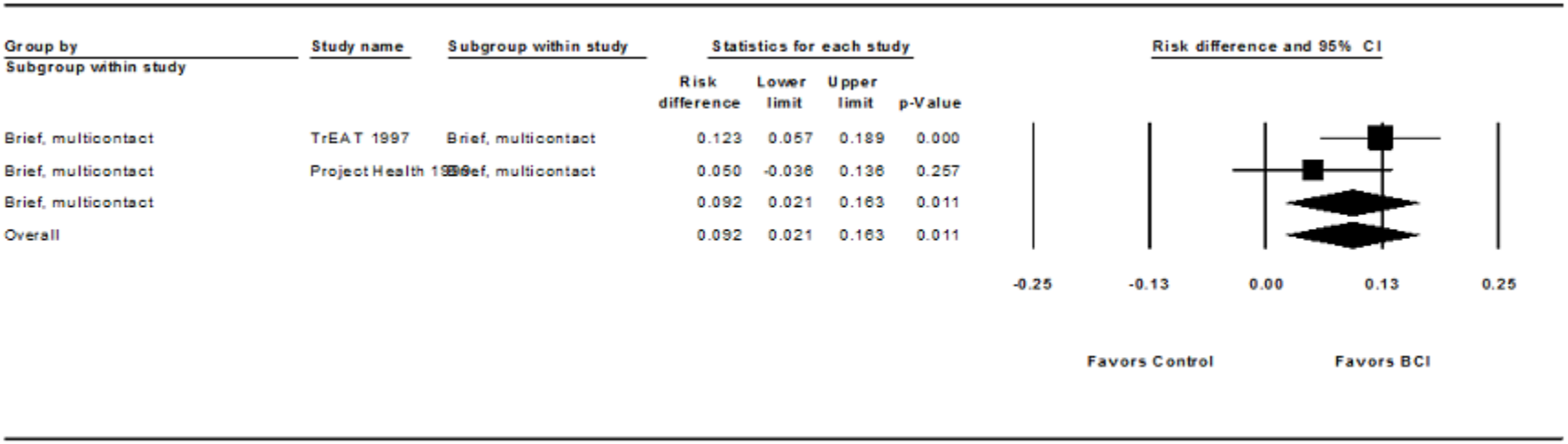


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief	0.000	0	1.000	0.000
Brief, multicontact	2.724	1	0.099	63.290
Overall	5.921	2	0.052	66.220

Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	Scott 1990	Brief	0.000	0.000	0.000	1.000
Random			0.030	-0.128	0.188	0.709
	TrEAT 1997	Brief, multicontact	0.262	-0.051	0.576	0.101
	Rubio 2010	Brief, multicontact	0.127	0.016	0.238	0.025
Random			0.193	0.061	0.326	0.004
Random		Overall	0.126	0.024	0.227	0.015

Risk of binge BI vs. control: adults, 6 months

Comparison of behavioral counseling interventions vs. control in adults: no binge alcohol use at 6 months



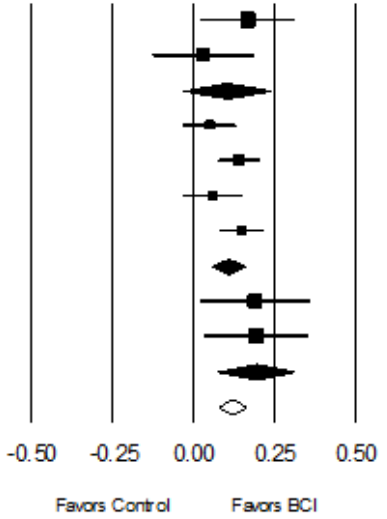
Heterogeneity Statistics				
Intensity	Q-value	df (Q)	P-value	I-squared
Brief, multicontact	1.735	1	0.188	42.351
Overall	1.735	1	0.188	42.351

Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	TrEAT 1997	Brief, multicontact	0.050	-0.036	0.136	0.257
	Project Health 1999	Brief, multicontact	0.123	0.057	0.189	0.000
Random			0.092	0.021	0.163	0.011
Random		Overall	0.092	0.021	0.163	0.011

Risk of binge BI vs. control: adults, 12 months

Comparison of behavioral counseling interventions vs. control in adults: no binge alcohol use at 12 months

Group by Subgroup within study	Study name	Subgroup within study	Risk difference	Lower limit	Upper limit	p-Value
Brief	Anderson 1992 (Men)	Brief	0.167	0.023	0.311	0.023
Brief	Scott 1990 (Women)	Brief	0.030	-0.128	0.188	0.709
Brief			0.102	-0.032	0.236	0.134
Brief, multicontact	Curry 2003	Brief, multicontact	0.050	-0.033	0.133	0.236
Brief, multicontact	TrEAT 1997	Brief, multicontact	0.141	0.074	0.208	0.000
Brief, multicontact	Project Health 1999	Brief, multicontact	0.060	-0.033	0.153	0.204
Brief, multicontact	Rubio 2010	Brief, multicontact	0.149	0.080	0.218	0.000
Brief, multicontact			0.106	0.056	0.157	0.000
Extended, multicontact	SIP 2008 (Bischof)-FC	Extended, multicontact	0.189	0.020	0.358	0.029
Extended, multicontact	SIP 2008 (Bischof)-SC	Extended, multicontact	0.193	0.031	0.355	0.020
Extended, multicontact			0.191	0.074	0.308	0.001
Overall			0.118	0.074	0.162	0.000

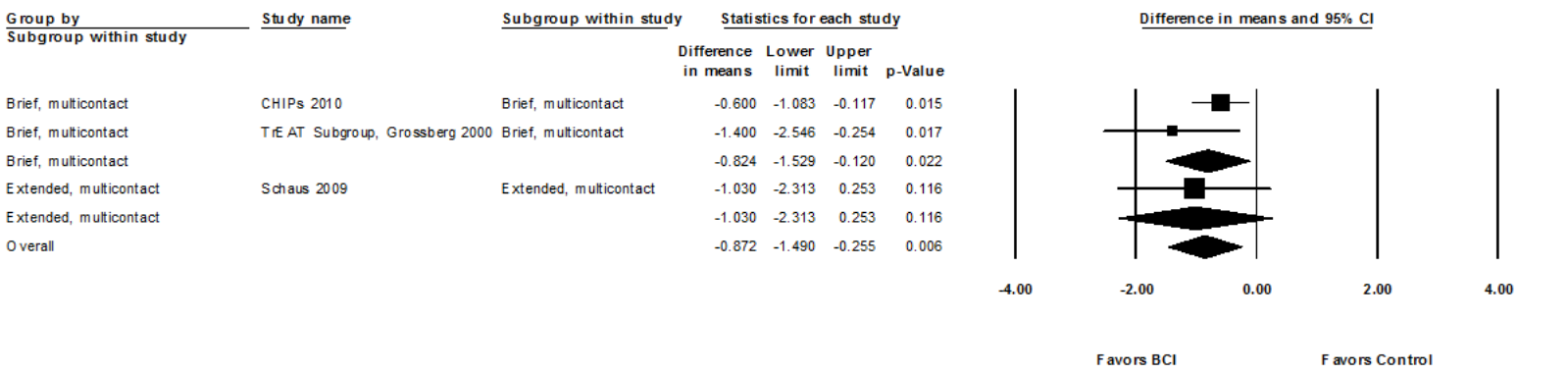


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief	1.581256	1	0.20858	36.75915
Brief, multicontact	5.183	3	0.159	42.118
Extended, multicontact	0.001	1	0.973	0.000
Overall	8.457416	7	0.293991	17.2324

Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	Anderson 1992 (Men)	Brief	0.030	-0.137	0.197	0.724837
	Scott 1990 (Women)	Brief	0.167	0.017	0.317	2.96E-02
Random			0.102	-0.032	0.236	0.134307
	Curry 2003	Brief, multicontact	0.127	0.084	0.169	5.59E-09
	TrEAT 1997	Brief, multicontact	0.092	0.035	0.150	1.77E-03
	Project Health 1999	Brief, multicontact	0.120	0.073	0.166	5.46E-07
	Rubio 2010	Brief, multicontact	0.091	0.036	0.146	1.15E-03
Random			0.106	0.056	0.157	3.64E-05
	SIP 2008 (Bischof)-FC	Extended, multicontact	0.193	0.023	0.363	2.63E-02
	SIP 2008 (Bischof)-SC	Extended, multicontact	0.189	0.013	0.365	3.57E-02
Random			0.191	0.074	0.308	1.40E-03
Random		Overall	0.118	0.074	0.162	1.38E-07

Reduction in heavy episodic drinking BI vs. control: young adults, 6 months

Comparison of behavioral counseling interventions vs. control in young adults: reduction in heavy episodic drinking at 6 months

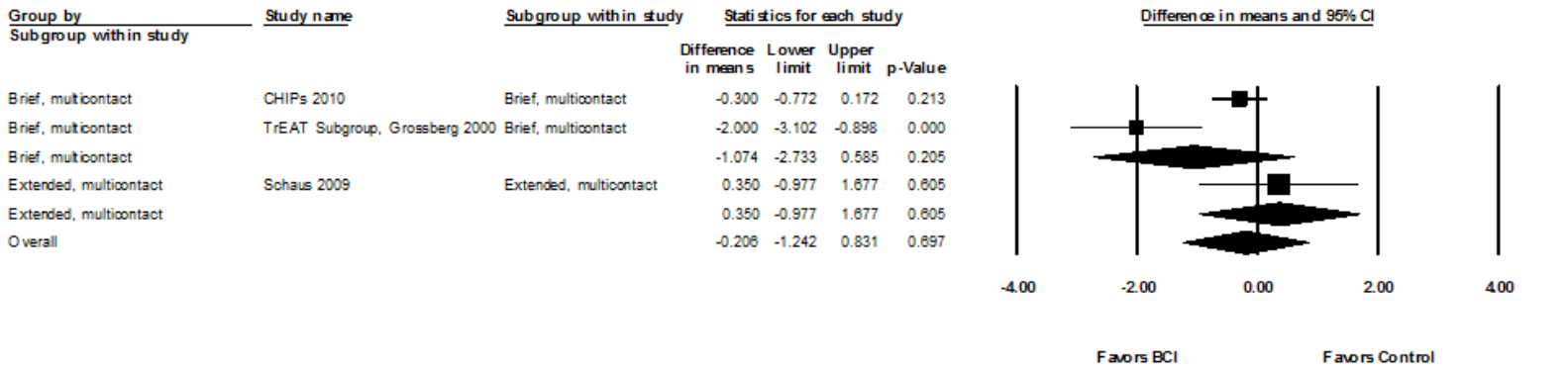


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief, multicontact	1.590	1.000	0.207	37.125
Extended, multi	0.000	0.000	1.000	0.000
Overall	1.790	2.000	0.409	0.000

Model	**Study name**	**Intensity**	**Statistics with study removed**			
			RD	**Lower limit**	**Upper limit**	**p-Value**
	CHIPs 2010	Brief, multicontact	-1.400	-2.546	-0.254	0.017
	TrEAT Subgroup, Grossberg 2000	Brief, multicontact	-0.600	-1.083	-0.117	0.015
Random			-0.824	-1.529	-0.120	0.022
	Schaus 2009	Extended, multicontact	-1.030	-2.313	0.253	0.116
Random			-1.030	-2.313	0.253	0.116
Random			-0.872	-1.490	-0.255	0.006

Reduction in heavy episodic drinking BI vs. control: young adults, 12 months

Comparison of behavioral counseling interventions vs. control in young adults: reduction in heavy episodic drinking at 12 months



Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief, multicontact	7.721	1.000	0.005	87.049
Extended, multi	0.000	0.000	1.000	0.000
Overall	9.367	2.000	0.009	78.648

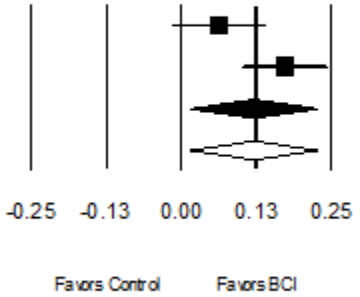
Model	**Study name**	**Intensity**	**Statistics with study removed**			
			RD	**Lower limit**	**Upper limit**	**p-Value**
	CHIPs 2010	Brief, multicontact	-2.000	-5.215	1.215	0.223
	TrEAT Subgroup, Grossberg 2000	Brief, multicontact	-0.300	-0.772	0.172	0.213
Random			-1.074	-2.733	0.585	0.205
	Schaus 2009	Extended, multicontact	0.350	-0.977	1.677	0.605
Random			0.350	-0.977	1.677	0.605
Random			-0.206	-1.242	0.831	0.697

Achievement of safe/recommended drinking limits

Achieved recommended level: adult men, 6 months

Comparison of behavioral counseling interventions vs. control in adult men: achieved recommended drinking at 6 months

Group by Subgroup within study	Study name	Subgroup within study	Risk difference	Lower limit	Upper limit	p-Value
Brief, multicontact	TrEAT 1997	Brief, multicontact	0.064	-0.015	0.143	0.111
Brief, multicontact	Wallace 1998	Brief, multicontact	0.173	0.102	0.244	0.000
Brief, multicontact			0.120	0.013	0.227	0.028
Overall			0.120	0.013	0.227	0.028

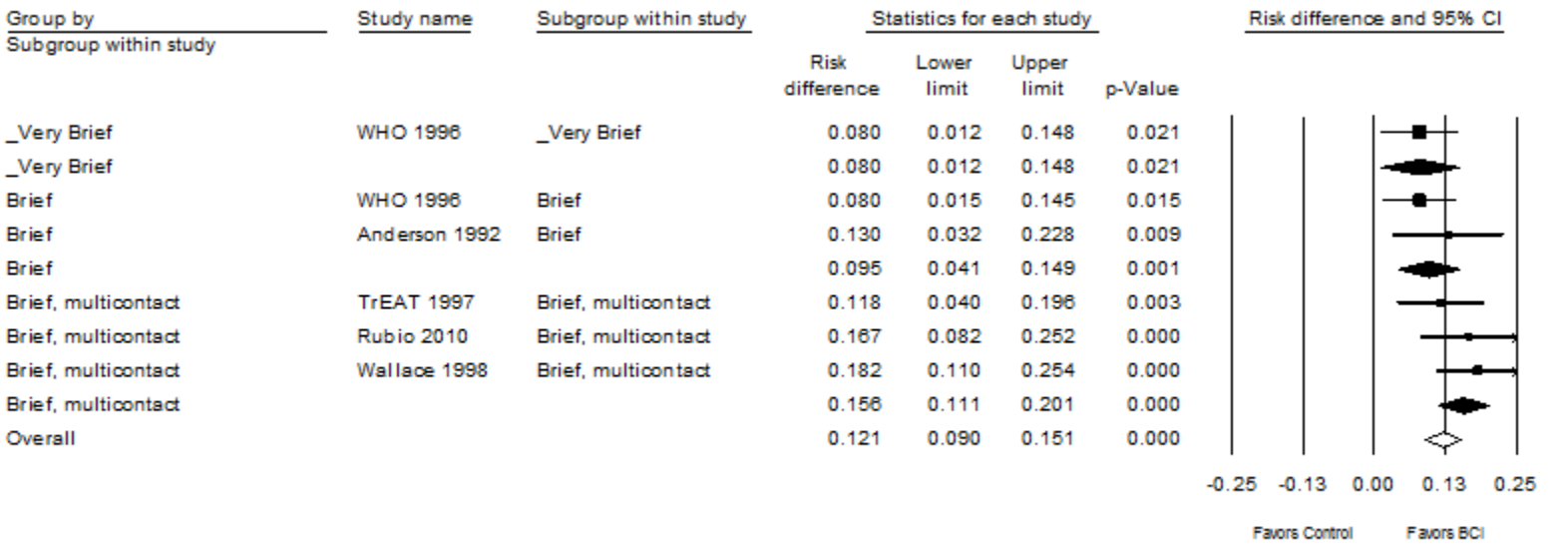


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief, multicontact	4.050	1	0.044	75.308
Overall	4.050	1	0.044	75.308

Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	TrEAT 1997	Brief, multicontact	0.173	0.102	0.244	0.000
	Wallace 1998	Brief, multicontact	0.064	-0.015	0.143	0.111
Random			0.120	0.013	0.227	0.028
Random		Overall	0.120	0.013	0.227	0.028

Achieved recommended level: adult men, 12 months

Comparison of behavioral counseling interventions vs. control in adult men: achieved recommended drinking at 12 months

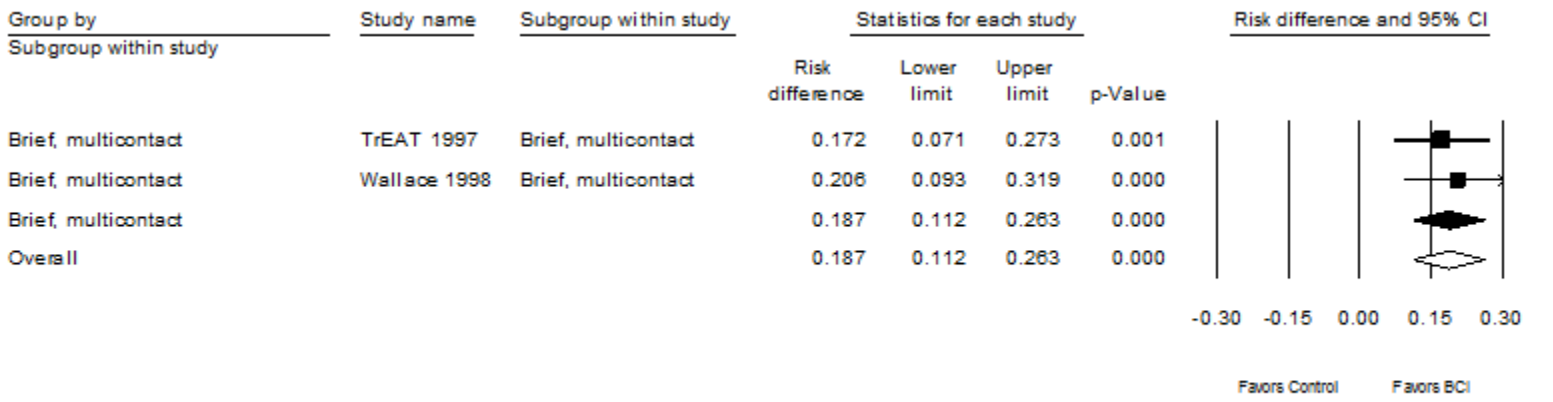


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	0	1.000	0.000
Brief	0.700	1	0.403	0.000
Brief, multicontact	1.477	2	0.478	0.000
Overall	6.830	5	0.234	26.793

Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	WHO 1996	_Very Brief	0.000	0.000	0.000	1.000
Random			0.080	0.012	0.148	0.021
	WHO 1996	Brief	0.130	0.026	0.234	0.015
	Anderson 1992	Brief	0.080	-0.009	0.169	0.077
Random			0.095	0.041	0.149	0.001
	TrEAT 1997	Brief, multicontact	0.175	0.104	0.247	0.000
	Rubio 2010	Brief, multicontact	0.152	0.089	0.214	0.000
	Wallace 1998	Brief, multicontact	0.140	0.083	0.198	0.000
Random			0.156	0.111	0.201	0.000
Random		Overall	0.121	0.090	0.151	0.000

Achieved recommended level: adult women, 6 months

Comparison of behavioral counseling interventions vs. control in adult women: achieved recommended drinking at 6 months

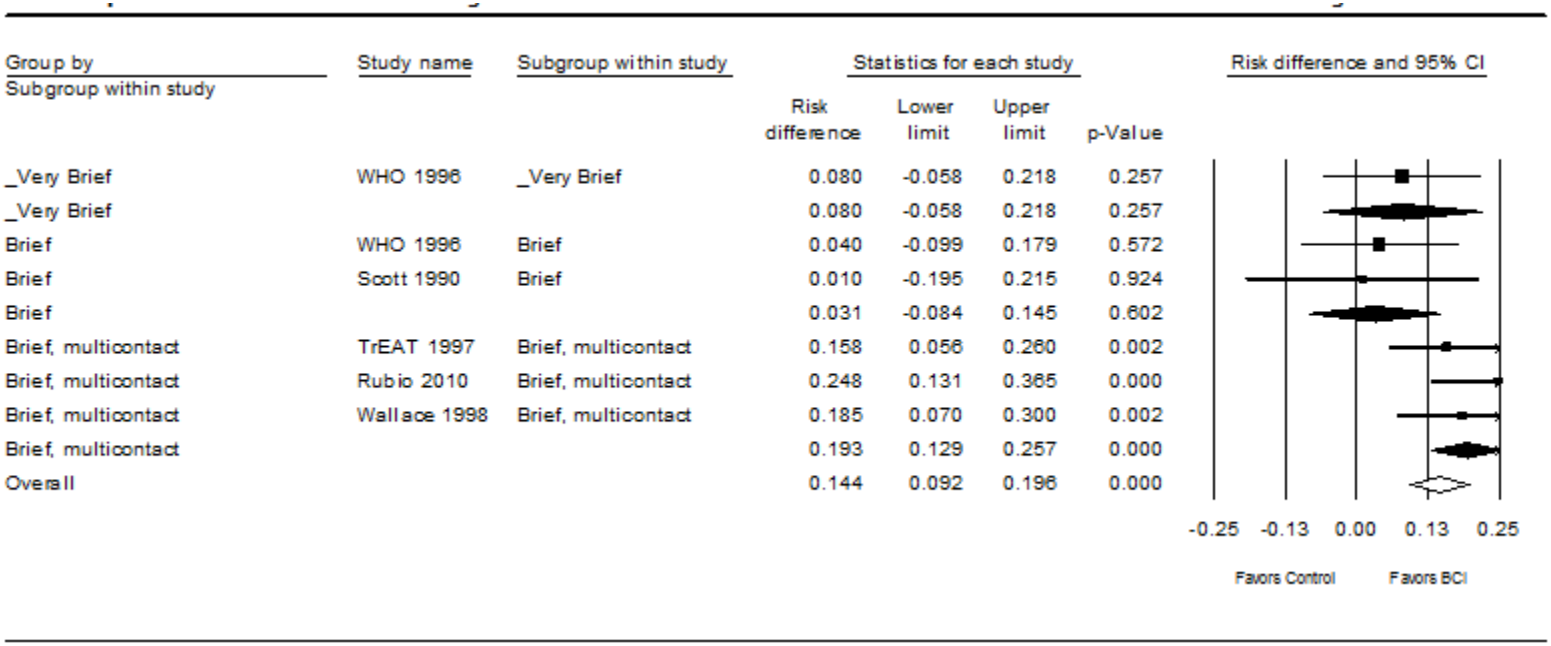


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief, multicontact	0.192	1	0.661	0.000
Overall	0.192	1	0.661	0.000

Model	**Study name**	**Intensity**	**Statistics with study removed**			
			RD	**Lower limit**	**Upper limit**	**p-Value**
	TrEAT 1997	Brief, multicontact	0.206	0.093	0.319	0.000
	Wallace 1998	Brief, multicontact	0.172	0.071	0.273	0.001
Random			0.187	0.112	0.263	0.000
Random		Overall	0.187	0.112	0.263	0.000

Achieved recommended level: adult women, 12 months

Comparison of behavioral counseling interventions vs. control in adult women: achieved recommended drinking at 12 months

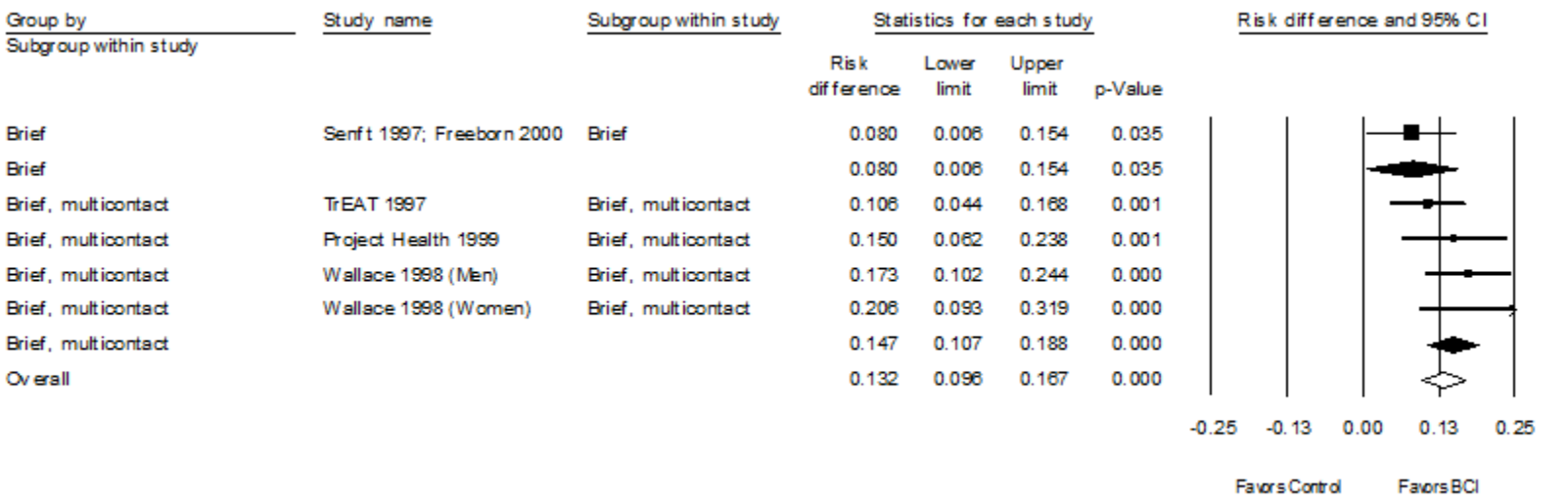


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	0	1.000	0.000
Brief	0.057	1	0.812	0.000
Brief, multicontact	1.314	2	0.518	0.000
Overall	8.201	5	0.145	39.035

Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	WHO 1996	_Very Brief	0.000	0.000	0.000	1.000
Random			0.080	-0.058	0.218	0.257
	WHO 1996	Brief	0.010	-0.211	0.231	0.929
	Scott 1990	Brief	0.040	-0.128	0.208	0.640
Random			0.031	-0.084	0.145	0.602
	TrEAT 1997	Brief, multicontact	0.216	0.089	0.344	0.001
	Rubio 2010	Brief, multicontact	0.170	0.087	0.253	0.000
	Wallace 1998	Brief, multicontact	0.200	0.082	0.318	0.001
Random			0.193	0.129	0.257	0.000
Random		Overall	0.144	0.092	0.196	0.000

Achieved recommended level: adults, 6 months

Comparison of behavioral counseling interventions vs. control in adults: achieved recommended drinking at 6 months



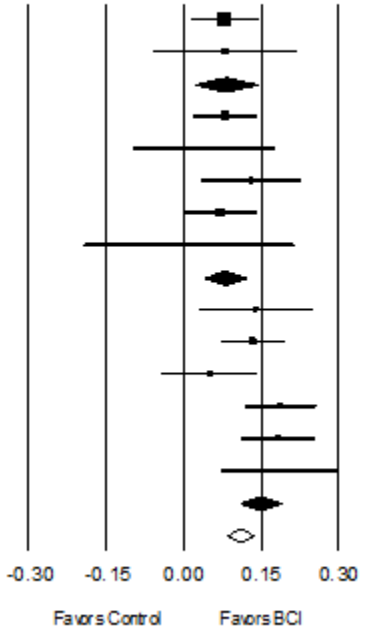
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief	0.000	0	1.000	0.000
Brief, multicontact	3.224	3	0.358	6.947
Overall	5.621	4	0.229	28.843

Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	Senft 1997; Freeborn 2000	Brief	0.000	0.000	0.000	1.000
Random			0.080	0.006	0.154	0.035
	TrEAT 1997	Brief, multicontact	0.173	0.111	0.235	0.000
	Project Health 1999	Brief, multicontact	0.152	0.091	0.212	0.000
	Wallace 1998 (Men)	Brief, multicontact	0.139	0.085	0.194	0.000
	Wallace 1998 (Women)	Brief, multicontact	0.139	0.092	0.187	0.000
Random			0.147	0.107	0.188	0.000
Random		Overall	0.132	0.096	0.167	0.000

Achieved recommended level: adults, 12 months

Comparison of behavioral counseling interventions vs. control in adults: achieved recommended drinking at 12 months

Group by Subgroup within study	Study name	Subgroup within study	Statistics for each study			
			Risk difference	Lower limit	Upper limit	p-Value
_Very Brief	WHO 1996 (Men)	_Very Brief	0.080	0.012	0.148	0.021
_Very Brief	WHO 1996 (Women)	_Very Brief	0.080	-0.058	0.218	0.257
_Very Brief			0.080	0.019	0.141	0.010
Brief	WHO 1996 (Men)	Brief	0.080	0.015	0.145	0.015
Brief	WHO 1996 (Women)	Brief	0.040	-0.099	0.179	0.572
Brief	Anderson 1992 (Men)	Brief	0.130	0.032	0.228	0.009
Brief	Senft 1997; Freeborn 2000	Brief	0.070	-0.003	0.143	0.060
Brief	Scott 1990 (Women)	Brief	0.010	-0.195	0.215	0.924
Brief			0.079	0.039	0.120	0.000
Brief, multicontact	Curry 2003	Brief, multicontact	0.140	0.029	0.251	0.013
Brief, multicontact	TrEAT 1997	Brief, multicontact	0.134	0.072	0.196	0.000
Brief, multicontact	Project Health 1999	Brief, multicontact	0.050	-0.043	0.143	0.290
Brief, multicontact	Rubio 2010	Brief, multicontact	0.187	0.117	0.256	0.000
Brief, multicontact	Wallace 1998 (Men)	Brief, multicontact	0.182	0.110	0.254	0.000
Brief, multicontact	Wallace 1998 (Women)	Brief, multicontact	0.185	0.070	0.300	0.002
Brief, multicontact			0.149	0.109	0.188	0.000
Overall			0.109	0.083	0.134	0.000

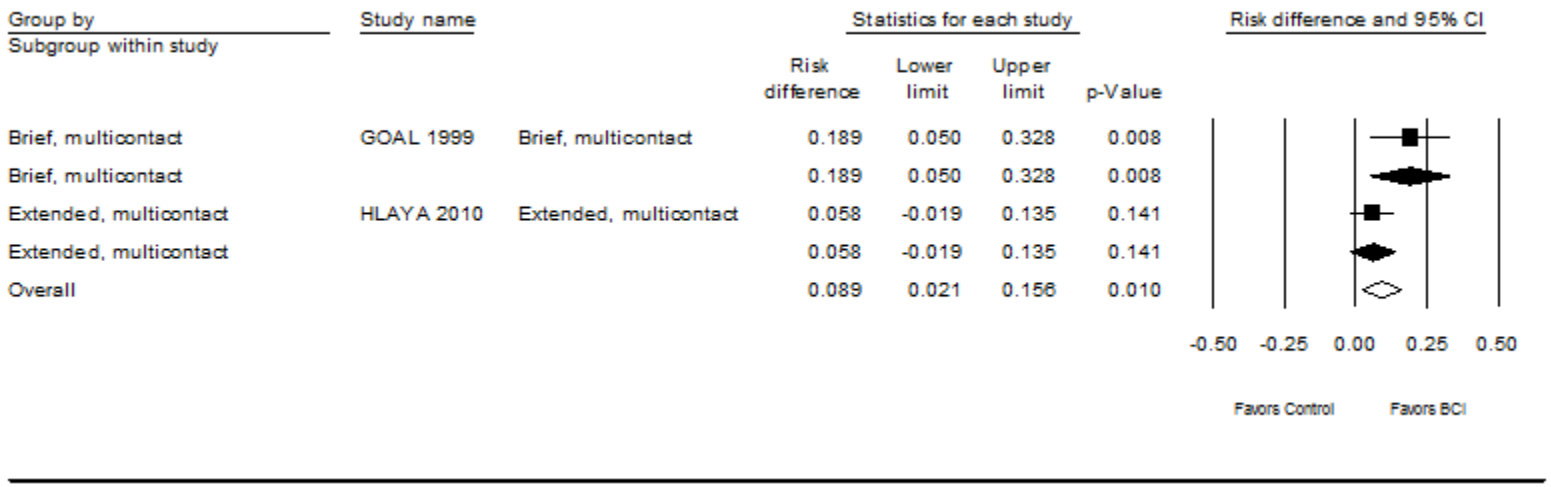


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
_Very Brief	0.000	1	1.000	0.000
Brief	1.845	4	0.764	0.000
Brief, multicontact	6.954	5	0.224	28.098
Overall	17.366	12	0.136	30.900

Model	**Study name**	**Intensity**	**Statistics with study removed**			
			RD	**Lower limit**	**Upper limit**	**p-Value**
	WHO 1996 (Men)	_Very Brief	0.080	-0.071	0.231	0.299
	WHO 1996 (Women)	_Very Brief	0.080	-0.012	0.172	0.089
Random			0.080	0.019	0.141	0.010
	WHO 1996 (Men)	Brief	0.078	0.015	0.140	0.015
	WHO 1996 (Women)	Brief	0.083	0.030	0.137	0.002
	Anderson 1992 (Men)	Brief	0.065	0.007	0.124	0.029
	Senft 1997; Freeborn 2000	Brief	0.082	0.022	0.142	0.007
	Scott 1990 (Women)	Brief	0.083	0.031	0.134	0.002
Random			0.079	0.039	0.120	0.000
	Curry 2003	Brief, multicontact	0.149	0.104	0.195	0.000
	TrEAT 1997	Brief, multicontact	0.153	0.103	0.202	0.000
	Project Health 1999	Brief, multicontact	0.165	0.121	0.208	0.000
	Rubio 2010	Brief, multicontact	0.139	0.098	0.180	0.000
	Wallace 1998 (Men)	Brief, multicontact	0.141	0.098	0.183	0.000
	Wallace 1998 (Women)	Brief, multicontact	0.144	0.101	0.188	0.000
Random			0.149	0.109	0.188	0.000
Random		Overall	0.109	0.083	0.134	0.000

Achieved recommended level: older adults, 12 months

Comparison of behavioral counseling interventions vs. control in older adults: achieved recommended drinking at 12 months



Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Brief, multicontact	0.000	0	1.000	0.000
Extended, multicontact	0.000	0	1.000	0.000
Overall	2.607	1	0.106	61.639

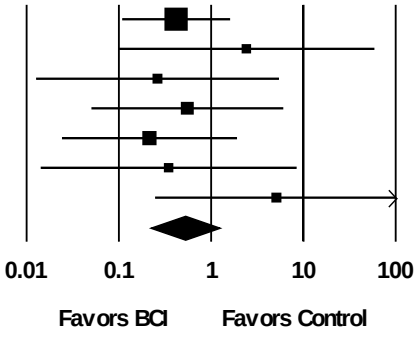
Model	Study name	Intensity	Statistics with study removed			
			RD	Lower limit	Upper limit	p-Value
	GOAL 1999	Brief, multicontact	0.000	0.000	0.000	1.000
Random			0.189	0.050	0.328	0.008
	HLAYA 2010	Extended, multicontact	0.058	-0.019	0.135	0.141
Random			0.058	-0.019	0.135	0.141
Random		Overall	0.089	0.021	0.156	0.010

Mortality

All-cause mortality in person-years: all adults

Comparison of behavioral interventions vs. control in adults, older adults, and young adults: all-cause mortality in person-years

Study name	Subgroup within study	Rate ratio	Lower limit	Upper limit	p-Value
TrEAT 1997	Brief, multicontact	0.418	0.108	1.615	0.206
Noknoy 2010	Brief, multicontact	2.412	0.098	59.203	0.590
SIP 2008 (Bischof)-FC	Extended, multicontact	0.263	0.013	5.468	0.388
SIP 2008 (Bischof)-SC	Extended, multicontact	0.553	0.050	6.095	0.628
GOAL 1999	Brief, multicontact	0.215	0.024	1.921	0.169
Kypri 2004	Brief	0.346	0.014	8.503	0.516
Wallace 1998	Brief, multicontact	5.100	0.245	106.230	0.293
		0.516	0.218	1.224	0.133



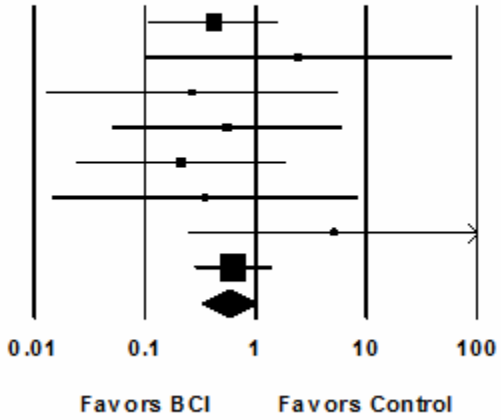
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Overall	4.040	6	0.671	0.000

Model	Study name	Intensity	Statistics with study removed			
			RR	**Lower limit**	**Upper limit**	**p-Value**
	TrEAT 1997	Brief, multicontact	0.597	0.194	1.835	0.368
	Noknoy 2010	Brief, multicontact	0.457	0.187	1.121	0.087
	SIP 2008 (Bischof)-FC	Extended, multicontact	0.548	0.223	1.349	0.190
	SIP 2008 (Bischof)-SC	Extended, multicontact	0.511	0.202	1.289	0.155
	GOAL 1999	Brief, multicontact	0.607	0.237	1.552	0.297
	Kypri 2004	Brief	0.533	0.217	1.306	0.169
	Wallace 1998	Brief, multicontact	0.422	0.171	1.039	0.060
Random			0.516	0.218	1.224	0.133

All-cause mortality in person-years: all adults; Wutzke added

Comparison of behavioral counseling interventions vs. control in adults, older adults, and young adults: all-cause mortality in person-years

Study name	Subgroup within study	Rate ratio	Lower limit	Upper limit	p-Value
TrEAT 1997	Brief, multicontact	0.418	0.108	1.615	0.206
Noknoy 2010	Brief, multicontact	2.412	0.098	59.203	0.590
SIP 2008 (Bischof)-FC	Extended, multicontact	0.263	0.013	5.468	0.388
SIP 2008 (Bischof)-SC	Extended, multicontact	0.553	0.050	6.095	0.628
GOAL 1999	Brief, multicontact	0.215	0.024	1.921	0.169
Kypri 2004	Brief	0.346	0.014	8.503	0.516
Wallace 1998	Brief, multicontact	5.100	0.245	106.230	0.293
Wutzke 2002	Mixed	0.624	0.276	1.413	0.258
		0.571	0.315	1.033	0.064

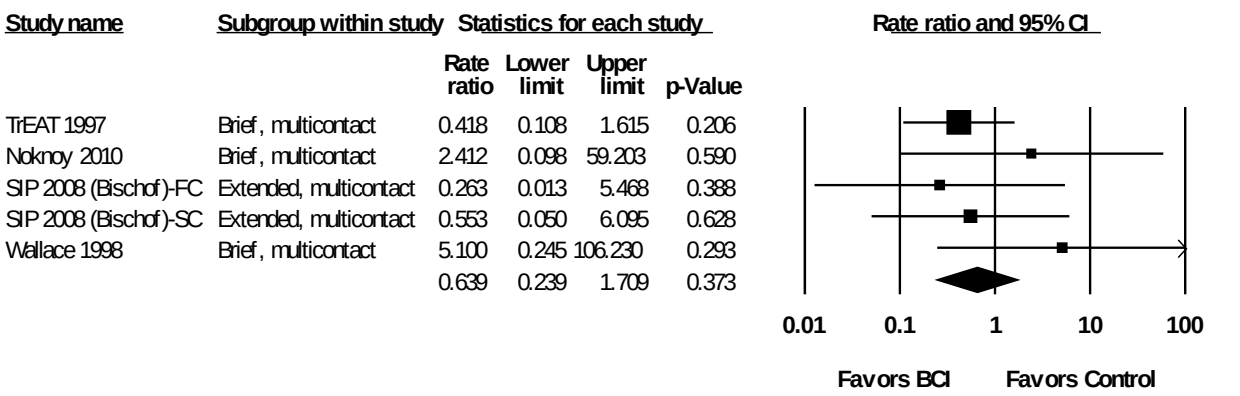


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Overall	4.139	7	0.764	0.000

Model	Study name	Intensity	Statistics with study removed			
			RR	Lower limit	Upper limit	p-Value
	TrEAT 1997	Brief, multicontact	0.615	0.318	1.190	0.149
	Noknoy 2010	Brief, multicontact	0.542	0.296	0.992	0.047
	SIP 2008 (Bischof)-FC	Extended, multicontact	0.589	0.321	1.078	0.086
	SIP 2008 (Bischof)-SC	Extended, multicontact	0.572	0.310	1.055	0.074
	GOAL 1999	Brief, multicontact	0.617	0.333	1.142	0.124
	Kypri 2004	Brief	0.581	0.318	1.063	0.078
	Wallace 1998	Brief, multicontact	0.523	0.286	0.958	0.036
	Wutzke 2002	Mixed	0.516	0.218	1.224	0.133
Random			0.571	0.315	1.033	0.064

All-cause mortality in person-years: adults (excluding older and young adults)

Comparison of behavioral counseling interventions vs. control in adults: all-cause mortality in person-years



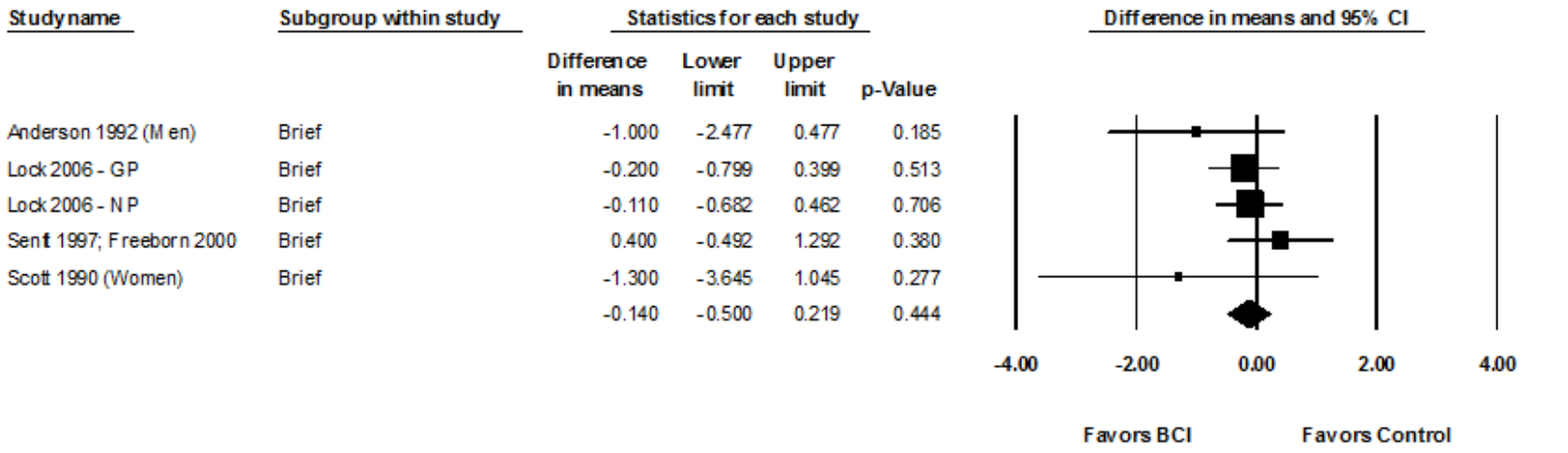
Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Overall	3.183	4	0.528	0.000

Model	Study name	Intensity	Statistics with study removed			
			RR	Lower limit	Upper limit	p-Value
	TrEAT 1997	Brief, multicontact	1.030	0.246	4.312	0.967
	Noknoy 2010	Brief, multicontact	0.557	0.198	1.565	0.267
	SIP 2008 (Bischof)-FC	Extended, multicontact	0.710	0.251	2.006	0.518
	SIP 2008 (Bischof)-SC	Extended, multicontact	0.686	0.218	2.156	0.519
	Wallace 1998	Brief, multicontact	0.501	0.177	1.417	0.193
Random			0.639	0.239	1.709	0.373

Health care utilization

Change in number of practitioner visits: adults, 12 months

Comparison of behavioral counseling interventions vs. control in adults: 12 month change in number of practitioner visits

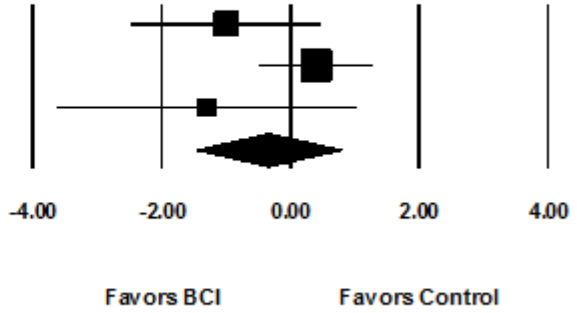


Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Overall	3.698	4	0.448	0.000

Change in number of practitioner visits: adults, 12 months; without Lock, 2006

Comparison of behavioral counseling interventions vs. control in adults: 12 month change in number of practitioner visits

Study name	Subgroup within study	Statistics for each study			
		Difference in means	Lower limit	Upper limit	p-Value
Anderson 1992 (Men)	Brief	-1.000	-2.477	0.477	0.185
Senf 1997; Freeborn 2000	Brief	0.400	-0.492	1.292	0.380
Scott 1990 (Women)	Brief	-1.300	-3.645	1.045	0.277
		-0.352	-1.481	0.776	0.541



Heterogeneity Statistics				
Intensity	**Q-value**	**df (Q)**	**P-value**	**I-squared**
Overall	3.638	2	0.162	45.018

Appendix F. Screening Instruments

Instrument Name	Description	No. Items/ Questions Time to Administer	Scoring Notes
ARPS	Includes items in the following: domains: presence of medical and psychiatric conditions (14 items); symptoms of disease (12 items); smoking behavior (1 item); medication use (17 items), physical function and health status (6 items); quantity and frequency of alcohol use (2 items); episodic heavy drinking (2 items); symptoms of alcohol abuse and dependence (4 items); driving after drinking (1 item), and gender (1 item).	60 16 min	Developed for older adults; Complex scoring algorithm; Classifies as harmful, hazardous, or nonhazardous
ASSIST	Instrument is a brief interview about alcohol, tobacco products, and other drugs; Alcoholic beverages (beer, wine, spirits, etc.) are a subset of each questionnaire item, which each lists a series of substances for potential abuse screening. Lifetime use (Response Choices: No=0; Yes=3) Use in past three months (Response Choices: Never=0; Once or Twice=2; Monthly=3; Weekly=4; Daily or Almost Daily=6) During the past three months, strong desire or urge to use (Response Choices: Never=0; Once or Twice=3; Monthly=4; Weekly=5; Daily or Almost Daily=6) During the past three months, how often use led to health, social, legal or financial problems (Response Choices: Never=0; Once or Twice=4; Monthly=5; Weekly=6; Daily or Almost Daily=7) During the past three months, how often failed to do what was normally expected because of use (Response Choices: Never=0; Once or Twice=5; Monthly=6; Weekly=7; Daily or Almost Daily=8) Friend or relative or anyone else expressed concern about use (Response choices: No, Never=0; Yes, in the past 3 months=6; Yes, but not in the past 3 months=3) Ever tried and failed to control, cut down or stop using (Response choices: No, Never=0; Yes, in the past 3 months=6; Yes, but not in the past 3 months=3) Ever used any drug by injection Response choices: No, Never=0; Yes, in the past 3 months=2; Yes, but not in the past 3 months=1)	8 2-4 min	Add up the scores received for questions 2 through 7 inclusive. Does not include the results from either Q1 or Q8.. Score 0-10: no intervention; risk level low Score 11-26: receive brief Intervention; risk level moderate Score 27+ more intensive treatment; risk level high. Further assessment and more intensive treatment may be provided by the health professional(s) within primary care setting, or, by a specialist drug and alcohol treatment service when available.

Instrument Name	Description	No. Items/ Questions Time to Administer	Scoring Notes
AUDIT	1. How often do you have a drink containing alcohol? 0. NEVER 1. MONTHLY OR LESS 2. TWO TO FOUR TIMES A MONTH 3. TWO TO THREE TIMES A WEEK 4. FOUR OR MORE TIMES A WEEK 2. How many drinks containing alcohol do you have on a typical day when you are drinking? 0. 1 OR 2 1. 3 or 4 2. 5 OR 6 3. 7 TO 9 4. 10 OR MORE 3. How often do you have six or more drinks on one occasion? 0. NEVER 1. LESS THAN MONTHLY 2. MONTHLY 3. WEEKLY 4. DAILY OR ALMOST DAILY 4. How often during the last year have you found that you were not able to stop drinking once you had started? *(same options as #3)* 5. How often during the last year have you failed to do what was normally expected from you because of drinking? *(same options as #3)* 6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session? *(same options as #3)* 7. How often during the last year have you had a feeling of guilt or remorse after drinking? *(same options as #3)* 8. How often during the last year have you been unable to remember what happened the night before because you have been drinking? *(same options as #3)* 9. Have you or someone else been injured as a result of your drinking? 0. NO 1. YES, BUT NOT IN THE LAST YEAR 2. YES, DURING THE LAST YEAR 10. Has a relative or friend or a doctor or other health worker been concerned about your drinking or suggested you cut down? *(same options as #9)*	10 2-5 min	Scoring: ≥8 considered a positive screen for hazardous or harmful drinking. <u>In general:</u> Scores between 8 and 15 are most appropriate for simple advice focused on the reduction of hazardous drinking; Scores between 16 and 19 suggest brief counseling and continued monitoring; Scores of 20 and above clearly warrant further diagnostic evaluation for alcohol dependence.

Instrument Name	Description	No. Items/ Questions Time to Administer	Scoring Notes
AUDIT-C	1. How often do you have a drink containing alcohol? 0. NEVER 1. MONTHLY OR LESS 2. TWO TO FOUR TIMES A MONTH 3. TWO TO THREE TIMES A WEEK 4. FOUR OR MORE TIMES A WEEK 2. How many drinks containing alcohol do you have on a typical day when you are drinking? 0. 1 OR 2 1. 3 or 4 2. 5 OR 6 3. 7 TO 9 4. 10 OR MORE 3. How often do you have six or more drinks on one occasion? 0. NEVER 1. LESS THAN MONTHLY 2. MONTHLY 3. WEEKLY 4. DAILY OR ALMOST DAILY	3 1-2 min	In men, ≥4 points is considered positive for alcohol misuse; in women, ≥3 points is considered positive.
CAGE	C: have you ever felt you should cut down on your drinking? A: have people annoyed you by criticizing your drinking? G: have you ever felt bad or guilty about your drinking? E: eye-opener: have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover?	4 1 min	Score 1 point for each 'yes' response; range 0–4. Positive score ≥2.
LAST	1. Are you always able to stop drinking when you want to? 2. Have you ever felt you should cut down on your drinking? 3. Have you ever felt bad or guilty about your drinking? 4. Does your wife, husband, a parent, or other near relative ever worry or complain about your drinking? 5. Have you ever gotten into trouble at work because of drinking? 6. Have you ever been told you have liver trouble? Cirrhosis? 7. Have you ever been in a hospital because of drinking?	7 1-2 mins	Score 1 point for answer of "no" on question 1; score 1 point for each 'yes on questions 2-7.' Two or more points are indicative of alcohol dependence or abuse

Instrument Name	Description	No. Items/ Questions Time to Administer	Scoring Notes
MAST*	All items are yes/no questions 1. Do you feel you are a normal drinker? ("normal" - drink as much or less than most other people)? 2. Have you ever awakened the morning after some drinking the night before and found that you could not remember a part of the evening? 3. Does any near relative or close friend ever worry or complain about your drinking? 4. Can you stop drinking without difficulty after one or two drinks? 5. Do you ever feel guilty about your drinking? 6. Have you ever attended a meeting of Alcoholics Anonymous (AA)? 7. Have you ever gotten into physical fights when drinking? 8. Has drinking ever created problems between you and a near relative or close friend? 9. Has any family member or close friend gone to anyone for help about your drinking? 10. Have you ever lost friends because of your drinking? 11. Have you ever gotten into trouble at work because of drinking? 12. Have you ever lost a job because of drinking? 13. Have you ever neglected your obligations, your family, or your work for two or more days in a row because you were drinking? 14. Do you drink before noon fairly often? 15. Have you ever been told you have liver trouble such as cirrhosis? 16. After heavy drinking have you ever had delirium tremens (D.T.'s), severe shaking, visual or auditory (hearing) hallucinations? 17. Have you ever gone to anyone for help about your drinking? 18. Have you ever been hospitalized because of drinking? 19. Has your drinking ever resulted in your being hospitalized in a psychiatric ward? 20. Have you ever gone to any doctor, social worker, clergyman or mental health clinic for help with any emotional problem in which drinking was part of the problem? 21. Have you been arrested more than once for driving under the influence of alcohol? 22. Have you ever been arrested, even for a few hours, because of other behavior while drinking?	22 8-15 min	This quiz is scored by allocating 1 point to each 'yes' answer -- except for questions 1 and 4, where 1 point is allocated for each 'no' answer -- and totalling the responses. ≥5 is a positive screen for possible alcoholism

Instrument Name	Description	No. Items/ Questions Time to Administer	Scoring Notes
MAST-G	All items are yes/no questions 1. After drinking have you ever noticed an increase in your heart rate or beating in your chest? 2. When talking to others, do you ever underestimate how much you actually drank? 3. Does alcohol make you sleepy so that you often fall asleep in your chair? 4. After a few drinks, have you sometimes not eaten or been able to skip a meal because you didn't feel hungry? 5. Does having a few drinks help you decrease your shakiness or tremors? 6. Does alcohol sometimes make it hard for you to remember parts of the day or night? 7. Do you have rules for yourself that you won't drink before a certain time of the day? 8. Have you lost interest in hobbies or activities you used to enjoy? 9. When you wake up in the morning, do you ever have trouble remembering part of the night before? 10. Does having a drink help you sleep? 11. Do you hide your alcohol bottles from family members? 12. After a social gathering, have you ever felt embarrassed because you drank too much? 13. Have you ever been concerned that drinking might be harmful to your health? 14. Do you like to end an evening with a night cap? 15. Did you find your drinking increased after someone close to you died? 16. In general, would you prefer to have a few drinks at home rather than go out to social events? 17. Are you drinking more now than in the past? 18. Do you usually take a drink to relax or calm your nerves? 19. Do you drink to take your mind off your problems? 20. Have you ever increased your drinking after experiencing a loss in your life? 21. Do you sometimes drive when you have had too much to drink? 22. Has a doctor or nurse ever said they were worried or concerned about your drinking? 23. Have you ever made rules to manage your drinking? 24. When you feel lonely, does having a drink help?	24 10 min	This quiz is scored by allocating 1 point to each 'yes' answer ; ≥5 is a positive screen for possible alcoholism
NET	N: normal drinker: do you feel you are a normal drinker? E: eye-opener question from CAGE T: tolerance: how many drinks does it take to make you feel high? (>2 indicates tolerance)	3 1 min	Score 1 point each for not normal or eye openers and 2 points for tolerance; range 0–4

Instrument Name	Description	No. Items/ Questions Time to Administer	Scoring Notes
shARPS	Includes items in the following: domains: presence of medical and psychiatric conditions (8 items); symptoms of disease (7 items); medication use (11 items), physical function and health status (1 item); quantity and frequency of alcohol use (2 items); episodic heavy drinking (1 item); symptoms of alcohol abuse and dependence (1 items); and driving after drinking (1 item)	32 2-5 min	Developed for older adults; Complex scoring algorithm; Classifies as harmful/hazardous, or nonhazardous
Single question: 12 months (NIAAA-recommended)	"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).	1 1 min	≥1 is a positive screen
Single question: 3 months (often called SASQ)	"When was the last time you had more than X drinks in 1 day?," where X was 4 for women and X was 5 for men Alternate wording: "On any single occasion during the past 3 months, have you had more than 5 drinks containing alcohol?"	1 1 min	Positive if answer is within past 3 months. Positive if answer is yes.
SMAST	1. Do you feel you are a normal drinker? 2. Do your spouse, parents or other close relative worry or complain about your drinking? 3. Do you ever feel guilty about your drinking? 4. Do friends or relatives think you are a normal drinker? 5. Are you able to stop drinking when you want to? 6. Have you ever attended a meeting of Alcoholics Anonymous? 7. Has your drinking ever caused problem between you, a spouse, parents or close relative? 8. Have you ever got into trouble at work because of drinking? 9. Have you ever neglected your obligations your family or your work for 2 or more days in a row because you were drinking? 10. Have you ever gone to anyone for help about your drinking? 11. Have you ever been in a hospital because of drinking? 12. Have you ever been arrested for drunk driving or driving after drinking? 13. Have you ever been arrested, however short a time, because of drinking?	13 5 min	This quiz is scored by allocating 1 point to each 'yes' answer; ≥2 is a positive screen for possible alcoholism

Instrument Name	Description	No. Items/ Questions Time to Administer	Scoring Notes
SMAST-G	1. When talking to others, do you ever underestimate how much you actually drank? 2. After a few drinks, have you sometimes not eaten or been able to skip a meal because you didn't feel hungry? 3. Does having a few drinks help you decrease your shakiness or tremors? 4. Does alcohol sometimes make it hard for you to remember parts of the day or night? 5. Do you usually take a drink to relax or calm your nerves? 6. Do you drink to take your mind off your problems? 7. Have you ever increased your drinking after experiencing a loss in your life? 8. Has a doctor or nurse ever said they were worried or concerned about your drinking? 9. Have you ever made rules to manage your drinking? 10. When you feel lonely, does having a drink help?	10 NR	This quiz is scored by allocating 1 point to each 'yes' answer; ≥2 is a positive screen for possible alcoholism
T-ACE	T: tolerance: how many drinks does it take to make you feel high? (>2 indicates tolerance) A: have people annoyed you by criticizing your drinking? C: have you ever felt you should cut down on your drinking? E: eye-opener: have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover?	4 1 min	Score 2 points for tolerance; 1 point for others; range 0–5; threshold for positive score ≥2
TWEAK	T: tolerance: how many drinks can you hold (‘hold’ version >5 indicates tolerance) or how many drinks can take before you begin to feel the effects (‘high’ version >2 indicates tolerance) W: have close friends or relatives worried or complained about your drinking in the last year? E: eye-openers: do you sometimes take a drink in the morning when you first get up? A: amnesia: has a friend or family member ever told you about things you said or did while you were drinking that you could not remember? K: kut down: do you sometimes feel the need to cut down on your drinking?	5 <2 min	Score 2 points each for first 2 items and 1 point each for last 3; range 0–7; positive score ≥2

* The original MAST included 25 questions and used a more complex scoring method; the version presented here represents the revised version used in practice today.

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Appendix G. Strength of Evidence Tables

STRENGTH of EVIDENCE for KQ 1

Table G-1. Screening (followed by a behavioral counseling intervention) compared with another screening approach, no screening, or usual care

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Morbidity						
0; 0	NA	NA	NA	NA	NA	Insufficient
Mortality						
0; 0	NA	NA	NA	NA	NA	Insufficient
Other long-term outcomes						
0; 0	NA	NA	NA	NA	NA	Insufficient

Abbreviations: CI = confidence interval; NA = not applicable.

STRENGTH of EVIDENCE for KQ 3

Table G-2. Harms of screening for alcohol misuse and screening-related assessment

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Anxiety						
0; 0	NA	NA	NA	NA	NA	Insufficient
Stigma, labeling, or discrimination						
0; 0	NA	NA	NA	NA	NA	Insufficient
Interference with the doctor-patient relationship						
0; 0	NA	NA	NA	NA	NA	Insufficient
Opportunity costs (e.g., time taken away from other clinical activities)						
0; 0	NA	NA	NA	NA	NA	Insufficient
Increased alcohol, tobacco, or illegal substance use						
0; 0	NA	NA	NA	NA	NA	Insufficient

Abbreviations: CI = confidence interval; NA = not applicable.

STRENGTH of EVIDENCE for KQ 4a

Table G-3. Behavioral counseling interventions for adults compared with usual care

	Domains Pertaining to strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, mean change in drinks per week at 12 months						
14; 4,332	Low; RCTs/Fair and Good	Consistent (I^2 14%)	Indirect	Precise	WMD -3.6 (95% CI, -4.8 to -2.4)	Moderate[a]
Heavy drinking episodes, % without by 12 months						
8; 2,737	Low; RCTs/ Fair and Good	Consistent (I^2 17%)	Indirect	Precise	Risk difference 0.12 (95% CI, 0.07 to 0.16)	Moderate[a]
Recommended drinking limits achieved, % at 12 months						
13; 5,973	Low; RCTs/ Fair and Good	Consistent (I^2 31%)	Indirect	Precise	Risk difference 0.11 (95% CI, 0.08 to 0.13)	Moderate[a]
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence						
3; 2,387	Low; RCTs/Fair	Inconsistent	Indirect	Imprecise	Heterogeneous results reported with little data reported	Insufficient[b]

[a]These were graded moderate, rather than high, because they are intermediate outcomes (thus the Indirect ratings in the Directness column).

[b]Unable to pool data or make a conclusion with the limited data reported among the secondary outcomes of the three studies reporting abstinence.

Abbreviations: CI = confidence interval; NA = not applicable; RCT = randomized controlled trial; WMD = weighted mean difference.

Table G-4. Behavioral counseling interventions for older adults compared with usual care

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, mean change in drinks per week at 12 months						
2; 789	Low; RCTs/Fair	Consistent	Indirect	Imprecise	WMD -1.74 (95% CI, -2.8 to -0.6)	Moderate[a]
Heavy drinking episodes at 12 months						
2; 789	Low; RCTs/Fair	Inconsistent	Indirect	Imprecise	Mixed results[b]	Insufficient[b]
Recommended drinking limits achieved at 12 months						
2; 789	Low; RCTs/Fair	Inconsistent	Indirect	Imprecise	Risk difference 0.09 (95% CI, 0.02 to 0.16)	Low[c]
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence						
0; 0	NA	NA	NA	NA	NA	Insufficient

[a]We have moderate confidence that behavioral interventions are beneficial in older adults because both trials found a benefit, but the magnitude of benefit is less certain, as one trial (Project GOAL[1, 2]) found a reduction of over 5 drinks per week for those in the intervention group compared with controls and the other (HLAYA[3, 4]) found a reduction of between 1 and 2 drinks per week compared with controls.

[b]Project GOAL was a positive study, finding greater reduction in binge drinking in the previous 30 days (18% more subjects reported no binge drinking in the intervention group, $p<0.025$). The HLAYA study did not find a statistically significant difference for one or more heavy drinking days in the past 7 days at 12 months (OR, 0.89, 95% CI, 0.4v 1.97).

[c]Both point estimates for the individual studies favored behavioral interventions, although the difference in GOAL reached statistical significance and the difference in HLAYA did not quite. Pooling the data for the two studies found a 9% absolute difference favoring behavioral interventions.

Abbreviations: CI = confidence interval; NA = not applicable; RCT = randomized controlled trial; WMD = weighted mean difference.

Table G-5. Behavioral counseling interventions for young adults and college students compared with usual care

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, mean change in drinks per week at 6 months						
5; 2,255	Low; RCTs/Fair and Good	Consistent	Indirect	Precise	Greater reduction with behavioral counseling interventions in 5 of 5 studies (6/6 comparisons); WMD, -1.7 drinks per week (95% CI, -2.6 to -0.7) for 3 studies reporting drinks per week; RRs from 0.74 to 0.79 for the 2 studies reporting rate ratios (all with statistically significant 95% CIs).	Moderate
Alcohol use, mean change in drinks per week at 12 months						
4; 2,151	Low; RCTs/Fair and Good	Inconsistent[a]	Indirect	Imprecise[a]	Greater reduction with behavioral counseling interventions with effect sizes ranging from 1.2[5] to 4.1[6] drinks per week.	Moderate[a]
Heavy drinking episodes at 6 months						
5; 2,255	Low; RCTs/Fair and Good	Consistent	Indirect	Precise	Greater reduction with in-person interventions of 0.9 heavy drinking days per month (WMD, -0.9, 95% CI, -1.5 to -0.3) and with web-based interventions (RR, 0.76, 95% CI, 0.61 to 0.93)	Moderate
Heavy drinking episodes at 12 months						
4; 2,151	Low; RCTs/Fair and Good	Inconsistent	Indirect	Imprecise	No difference between groups for heavy drinking days per month (WMD, -0.2, 95% CI, -1.2 to 0.8)	Low
Recommended drinking limits achieved						
0; 0	NA	NA	NA	NA	NA	Insufficient
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence						
0; 0	NA	NA	NA	NA	NA	Insufficient

[a]Although there is some inconsistency because one of four studies (one of five comparisons) did not find a difference between groups, the best evidence suggests a difference, and there are several reasons why the study by Schaus and colleagues[7] may not have found a difference: (1) 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. Thus, we graded this moderate, rather than low.

Abbreviations: CI = confidence interval; NA = not applicable; RCT = randomized controlled trial; RR = relative risk; WMD = weighted mean difference.

Table G-6. Behavioral counseling interventions for pregnant women compared with usual care

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95%CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, mean change in drinks per week						
1; 250	Medium; RCT/Fair	NA, single study	Indirect	Imprecise	Difference between groups was not statistically significant (-0.3 vs. -0.4, p=NS, excluding patients who maintained abstinence through the end).	Low
Heavy drinking episodes						
0; 0	NA	NA	NA	NA	NA	Insufficient
Recommended drinking limits achieved						
0; 0	NA	NA	NA	NA	NA	Insufficient
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence						
1; 250	Medium; RCT/Fair	NA, single study	Indirect	Imprecise	For the overall sample, data were not reported[a]	Insufficient[a]

[a]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% vs. 72%, p=0.04, low strength of evidence).

Abbreviations: CI = confidence interval; NA = not applicable; NS = not significant; RCT = randomized controlled trial.

STRENGTH of EVIDENCE for KQ 4b

Table G-7. Behavioral counseling interventions for adults compared with each other: Very brief interventions compared with brief interventions

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, % decreasing average daily amount at 9 months						
1; 1072[a]	Medium;[b] RCT/Fair	NA, single study	Indirect	Imprecise	*Men* VB: 40.8 vs. B: 40.3[c] *Women* VB: 43.2 vs. B: 45.1[c]	Insufficient
Heavy drinking episodes						
0; 0	NA	NA	NA	NA	NA	Insufficient
Recommended drinking limits: Improvement in % of subjects above recommended weekly limit at 9 months						
1; 1072[a]	Medium;[b] RCT/Fair	NA, single study	Indirect	Imprecise	*Men* VB: 21 vs. B: 17[c] *Women* VB: 27 vs. B: 25[c]	Insufficient
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence, % abstinent at 9 months						
1; 1072[a]	Medium;[b] RCT/Fair	NA, single study	Indirect	Imprecise	*Men* VB: 5 vs. B: 8[c] *Women* VB: 7 vs. B: 12[c]	Insufficient

[a]Total number of subjects randomized in the study was 1,559;[8] 1,072 were randomized to the 2 study groups relevant for this comparison

[b] One study making the comparison: WHO Brief Intervention Study, 1996.[8] Interpretation of the head-to-head information to make a conclusion about how very brief and brief interventions compare in primary care settings is limited by heterogeneity of settings (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.

[c]p-values or confidence intervals not reported.

Abbreviations: B = brief intervention up to 15 minutes; CI = confidence interval; NA = not applicable; NS = not statistically significant; RCT = randomized controlled trial; VB = very brief intervention up to 5 minutes.

Table G-8. Behavioral counseling interventions for adults compared with each other: Very brief interventions compared with extended multicontact interventions

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; (Design/ Quality)**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, reduction in weekly consumption (drinks/week) at 12 months						
1; 192[a]	Medium; RCT/Fair	NA, single study	Indirect	Imprecise	VB: -2.1 vs. EM: -7.0[b]	Insufficient[b]
Heavy drinking episodes						
0; 0	NA	NA	NA	NA	NA	Insufficient
Recommended drinking limits: % of subjects above recommended limits (%change from baseline) at 12 months						
1; 192[a]	Medium; RCT/Fair	NA, single study	Indirect	Imprecise	VB: 77.1 (-2.1) vs. EM: 76.0 (-7.3), p=NS	Low
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence, % abstinent at 9 months						
0; 0	NA	NA	NA	NA	NA	Insufficient

[a]Total number of subjects randomized in the study was 378;[9] 192 were randomized to the 2 study groups relevant for this comparison.

[b]p-values or confidence intervals not reported to determine statistical significance.

Abbreviations: CI = confidence interval; EM = extended multicontact intervention (multiple contacts, some or all longer than 15 minutes); NA = not applicable; NS = not statistically significant; RCT = randomized controlled trial; VB = very brief intervention up to 5 minutes; vs. = versus.

Table G-9. Behavioral counseling interventions for adults compared with each other: Brief interventions compared with extended multicontact interventions

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, Change in # of drinks in last 30 days at 12 months						
1; 201[a]	Medium; RCT/Fair	NA, single study	Indirect	Imprecise	B: -33.20 (-48.19 to -18.21) vs. EM: -21.99 (-32.32 to -11.65)	Low
Heavy drinking episodes						
0; 0	NA	NA	NA	NA	NA	Insufficient
Recommended drinking limits						
0; 0	NA	NA	NA	NA	NA	Insufficient
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence, Change in # of days abstinent at 12 months						
1; 201[a]	Medium; RCT/Fair	NA, single study	Indirect	Imprecise	B: +2.54 (0.53 to 4.56) vs. EM: +3.58 (1.58 to 5.57)	Low

[a]Total number of subjects randomized in the study was 301;[10] 201 were randomized to the 2 study groups relevant for this comparison.

Abbreviations: B = brief intervention up to 15 minutes; CI = confidence interval; EM = extended multicontact intervention (multiple contacts, some or all longer than 15 minutes); NA = not applicable; NS = not statistically significant; RCT = randomized controlled trial; vs. = versus.

Table G-10. Behavioral counseling interventions for adults compared with each other: Extended multicontact interventions compared with extended multicontact interventions

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, Change from baseline in alcohol grams per day at 12 months						
1; 269[a]	Medium; RCT/Fair	NA, single study	Indirect	Imprecise	EM (FC): -13.0 vs. EM (SC): -12.2, p=0.217	Low
Heavy drinking episodes						
1; 269[a]	Medium; RCT/Fair	NA, single study	Indirect	Imprecise	*Overall data NR, only reported for subgroups*[b]	Insufficient
Recommended drinking limits						
0; 0	NA	NA	NA	NA	NA	Insufficient
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence, Change in # of days abstinent at 12 months						
0; 0	NA	NA	NA	NA	NA	Insufficient

[a]Total number of subjects randomized in the study was 408;[11] 269 were randomized to the 2 study groups relevant for this comparison.

[b]*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

Abbreviations: CI = confidence interval; EM = extended multicontact intervention (multiple contacts, some or all longer than 15 minutes); FC = full care; NA = not applicable; NR = not reported; RCT = randomized controlled trial; SC = stepped care; vs. = versus.

Table G-11. Behavioral counseling interventions for young adults or college students compared with each other: Brief interventions compared with brief multicontact interventions

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Alcohol use, total drinks in the past 2 weeks at 6 months						
1; 283[a]	Low; RCT/Good	NA, single study	Indirect	Imprecise	For each group compared with the control group: B: RR, 0.77 (95% CI, 0.63 to 0.95) BM: RR, 0.79 (95% CI, 0.64 to 0.97)	Low
Alcohol use, total drinks in the past 2 weeks at 12 months						
1; 283[a]	Low; RCT/Good	NA, single study	Indirect	Imprecise	For each group compared with the control group: B: RR, 0.77 (95% CI, 0.63 to 0.95), BM: RR, 0.87 (95% CI, 0.71 to 1.06)	Low
Heavy drinking episodes, heavy drinking episodes in the past 2 weeks at 6 months						
1; 283[a]	Low; RCT/Good	NA, single study	Indirect	Imprecise	For each group compared with the control group: B: RR, 0.78 (95% CI, 0.55 to 1.12) BM: RR, 0.65 (95% CI, 0.45 to 0.93)	Low
Heavy drinking episodes, heavy drinking episodes in the past 2 weeks at 12 months						
1; 283[a]	Low; RCT/Good	NA, single study	Indirect	Imprecise	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).	Low
Recommended drinking limits						
0; 0	NA	NA	NA	NA	NA	Insufficient
Followup with referrals						
0; 0	NA	NA	NA	NA	NA	Insufficient
Abstinence, Change in # of days abstinent at 12 months						
0; 0	NA	NA	NA	NA	NA	Insufficient

[a]Total number of subjects randomized in the study was 576;[12, 13] 283 were randomized to the 2 study groups relevant for this comparison.

Abbreviations: B = brief intervention up to 15 minutes; BM = brief multicontact intervention; CI = confidence interval; NA = not applicable; RCT = randomized controlled trial; RR = rate ratio.

STRENGTH of EVIDENCE for KQ 5

Table G-12. Adverse effects associated with behavioral counseling interventions compared with usual care

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; # of Subjects	**Risk of Bias (Design/ Quality)**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Increased smoking						
5;[a] 2,067	Low RCTs/Fair and Good	Consistent	Direct	Imprecise	No difference between groups (unable to calculate effect size)	Low
Opportunity costs/time						
23; 10,519	Low RCTs/Fair and Good	Consistent, within a given intensity category	Indirect[b]	Imprecise	Range from about 5 minutes to approximately 2 hours, depending on planned intervention intensity	Moderate
Anxiety						
2; 226	Low to medium RCTs/Fair	Consistent	Direct	Imprecise	No difference between groups (unable to calculate effect size)	Low
Stigma, labeling, discrimination, or interference with doctor-patient relationship						
0; 0	NA	NA	NA	NA	NA	Insufficient
Illegal substance use						
0; 0	NA	NA	NA	NA	NA	Insufficient

[a]4 of the studies were conducted in adult populations; 1 study enrolled older adults, and a subgroup analysis of TrEAT also provided information on older adults. We found no evidence in young adults/college students or pregnant women.

[b]We considered this indirect because the time for the intervention was not actually measured in most studies. Authors generally reported the estimated/planned time for interventions, rather than measured/actual time.

Abbreviations: CI = confidence interval; NA = not applicable; RCT = randomized controlled trial.

STRENGTH of EVIDENCE for KQ 6

Table G-13. Behavioral counseling interventions for adults compared with usual care or with each other

Number of Studies; Number of Subjects	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
	Risk of Bias; Design/ Quality	Consistency	Directness	Precision	Summary Effect Size (95% CI)	High, Moderate, Low, Insufficient
Mortality, all-cause mortality (person-years)						
4; 2,006	Low to medium; RCTs/Fair and Good	Inconsistent	Direct	Imprecise	Rate ratio 0.64 (95% CI, 0.24 to 1.7)[a]	Low
Alcohol-related accidents						
4; 1,117	Medium; RCTs/Fair and Good	Consistent	Direct	Imprecise	Unable to determine a magnitude of effect[b]	Insufficient
Alcohol-related liver problems						
0; 0	NA	NA	NA	NA	NA	Insufficient
Outpatient/primary care visits[c]						
5; 876	Low; RCTs/Fair and Good	Inconsistent	Direct	Imprecise	No significant difference (WMD, 0.14 visits, 95% CI, -0.5 to 0.2)	Low
Hospitalizations (hospital days)						
3; 1,417	Low; RCTs/Fair and Good	Inconsistent	Direct	Imprecise	Best evidence found a 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).[d]	Low
Emergency visits						
2; 901	Low; RCTs/Fair and Good	Consistent	Direct	Imprecise	Trend favoring control, but not statistically significant. At 6, 12, and 48 months for intervention vs. control: 47 vs. 70, 60 vs. 62, and 302 vs. 376, p>0.10, p>0.10, and p<0.10, respectively[d]	Low
Costs						
2; 901	Low RCTs/Fair and Good	Inconsistent	Direct	Imprecise	12 months: average per subject benefit over $1,100 and benefit-cost ratio 5.6:1 (95% CI, 0.4 to 11.0). 48 months: cost per patient of $205, benefit per patient of $7,985, for a resulting benefit-cost ratio of 39 (95% CI, 5.4 to 72.5)[d]	Low

Table G-13. Behavioral counseling interventions for adults compared with usual care or with each other (continued)

Number of Studies; Number of Subjects	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
	Risk of Bias; Design/ Quality	Consistency	Directness	Precision	Summary Effect Size (95% CI)	High, Moderate, Low, Insufficient
Legal events: assault/battery/child abuse, resist/obstruct officer/disorderly conduct, criminal damage/property damage, theft/robbery, other arrests, controlled substance/liquor violations						
1; 774	Low RCT/Good	NA, single study	Direct	Imprecise	No statistically significant differences reported except for controlled substance/liquor violations (2 vs. 11, p<0.05)[a]	Low
Sick days and employment stability						
0; 0	NA	NA	NA	NA	NA	Insufficient
Quality of Life						
3; 353	Medium RCTs/Fair	Consistent	Direct	Imprecise	No difference[e]	Low

[a]Analyses with the addition of the included studies in older adults (GOAL) and in younger adults[14] trended further toward favoring behavioral interventions, but remained nonstatistically significant (rate ratio 0.52, 95% CI 0.22 to 1.2; 6 studies, 2,255 subjects).

[b]Four studies reported data on accidents in adults. Studies were not designed or powered to detect differences in these outcomes. The best available evidence comes from Project TrEAT (N=774),[15] which reported outcomes after 48 months of followup. The study found lower numbers of motor vehicle crashes with fatalities (0 vs. 2), motor vehicle crashes with nonfatal 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. 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.[16, 17] Neither found a significant change from baseline data for the intervention group or for the control group. 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).[18]

[c]List the actual outcome measures that were reported for primary care utilization.

[d]Summary effect sizes and data are from Project TrEAT, as it provided the best evidence (due to design, sample size of 774, risk of bias, and duration of followup). For hospitalizations, two smaller studies of shorter duration reported no statistically significant difference between groups for hospitalization outcomes, but 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% vs. 22.0%, p=0.81) and a trend toward fewer mean hospital days for those hospitalized (4.7 vs. 6.6, p=0.37); Lock and colleagues (N=127) reported no significant difference between groups for hospital inpatient stays. 48-month cost data are from the societal perspective.[15, 19]

[e]Two 12-month studies reported no difference in change in mean life quality scores between the intervention and control groups (0 vs. 0 and -0.3 vs. -0.3).[16, 17] 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.[20]

Abbreviations: CI = confidence interval; NA = not applicable; RCT = randomized controlled trial; vs. = versus; WMD = weighted mean difference.

Table G-14. Behavioral counseling interventions for older adults compared with usual care or with each other

	Domains Pertaining to strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Mortality, all-cause mortality (person-years)						
1; 158	Medium; RCT/Fair	NA, single study	Direct	Imprecise	Intervention vs. control: 1 death vs. 4, p=NR	Insufficient
Morbidity						
0; 0	NA	NA	NA	NA	NA	Insufficient
Utilization						
0; 0	NA	NA	NA	NA	NA	Insufficient
Costs						
1; 158	Medium; RCT/Fair	NA, single study	Direct	Imprecise	No statistically significant difference in economic outcomes through 24 months[a]	Low
Legal events, sick days, and employment stability						
0; 0	NA	NA	NA	NA	NA	Insufficient
Quality of life						
0; 0	NA	NA	NA	NA	NA	Insufficient

[a]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.[2]

Abbreviations: CI = confidence interval; NA = not applicable; NR = not reported; RCT = randomized controlled trial; vs. = versus.

Table G-15. Behavioral counseling interventions for young adults and college students compared with usual care or with each other

	Domains Pertaining to Strength of Svidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Mortality						
1; 104	Medium; RCT/Fair	NA, single study	Direct	Imprecise	One of the trials (Kypri 2004) reported one death in the control group and zero in the intervention group.	Insufficient
Motor vehicle events						
1; 226	Medium; RCT/Fair	NA, single study	Direct	Imprecise	Fewer events in intervention group than control group[a]	Low
Alcohol-related liver problems						
0; 0	NA	NA	NA	NA	NA	Insufficient
Hospitalizations (hospital days)						
1; 226	Medium; RCT/Fair	NA, single study	Direct	Imprecise	Lower number of days of hospitalization for the intervention group, but did not reach statistical significance: 131 vs. 150, p=NS[a]	Low
Emergency visits						
1; 226	Medium; RCT/Fair	NA, single study	Direct	Imprecise	Fewer emergency department visits for the intervention group than for the control group: 103 vs. 177, p<0.01	Low
Academic outcomes						
2; 680	Low; RCTs/Fair and Good	Consistent	Direct	Imprecise	Fewer consequences related to academic role expectations (rate ratio between 0.70 and 0.80)[d]	Moderate
Legal events						
1; 226	Medium; RCT/Fair	NA, single study	Direct	Imprecise	No statistically significant differences reported except for controlled substance/liquor violations: 0 vs. 8, p<0.01[b]	Low
Costs						
0; 0	NA	NA	NA	NA	NA	Insufficient
Quality of life						
0; 0	NA	NA	NA	NA	NA	Insufficient

[a]Evidence is from a subgroup analysis of young adults (18 to 30) from Project TrEAT. The study reported significantly 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.[6]

[b]No statistically significant difference 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).[6]

[c]Both studies used the Academic Role Expectations and Alcohol Scale (AREAS).[12, 14] 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; multicontact intervention 0.75, 95% CI, 0.62 to 0.90).[12] 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).[14]

Abbreviations: CI = confidence interval; NR = not reported; NS = not sufficient; RCT = randomized controlled trial; vs. = versus.

Table G-16. Behavioral counseling interventions for pregnant women compared with usual care or with each other

	Domains Pertaining to Strength of Evidence				Magnitude of Effect	Strength of Evidence
Number of Studies; Number of Subjects	**Risk of Bias; Design/ Quality**	**Consistency**	**Directness**	**Precision**	**Summary Effect Size (95% CI)**	**High, Moderate, Low, Insufficient**
Mortality						
0; 0	NA	NA	NA	NA	NA	Insufficient
Morbidity						
0; 0	NA	NA	NA	NA	NA	Insufficient
Other long-term outcomes						
0; 0	NA	NA	NA	NA	NA	Insufficient

Abbreviations: CI = confidence interval; NA = not applicable.

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Appendix H. List of Abbreviations

ADS	Alcohol Dependence Scale
ALT	alanine transaminase
ARPS	Alcohol-Related Problems Survey
AST	aspartate transaminase
AUDADIS	Alcohol Use Disorder and Associated Disabilities Interview Schedule;
AUDIT	Alcohol Use Disorders Identification Test
AUDIT-C	Alcohol Use Disorders Identification Test - Consumption
auROC	area under receiving operator characteristic;
BAC	blood alcohol content
BI	brief intervention
BMAST	brief Michigan Alcohol Screening Test
BP	blood pressure
CAGE	Cut-down, Annoyed, Guilty, Eye-opener questionnaire
CARET	Comorbidity-Alcohol Risk Evaluation Tool
CDT	carbohydrate-deficient transferrin
CI	confidence interval
DrInC	Drinker Inventory of Consequences
DSM-III-R	Diagnostic and Statistical Manual of Mental Disorders (3rd Edition, Revised)
ED	emergency department
EPDS	Edinburgh Postnatal Depression Score
ER	emergency room
EtOH	ethanol
f/up	followup
g	gram
G	group
GGT	gamma-glutamyl transferase
GHQ	General Health Questionnaire
GP	general practitioner
HG	mercury
HSQ	Health Status Questionnaire
HSS	Health Screening Survey
ICD	International Classification of Diseases
ITT	intent to treat
LAST	Lübeck Alcohol dependence and abuse Screening Test
LOCF	last observation carried forward
M-CIDI	Munich-Composite International Diagnostic Interview
MAST	Michigan Alcoholism Screening Test
MCV	mean corpuscular erythrocyte volume
MD	medical doctor
Min	minutes
mths	months
NA	not applicable
NET	Normal drinker, Eye opener, Tolerance questionnaire
NP	nurse practitioner

NR	not reported
NS	not significant
OR	odds ratio
OTC	over the counter
PA	physician's assistant
PCP	primary care provider
QF	quantity/frequency
QOL	quality of life;
RA	research assistant
RAPI	Rutgers Alcohol Problem Index
RCT	randomized controlled trials
RR	relative risk
Rx	prescription
SCID	Structured Clinical Interview for DSM
SD	standard deviation
SE	standard error
SF-12	12-Item Short-Form Survey
SMAST	short Michigan Alcoholism Screening Test
SOCRATES	Stages of Change Readiness and Treatment Eagerness Scale
T-ACE	Tolerance, Annoyed, Cut-down, Eye-opener questionnaire
TLFB	Timeline Followback
TrEAT	Trial for Early Alcohol Treatment
tx	treatment
UC	usual care
var	variance
WHO	World Health Organization
Wk	week
y	year