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# Smoking Cessation Interventions for Potential Use in the Lung Cancer Screening Setting: A Systematic Review and Meta-Analysis

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# Abstract

**Objectives:** Current guidelines recommend delivery of smoking cessation interventions with lung cancer screening (LCS). Unfortunately, there are limited data to guide clinicians and policy-makers in choosing cessation interventions in this setting. Several trials are underway to fill this evidence gap, but results are not expected for several years.

**Methods and Materials:** We conducted a systematic review and meta-analysis of current literature on the efficacy of smoking cessation interventions among populations eligible for LCS. We searched PubMed, Medline, and PsycINFO for randomized controlled trials of smoking cessation interventions published from 2010-2017. Trials were eligible for inclusion if they sampled individuals likely to be eligible for LCS based on age and smoking history, had sample sizes >100, follow-up of 6- or 12-months, and were based in North America, Western Europe, Australia, or New Zealand.

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Conflicts of Interest:

None declared.

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This systematic review is registered with PROSPERO and is available at http://www.crd.york.ac.uk/PROSPERO/display\_record.php? ID=CRD42018110322.

**Results:** Three investigators independently screened 3,813 abstracts and identified 332 for full-text review. Of these, 85 trials were included and grouped into categories based on the primary intervention: electronic/web-based, in-person counseling, pharmacotherapy, and telephone counseling. At 6-month follow-up, electronic/web-based (odds ratio [OR] 1.14, 95% CI 1.03-1.25), in-person counseling (OR 1.46, 95% CI 1.25-1.70), and pharmacotherapy (OR 1.53, 95% CI 1.33-1.77) interventions significantly increased the odds of abstinence. Telephone counseling increased the odds but did not reach statistical significance (OR 1.21, 95% CI 0.98-1.50). At 12-months, in-person counseling (OR 1.28 95% CI 1.09-1.51) and pharmacotherapy (OR 1.46, 95% CI 1.17-1.84) remained efficacious, although the decrement in efficacy was of similar magnitude across all intervention categories.

**Conclusions:** Several categories of cessation interventions are promising for implementation in the LCS setting.

#### Review Registration (PROSPERO): CRD42018110322

#### **Keywords**

smoking cessation; lung cancer screening; meta-analysis

### 1. Introduction

The National Lung Screening Trial (NLST) and the NEderlands-Leuvens Longkanker Screenings ONdersoek (NELSON) trial provided evidence that lung cancer screening with low-dose computed tomography (LCS) detected cancers earlier than when clinically symptomatic, and reduced lung cancer mortality by 20%-26% (1, 2). Professional groups, including the U.S. Preventive Services Task Force (USPSTF) and the National Comprehensive Cancer Network (NCCN) recommend LCS for individuals with a high risk of lung cancer based on their age (55-80 and 55-74 years, for the USPSTF and NCCN, respectively), a 30 pack-year smoking history, and other risk factors (3, 4).

The potential benefits of screening may go beyond the early detection of lung cancers. Screening may provide a "teachable moment" for encouraging cessation from smoking for the estimated four million current US smokers eligible for LCS, approximately half of all eligible individuals (5, 6). Smoking cessation, in turn, reduces the risk of several cancer types and cardiopulmonary disease. However, merely undergoing LCS does not influence smoking behaviors (7). Consequently, the Centers for Medicare and Medicaid Services (CMS) mandates that smoking cessation assistance is provided to all current smokers undergoing LCS, but leaves decisions about the type of cessation interventions up to clinicians and screening sites (8).

Presently, there are nine trials in progress in the US that will provide valuable evidence on the efficacy of smoking cessation in the context of LCS (9). However, results are not expected until after 2021. While a number of smoking interventions have been found to be effective in general populations (10), there is a paucity of data on whether these approaches will be effective in older, persistent, heavy smokers eligible for LCS. Only a handful of randomized controlled trials have thus far considered the efficacy of smoking cessation in

the screening setting (11-15). Reviews have highlighted the lack of sufficient data needed to make decisions regarding cessation in this setting concluding a need for more data to identify optimal screening strategies for this population (16, 17).

Hence, clinicians and policy-makers now have a mandate to provide cessation to smokers who present for LCS but have limited evidence on the most effective interventions to offer (11-15, 18). To address this lack of information while clinical trials are ongoing, we conducted a systematic review and meta-analysis of recently published clinical trials of smoking cessation that primarily included populations similar to those eligible for LCS. We grouped trials into intervention categories that reflect current clinical guidelines and practice, including electronic/web-based, in-person counseling, pharmacotherapy with drugs currently approved by the Food and Drug Administration, and telephone counseling (9, 10, 19, 20). The results of this analysis are intended to inform current clinical practice at screening sites. As new studies are conducted, the results of this analysis will also support the framework for future research on the expected population effects, costs, and cost-effectiveness of smoking cessation interventions in the LCS setting.

# 2. Methods

The review follows the guidelines set forth by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Appendix A.1) (21) and is registered with PROSPERO: http://www.crd.york.ac.uk/PROSPERO/display\_record.php? rD=CRD42018110322.

#### 2.1 Data Sources and Searches

Searches were conducted with the help of a health sciences research librarian in PubMed, Medline (Ovid), and PsycINFO for articles published from January 1, 2010, to December 31, 2017. This period was selected to represent current cessation practice. General smoking cessation search terms were used in conjunction with geographic specifications and clinical trial terms (Appendix B.1). The search terms were kept as inclusive as possible to identify all potentially relevant studies. We also searched the bibliographies of selected trials and reviews to identify any articles missed by the database searches. Results of the search were exported into Microsoft Excel 2010 workbooks designed by a health sciences research librarian specifically for screening article eligibility for systematic reviews (22).

#### 2.2 Study Selection

Eligibility criteria were determined *a priori*. To be eligible, randomized controlled trials published in English tested the efficacy of one or more of four categories of cigarette smoking cessation interventions on 7-day point prevalence at 6- or 12-months post-intervention, had sample sizes >100, were conducted in North America, Western Europe, Australia or New Zealand, so as to reflect populations that could be generalizable to the US; and published between January 1, 2010 to December 31, 2017. The intervention categories included: electronic/web-based, in-person counseling, pharmacotherapy, and telephone counseling. We selected these four categories based on clinical guidelines, expert opinion, and comparability to current ongoing trials in the screening setting (9, 10, 19). Trials that

tested multiple interventions or combinations of interventions were deemed eligible for inclusion. Importantly, trials had to include individuals between the ages of 55 and 80 with no signs or symptoms of lung cancer and with indications of heavy smoking (e.g., based on cigarettes per day, or pack-year smoking history) (3, 4, 8). We excluded studies that did not include individuals over 55 (defined as mean age of < two standard deviations below 55 in each study arm or trial-wide), or that focused on light smokers (defined as mean cigarettes per day of <10). Studies could include individuals who were light smokers or below the age of 55. As only a handful of trials reported pack-years, it was not feasible to screen studies using that measure. We excluded trials that focused exclusively on institutionalized populations such as prisoners, long-term care residents, and drug rehabilitation residents, individuals with known cancer or severe COPD, or people with mental illness. Pharmacotherapy interventions needed to use FDA approved drugs to be eligible (i.e., nicotine replacement therapy, bupropion, and varenicline) (20). Interventions that tested a drug not currently approved by the FDA were excluded, as these would not be available in current clinical practice.

Following the deletion of duplicate publications, all trial titles and abstracts were reviewed to determine potential eligibility. If the abstract lacked sufficient evidence to determine eligibility, it was included in the full-text review. Three authors independently screened a sample of papers to measure inter-rater reliability using Cohen's  $\kappa$  where a  $\kappa$ = 0.8 indicates good inter-rater agreement. Disagreements between reviewers regarding eligibility were resolved through discussion to achieve consensus. The remaining titles and abstracts were screened with each abstract screened separately by two authors. The results were reconciled and the final list of studies for full-text review was identified.

The full-text of selected publications was then reviewed to determine final eligibility and identify multiple reports from the same trial. Where multiple reports of the same intervention were found, we used the report with the greatest level of detail regarding the effects of the intervention on smoking cessation at 6 and 12-months. Two reviewers conducted full-text review independently and any uncertainty over inclusion was discussed and resolved among three authors.

#### 2.3 Data Abstraction and Quality Assessment

A data abstraction template was developed in Microsoft Excel 2010. Two reviewers independently abstracted data; disagreements on data elements were resolved by consensus. A random sample was re-abstracted by a third author for quality control; any discrepancies were resolved and the process updated as needed. Each intervention was classified into a category (electronic/web-based, in-person counseling, pharmacotherapy, or telephone counseling). When more than one intervention was included, trials were classified based on their primary focus. In these multimodal trials, primary focus was determined by the trial report. For instance, Burns et al. conducted a two-arm trial in the NY State Quitline where participants in the intervention arm were randomized to receive 4 vs. 8 weeks of NRT. This study would be classified as a pharmacotherapy intervention as both the intervention and control arms received the quitline care, but only the intervention arm received NRT. As another example, Wetter et al. conducted a trial where smokers received and initial group

counseling session followed by computer-based treatment vs. no further treatment. The intervention arm in this trial would be considered a multimodality electronic/web-based intervention as the control did not receive the computer-based treatment. Where a primary intervention was not specified we selected the intervention component that had to be fulfilled in order to receive supplemental components. All supplemental intervention types were noted. Trials with multiple intervention arms of the same generic type were combined and compared to the study's specified control arm (23). When intervention arms were of different intervention types, they were not combined.

Data were abstracted for the self-reported and biochemically verified number of individuals in each arm who were abstinent based on 7-day point prevalence of cessation at 6 and 12months and the total number in the arm; all data abstraction was based on intention-to-treat. We assumed that participants lost to follow-up were not successful in smoking cessation. Additionally, we abstracted data on sample size, retention rate, the proportion of eligible individuals who enrolled in the trial, age, smoking history (cigarettes per day, years smoking, and pack-years, if available), active vs. minimal/usual care control, motivation to quit, whether or not conflicts of interest were reported by the authors, and funding source. The response rate by intervention arm were not abstracted.

We assessed the methodological quality of trials using an established system (24, 25). Studies were given one point based on having each of the following criteria: 1) a description of the methodology of randomization; 2) randomization resulted in balanced groups; 3) a description of the methods of masking participant allocation; 4) use of double-blinding when feasible; 5) a description of the follow-up rates and reasons for withdrawal; and 6) reported all study outcomes. Trials could receive a total of six points. In this system, a score of two or less was considered poor quality, and scores of three and above were deemed of moderate to high quality (24). The Society for Research on Nicotine and Tobacco recommends that studies with a significant in-person component use biochemical verification (26). Therefore, studies in the in-person counseling groups only received the point for reporting outcomes if they presented biochemically verified results. Additionally, as double-blinding is not always feasible in certain intervention types (electronic/web-based, in-person counseling, or telephone counseling) these interventions were scored out of five points, where two or more points were deemed moderate to high quality (27). Factors such as response rate, or mode of recruitment were not considered as indicators of study quality.

#### 2.4 Data Synthesis and Analysis

The primary analysis was based on self-reported or biochemically verified 7-day abstinence at 6-months in the intervention arm vs. the control arm; 12-month outcomes were a secondary endpoint. When available, biochemically verified cessation rates were used for analysis; otherwise, cessation outcomes were self-reported.

We estimated potential publication bias using contour-enhanced funnel plots where an asymmetric plot suggests the possibility that studies with null intervention effects were less likely to be published than those with significant results (28). Funnel plot asymmetry was assessed using a simple weighted linear regression proposed by Peters, *et al.* rather than Egger's test, since the latter does not perform well when examining effects in large numbers

of studies with moderate to high heterogeneity (28). A p-value p<0.05 for Peters' test is considered an indication of possible publication bias.

The DerSimonian and Laird random-effects method was used to determine odds ratios and 95% confidence intervals for each intervention category, where each study effect was weighted by its sample size and variance (29, 30). The random-effects model, which recognizes variance between and within studies, was employed because heterogeneity was expected based on differences in interventions and patient populations. A measure of heterogeneity (I<sup>2</sup>) was also calculated. I<sup>2</sup> values of 50%–75% and 75% indicate moderate and high heterogeneity, respectively. For one study, there was no event in the control arm (i.e., no quitters). In this case, 0.5 was added to each cell (intervention and control) to avoid infinite odds (31).

Sensitivity analyses tested the effects on pooled cessation estimates at 6-months for intervention arms that included pharmacotherapy as a supplemental intervention vs. not; single-vs. multi-modality interventions, where the intervention arm included supplementary interventions beyond the primary intervention type (including pharmacotherapy); if the study was able to enroll >50% of eligible patients; and active vs. minimal or no intervention controls. Additionally, we analyzed the impact on effect sizes of omitting trials that were identified as being of poor quality, or were industry-sponsored, on outcomes at 6-months. Finally, we compared the pooled statistics of biochemically-verified-only results with self-report-only results at both 6- and 12-months.

All analyses were conducted in STATA 14.0 (StataCorp. 2015. College Station, TX.).

# 3. Results

Searches identified 3813 unique articles of potentially eligible trials. The full screening process and reasons for exclusion are outlined in the Preferred Reporting Item for Systematic Reviews and Meta-Analyses (PRISMA) diagram (Figure 1). Through abstract and title review, 332 articles were identified as potentially eligible. Inter-rater reliability was high between the three reviewers (Cohen's  $\kappa$  0.72-0.84). Following the full-text review, 85 trials were deemed eligible and data were abstracted.

The 85 trials in the final analytic sample included 74 that reported 6-month outcomes for 93,827 participants; and 40 that reported 12-month outcomes for 46,844 participants. The trials ranged in size from 103 to 16,430 participants and the majority were conducted in the US (Table 1). We identified 26 publications that used electronic or web-based intervention methods, 25 utilized in-person counseling, 25 utilized pharmacotherapy agents, and 14 utilized telephone counseling. Twenty-seven trials included more than one intervention arm; of these, 22 had intervention arms of similar types that were collapsed into one. Five trials had intervention arms that were categorized into separate primary intervention types (Table 1). Forty-five trials (52.9%) included biochemically verified smoking cessation outcomes. Fourteen trials did not report the number of eligible individuals who declined to participate, of those that did the majority (71.7%) enrolled >50% of eligible individuals. Results for studies with higher (50%+) vs. lower (<50%) participation were similar.

There were notable differences in the structure of interventions within the four categories (Table 1). Pharmacotherapy interventions included the use of nicotine replacement for a little as two weeks to up to a year; and included various combinations of NRT and bupropion or varenicline. In-person counseling interventions ranged from short (15 minute) one-time counseling sessions to multiple hour-long individual or group sessions. Both telephone and in-person counseling interventions may have included culturally tailored interventions. Electronic/web-based interventions included website based cessation programs, texting interventions, and email reminders. The majority of trial intervention arms (82.2%) were classified as multimodal interventions, and 53.3% included active controls.

### 3.1 Study Outcomes

All interventions showed increased odds of quitting smoking (vs control) based on 7-day point prevalence of smoking abstinence at 6-months, but the telephone counseling effect did not reach statistical significance (Figure 2 and Table 2). We found pooled odds ratios and 95% confidence intervals for electronic/web-based of 1.14 (1.03-1.25), in-person counseling 1.46 (1.25-1.70), and pharmacotherapy 1.53 (1.33-1.77) and telephone counseling 1.21 (0.98-1.50).

At 12 months, overall efficacy was lower across all intervention groups (Table 2 and Appendix B.2) and only pharmacotherapy (OR 1.46 95% CI 1.17-1.84) and in-person counseling (OR 1.28 95% CI 1.09-1.51) remained statistically significant.

#### 3.2 Sensitivity Analyses

An examination of the role of pharmacotherapy as a supplemental intervention generally increased the odds of cessation, but results were not consistently statistically significant since most interventions included active controls (Table 2 and Appendix B.3.1). Multi-modality approaches had greater efficacy than single modality approaches (Table 2 and Appendix B.3.2), although single-modality pharmacotherapy interventions were more efficacious than other categories of multi-modality interventions; likely due to the use of placebo controls among the single-modality studies. Efficacy was higher for all intervention categories when compared to a minimal or no intervention control vs. an active control arm (Table 2 and Appendix B.3.3).

Results for biochemically verified abstinence did not differ appreciably from self-report at either 6- or 12-month outcomes (Table 2). The removal of poor quality studies, those that were unable to enroll >50% of eligible participants, and of studies that reported a conflict of interest had minimal impact on cessation outcomes at 6-months (Table 2).

#### 3.3 Quality and Bias Assessment

Only nine of the 85 trials included were determined to be low quality (Appendix B.4). The contour-enhanced funnel plots suggest that there may be some publication bias for in-person counseling and pharmacotherapy at 6- and 12-months (Appendix B.5). Peters' test only found significant evidence of publication bias for the 6-month outcome of telephone counseling (Appendix B.6) suggesting among this group some trials may not have been published due to non-significant results. However, the interpretation of these results must

acknowledge the difficulty of regression based measures of publication bias to account for between study heterogeneity (32).

# 4. Discussion

This meta-analysis is the only large synthesis of data on the efficacy of multiple categories of current smoking cessation interventions with populations similar to those eligible for LCS. We found that most classes of smoking cessation interventions were effective in increasing abstinence at 6 months among patients eligible for LCS. Among these, the most efficacious were pharmacological interventions, followed by in-person counseling and webbased approaches. Telephone counseling did not reach statistical significance at the 95% level, although the direction of the association is promising. This non-significant result may, in part, be due to the smaller number of telephone counseling studies (n=9 at 6-months). Multimodal interventions appeared to be more efficacious than a single modality. Finally, the odds of 6-month cessation appear to persist to 12-months among pharmacotherapy and inperson counseling interventions suggesting that LCS sites should consider the implementation of these interventions.

Our study is unique in its focus on cessation in older age groups and those with a heavier smoking history, making the results relevant to the LCS setting. Our results are similar to those of preliminary reports of studies in the field that suggest a range of smoking cessation interventions will be effective for individuals eligible for LCS (11-18). The results of four prior reviews of smoking cessation interventions for older adults suggested, like our metaanalysis, that most currently recommended approaches to cessation might be effective among older smokers (17, 19, 33, 34). However, three reviews did not pool study effectiveness. Two of these reviews considered only studies conducted in the screening setting, but were limited by small numbers of observational and randomized controlled trials and a dearth of substantial high quality data inappropriate for meta-analyzing (16, 17). We found small effects, and our summary odds ratios had lower point estimates (but overlapping confidence intervals) than previous meta-analyses of smoking cessation in general populations (10, 35-38). In contrast to studies in the general population, telephone counseling was not statistically significantly associated at the 95% level with cessation in our sample of trials that included older and heavier smokers, although the point estimate suggests a positive association and the number of trials was the smallest among the intervention categories (10, 36).

Our finding of lower intervention efficacy in LCS populations compared to use of the same interventions when applied in the general populations could be due to a greater difficulty to quit among long-term, heavy smokers compared to other smokers. Alternatively, our estimates may be lower because we included trials with both active and minimal care control groups, whereas the previous reviews compared intervention groups to minimal intervention controls (10, 35, 36). Our sensitivity analysis removing studies with an active control resulted in more comparable, albeit still lower point estimates of efficacy, across all intervention categories (10, 27, 35, 36).

Our findings show that multimodal interventions are likely to be more efficacious than single-modality interventions, although the results were inconclusive due to smaller samples in sub-group analyses. The greater efficacy in the single-modality pharmacotherapy arms is likely due to the four studies in the single-modality sub-group being placebo-controlled trials compared to predominantly active control trials in the multi-modality group (Table 1). This will be an important area for future investigation, since, if effective, single modality approaches are likely to be less costly than multi-faceted interventions. Our results, like those of others (10, 36), suggest that supplemental pharmacotherapy will be beneficial as part of multi-modality approaches to improving the odds of cessation in the LCS setting. It is encouraging that our results support cessation at 12-months among pharmacotherapy and in-person counseling interventions. Since long-term abstinence is necessary for the realization of screening benefits on mortality, it will be critical to re-evaluate the long-term maintenance of abstinence as new research studies become available. The ongoing NCI-funded Smoking Cessation at Lung Examination (SCALE) Collaboration trials were designed to address these gaps and the results are expected after 2021 (9).

The results of our study must be considered in the current context of LCS. To date, fewer than 5% of eligible individuals have presented for lung cancer screening (39, 40). Individuals who present for LCS are likely different from those who are eligible and not referred or those who are referred, but do not attend. The characteristics of these individuals will likely impact their willingness to accept cessation and their ultimate success in quitting smoking. We are unaware of research that looks at the different characteristics of those who do and don't present for screening. However, it is possible that due to the healthy adherer bias (41), individuals who present for lung cancer screening are more likely to quit on their own. This would likely reduce the efficacy of an intervention tested in this setting, as participants in both the intervention and control arms would be more likely to quit on their own. Additionally, studies examining smoking cessation in lung screening trials found cessation to be associated with screen-detected abnormalities which could further bias results towards the null (42). It is hoped that future research by the SCALE Trials will provide some insight into these interactions. This meta-analysis has several strengths, including the large pooled sample size, the rigor of the methods, quality of included studies, and focus on trials that included smokers eligible for LCS. There are also several limitations that should be noted in considering our results. Our subgroup analysis by enrollment rate suggests that the results of these studies are likely to be generalizable to the target populations of the studies. However, none of the studies in this meta-analysis solely included individuals eligible for LCS. All trials included some individuals that were younger and with a lighter smoking history than necessary to qualify for lung cancer screening, potentially over-estimating effects that may be seen among smokers eligible for LCS. The effects seen in cessation trials in the LCS setting could also vary based on implementation difficulties, measurement differences, or differences in settings and populations. More attention should be focused on smoking cessation interventions for the LCS population, given the opportunity that screening provides for bringing smokers into cessation services and the mandate from the Centers for Medicaid and Medicare Services to include cessation as part of effective screening programs (8). Second, the pooling of studies into generic categories limits the ability to look more in depth at individual interventions or combinations of individual

interventions, including the types or intensity of counseling, pharmacotherapy, and electronic interventions. Due to the limited number of studies in this setting, we were unable to compare results by specific types of pharmacotherapy or intervention intensity. Determining the most effective and feasible regimens in LCS is an important priority for future research.

# 5. Conclusion

The results of our meta-analysis provide important information to guide LCS sites, clinical practices, and health systems that are faced with having to make decisions about integrating smoking cessation interventions in their LCS practices ahead of definitive studies about cessation specific to screening populations. We found that multiple categories of cessation interventions are likely to be efficacious in a population similar to those undergoing LCS, but that screening sites looking for the most efficacious intervention could consider pharmacotherapy or in-person counseling since electronic/web-based and telephone counseling interventions either has non-significant effects at 6 months and/or failed to show effects on cessation at 12-months. With a wide range of possible effective interventions for screening sites to choose from, implementation will depend on feasibility, scalability, acceptability, cost, and specific characteristics of each environment and patient population. Results from ongoing clinical trials are expected to address several dimensions of implementation, efficacy, and cost (9). Until then, our results provide a useful framework for estimating the impact of different models of care for the integration of smoking cessation into the LCS setting.

### Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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# Appendix

Appendix B.1:

Search Terms\*

	uine Search Strategy
1	smoking/ or pipe smoking/ or tobacco smoking/ or cigar smoking/ or cigarette smoking/ or vaping/
2	(cigar* or ecigarette* or smoking or tobacco or vaping).ti,ab,kw.
3	1 or 2
4	(abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,kw.
5	3 and 4
6	smoking cessation/ or smoking reduction/ or "tobacco use cessation"/ or "Tobacco Use Cessation Products"/
7	5 or 6
8	limit 7 to (english language and yr="2010 - 2017")
9	(8 and (adult/ or aged/ or middle aged/)) or (8 not (adolescent/ or young adult/ or child/ or infant/))
10	(9 and (north america/ or exp united states/ or exp australia/ or exp canada/ or exp europe/)) or (9 not (exp afric or exp asia/ or exp south america/))
	("clinical trial" or "clinical trial, phase i" or "clinical trial, phase ii" or clinical trial, phase iii or clinical trial, phase iii or clinical trial, phase iii or clinical trial or "multicenter study" or "randomized controlled trial").pt. or double-blind method or clinical trials as topic/ or clinical trials, phase i as topic/ or clinical trials, phase iii as topic/ or clinical trials, phase iii as topic/ or clinical trials, phase iv as topic/ or controlled clinical trials as topic/ or randomized control trials as topic/ or early termination of clinical trials as topic/ or multicenter studies as topic/ or (randomi?ed adj (studies or study or trial or trials).ti,ab,kw. or (controlled adj3 trial*).ti,ab,kw. or (clinical adj2 trial*).ti,ab,kw.
11	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw.
11 12	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11
11 12 Psyc 1	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 INFO Search Strategy tobacco smoking/
11 12 Psyc 1 2	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 EINFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id.
11 12 Psyc 1 2 3	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 SINFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2
11 12 Psyc 1 2 3 4	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 EINFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id.
11 12 Psyc 1 2 3 4 5	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 INFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id. 3 and 4
11 12 Psyc 1 2 3 4 5 6	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 SINFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id. 3 and 4 smoking cessation/
11 12 Psyc 1 2 3 4 5 6 7	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 INFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id. 3 and 4 smoking cessation/ 5 or 6
11 12 Psyc 1 2 3 4 5 6 7 8	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 INFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id. 3 and 4 smoking cessation/ 5 or 6 clinical trials/ or "treatment outcome clinical trial".md. or ((randomi?ed adj7 trial*) or ((single or doubl* or trip or treb*) and (blind* or mask*)) or (controlled adj3 trial*) or (clinical adj2 trial*)).ti,ab,id.
11 12 Psyc 1 2 3 4 5 6 7 8 9	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 HNFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id. 3 and 4 smoking cessation/ 5 or 6 clinical trials/ or "treatment outcome clinical trial".md. or ((randomi?ed adj7 trial*) or ((single or doubl* or trip or treb*) and (blind* or mask*)) or (controlled adj3 trial*) or (clinical adj2 trial*)).ti,ab,id. 7 and 8
11 12 Psyc 1 2 3 4 5 6 7 8 9 10	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 INFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id. 3 and 4 smoking cessation/ 5 or 6 clinical trials/ or "treatment outcome clinical trial".md. or ((randomi?ed adj7 trial*) or ((single or doubl* or trip or treb*) and (blind* or mask*)) or (controlled adj3 trial*) or (clinical adj2 trial*)).ti,ab,id. 7 and 8 (aged 65 yrs older or middle age 40 64 yrs).ag.
11 12 Psyc 1 2 3 4 5 6 7 7 8 9 10 11	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 INFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id. 3 and 4 smoking cessation/ 5 or 6 clinical trials/ or "treatment outcome clinical trial".md. or ((randomi?ed adj7 trial*) or ((single or doubl* or trip or treb*) and (blind* or mask*)) or (controlled adj3 trial*) or (clinical adj2 trial*)).ti,ab,id. 7 and 8 (aged 65 yrs older or middle age 40 64 yrs).ag. (adolescence 13 17 yrs or school age 6 12 yrs or thirties 30 39 yrs).ag.
11 12 Psyc 1 2 3 4 5 6 7 8 9 10 11 12	((single or doubl* or tripl* or treb*) and (blind* or mask*)).ti,ab,kw. or ("4 arm" or "four arm").ti,ab,kw. 10 and 11 ENFO Search Strategy tobacco smoking/ (cigar* or smoking or tobacco).ti,ab,id. 1 or 2 (abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking").ti,ab,id. 3 and 4 smoking cessation/ 5 or 6 clinical trials/ or "treatment outcome clinical trial".md. or ((randomi?ed adj7 trial*) or ((single or doubl* or trip or treb*) and (blind* or mask*)) or (controlled adj3 trial*) or (clinical adj2 trial*)).ti,ab,id. 7 and 8 (aged 65 yrs older or middle age 40 64 yrs).ag. (adolescence 13 17 yrs or school age 6 12 yrs or thirties 30 39 yrs).ag. (9 and 10) or (9 not 11)

OR cigar

- #1 OR #2 3

2	(cigar* or smoking or tobacco).ti,ab,id.
3	1 or 2
4	(abstinence or cessation or quit or quits or quitting or "stop smoking" or "stopped smoking
5	3 and 4
6	smoking cessation/
7	5 or 6
8	clinical trials/ or "treatment outcome clinical trial".md. or ((randomi?ed adj7 trial*) or ((sin or treb*) and (blind* or mask*)) or (controlled adj3 trial*) or (clinical adj2 trial*)).ti,ab,id.
9	7 and 8
10	(aged 65 yrs older or middle age 40 64 yrs).ag.
11	(adolescence 13 17 yrs or school age 6 12 yrs or thirties 30 39 yrs).ag.
12	(9 and 10) or (9 not 11)
13	limit 12 to (all journals and english language and yr="2010 - 2017")
Pub	Med Search Strategy
1	smoking[mesh:noexp] OR pipe smoking[mesh:noexp] OR tobacco smoking[mesh:noexp] smoking[mesh:noexp] OR cigarette smoking[mesh:noexp] OR vaping[mesh:noexp]
2	(cigar*[tiab] OR ecigarette*[tiab] OR smoking [tiab] OR tobacco [tiab] OR vaping [tiab])

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4	(abstinence[tiab] OR cessation[tiab] OR quit[tiab] OR quits[tiab] OR quitting[tiab] OR "stop smoking"[tiab] "stopped smoking"[tiab])
5	#3 AND #4
6	smoking cessation[mesh:noexp] OR smoking reduction[mesh:noexp] OR "tobacco use cessation"[mesh:noe OR "Tobacco Use Cessation Products"[mesh:noexp]
7	#5 OR #6
8	#7 AND english[1a] AND 2010:2017[dp]
9	(#8 AND (adult[mesh:noexp] OR aged[mesh:noexp] OR middle aged[mesh:noexp])) OR (#8 NOT (adolescent[mesh:noexp] OR young adult[mesh:noexp] OR child[mesh:noexp] OR infant[mesh:noexp]))
10	(#9 AND (north america[mesh:noexp] OR united states[mesh] OR australia[mesh] OR canada[mesh] OR europe[mesh])) OR (#9 NOT (africa[mesh] OR asia[mesh] OR south america[mesh]))
11	Clinical Trial [PT:NoExp] OR "clinical trial, phase i"[pt] OR "clinical trial, phase ii"[pt] OR "clinical trial, phase iv"[pt] OR "controlled clinical trial" [pt] OR "multicenter study" [pt] OR "randomized controlled trial" [pt] OR "Clinical trials, phase ias topic"[MeSH Terms:noexp] OR "clinical trials" [MeSH Terms:noexp] OR "nandomized controlled trials as topic"[MeSH Terms:noexp] "early termination of clinical trials" [MeSH Terms:noexp] OR "multicenter studies as topic" [MeSH Terms: OR "Double-Blind Method"[Mesh] OR ((randomised[TIAB] OR madomized[TIAB]) AND (trial[TIAB] OR triple[TIAB] OR studies[tiab]) OR ((single[TIAB] OR double[TIAB] OR doubled[TIAB] OR triple[TIAB] OR tripled[TIAB] OR treble[TIAB] OR treble[TIAB] OR mask* [TIAB] OR mask* [TIAB] OR "four arm"[tiab])
12	#10 AND #11
Pub	Med Search Strategy
1	smoking[mesh:noexp] OR pipe smoking [mesh:noexp] OR tobacco smoking[mesh:noexp] OR cigar smoking[mesh:noexp] OR cigarette smoking[mesh:noexp] OR vaping[mesh:noexp]
2	(cigar* [tiab] OR ecigarette*[tiab] OR smoking[tiab] OR tobacco[tiab] OR vaping[tiab])
3	#1 OR #2
4	(abstinence[tiab] OR cessation [tiab] OR quit[tiab] OR quits[tiab] OR quitting [tiab] OR "stop smoking"[tia "stopped smoking"[tiab])
5	#3 AND #4
6	smoking cessation[mesh:noexp] OR smoking reduction[mesh:noexp] OR "tobacco use cessation" [mesh:noexp] OR "Tobacco Use Cessation Products"[mesh:noexp]
7	#5 OR #6
8	#7 AND english[1a] AND 2010:2017[dp]
9	(#8 AND (adult[mesh:noexp] OR aged[mesh:noexp] OR middle aged[mesh:noexp])) OR (#8 NOT (adolescent[mesh:noexp] OR young adult[mesh:noexp] OR child[mesh:noexp] OR infant[mesh:noexp]))
10	(#9 AND (north america[mesh:noexp] OR united states[mesh] OR australia[mesh] OR canada[mesh] OR europe[mesh])) OR (#9 NOT (africa[mesh] OR asia[mesh] OR south america[mesh]))
	Clinical Trial [PT:NoExp] OR "clinical trial, phase i" [pt] OR "clinical trial, phase ii" [pt] OR "clinical trial, iii"[pt] OR "clinical trial, phase iv"[pt] OR "controlled clinical trial"[pt] OR "multicenter study" [pt] OR "randomized controlled trial" [pt] OR "clinical Trials as Topic"[mesh:noexp] OR "clinical trials, phase i as topic"[MeSH Terms:noexp] OR "clinical trials, phase ii as topic"[MeSH Terms:noexp] OR "clinical trials, phase ii as topic"[MeSH Terms:noexp] OR "clinical trials, phase iv as topic"[MeSH Terms:noexp] OR "controllec clinical trials as topic"[MeSH Terms:noexp] OR "clinical trials, phase iv as topic"[MeSH Terms:noexp] OR "controllec "early termination of clinical trials" [MeSH Terms:noexp] OR "multicenter studies as topic" [MeSH Terms: OR "Double-Blind Method"[Mesh] OR ((randomised[TIAB] OR randomized[TIAB]) AND (trial[TIAB] O
11	trials[tiab] OR study[tiab] OR studies[tiab])) OR ((single[TIAB] OR double[TIAB] OR doubled[TIAB] OR triple[TIAB] OR tripled[TIAB] OR treble[TIAB] OR treble[TIAB] OR treble[TIAB] OR mask*[TIAB] ("4 arm"[tiab] OR "four arm"[tiab])

(Figure 1).

	Licencia	neo Buseu (i	i o'ununo)		1 unor	с.	1 114111400	merupj	(		••
						<b>.</b>					
	Sample			%		Sample					%
Author	Size		OR (95% CI)	Weight	Author	Size			OR	(95% CI)	vveig
Bricker 2017	2627		0.80 (0.75, 1.06)	25.60	Baker, 2016	1086	_	•	0.9	3 (0.66, 1.33)	10.34
bricker, 2017	2637	-	0.69 (0.75, 1.06)	25.09	Caldwell, 2014	1423			1.1	3 (0.79, 1.63)	10.20
Calhoun, 2016	408 —		0.85 (0.49, 1.46)	5.67	Ebbert, 2014	506		+	1.4	0 (0.96, 2.03)	10.08
Leykin, 2012	16430		1.17 (1.02, 1.33)	30.51	Gonzales, 2014	494			• 2.9	2 (1.82, 4.66)	8.69
Reitzel, 2011	303		0.78 (0.39, 1.54)	3.84	Hall, 2011	325			1.2	7 (0.81, 2.00)	8.94
Richter 2015	586		0.79 (0.46, 1.35)	5.94	Lerman, 2015	1246			1.3	5 (0.94, 1.93)	10.28
					Levine, 2010	349			2.6	3 (1.50, 4.63)	7.47
Smit, 2016	251	-	1.78 (0.90, 3.54)	3.81	Schnoll, 2010	575			1.0	2 (0.64, 1.63)	8.75
Stanczyk, 2016	2099		1.11 (0.87, 1.41)	18.72	Schnoll, 2015	526	_		1.0	9 (0.70, 1.68)	9.19
Wetter, 2011	302 -		0.93 (0.54, 1.59)	5.83	Tulloch, 2016	737		<u> </u>	1.4	7 (0.96, 2.24)	9.30
Overall (I-squared	= 36.1%, p = 0.141)	$\diamond$	1.02 (0.89, 1.18)	100.00	Tønnesen 2012	479				1 (1 72 6 01)	6.75
		Y			Overall (Leavan	wd = 67.3% n	= 0.001)		1.4	6 (1 17 1 84)	100.0
					o to tail (r oquari	or o	0.001/	$ $ $\checkmark$		0 (1111, 1101)	100.0
	282	1	3 54								
			010 1			.1	1 166	1	6.01		
nel B:	In-Person C	Counseling (n=	= 15 trials)		Panel I	<b>):</b> T	elephone	Counseli	ng (n=	= 10	tr
nel B:	In-Person C	Counseling (n=	= 15 trials)		Panel I	<b>):</b> T	elephone	Counseli	ng (n=	= 10	tr
nel B:	In-Person C	Counseling (n=	= 15 trials)	% Weight	Panel I	): T	elephone	Counseli	ng (n=	= 10	tr %
nel B:	In-Person C	Counseling (n=	= 15 trials) OR (95% CI)	% Weight	Panel I Author	Sample Size	elephone	Counseli	ng (n=	= 10	tr % Weig
nel B: Author	In-Person C Sample Size	Counseling (n=	= 15 trials) OR (95% Cl) - 220 (0.96, 5.01)	% Weight 3.53	Panel I	Sample Size	elephone	Counseli	ng (n=	= 10	tr % Weigh
Author Andrews, 2016 Bock, 2014	In-Person C Sample Size	Counseling (n=	= 15 trials) OR (95% Cl) - 220 (0.96, 5.01) 0.90 (0.60, 1.36)	% Weight 3.53 11.42	Panel I Author Bastian, 2013	): T Sample Size 496	elephone	Counseli	ng (n= or	= 10 R (95% CI) 46 (0.51, 1.45)	kr % Weigt
Author Andrews, 2016 Bock, 2014 Brooks, 2017	In-Person C	Counseling (n=	= 15 trials) OR (95% CI) - 220 (0.96, 5.01) 0.90 (0.60, 1.36) 1.81 (0.95, 3.47) 1.91 (0.95, 3.47)	% Weight 3.53 11.42 5.40	Panel I - Author Bastian, 2013 Fu, 2015	Sample Size	elephone	Counseli	ng (n= or 08 09	= 10 (95% Cl) (95% Cl) (0.51, 1.45) (0.72, 1.18)	tr % Weigh 5.26 15.16
Author Andrews, 2016 Bock, 2014 Brooks, 2017 Garvey, 2012	In-Person C	Counseling (n=	= 15 trials) OR (85% CI) - 220 (0.96, 5.01) 0.99 (0.60, 1.36) 1.81 (0.95, 3.47) 1.20 (0.81, 2.36) 1.50 (0.89, 1.62)	% Weight 3.53 11.42 5.40 5.00 9.86	Author Bastian, 2013 Fu, 2015 Klemperer, 2016	Sample           Size           496           2406           560	elephone	Counseli	ng (n= or 0.8 0.9 2.6	= 10 (95% CI) (95% CI)	% Weigh 5.26 15.16 2.30
Author Andrews, 2016 Bock, 2017 Garvey, 2012 Hall, 2011 Hooper, 2017	In-Person C Sample Size 409 846 331 278 325 342	Counseling (n=	= 15 trials) - 220 (0.96, 5.01) 0.90 (0.96, 1.36) 181 (0.95, 3.47) 125 (0.80, 1.96) 125 (0.80, 1.96) 126 (0.97, 2.00)	% Weight 3.53 11.42 5.40 5.40 5.00 9.86 7.96	Author Bastian, 2013 Fu, 2015 Klemperer, 2016 Klesges, 2015	Contemple Sample Size 496 2406 560 1298	elephone	Counseli	or 0.8 0.9 0.8 0.9 0.8 0.9 0.8 0.9 0.8 0.9 0.8 0.9 0.8 0.9 0.8 0.9 0.8 0.9 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8	= 10 (95% Cl) (0.51, 1.45) (0.72, 1.18) (2 (0.72, 1.18) (2 (1.14, 6.04) (5 (0.98, 1.58)	% Weig 5.26 15.16 2.30 15.50
Author Andrews, 2016 Bock, 2014 Brooks, 2017 Garvey, 2012 Hall, 2011 Hooper, 2017 Kim 2015	In-Person C Sample Size 409 846 331 278 325 342 109	Counseling (n=	= 15 trials) - 220 (0.96, 5.01) 0.90 (0.80, 1.36) 1.81 (0.95, 3.47) 120 (0.81, 2.36) 125 (0.80, 1.96) 120 (0.72, 2.01) 316 (1.32, 7.61)	% Weight 3.53 11.42 5.40 5.00 9.86 7.96 7.96 3.19	Author Bastian, 2013 Fu, 2015 Klemperer, 2016 Klesges, 2015 Lindquist, 2013	Sample Size 496 2406 560 1298 772	elephone	Counseli	or 0.8 0.9 0.8 0.9 2.6 1.2 1.3	= 10 (95% Cl) (0.51, 1.45) (0.72, 1.18) (0.72, 1.18) (1.14, 6.04) (5 (0.98, 1.58) (0.95, 1.89)	% Weigh 5.26 15.16 2.30 15.50 9.89
Author Andrews, 2016 Bock, 2017 Brooks, 2017 Garvey, 2012 Hall, 2011 Hooper, 2017 Kim, 2015	In-Person C Sample Size 409 846 331 278 325 342 109 219	Counseling (n=	= 15 trials) OR (95% Cl) - 220 (0 96, 5.01) 0.90 (0 60, 1.36) 1.81 (0.95, 3.47) 120 (0.61, 2.36) 125 (0.80, 1.96) 120 (0.72, 2.01) 3.16 (132, 7.56) 0.97 (0.56, 167)	% Weight 3.53 11.42 5.40 5.40 5.00 9.86 7.96 3.19 7.32	Author Bastian, 2013 Fu, 2015 Kilemperer, 2016 Kilesges, 2013 Nohert, 2014	Sample Size 496 2406 560 1298 772 586	elephone	Counseli	ng (n= 08 09 26 12 13 08	e (95% Cl) e (95% Cl) 2 (0.72, 1.18) 2 (0.72, 1.18) 2 (1.14, 6 04) 5 (0.98, 1.58) 4 (0.95, 1.89) 4 (0.58, 1.20)	% Weigh 5.26 15.16 2.30 15.50 9.89 9.25
Author Author Andrews, 2016 Bock, 2014 Brocks, 2017 Garwy, 2012 Hall, 2011 Kim, 2015 Laude, 2017 Laude, 2017	In-Person C Sample Size 409 846 331 278 342 109 219 349	Counseling (n=	<ul> <li>DR (95% Cl)</li> <li>220 (0.96, 5.01) 0.90 (0.60, 1.36) 1.81 (0.95, 3.47) 1.20 (0.61, 2.36) 1.25 (0.80, 1.96) 1.25 (0.80, 1.96) 1.20 (0.72, 2.01) 3.16 (1.32, 7.56) 0.97 (0.56, 1.67) 0.99 (0.54, 1.57)</li> </ul>	% Weight 3.53 11.42 5.40 5.00 9.86 7.96 3.19 7.32 8.03	Panel I Author Bastian, 2013 Fu, 2015 Klemperer, 2016 Klesges, 2015 Lindqvist, 2013 Nohiert, 2014 Ramon, 2013	Sample Size 496 2406 560 1298 772 586 600	elephone		ng (n= 08 09 26 12 13 08 08	e 10 (95% C) (0,51, 1,45) (2,0,72, 1,18) (2,114, 6,04) (5,0,98, 1,58) (4,0,58, 1,20) (6,058, 1,20)	% Weigh 5.26 15.16 2.30 15.50 9.89 9.25 8.71
Author Andrews, 2016 Bock, 2014 Brooks, 2017 Garvey, 2012 Hall, 2017 Kim, 2015 Laude, 2017 Levine, 2010 Ramon, 2013	In-Person C Size 409 846 331 278 325 342 109 219 349 600	Counseling (n=	= 15 trials) - 220 (0.96, 5.01) 0.90 (0.60, 1.36) 1.81 (0.95, 3.47) 1.20 (0.61, 2.36) 1.25 (0.80, 1.96) 1.20 (0.72, 2.01) 3.16 (1.32, 7.56) 0.97 (0.54, 1.51) 1.51 (1.01, 2.26)	% Weight 3.53 11.42 5.40 5.00 9.86 3.19 7.36 3.19 7.32 8.03 11.69	Author Bastian, 2013 Fu, 2015 Kikenperer, 2016 Kikeges, 2015 Lindqvist, 2013 Nohlert, 2014 Ramon, 2013	Sample Size 496 2406 560 1298 772 586 600 518	elephone		ng (n= or 08 26 12 13 08 08	e 10 (955% C)) (955% C) (0,51, 1.45) (0,72, 1.16) (0,72, 1.18) (0,72, 1.18) (1,14, 6.04) (5, (0.96, 1.58) (4, (0.95, 1.58) (4, (0.95, 1.58) (0,58, 1.20) (6, (0.51, 0.25) (0, 0.78, 1.84) (0, 0.78, 1.84)	% Weigi 5.26 15.16 2.30 15.50 9.89 9.25 8.71 7.26
Author Andrews, 2016 Bock, 2014 Brooks, 2017 Brooks, 2017 Hall, 2011 Hooper, 2017 Kuado, 2017 Lavine, 2010 Ramon, 2013	In-Person C Sample Size 409 846 331 275 342 275 342 109 219 349 600 287	Counseling (n=	= 15 trials) - 220 (0.96, 5.01) 0.90 (0.80, 1.36) 1.81 (0.95, 3.47) 120 (0.81, 2.36) 125 (0.80, 1.96) 120 (0.72, 2.01) 3.16 (1.32, 7.56) 0.97 (0.56, 1.67) 0.90 (0.54, 1.51) 1.51 (1.01, 2.26) 3.17 (0.91, 11.05)	% Weight 3.53 11.42 5.40 5.00 9.86 7.96 3.99 7.32 8.03 11.69 1.62	Panel I Author Bastian, 2013 Fu, 2015 Kleegeer, 2016 Kleegee, 2016 Lindqviat, 2013 Nohiert, 2014 Ramon, 2013 Sumer, 2016	Sample Size 496 2406 560 1298 772 586 600 518	elephone	Counseli	ng (n= 08 08 28 12 13 08 08 12 13 08 08 12 13 08 08 12 13 08 08 12 13 13 14 15 15 15 15 15 15 15 15 15 15	e 10 (95% Cl) (05% Cl) (05% Cl) (072, 118) (072, 118) (072, 118) (072, 118) (072, 118) (0,58, 120) (0,08, 158) (0,09, 128) (0,09, 144) (0,09, 144)	% Weight 5.26 15.16 2.30 15.50 9.89 9.25 8.71 7.26
Author Andrews, 2016 Bock, 2014 Brocks, 2017 Garvey, 2012 Hall, 2011 Hooper, 2017 Kim, 2015 Levine, 2010 Ramon, 2013 Ramos, 2010	In-Person C Sample Size 409 846 331 276 325 342 109 219 349 600 287 282	Counseling (n=	= 15 trials) → CR (95% Cl) - 220 (0.96, 5.01) 0.90 (0.60, 1.36) 1.81 (0.95, 3.47) 1.20 (0.51, 2.36) 1.25 (0.80, 1.96) 1.25 (0.80, 1.96) 1.20 (0.72, 2.01) 3.16 (1.32, 7.56) 0.97 (0.54, 1.51) 1.51 (1.01, 2.26) 3.17 (0.91, 11.05) 0.97 (0.47, 1.198)	% Weight 3.53 11.42 5.40 5.40 9.86 7.96 3.19 9.86 7.32 8.03 11.69 1.62 4.56	Author Bastian, 2013 Fu, 2015 Klengerer, 2016 Klesges, 2015 Lindqvist, 2013 Nohlert, 2014 Ramon, 2013 Sumner, 2016 Tzelepis, 2010	Sample Size 496 2406 560 1298 772 586 600 518 1562	elephone	Counseli	ng (n= 08 09 26 12 13 08 08 12 13 08	e 10 (95% C) (95% C) (0,51,145) (0,72,118) (0,72,118) (1,14,604) (0,98,158) (0,08,158) (0,08,125) (0,078,184) (7,001,141)	% Weight 5.26 15.16 2.30 15.50 9.89 9.25 8.71 7.26 12.99
Author Andrews, 2016 Bock, 2014 Brooks, 2017 Garvey, 2017 Garvey, 2017 Kim, 2015 Laude, 2017 Ramon, 2013 Ramos, 2010 Smit, 2016 Wewers, 2017	Sample Size 409 846 331 278 342 109 219 348 600 287 707	Counseling (n=	= 15 trials) → CR (85% Cl) - 220 (0.96, 5.01) 0.90 (0.60, 1.36) 1.81 (0.95, 3.47) 1.20 (0.61, 2.36) 1.25 (0.80, 1.96) 1.20 (0.72, 2.01) 3.16 (1.32, 7.56) 0.97 (0.56, 1.67) 0.99 (0.54, 1.67) 1.51 (1.01, 2.26) 3.17 (0.94, 1.198) 0.97 (0.47, 1.99) 1.28 (0.81, 2.01)	% Weight 3.53 11.42 5.40 5.00 9.86 7.96 3.19 7.32 8.03 11.69 1.62 4.56 9.65	Author Bastian, 2013 Fu, 2015 Klemperer, 2016 Klesges, 2015 Lindqvist, 2013 Nohlert, 2014 Ramon, 2013 Sumner, 2016 Tzelepis, 2010 Zwar, 2015	Sample Size       Sample Size       496       2406       560       1298       600       518       1562       1514	Pelephone	Counseli	ng (n= 08 09 26 12 13 08 08 12 13 08 08 12 13 08 12 10 11	e 10 a (95% Cl) b (0.51, 1.45) 2 (0.72, 1.18) 2 (1.14, 6.04) 5 (0.96, 1.58) 4 (0.55, 1.29) 0 (0.78, 1.84) 17 (0.81, 1.41) 8 (0.90, 1.54)	\$ % Weigl 5.26 15.16 2.30 15.50 9.89 9.25 8.71 7.26 12.99 13.67
Author Author Andrews, 2016 Bock, 2014 Brocks, 2017 Garvey, 2012 Hail, 2011 Kim, 2015 Laude, 2017 Ramon, 2010 Ramon, 2010 Smit, 2016	In-Person C Size 409 846 331 278 325 342 109 219 349 600 287 282 287 287 282 707 330	Counseling (n=	= 15 trials) OR (95% CI) - 220 (0.96, 5.01) 0.99 (0.96, 1.36) 181 (0.95, 3.47) 120 (0.61, 2.36) 125 (0.80, 1.96) 120 (0.72, 201) 3.16 (132, 7.56) 0.97 (0.54, 1.51) 1.51 (101, 2.26) 3.17 (0.91, 11.05) 0.97 (0.47, 1.98) 1.28 (0.81, 2.01) 1.22 (0.89, 2.16)	% Weight 3.53 11.42 5.40 5.00 9.86 3.19 7.36 3.19 7.32 8.03 11.69 1.62 4.56 9.65 6.69	Author Bastian, 2013 Fu, 2015 Kikenperer, 2016 Kikeges, 2015 Lindqvist, 2013 Nohlert, 2014 Ramon, 2013 Sumner, 2016 Tzelepis, 2010 Zwar, 2015 Overall (i-square	Sample Size          496         2406         560         1298         772         586         600         518         1562         1514         vd = 33.4%, p =	<sup>2</sup> elephone	Counseli	ng (n= 08 09 26 12 13 08 12 13 08 12 13 08 12 13 08 12 13 08 12 13 14 14 15 16 16 16 16 16 16 16 16 16 16	e 100 ((95% C)) ((0.51, 1.45) (0.051, 1.45) (0.07, 1.18) (0.09, 1.58) (0.09, 1.58) (0.09, 1.58) (0.09, 1.58) (0.07, 1.89) (0.07, 1.84) (0.07, 1.84) (0.09, 1.54) (0.09, 1.54)	\$ % Weig 5.26 15.16 2.30 15.50 9.89 9.25 8.71 7.26 12.99 13.67 100.0
Author Andrews, 2016 Bock, 2014 Broks, 2017 Broks, 2017 Hall, 2011 Hooper, 2017 Kim, 2010 Ramon, 2010 Smit, 2016 Wewers, 2017 Winkley, 2012 Williams, 2016	In-Person C Sample Size 409 846 331 327 325 342 100 219 349 600 287 282 707 330 820	Counseling (n=	= 15 trials) OR (95% Cl) - 220 (0.96, 5.01) 0.90 (0.80, 1.36) 1.81 (0.95, 3.47) 120 (0.81, 2.36) 125 (0.80, 1.96) 120 (0.72, 2.01) 3.16 (1.32, 7.56) 0.97 (0.56, 1.67) 0.90 (0.54, 1.51) 1.51 (1.01, 2.26) 3.17 (0.91, 11.05) 0.97 (0.47, 1.99) 1.28 (0.81, 2.01) 1.28 (0.81, 2.01) 1.28 (0.87, 3.99)	% Weight 3.53 11.42 5.40 5.00 9.86 7.96 3.19 7.32 8.03 11.62 4.56 9.65 6.69 4.07	Author Bastian, 2013 Fu, 2015 Klemperer, 2016 Kleagea, 2016 Lindqviat, 2013 Nohlert, 2014 Ramon, 2013 Summer, 2016 Tzelepis, 2010 Zwar, 2015 Overall (i-square	Sample Size          496         496         2406         560         1298         772         586         600         518         1562         1514         rd = 33.4%, p =	<sup>2</sup> elephone	Counseli	ng (n= 08 08 26 12 13 08 08 12 10 11 10	e 105% CI) (05% CI) (0,51, 1.45) (0,72, 1.15) (2,072, 1.15) (2,072, 1.15) (2,072, 1.15) (0,08, 1.54) (0,05, 1.24) (0,05, 1.24) (0,05, 1.24)	% Weig 5.26 15.16 2.30 15.50 9.89 9.25 8.71 7.26 12.99 13.67 100.0
Author Andrews, 2016 Bock, 2014 Brocks, 2017 Garwey, 2012 Hall, 2011 Hooper, 2017 Kim, 2015 Garwey, 2017 Levine, 2010 Smit, 2016 Wewers, 2017 Whiteley, 2012 Whiteley, 2012	Sample           Size           409           846           331           278           325           342           109           219           349           600           287           282           707           330           820           ed = 16.8%, p = 0.265)	Counseling (n=	<ul> <li>OR (95% Cl)</li> <li>220 (0.96, 5.01)</li> <li>080 (0.80, 1.36)</li> <li>1.81 (0.95, 3.47)</li> <li>1.20 (0.81, 2.36)</li> <li>1.25 (0.80, 1.96)</li> <li>1.20 (0.72, 2.01)</li> <li>3.16 (1.32, 7.56)</li> <li>0.97 (0.65, 1.67)</li> <li>0.80 (0.54, 1.51)</li> <li>1.51 (1.01, 2.26)</li> <li>3.17 (0.91, 11.06)</li> <li>0.97 (0.47, 1.99)</li> <li>1.28 (0.81, 2.01)</li> <li>1.28 (0.81, 2.01)</li> <li>1.28 (0.87, 3.99)</li> <li>1.28 (1.09, 1.51)</li> </ul>	% Weight 3.53 11.42 5.40 5.00 9.86 7.96 3.19 9.86 7.32 8.03 11.69 1.69 1.69 4.56 9.65 6.69 9.65 6.69 4.07 100.00	Author Bastian, 2013 Fu, 2015 Klemperer, 2016 Klasges, 2015 Lindqviat, 2013 Nohlert, 2014 Ramon, 2013 Sumner, 2016 Tzekejis, 2010 Zwar, 2015 Overall (Lisquare	Sample Size 496 2406 560 1298 772 586 600 518 1562 1514 dd = 33.4%, p =	<sup>2</sup> elephone -	Counseli	ng (n= 08 09 26 12 13 08 08 12 10 11 10	e 105% CI) ( (05% CI) ( (0,51, 1.45) ( 0,72, 1.16) ( 0,72, 1.16) ( 0,72, 1.16) ( 0,72, 1.16) ( 0,95, 1.58) ( 0,95, 1.58) ( 0,58, 1.20) ( 0,58, 1.20) ( 0,59, 1.25) ( 0,59, 1.54) ( 0,51, 1.41) ( 0,59, 1.54) ( 0,51, 1.45) ( 0,59, 1.25) ( 0,51, 1.45) ( 0,51, 1.4	% Weigl 5.26 15.16 2.30 15.50 9.89 9.25 8.71 7.26 12.99 13.67 100.0
Author Andrews, 2016 Bock, 2014 Brooks, 2017 Garvey, 2012 Hall, 2011 Hooper, 2017 Kim, 2015 Laude, 2017 Levine, 2010 Ramon, 2013 Ramos, 2011 Withery, 2012 Williamey, 2016 Overall (I-isquare	Sample Size 409 846 331 276 325 342 109 219 349 600 287 282 707 330 820 820	Counseling (n=	<ul> <li>OR (95% CI)</li> <li>220 (0.96, 5.01) 0.90 (0.60, 1.36) 1.81 (0.95, 3.47) 1.20 (0.81, 2.36) 1.25 (0.80, 1.95) 1.20 (0.72, 2.01) 3.16 (1.32, 7.56) 0.97 (0.56, 1.67) 0.90 (0.54, 1.51) 1.51 (1.01, 2.26) 3.17 (0.91, 11.05) 0.97 (0.47, 1.19) 1.28 (0.81, 2.01) 1.22 (0.59, 2.16) 1.86 (0.87, 3.99) 1.28 (1.09, 1.51)</li> </ul>	% Weight 3.53 11.42 5.40 5.00 9.86 7.96 3.19 7.32 8.03 11.69 1.62 9.65 6.69 4.07 100 00	Author Bastian, 2013 Fu, 2015 Kiemperer, 2016 Kiesges, 2015 Lindqviat, 2013 Nohiert, 2014 Ramon, 2013 Sumner, 2016 Tzelepis, 2010 Zwar, 2015 Overall (Haguare	Sample Size          496         2406         560         1298         772         586         600         518         1562         1514         idd = 33.4%, p =	°elephone	Counseli	ng (n= 0R 0.8 0.9 2.6 1.2 1.3 0.8 0.8 1.2 1.0 1.1 1.0 6.04	e (95% Cl) (0,51, 1,45) (0,51, 1,45) (0,51, 1,45) (0,51, 1,45) (1,14, 6, 604) (1,058, 1,56) (4,058, 1,56) (4,058, 1,20) (6,059, 1,25) (0,076, 1,84) (7,081, 1,41) (8,090, 1,54) (6,095, 1,24)	% Weigl 5.26 15.16 2.30 15.50 9.89 9.25 8.71 7.26 12.99 13.67 100.0

#### Appendix B.2: Odds of Smoking Cessation From Random-Effects Meta-Analysis of Trials with Smokers Potentially Eligible for Lung Screening Based on 7-day Point Prevalence of Abstinence at 12-Months by Primary Intervention Type (n= 40 Trials)\*

Forest plots display weighted odds ratios and 95% confidence intervals of included trials. Trial weights are generated from a random effects analysis. Squares around point estimates indicate study weight relative to the lowest weighted study for each meta-analysis. The vertical dashed line represents the pooled odds ratio with the diamond representing the 95% confidence interval.

\* Some trials included more than one intervention of a differing generic type so that the sum of the sample of all intervention types is greater than the total number of trials included.



#### B.3.2: Single versus Multi-Modality Interventions

	ectronic/w	eb-Based (n=	= 25 trials)	Pa	iei	C:	Pharmac	connerapy	(n=	25	ι
	Sample			%		Sample					%
Author	Size		OR (95% CI)	Weight	Author	Size			O	R (95% CI)	We
Single Modality	503		- 1 47 (0 97 2 49	2.52	Single Modality	y and and t				05 (4 00 0 40)	
Bolman, 2015	1982		0.98 (0.73, 1.33	) 4.91	Gonzales 201	16 3015			- 2	67 (1 73 4 13)	) 3.70
Bricker, 2017	2637		0.91 (0.76, 1.09	) 7.02	Ramon, 2014	341		-	1.	28 (0.81, 2.02)	) 3.68
Brown, 2014	4613		1.08 (0.92, 1.27	) 7.31	Selby, 2014	1380			1.	66 (1.20, 2.28)	) 4.52
Moskowitz 2016	900 403		1.73 (1.08, 2.77	) 2.91	Subtotal (I-squ	uared = 53.9	9%, p = 0.090)		1.	.87 (1.47, 2.39)	) 17.2
Stanczyk, 2016	2099	1	1.41 (1.10, 1.80	5.77	Multi Modality						
Subtotal (I-squared =	55.5%, p = 0.036)	$\diamond$	1.15 (0.97, 1.35	) 32.28	Baker, 2016	1086			1.	14 (0.81, 1.60)	) 4.41
Multi-Modality					Bullen, 2010	1100			0.	80 (0.59, 1.09)	) 4.59
Bock, 2010	200		2.20 (1.09, 4.44	1.59	Burns, 2014	1495			0.	90 (0.68, 1.20)	) 4.79
Borland, 2013	2772	-+•	1.13 (0.87, 1.46	5.59	Caldwell, 2014	1423 5 502			. 2	41 (1.02, 1.97)	) 4.48
Choi, 2014	145		1.04 (0.38, 2.87	0.84	Carpenter, 201	11 849			1.	17 (0.80, 1.71)	) 4.16
Free. 2011	5792		1.42 (1.25, 1.62	7.93	Cinciripini, 201	13 294		*	1.	56 (0.90, 2.68)	) 3.17
Gilbert, 2012	6697		1.13 (0.93, 1.37	6.75	Cummings, 20	011 2806		•	1.	20 (0.97, 1.50)	) 5.18
Houston, 2013	576	•	0.65 (0.38, 1.11	2.46	Ebbert, 2014	325			1.	32 (0.91, 1.90)	) 4.23
Leykin, 2012 Loughead, 2016	16430		1.20 (1.05, 1.36	) 7.91	Hughes, 2011	218			2.	10 (0.85, 5.18)	) 1.74
Mason, 2011	1758	- • ·	0.91 (0.69, 1.20	5.25	Lerman, 2015	1246			1.	51 (1.08, 2.11)	) 4.44
Reitzel, 2011	303		0.99 (0.52, 1.88	) 1.85	Levine, 2010	349			• 3.	52 (1.98, 6.27)	) 2.99
Richter, 2015	566		0.98 (0.65, 1.48	) 3.50	Rennard, 2012 Rose 2013	2 659			- 3.	67 (2.24, 6.01)	) 3.44
Smit. 2012	1123		1.40 (0.88, 2.22	2.99	Schnoll, 2010	575			1.	.77 (1.21, 2.59)	) 4.14
Smit, 2016	251		1.12 (0.57, 2.21	) 1.68	Schnoll, 2015	526			1.	35 (0.88, 2.07)	) 3.85
Swan, 2010	1201		0.91 (0.71, 1.17	) 5.64	Stapleton, 201	13 1071			1.	11 (0.85, 1.46)	) 4.85
Wetter, 2011	302 -		0.75 (0.45, 1.23	) 2.68	Tønnesen 201	12 479			- 2	.84 (1.23, 2.74) 12 (1.28, 3.49)	) 4.01
Subtotal (I-squared =	58.2%, p = 0.001)	$\overline{\diamond}$	1.13 (1.00, 1.28	67.72	Walker, 2011	1410		-	1.	25 (0.97, 1.62)	) 4.94
Overall /leaverad = E	57.0% = = 0.000)		4 44 (4 02 4 05	100.00	Subtotal (I-squ	uared = 70.1	%, p = 0.000)	$\diamond$	1.	.47 (1.26, 1.71)	) 82.7
Overall (Insquared = 5	57.276, p = 0.000)	Y	1.14 (1.00, 1.20	) 100.00	Overall (Lequi	ared = 73 79	% n = 0.000)		1	53 (1 33 1 77)	100
		i			Overan (i-squi	ureu - 70.77	(0, p = 0.000)				, 100
	.225	1	4.44	-			1		1		
nel B: In-	-Person Co	ounseling (n=	20 trials)	Pai	nel D	<b>):</b> Т	elephone	Counseli	ng (n	n= 9	t
nel B: In-	-Person Co	ounseling (n=	20 trials)	Par	nel D	): T	elephone	Counseli	ng (n	n= 9	t
nel B: In-	-Person Co	ounseling (n=	20 trials) OR (95% CI)	% Weight	nel D	Sample	elephone	Counseli	ng (n	<u>n</u> = 9	t %
nel B: In-	-Person Co	ounseling (n=	20 trials) or (95% Cl)	%	nel D	): T Sample Size	`elephone	Counseli	ng (n or	<b>]= 9</b>	t % Wei
Author Siz Single Modality 277	-Person Co	ounseling (n=	20 trials) OR (95% CI) 1.36 (0 79, 2.34)	% · · · · · · · · · · · · · · · · · · ·	nel D	): T Sample Size	`elephone	Counseli	ng (n or	<b>]= 9</b> R (95% CI)	t. % Wei
Author Sa Single Modality Garvey, 2012 370	-Person Co	ounseling (n=	20 trials) OR (85% CI) 138 (0.79. 2.34) 1.10 (0.65, 187)	%	nel D Author Single Modality	Sample Size	`elephone	Counseli	ng (n	n= 9	t % Wei
Author Sai Single Modality Garvey, 2012 370 Whiteley, 2012 330 Subtal (I+quared =	-Person Cc	ounseling (n=	20 trials) OR (95% CI) 1.38 (0.79, 2.34) 1.10 (0.65, 1.87) 1.22 (0.83, 1.78)	% Weight 5.81 6.03 11.84 5.81	nel D Author Single Modality Sherman, 2017	): T Sample Size	elephone	Counselin	ng (n	<b>]</b> = 9 R (95% Cl) 17 (0.90, 1.51)	t % Wei
Author Siz Single Modality Garvey, 2012 277 Whiteley, 2012 333 Subtotal (I-squared =	-Person Cc	ounseling (n=	20 trials) OR (95% CI) 136 (0 79, 2 34) 110 (0 65, 187) 122 (0 83, 176)	% · · · · · · · · · · · · · · · · · · ·	Author Single Modality Sherman, 2017 Sumner, 2016	Sample Size	`elephone	Counseli	ng (n of	n= 9 R (95% Cl) 17 (0.90, 1.51) 90 (0.60, 1.34)	t % Wei 13.2 10.3
Author Siz Single Modality Garvey, 2012 27 Whiteley, 2012 27 Subtotal (I-squared = Multi-Modality Authors 2016 and	-Person Cc	ounseling (n=	20 trials) OR (95% C)) 138 (0.79. 2.34) 1.10 (0.65, 187) 1.22 (0.83, 1.76) 2.94 (113, 7.69)	% Weight / 5.81 6.03 11.84 5 2.29 5	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar	2003 518 red = 16.0%,	`elephone 	Counselin	ng (n	<b>1</b> = 9 <b>R</b> (95% Cl) <b>17</b> (0.90, 1.51) <b>90</b> (0.60, 1.34) <b>07</b> (0.84, 1.37)	% Wei 13.2 10.3 23.5
Author Sa Author Single Modality Garvey, 2012 277 Whiteley, 2012 333 Subtotal (+squared = Multi-Modality Andrews, 2016 40	-Person Cc	ounseling (n=	20 trials) OR (95% CI) 1.36 (0.79, 2.34) 1.10 (0.65, 1.87) 1.22 (0.83, 1.76) 2.94 (1.13, 7.68) 1.07 (75, 1.52)	% Weight 5.81 6.03 11.84 2.29 10.01	Nuthor Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar	Sample Size 2003 518 red = 16.0%,	`elephone 	Counselin	ng (n or 1.1 0.5 1.0	<b>1 = 9</b> <b>R</b> (95% Cl) <b>17</b> (0.90, 1.51) <b>30</b> (0.60, 1.34) <b>07</b> (0.84, 1.37)	t. % Wei 13.2 10.3 23.5
Author Siz Single Modality Garvey, 2012 277 Whiteley, 2012 333 Subtolal (I-squared = Multi-Modality Andrews, 2016 403 Bock, 2014 845 Cateley, 2016 425	-Person Cc mple te 00%, p = 0.585) 9 5	ounseling (n=	20 trials) OR (95% Cl) 136 (0 79, 2 34) 110 (0 65, 1 67) 122 (0 83, 1 78) 2 94 (113, 7 68) 107 (0 75, 1 52) 6 12 (0 35, 105 62)	% Weight 5.81 6.03 11.84 2.29 10.01 0.29	Author Single Modality Sherman, 2017 Sumner, 2018 Subtotal (I-squar Auth-Modality	2003 518 red = 16.0%,	`elephone _ ₽ = 0.275)	Counseli	ng (n of 1.: 0.5 1.5	n= 9 R (95% Cl) 17 (0.90, 1.51) 90 (0.60, 1.34) 07 (0.84, 1.37)	t % Wei 13.2 10.3 23.5
Author Siz Single Modality Garvey, 2012 27,7 Whiteley, 2012 30, Subtal (I+quared = Multi-Modality Andrews, 2016 465, Colis, 2016 465,	-Person Cc mple 8 0.0%, p = 0.585) 9 6 5 3	ounseling (n=	20 trials) OR (95% CI) 1.36 (0.79, 2.34) 1.10 (0.65, 1.67) 1.22 (0.83, 1.78) 1.07 (0.75, 1.52) 6.12 (0.35, 105.62) 1.27 (0.68, 2.38)	% Weight 5.81 6.03 11.84 2.29 10.01 0.29 4.75	Author Single Modality Sherman, 2017 Subtotal (I-squar Auth-Modality Bastian, 2013	Sample Size       2003       518       red = 16.0%,       496	`elephone 	Counselin	ng (n or 1.1 1.5 1.5	<b>1</b> = <b>9</b> <b>R</b> (95% Cl) <b>17</b> (0.90, 1.51) <b>90</b> (0.60, 1.34) <b>07</b> (0.84, 1.37) <b>13</b> (0.62, 2.04)	t % Wei 13.2 10.3 23.5
Author Siz Single Modality Garvey, 2012 277 Whiteley, 2012 333 Subtotal (I-squared = Multi-Modality Andrews, 2016 400 Bock, 2014 844 Choi, 2016 465 Choi, 2016 465	-Person Cc	ounseling (n=	20 trials) OR (95% C) 1.36 (0.79, 2.34) 1.10 (0.65, 187) 1.22 (0.83, 178) 2.94 (1.13, 768) 1.07 (0.75, 1.52) 6.12 (0.35, 105, 62) 1.53 (0.67, 3.51)	%         .           %         .           5.81         .           6.03         .           11.84         .           2.29         .           10.01         0.29           2.95         .	nel D Author Single Modality Sherman, 2017 Suthotal (I-squar Autti-Modality Bastian, 2013 (Ismaner, 2016	Sample Size       2003       518       red = 16.0%,       496       560	`elephone 	Counselin	ng (n or 1.7 0.5 1.0	<b>n</b> = <b>9</b> <b>R</b> (95% Cl) <b>17</b> (0.90, 1.51) <b>90</b> (0.60, 1.34) <b>07</b> (0.84, 1.37) <b>13</b> (0.62, 2.04) <b>86</b> (0.90, 3.85)	t. % Wei 13.2.3.5 7.21
San           Author         Siz           Single Modality         Garvey, 2012         233           Winbley, 2012         233         Subtotal (I-squared = 1           Multi-Modality         Andrews, 2016         405           Bock, 2014         644         644           Carley, 2016         255         Cho, 2016           Davis, 2014         1303         Gifford, 2011         303	-Person Cc mple 8 0 0%, p = 0.585) 9 5 3 3	ounseling (n=	20 trials) OR (95% Cl) 136 (079, 234) 110 (065, 187) 122 (083, 178) 294 (113, 768) 107 (075, 152) 612 (033, 105 62) 127 (068, 236) 153 (067, 35) 128 (138, 604)	% Weight 5.81 6.03 11.84 2.29 10.01 0.29 4.75 2.95 3.60	Author Single Modality Sherman, 2017 Subtotal (I-squar Auti-Modality Bastian, 2013 Gemperer, 2013	): T Sample Size 2003 518 red = 16.0%, 496 560	`elephone <sub>₽=0275)</sub> —	Counselin	ng (n 04 1.0 1.0 1.0 1.0 1.0	<b>R</b> (95% Cl) <b>17</b> (0.90, 1.51) <b>90</b> (0.60, 1.34) <b>07</b> (0.84, 1.37) <b>13</b> (0.62, 2.04) <b>86</b> (0.90, 3.85) <b>90</b> (0.70, 3.45)	t. % Wei 13.2 10.3 23.5 7.21
Author Siz Single Modality Garvey, 2012 277 Whiteley, 2012 302 Whiteley, 2012 302 Whiteley, 2012 302 Whiteley, 2012 302 Whiteley, 2012 402 Multi-Modality Andrews, 2016 405 Coni, 2016 425 Choi, 2016 425 Choi, 2016 425 Choi, 2016 425 Gifford, 2011 302	-Person Cc	ounseling (n=	20 trials) OR (95% CI) 1.36 (0.79, 2.34) 1.10 (0.65, 187) 1.22 (0.83, 1.78) 1.27 (0.86, 2.39) 1.27 (0.86, 2.39) 1.53 (0.67, 3.51) 2.86 (1.36, 6.04) 1.57 (0.86, 2.12)	% Weight 5.81 6.03 11.84 2.29 10.01 0.29 4.75 2.25 3.60 7.81 0.01	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Auth-Modality Bastian, 2013 Gemperer, 2016 Aaddison, 2014	Sample Size       2003       518       red = 16.0%,       496       560       906	`elephone	Counselin	ng (n 127 147 147 147 147 147 147 147 14	<b>1</b> = 9 <b>1</b> 7 (0.90, 1.51) <b>9</b> 0 (0.60, 1.34) <b>9</b> 0 (0.60, 1.34) <b>13</b> (0.62, 2.04) <b>86</b> (0.90, 3.85) <b>08</b> (0.79, 1.48)	t. % Wei 13.2 10.3 23.5 7.21 5.67 12.1
Author Siz Single Modality Garvey, 2012 277 Whiteley, 2012 333 Subtotal (I-squared = Multi-Modality Andrews, 2016 405 Bock, 2014 84 Multi-Modality Andrews, 2016 405 Gatey, 2016 425 Choi, 2011 80 Gifford, 2011 80 Gifford, 2011 302 Hooper, 2017 344	-Person Cc mple te 0.0%, p = 0.585) 9 6 5 3 5 2 2	ounseling (n=	20 trials) OR (95% C)) 1.36 (0.79, 2.34) 1.10 (0.65, 1.87) 1.22 (0.83, 1.76) 2.94 (1.13, 7.68) 1.07 (0.75, 1.52) 1.27 (0.68, 2.36) 1.53 (0.67, 3.51) 2.88 (1.38, 104, 22) 1.53 (0.67, 3.51) 2.88 (1.38, 6.44) 1.37 (0.88, 2.12) 1.27 (0.77, 2.09) 1.26 (0.82, 2.23)	% Veight // // // // // // // // // // // // //	Author Single Modality Sherman, 2017 Sumner, 2018 Subtotal (I-squar Auth-Modality Bastian, 2013 Skemperer, 2016 Gedison, 2014 Ramon, 2013	Sample Size           2003         518           red = 16.0%,         496           560         906           600         600	`elephone , , , , , , , , , , , , , , , , , , ,	Counselin	ng (n or 1:1 0:3 1:4 1:4 1:4 0:4	<b>R</b> (95% Cl) <b>R</b> (95% Cl) <b>17</b> (0.90, 1.51) <b>90</b> (0.60, 1.34) <b>07</b> (0.84, 1.37) <b>13</b> (0.62, 2.04) <b>86</b> (0.90, 3.85) <b>86</b> (0.79, 1.48) <b>82</b> (0.58, 1.15)	t % Wei 13.2 10.3 23.5 7.21 5.67 12.1 11.5
Author Siz Single Modality Garvey, 2012 27, Winteley, 2012 27, Winteley, 2012 27, Subtal (1+quared = Multi-Modality Andrews, 2016 055 book, 2014 844 Catley, 2016 255 Choi, 2016 464 Choi, 2016 100 Hall, 2011 302 Hall, 2011 324	-Person Co mple 8 0.0%, p = 0.585) 9 6 5 3 5 3 5 2 9 0	ounseling (n=	20 trials) OR (95% CI) 1.36 (0.79, 2.34) 1.10 (0.65, 1.67) 1.22 (0.83, 1.78) 1.07 (0.75, 1.52) 6.12 (0.35, 1.056, 2.39) 1.27 (0.68, 2.39) 1.28 (1.68, 2.39) 1.28 (0.68, 2.39) 1.28 (0.68, 2.39) 1.28 (0.68, 2.39) 1.28 (0.29, 2.34) 1.29 (0.82, 2.24) 1.27 (0.29, 2.36)	%         Pai           %         %           %         %           5.81         6.03           6.03         1.84           11.84         5           10.01         0.29           0.29         9           7.81         5           8.60         6           6.61         6           6.62         9	Author Single Modality Sherman, 2017 Sunner, 2016 Subtotal (I-squar Auth-Modality Bastian, 2013 Stemperer, 2016 Adadison, 2014 Ramon, 2013	Sample Size           2003         518           red = 16.0%,         496           560         906           600         1202	`elephone	Counselin	ng (n	<b>1 = 9</b> <b>1</b> 7 (0.90, 1.51) <b>9</b> 0 (0.60, 1.34) <b>0</b> 7 (0.84, 1.37) <b>13</b> (0.62, 2.04) <b>8</b> 6 (0.90, 3.85) <b>0</b> 8 (0.758, 1.15) <b>17</b> (0.90, 1.51)	t. % Wei 13.2.3.5 7.21 5.67 12.1 11.5 13.1
Author         Sar           Single Modality         Garvey, 2012         277           Winheley, 2012         333         Subtotal         I-lease           Jubit-Modality         Andrews, 2016         255         Choi, 2016         464         Catley, 2016         256         Choi, 2016         436         Gifford, 2011         303         Subtotal         1-lease         Jubit-Modality         Andrews, 2016         436         Gifford, 2011         303         Gifford, 2011         303         Gifford, 2011         302         Hooper, 2017         344         Hooper, 2017         345         Hooper, 2017         Hooper, 2017         Hooper, 2017	-Person Cc	ounseling (n=	20 trials) OR (55% C)) 1.36 (0.79, 2.34) 1.10 (0.65, 1.87) 1.22 (0.83, 1.76) 0.17 (0.75, 1.62) 6.12 (0.35, 1.05 62) 1.27 (0.68, 2.35) 1.286 (1.36, 64) 1.37 (0.68, 2.12) 1.36 (0.62, 2.24) 1.37 (0.62, 2.24) 1.37 (0.62, 2.24) 1.37 (0.62, 2.24)	%            %            5.81         6.03           11.84         5.81           10.01         0.29           0.29            2.95            3.60            6.60            6.48         3.57	Author Single Modality Sherman, 2017 Sumner, 2018 Subtotal (Haquar Autli-Modality Bastian, 2013 Gemperer, 2013 Swan, 2010 Zeelpis, 2010	Sample Size           2003           518           red = 16.0%,           496           560           906           600           1202           1562	`elephone	Counselin	ng (n or 1.1 0.5 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2	P         9           R (95% Cl)         17 (0.90, 1.51)           90 (0.60, 1.34)         07 (0.84, 1.37)           13 (0.62, 2.04)         66 (0.90, 3.85)           08 (0.79, 1.48)         82 (0.58, 1.15)           17 (0.90, 1.51)         35 (1.00, 1.83)	% Wei 13.2 10.3 23.5 7.21 5.67 12.1 111.5 13.1 12.3
Sand         Sand           Author         Siz           Single Modality         Siz           Garvey, 2012         233           Winbley, 2012         233           Subtotal (I-squared =         Multi-Modality           Andrews, 2014         644           Bock, 2014         644           Davis, 2014         130           Giford, 2011         302           Giford, 2011         303           Multi-Modality         Author           Author         130           Giford, 2011         302           Gokyemin, 2013         333           Pesis-Katz, 2013         343           Pesis-Katz, 2013         360	-Person Cc mple 8 0 0%, p = 0.585) 9 6 5 3 5 3 5 3 5 3 5 3 5 3 5 3 5 3 5 3 5 7 0	ounseling (n=	20 trials) OR (95% CI) 136 (0 79, 2 34) 110 (0 65, 187) 122 (0 83, 178) 2 94 (113, 7 68) 107 (0 75, 152) 127 (0 86, 2 36) 153 (0 67, 3 51) 2 84 (1 38, 6 04) 137 (0 88, 2 12) 127 (0 77, 2 09) 135 (0 62, 2 44) 177 (0 82, 3 61) 37 (1 89, 7 31) 169 (1 19, 2 41)	%            %            %            5.81            6.03            3.11.84            2.29            10.01            0.29            7.81            6.60            6.48            3.57            10.02	Author Single Modality Sherman, 2017 Sumner, 2018 Subtotal (I-squar Auth-Modality Bastian, 2013 Glemperer, 2016 Aaddison, 2014 Swan, 2010 Tzelepis, 2010 Tzelepis, 2010	): T Sample Size          2003         518         2003         518         red = 16.0%,         496         560         906         600         1202         1562         2277	`elephone	Counselin	ng (n	<b>n = 9</b> <b>R</b> (95% C)) <b>17</b> (0.90, 1.51) <b>13</b> (0.62, 2.04) <b>16</b> (0.90, 3.85) <b>08</b> (0.79, 1.46) <b>02</b> (0.58, 1.15) <b>17</b> (0.90, 1.51) <b>35</b> (1.00, 1.63) <b>94</b> (160, 2.35)	% Wei 13.2 10.3 23.5 7.21 5.67 12.1 11.5 13.1 11.2 14.4
Author Siz Single Modality Garvey, 2012 277 Whiteley, 2012 302 Whiteley, 2012 303 Whiteley, 2012 303 Multi-Modality Andrews, 2016 265 Davis, 2016 265 Davis, 2016 265 Garley, 2017 345 Hooper, 2017 345 Hooper, 2017 345 Hooper, 2017 345 Beels-Katz, 2013 73 Ramon, 2013 600	-Person Co	ounseling (n=	20 trials) OR (95% CI) 1.38 (0.79, 2.34) 1.10 (0.65, 1.87) 1.22 (0.83, 1.78) 1.27 (0.78, 1.22) 1.27 (0.78, 1.22) 1.27 (0.78, 1.22) 1.27 (0.78, 2.34) 1.28 (1.38, 6.04) 1.37 (0.88, 2.39) 1.28 (0.82, 2.34) 1.37 (0.88, 2.12) 1.27 (0.77, 2.09) 1.35 (0.62, 2.24) 1.72 (0.82, 3.61) 1.37 (1.49, 7.31) 1.69 (1.19, 7.31) 1.69 (1.19, 7.31) 1.69 (1.19, 7.31)	%         Pai           %         -           5.81         6.03           11.84         5           11.84         5           10.01         0.29           0.29         8           3.60         7           3.60         7           6.48         3.57           4.15         10.02           6.15         2.2	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Auth-Modality Bastian, 2013 Gemperer, 2016 Maddison, 2014 Aramon, 2013 Swan, 2010 Tzelepis, 2010 Tzelepis, 2010	Sample Size           2003         518           2003         518           red = 16.0%,         496           560         906           900         1202           1562         2277           21562         2277	`elephone 	Counselin	ng (n or 1.1 0.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	<b>1</b> = <b>9</b> <b>1</b> 7 (0.90, 1.51) <b>3</b> 0 (0.60, 1.34) <b>3</b> 0 (0.62, 2.04) <b>4</b> 8 (0.90, 3.68) <b>1</b> 3 (0.62, 2.04) <b>5</b> 8 (0.90, 3.68) <b>1</b> 3 (0.62, 2.04) <b>5</b> 8 (1.06, 1.48) <b>5</b> 9 (1.00, 1.83) <b>5</b> 4 (1.00, 1.83) <b>5</b> 4 (1.00, 2.35) <b>5</b> 7 (1.00, 2.35) <b>5</b>	t % Weij 13.2 10.3 23.5 7.21 15.67 12.1 11.5 13.1 14.4 7.6
Author         Sa           Single Modality         Garvey, 2012         277           Garvey, 2012         273         303           Subtotal (I-squared = 1         -         -           Multi-Modality         Andrews, 2016         404           Bock, 2014         844         -           Jubit-Modality         Andrews, 2016         405           Gatey, 2016         265         Choi, 2011         303           Garlow, 2017         344         Hooper, 2017         344           Ocuyern, 2013         333         Ramon, 2013         337           Ramon, 2013         305         Sheffer, 2017         245           Sheffer, 2017         242         Andrews, 2018         373           Ramon, 2013         305         Sheffer, 2017         245	-Person Cc mple 20 00%, p = 0.585) 9 6 5 3 5 2 9 0 7 2	ounseling (n=	20 trials) OR (95% C) 1.36 (0.79, 2.34) 1.10 (0.65, 187) 1.22 (0.83, 1.78) 2.94 (1.13, 76) 1.22 (0.83, 105, 62) 1.53 (0.67, 3.51) 2.88 (1.38, 105, 62) 1.53 (0.67, 3.51) 2.88 (1.38, 6.44) 1.37 (0.88, 2.12) 1.37 (1.98, 7.31) 1.66 (1.19, 7.31) 1.67 (1.19, 7.31) 1.67 (1.19, 7.31) 1.68	%            %            %            5.81         6.03           11.84         5.81           2.29         10.01           0.29         9           4.75         8           2.95         3.60           6.60         6.48           3.57         4.15           4.35         5	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Auth-Modality Bastian, 2013 Georgener, 2016 Gaddison, 2014 Ramon, 2013 Swan, 2010 Izelepis, 2010 Izelepis, 2010	Sample Size           2003         518           2003         518           red = 16.0%,         496           560         906           600         1202           1202         1202           1202         1202           1207         red = 77.2%,	`elephone	Counselin	ng (n 11 12 14 14 14 14 14 14 14 14 14 14	P         9           R (95% Cl)         17 (0.90, 1.51)           90 (0.60, 1.34)         07 (0.84, 1.37)           13 (0.62, 2.04)         66 (0.90, 3.85)           90 (0.79, 1.48)         82 (0.58, 1.15)           17 (0.90, 1.51)         35 (1.00, 1.83)           94 (1.40, 2.33)         527 (0.98, 1.65)	% Weie 13.2 10.3 23.5 7.21 15.67 12.1 11.5 13.1 12.3 14.4 76.4
Author         Siz           Single Modality         Siz           Ganey, 2012         273           Wihteley, 2012         274           Wihteley, 2012         274           Wihteley, 2012         274           Wihteley, 2012         274           Multi-Modality         Andrews, 2016           Andrews, 2016         464           Choi, 2016         464           Davis, 2014         134           Levine, 2013         434           Peais-Katz, 2013         373           Ramon, 2013         603           Sheffer, 2017         225           Smit, 2016         263	-Person Co mple 8 0.0%, p = 0.585) 9 6 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3 5 5 3	ounseling (n=	20 trials) OR (95% CI) 1 36 (0 79, 2 34) 1 10 (0 65, 167) 1 22 (0 83, 178) 2 94 (1 13, 7 68) 1 07 (0 75, 152) 6 12 (0 33, 105 62, 234) 1 27 (0 68, 2 38) 1 27 (0 68, 2 38) 1 37 (1 88, 7 31) 1 76 (1 19, 2 41) 1 36 (1 19, 2 41) 1 32 (0 65, 5 24)	%         Pai           %         %           Weight         %           5.81         6.03           6.03         1.84           11.84         5           10.01         0.29           9         8           7.81         5           3.60         7           7.81         5           3.60         7           3.61         7           3.62         7           3.61         7           3.62         7           3.61         7           3.62         7           3.63         7           3.61         7           3.62         7           3.63         7           3.61         7           3.62         7           3.63         7           3.61         7           3.61         7           3.62         7           3.63         7           3.61         7           3.62         7           3.63         7           3.63         7           3.63         7 <td>Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Auth-Modality Bastian, 2013 Sastian, 2013 Sastian, 2013 Sastian, 2013 Subtotal (I-squar Subtotal (I-squar</td> <td>Sample Size          2003         518         2003         518         2003         518         2003         518         2003         518         2003         518         2003         518         906         600         1202         1562         2277         red = 77.2%,</td> <td>`elephone</td> <td>Counselin</td> <td>ng (n</td> <td>Image         9           R (95% Cl)         90           17 (0.90, 1.51)         90           90 (0.60, 1.34)         90           90 (0.60, 1.34)         90           90 (0.62, 2.04)         86           86 (0.90, 3.85)         80           98 (0.58, 1.15)         17           95 (0.58, 1.15)         15           95 (1.00, 1.83)         94 (1.60, 2.36)           92 (7.0.98, 1.65)         156)</td> <td>t % Weig 13.2 10.3 23.5 7.21 11.5 .67 12.1 11.5 .67 12.1 11.5 13.1 11.2 3 14.4 76.4</td>	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Auth-Modality Bastian, 2013 Sastian, 2013 Sastian, 2013 Sastian, 2013 Subtotal (I-squar Subtotal (I-squar	Sample Size          2003         518         2003         518         2003         518         2003         518         2003         518         2003         518         2003         518         906         600         1202         1562         2277         red = 77.2%,	`elephone	Counselin	ng (n	Image         9           R (95% Cl)         90           17 (0.90, 1.51)         90           90 (0.60, 1.34)         90           90 (0.60, 1.34)         90           90 (0.62, 2.04)         86           86 (0.90, 3.85)         80           98 (0.58, 1.15)         17           95 (0.58, 1.15)         15           95 (1.00, 1.83)         94 (1.60, 2.36)           92 (7.0.98, 1.65)         156)	t % Weig 13.2 10.3 23.5 7.21 11.5 .67 12.1 11.5 .67 12.1 11.5 13.1 11.2 3 14.4 76.4
Author Siz Single Modality Garvey, 2012 277 Whiteley, 2012 333 Subtotal (+aquared = - Multi-Modality Andrews, 2016 265 Davis, 2014 343 Gifford, 2011 302 Gifford, 2011 302 Gifford, 2011 302 Gifford, 2011 302 Bavis, 2014 133 Gifford, 2011 302 Bavis, 2013 373 Ramon, 2013 600 Simh, 2014 101 Simher, 2013 737 Ramon, 2013 600 Simh, 2014 101 Simher, 2015 255	-Person Cc	ounseling (n=	20 trials) OR (95% C)) 1 36 (0 79, 2 34) 1 10 (0 65, 187) 1 22 (0 83, 178) 1 27 (0 68, 2 36) 1 55 (0 67, 351) 2 86 (1 36, 604) 1 37 (0 88, 2 12) 1 37 (0 86, 2 12) 1 37 (0 86, 5 24) 1 10 (0 55, 2 42) 1 10 (0 55, 2 42) 1 36 (0 65, 5 24) 1 31 (0 55,	%         Pai           %            5.81            6.03         1           11.84            2.29            10.01         0           0.29            4.75            2.96            3.60            6.60            6.48            3.57            1.98            3.41	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Autli-Modality Bastian, 2013 Gemperer, 2016 Gemperer, 2016 Swan, 2010 Zhu, 2012 Subtotal (I-squar Dverall (I-squar	2003 518 red = 16.0%, 496 560 906 600 1202 1562 2277 red = 77.2%, ad = 74.4%, p	`elephone	Counselin	ng (n 	P         9           R (95% Cl)         17 (0.90, 1.51)           90 (0.60, 1.34)         07 (0.84, 1.37)           13 (0.62, 2.04)         86 (0.90, 3.85)           08 (0.79, 1.48)         82 (0.58, 1.15)           17 (0.90, 1.51)         35 (1.00, 1.83)           94 (1.60, 2.35)         27 (0.98, 1.65)           21 (0.98, 1.50)         21 (0.98, 1.50)	% Weig 13.2 10.3 23.5 7.21 10.3 23.5 7.21 11.5 13.1 11.5 13.1 11.2 13.1 14.4 76.4
San         San           Author         Siz           Single Modality         Siz           Garvey, 2012         233           Winbley, 2012         233           Subtotal (I-squared =         Multi-Modality           Andrews, 2016         462           Coho, 2016         463           Coho, 2016         463           Davis, 2016         463           Multi-Modality         Andrews, 2016           Mandrews, 2016         463           Ohoper, 2017         344           Levine, 2010         343           Pesis-Katz, 2013         333           Sheffe, 2017         223           Sheffe, 2017         224           Sheffe, 2014         235           Smith, 2014         103           Webb, 2010         155           Webb, 2010         15	-Person Cc mple 8 0 0%, p = 0.585) 9 6 5 3 5 5 2 9 9 0 7 7 7 2 3 7 4 7	ounseling (n=	20 trials) OR (95% CI) 136 (0 79, 234) 110 (0 65, 167) 122 (0 83, 178) 2.94 (113, 7 68) 107 (0 75, 152) 6 (12 (0 33, 105 62) 127 (0 68, 236) 153 (0 67, 3 51) 128 (138, 6 04) 137 (0 88, 212) 127 (0 28, 3 61) 37 (1 88, 7 31) 160 (119, 244) 170 (26, 3 196) 186 (0 66, 5 24) 272 (122, 6 05) 138 (0 84, 927)	%            Weight            5.81            6.03         1           11.84            2.29            10.01            0.29            4.75            2.95            3.60            6.00            6.15            4.35            1.98            3.41            3.55	Author Single Modality Sherman, 2017 Sumner, 2018 Subtotal (I-squar Auth-Modality Bastian, 2013 Gemperer, 2016 Addison, 2014 Ramon, 2013 Swan, 2010 Fzelepis, 2010 Fzelepis, 2010 Chru, 2012 Subtotal (I-square	Sample Size          2003       518         2003       518         red = 16.0%,       496         600       906         600       1202         1562       2277         red = 77.2%,       ed = 74.4%, p	°elephone	Counselin	ng (n	n=         9           17 (0.90, 1.51)         300 (0.60, 1.34)           307 (0.84, 1.37)         13 (0.62, 2.04)           86 (0.90, 3.85)         380 (78, 1.48)           32 (0.68, 1.16)         151)           35 (100, 1.83)         44 (160, 2.35)           27 (0.98, 1.65)         21 (0.98, 1.50)	tr % Weig 13.2 10.3 23.5 7.21 11.5 13.1 14.4 76.4 100.
Author Siz Author Siz Single Modality Garvey, 2012 274 Whiteley, 2012 302 Subtal (I-squared = Mult-Modality Andrews, 2016 265 book, 2014 844 Catley, 2016 265 Mult-Modality Andrews, 2016 464 Chay, 2016 265 Gifford, 2011 302 Hall, 2011 322 Gifford, 2011 303 Hall, 2011 322 Sint, 2016 265 Sint, 2016 265 Sin	-Person Cc mple 8 0.0%, p = 0.585) 9 6 5 3 5 5 3 5 5 7 7 4 7 2 2 7 7 4 7 2 2 7 6 9 0 0 0 0 0 0 0 0 0 0 0 0 0	ounseling (n=	20 trials) OR (95% CI) 1.38 (0.79, 2.34) 1.10 (0.65, 1.87) 1.22 (0.83, 1.78) 2.94 (1.13, 7.68) 1.07 (0.75, 1.52) 6.12 (0.35, 1.056) 1.27 (0.68, 2.30) 1.28 (1.43, 7.68) 1.27 (0.77, 2.00) 1.36 (0.62, 2.24) 1.37 (1.68, 7.31) 1.66 (1.19, 7.31) 1.66 (1.19, 7.31) 1.66 (1.19, 7.31) 1.66 (1.19, 7.31) 1.66 (5, 5.24) 1.13 (0.55, 2.43) 1.27 (0.57, 1.52) 1.27 (0.5	%            %            %            5.81         6.03           1.1.84            2.29            10.01         0.29           0.29            7.81            6.80            3.57            1.98            3.15         6.59           88.16	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Auti-Modality Bastian, 2013 Gemperer, 2016 Maddison, 2014 Aradon, 2014 Subtotal (I-squar Subtotal (I-squar Dverall (I-squar	Sample Size          2003       518         2003       518         red = 16.0%,       496         560       906         906       600         1202       1562         2277       red = 77.2%,         ad = 74.4%, p       p	`elephone	Counselin	ng (n	<b>1</b> = <b>9</b> <b>1</b> (0.90, 1.51) <b>3</b> (0.60, 1.34) <b>3</b> (0.62, 2.04) <b>4</b> (0.90, 3.85) <b>3</b> (0.79, 1.48) <b>8</b> (0.58, 1.15) <b>3</b> (1.00, 1.83) <b>3</b> 4(1.60, 2.35) <b>2</b> 7(0.98, 1.65) <b>2</b> 1(0.98, 1.50)	t % Weig 13.2 10.3 23.5 7.21 15.67 7.21 11.5 13.1 11.5 13.1 14.4 76.4 100.
Saa           Author         Sia           Single Modality         Garvey, 2012         273           Garvey, 2012         273         Winbley, 2012         233           Muthor         Siz         Single Modality         Garvey, 2012         273           Mutholey, 2012         273         Winbley, 2012         273           Subtotal (I-squared = 1         Siz         640           Coho, 2016         460         640           Davis, 2016         450         640           Muth-Modality         Address, 2016         303           Manon, 2013         430         Pesis-Katz, 2013         310           Mamon, 2013         430         Pesis-Katz, 2013         310           Smith, 2014         204         304         304           Varine, 2016         255         Webb, 2010         15           Webb, 2010         15         304         304           Overall (I-squared = 2         0         0         0	-Person Co mple 0 0%, p = 0.585) 0 0%, p = 0.585) 0 0 5 5 5 5 5 5 5 7 7 7 29.7%, p = 0.115) 24.7%, p = 0.153)	ounseling (n=	20 trials) OR (95% CI) 136 (079, 234) 110 (065, 167) 122 (083, 178) 294 (113, 768) 107 (075, 152) 6 (12 (033, 10562) 127 (068, 238) 153 (067, 351) 128 (138, 604) 137 (088, 212) 127 (077, 209) 136 (028, 2361) 137 (189, 731) 169 (119, 241) 169 (19, 241) 169 (19, 241) 136 (068, 524) 217 (122, 169) 136 (064, 227) 151 (127, 179) 146 (125, 170)	%         Pai           %            %            581         6.0           6.03            11.84            11.84            2.29            10.01            0.29            8.60            6.80            6.80            0.475            10.01            0.29            10.01  <	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Auth-Modality Sastian, 2013 Subtotal (I-squar Subtotal (I-squar Divu, 2012 Subtotal (I-squar Divustal (I-square	Sample Size           2003           518           2003           518           2003           518           2003           518           2003           518           2003           518           2003           518           2003           518           906           600           600           1202           1562           2277           red = 77.2%,           ad = 74.4%, p	°elephone	Counselin	ng (n of 1.7 1.6 1.6 1.6 1.6 1.6 1.6 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	<b>1</b> = <b>9</b> <b>1</b> 7 (0.90, 1.51) <b>1</b> 7 (0.90, 1.51) <b>9</b> 0 (0.60, 1.34) <b>9</b> 0 (0.60, 1.34) <b>9</b> 0 (0.60, 1.34) <b>1</b> 3 (0.62, 2.04) <b>8</b> 6 (0.90, 3.85) <b>9</b> 0 (79, 1.48) <b>9</b> 2 (0.58, 1.15) <b>1</b> 5 (1.00, 1.83) <b>9</b> 4 (1.60, 2.35) <b>2</b> 7 (0.98, 1.65) <b>2</b> 1 (0.98, 1.50)	t Wei 13.2 10.3 23.5 7.21 11.5 13.1 11.5 13.1 12.3 14.4 76.4 100.
Author Siz Single Modality Garvey, 2012 273 Winiteley, 2012 274 Winiteley, 2012 274 Winiteley, 2012 374 Winiteley, 2012 330 Kottal (1-squared = 2 Kottal	-Person Co mple 8 0.0%, p = 0.585) 9 6 5 5 5 5 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7	ounseling (n=	20 trials) OR (95% CI) 1 36 (0 79, 2 34) 1 10 (0 65, 167) 1 22 (0 83, 178) 2 94 (1 13, 7 68) 1 07 (0 75, 152) 6 12 (0 33, 105 62, 234) 1 27 (0 68, 2 39) 1 28 (0 48, 2 39) 1 28 (0 48, 2 39) 1 37 (0 88, 2 12) 1 72 (0 68, 2 39) 1 73 (0 88, 2 12) 1 74 (1 88, 7 31) 1 60 (1 19, 2 41) 1 02 (0 65, 124) 1 80 (0 65, 524) 1 13 (0 55, 2 43) 1 80 (0 45, 227) 1 53 (0 27, 2 109) 1 80 (0 65, 524) 1 13 (0 55, 2 43) 1 38 (0 64, 2 27) 1 53 (0 27, 2 179) 1 46 (1 25, 1 70) 1 46 (1 25, 1 70)	%         Pai           %         %           %         %           5.81         6.03           6.03         3           11.84         5           10.01         0.29           9         8           10.01         0.29           0.860         6           6.84         5           3.60         7.81           9.60         6           9.43         5           10.02         2           1.5         5           6.03         8           3.60         7.81           6.88         6           3.41         3.15           6.59         88.16           100.00         100.00	Author Single Modality Sherman, 2017 Sumner, 2016 Subtotal (I-squar Auth-Modality Bastian, 2013 Sastian, 2013 Sastian, 2013 Subtotal (I-squar Subtotal (I-squar Overall (I-squar	Sample Size 2003 518 red = 16.0%, 496 560 906 600 1202 1562 2277 red = 77.2%, ad = 74.4%, p	`elephone	Counselin	ng (n or 1.1 0.6 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	<b>1 = 9</b> <b>1</b> (0.90, 1.51) <b>9</b> 0 (0.60, 1.34) <b>9</b> 0 (0.60, 1.34) <b>9</b> 0 (0.64, 1.37) <b>13</b> (0.62, 2.04) <b>8</b> 6 (0.90, 3.85) <b>8</b> 6 (0.76, 1.16) <b>13</b> (0.62, 2.04) <b>8</b> 6 (0.90, 3.85) <b>9</b> (1.60, 2.35) <b>27</b> (0.98, 1.65) <b>21</b> (0.98, 1.50)	t Wei 13.2.3.5 7.21 15.67 12.1 11.5 13.1 12.2 13.4 4.4 76.4 100

#### B.3.3: Active vs. Minimal Intervention Control Comparators Electronic/Web-Based (n= Panel Panel A: 25 trials) C: Pharmacotherapy (n=25 trials) Sample Sample Size % Weigh % Weight OR (95% CI) Autho OR (95% CI) Author Size Minimal, or No Intervention C Anthrenelli, 2016 3015 Bullen, 2010 1100 Cinciripini, 2013 294 Gonzales, 2014 494 Hughes, 2011 218 Rennard, 2012 659 Tonnesen, 2012 479 Walker, 2011 141 Subtotal (I-squared = 84.8%, Minimal, or No Abroms, 2014 Bock, 2010 1.47 (0.87, 2.48) 2.52 2.20 (1.09, 4.44) 1.59 1.13 (0.87, 1.46) 5.59 1.04 (0.38, 2.87) 0.84 2.31 (1.27, 4.22) 2.03 1.13 (0.93, 1.37) 6.75 0.65 (0.38, 1.11) 2.46 1.20 (1.05, 1.36) 7.91 0.99 (0.52, 1.88) 1.85 0.71 (0.45, 1.14) 2.97 1.40 (0.88 2.22) 2.90 2.05 (1.69, 2.49) 0.80 (0.59, 1.09) 1.56 (0.90, 2.68) 2.67 (1.73, 4.13) 2.10 (0.85, 5.18) 3.67 (2.24, 6.01) 2.12 (1.28, 3.49) 1.25 (0.97, 1.62) 1.80 (1.92, 2.54) 503 200 5.30 4.59 3.17 3.79 1.74 3.44 3.41 4.94 Bock, 2010 Borland, 2013 Choi, 2014 Cobos-Campos, Gilbert, 2012 Houston, 2013 Leykin, 2012 Reitzel, 2011 145 320 6697 576 1643 303 302 1.80 (1.28, 2.54) 30.39 p = 0.000Sherratt, 2018 Smit, 2012 Smit, 2016 1123 251 1.40 (0.88, 2.22) 2.99 1.12 (0.57, 2.21) 1.68 Active Control Active Control Baker, 2016 Burns, 2014 Caldwell, 2014 Caldwell, 2016 Carpenter, 2011 Eubert, 2014 Hall, 2011 Levine, 2010 Ramon, 2014 Rose, 2013 Schnoll, 2010 1086 1.14 (0.81, 1.60) $\begin{array}{c} 1.14 \ (0.81, 1.60) \\ 0.90 \ (0.68, 1.20) \\ 1.41 \ (1.02, 1.97) \\ 2.10 \ (1.41, 3.11) \\ 1.17 \ (0.80, 1.71) \\ 1.20 \ (0.97, 1.50) \\ 1.32 \ (0.91, 1.90) \\ 1.20 \ (0.78, 1.86) \\ 1.51 \ (1.08, 2.11) \\ 3.52 \ (1.98, 6.27) \\ 1.28 \ (0.81, 2.02) \\ 2.66 \ (1.20, 5.93) \\ 1.77 \ (1.21, 2.59) \\ 1.35 \ (0.88, 2.07) \end{array}$ 4.41 4.79 4.48 4.06 4.16 5.18 4.23 3.78 4.44 2.99 3.68 2.05 Stanczyk, 2016 Subtotal (I-squ 2099 3.1%, p 1.41 (1.10, 1.80) 5.77 1.19 (1.04, 1.37) 44.95 1495 1423 502 849 2806 506 325 1246 349 341 335 575 . Active Control Bolman, 2015 Bricker, 2017 0.98 (0.73, 1.33) 4.91 0.91 (0.76, 1.09) 7.02 1.08 (0.92, 1.27) 7.31 1.42 (1.25, 1.62) 7.93 1.73 (1.08, 2.77) 2.91 1.85 (0.93, 3.69) 1.64 0.91 (0.69, 1.20) 5.25 1.08 (0.57, 2.05) 1.84 0.98 (0.65, 1.48) 3.50 0.91 (0.71 1.17) 5.64 1982 2637 4613 5792 900 213 1758 403 566 Bricker, 2017 Brown, 2014 Free, 2011 Houston, 2015 Loughead, 2016 Mason, 2011 Moskowitz, 2016 Richter, 2015 Swap, 2010 Schnoll, 2010 4.14 3.85 Swan, 2010 1201 0.91 (0.71, 1.17) 5.64 Schnoll, 2015 526 1.35 (0.88, 2.07) Westmass, 2017 Wetter, 2011 Subtotal // 1.36 (0.98, 1.90) 4.42 0.75 (0.45, 1.23) 2.68 1.09 (0.95, 1.26) 55.05 1.66 (1.20, 2.28) 4.52 1.11 (0.85, 1.46) 4.85 1.84 (1.23, 2.74) 4.01 1.42 (1.24, 1.62) 69.61 1070 Selby, 2014 1380 1071 Stapleton, 2013 Tulloch, 2016 Tulloch, 2016 Subtotal (I-squa ed = 56.9%, p 0 . Overall (I-squared = 57.2%, p = 0.000) ð 1.14 (1.03, 1.25) 100.00 1.53 (1.33, 1.77) 100.00 . Overall (I-squared = 73.7%, p = 0.000) $\diamond$ 4.44 .225 6.27 16 **Panel D:** Telephone Counseling (n= 9 trials) **Panel B:** In-Person Counseling (n= 20 trials) Sample Sample OR (95% CI) Autho Size Weight Autho Size OR (95% CI) Weigh Minimal, or No Intervention Control Andrews, 2016 Bock, 2014 409 2.94 (1.13, 7.68) 2.29 Minim al. or No In 846 1.07 (0.75, 1.52) 6.12 (0.35, 105.62) 10.01 0.29 Bock, 2014 Catley, 2016 Okuyemi, 2013 Pesis-Katz, 2013 Smit, 2016 Vidrine, 2016 Wewers, 2017 Subtotal (I-square Bastian, 2013 496 1.13 (0.62, 2.04) 7.21 255 6.12 (0.35, 105.62 1.72 (0.82, 3.61) 3.71 (1.89, 7.31) 1.02 (0.53, 1.96) 1.13 (0.53, 2.43) 1.38 (0.84, 2.27) 1.57 (1.10, 2.25) 0.29 3.57 4.15 4.35 3.41 1.86 (0.90, 3.85) 560 5.67 430 737 Klemperer, 2016 1.08 (0.79, 1.48) Maddison, 2014 906 12.10 282 257 707 Sherman, 2017 2003 1.17 (0.90, 1.51) 13.22 Tzelepis, 2010 1562 1.35 (1.00, 1.83) 12.34 6.59 34.67 1.94 (1.60, 2.35) ed = 54.2%, p = 0.033) Zhu, 2012 2277 14.44 Subtotal (I-sq = 69.6%, p 1.38 (1.08, 1.76) 64.9 Active Control Choi, 2016 1.27 (0.68, 2.36) Davis, 2014 135 1.53 (0.67, 3.51) 1.36 (0.79, 2.34) 2.95 Active Control Garvey, 2012 Gifford, 2011 278 5.81 Ramon, 2013 600 0.82 (0.58, 1.15) 11.50 303 2.88 (1.38, 6.04) 3.60 7.81 0.90 (0.60, 1.34) Sumner, 2016 518 10.34 Hall, 2011 1.37 (0.88, 2.12) 325 342 349 600 227 103 154 Hooper, 2017 Levine, 2010 1.27 (0.77, 2.09) 6.60 Swan, 2010 1202 1.17 (0.90, 1.51) 13.19 6.48 10.02 6.15 1.98 3.15 1.35 (0.82, 2.24) Levine, 2010 349 Ramon, 2013 600 Sheffer, 2017 227 Smith, 2014 103 Webb, 2010 154 Whiteley, 2012 330 Subtotal (I-squared = 0.0%, p = 0.525) 1.35 (0.82, 2.24) 1.69 (1.19, 2.41) 1.02 (0.60, 1.72) 1.85 (0.66, 5.24) 2.72 (1.22, 6.05) 1.10 (0.65, 1.87) 1.44 (1.23, 1.69) Subtotal (I-squared = 34.0%, p = 0.220) 0.98 (0.78, 1.23) 35.02 all (I-squared = 74.4%, p = 0.000) 1.21 (0.98, 1.50) 100.00 6.03 65.33 .26 3.85 ۵ Overall (I-squared = 24.7%, p = 0.153) 1.46 (1.25, 1.70) 100.00 .00947 106

#### Appendix B.3: Sensitivity Analyses Examining Change in Odds of Smoking Cessation From Random-Effects Meta-Analysis of Trials with Smokers Potentially Eligible for Lung Screening Based on 7-day Point Prevalence of Abstinence at 6-Months by Primary Intervention Type (n= 74 Trials)\*

Forest plots display weighted odds ratios and 95% confidence intervals of included trials. Trial weights are generated from a random effects analysis. Squares around point estimates indicate study weight relative to the lowest weighted study for each meta-analysis. The vertical dashed line represents the pooled odds ratio with the diamond representing the 95% confidence interval.

\* Some trials included more than one intervention of a differing generic type so that the sum of the sample of all intervention types is greater than the total number of trials included.

# Appendix B.4:

### Study Quality Assessment

Author, Year	Randomized (1/0)	Similar Patient Characteristics (1/0)	Double Blind (1/0)	Masking (1/0)	Withdrawal (1/0)	Selective Reporting (1/0)	Total
Electronic/Web-Ba	ised						
Abroms, 2014	1	1	NA	0	1	1	4
Bock, 2010	1	0	0	0	0	1	2
Bolman, 2015	1	1	NA	1	1	1	5
Borland, 2013	1	0	NA	1	1	1	4
Bricker, 2017	1	1	NA	1	1	1	5
Brown, 2014	1	1	NA	1	1	1	5
Calhoun, 2016	1	1	NA	0	1	0	3
Choi, 2014	0	0	NA	1	1	1	3
Cobos-Campos, 2017	1	0	NA	0	1	1	3
Free, 2011	1	1	NA	1	1	1	5
Gilbert, 2013	1	0	NA	0	1	1	3
Houston, 2013	1	0	NA	1	0	1	3
Houston, 2015	1	1	NA	1	0	1	4
Leykin, 2012	1	1	NA	0	1	1	4
Loughead, 2016	1	1	NA	0	1	1	4
Mason, 2012	1	1	NA	1	1	1	5
Moskowitz, 2016	1	0	NA	1	1	1	4
Reitzel, 2011	0	1	NA	0	0	1	2
Richter, 2015	1	1	NA	0	1	1	4
Sheratt, 2018	1	0	NA	1	0	1	3
Smit, 2012	1	1	NA	0	1	1	4
Stanczyk, 2016	1	0	NA	1	1	1	4
Westmass, 2018	1	1	NA	0	0	1	3
Wetter, 2011	1	1	NA	0	1	1	4
In-Person Counsel	ing						
Andrews, 2016	0	1	NA	1	1	1	4
Bock, 2014	1	0	NA	0	1	0	2
Brooks, 2017	1	0	NA	0	1	1	3
Catley, 2016	1	1	NA	1	1	1	5
Choi, 2016	1	1	NA	0	1	1	4
Davis, 2014	0	0	NA	1	1	1	3
Garvey, 2012	1	1	NA	0	0	0	2
Gifford, 2011	1	1	NA	0	1	0	3
Hooper, 2017	0	1	NA	0	1	1	3

Author, Year	Randomized (1/0)	Similar Patient Characteristics (1/0)	Double Blind (1/0)	Masking (1/0)	Withdrawal (1/0)	Selective Reporting (1/0)	Total
Kim, 2015	1	0	NA	1	1	1	4
Laude, 2017	1	0	NA	0	1	1	3
Okuyemi, 2013	1	1	NA	0	1	1	4
Pesis-Katz, 2011	0	1	NA	0	0	0	1
Ramos, 2010	1	0	NA	1	1	1	4
Sheffer, 2017	1	0	NA	1	0	1	3
Smith, 2014	0	0	NA	0	1	1	2
Vidrine, 2016	1	1	NA	0	1	1	4
Webb, 2010	1	1	NA	0	1	1	4
Wewers, 2017	0	1	1	1	1	1	5
Whiteley, 2012	0	1	NA	1	1	1	4
Williams, 2016	0	0	NA	0	0	0	0
Pharmacotherapy	•	•	•				
Anthenelli, 2016	1	1	1	1	1	1	6
Baker, 2016	1	0	0	0	1	1	3
Bullen, 2010	1	0	NA	1	1	1	4
Burns, 2014	0	1	0	0	1	1	3
Caldwell, 2016	1	1	1	1	0	0	4
Caldwell, 2014	1	1	1	1	1	1	6
Carpenter, 2011	1	1	NA	0	0	1	3
Cinciripini, 2013	1	1	1	1	1	1	6
Cummings, 2011	0	1	NA	1	1	1	4
Ebbert, 2014	1	1	1	1	1	1	6
Gonzales, 2014	1	1	1	1	0	1	5
Hughes, 2011	1	1	1	1	1	1	6
Lerman, 2015	1	1	1	1	1	1	6
Ramon, 2014	1	1	0	1	1	1	5
Rennard, 2012	1	1	1	1	1	1	6
Rose, 2013	0	1	1	1	0	1	4
Schnoll, 2015	1	1	0	0	1	1	4
Schnoll, 2010	1	1	1	1	1	1	6
Selby, 2014	1	0	NA	0	0	1	2
Stapleton, 2013	1	0	0	0	1	1	3
Tønnesen, 2012	1	1	1	1	0	1	5
Tulloch, 2016	1	1	0	0	1	1	4
Walker, 2011	1	0	NA	1	1	1	4
Telephone Counsel	ing						
Bastian, 2013	0	1	NA	0	1	0	2

Author, Year	Randomized (1/0)	Similar Patient Characteristics (1/0)	Double Blind (1/0)	Masking (1/0)	Withdrawal (1/0)	Selective Reporting (1/0)	Total
Fu, 2015	0	1	NA	1	1	1	4
Klemperer, 2017	1	1	NA	1	1	0	4
Klesges, 2015	1	1	NA	1	1	1	5
Lindqvist, 2013	1	1	NA	0	1	1	4
Maddison, 2014	0	1	NA	1	1	1	4
Nohlert, 2014	0	0	NA	0	1	1	2
Sherman, 2018	1	0	NA	0	1	1	3
Sumner, 2016	1	1	NA	0	1	1	4
Tzelepis, 2010	1	0	NA	1	1	1	4
Zhu, 2012	1	1	NA	0	1	1	4
Zwar, 2015	0	1	NA	1	1	1	4
Multiple Interventi	ons						
Hall, 2011	1	1	0	1	1	1	5
Levine, 2010	0	1	1	0	1	1	4
Ramon, 2013	1	1	NA	0	1	1	4
Smit, 2016	1	1	NA	0	1	1	4
Swan, 2010	1	1	NA	0	1	1	4





Funnel plots compare the effect estimate of a study to some measure of its precision. Larger more powerful studies are placed at the top and smaller less powerful studies are at the bottom. Contour-enhanced funnel plots add areas of statistical significance to aid in the identification of areas of significance or non-significance from which studies appear to be missing.

#### Appendix B.6:

Results of Peters et al.'s Regression Test for Publication Bias of Smoking Cessation Interventions from a Random Effects Meta-Analysis by Intervention Type at 6- and 12-Months

Intervention Category	6-Month p-Value	12-Month p-Value
Electronic/Web-Based	0.871	0.552
In-Person Counseling	0.866	0.325
Pharmacotherapy	0.212	0.122
Telephone Counseling	0.048	0.992

# Abbreviations:

CMS	Centers for Medicare and Medicaid Services
FDA	Food and Drug Administration
LCS	lung cancer screening with low-dose computed tomography
NCCN	National Comprehensive Cancer Network
NELSON	Nederlands-Leuvens Longkanker Screenings ONdersoek trial
NLST	National Lung Screening Trial
OR	Odds Ratio
SCALE	Smoking Cessation at Lung Examination trials
USPSTF	United States Preventive Services Task Force
95% CI	95% Confidence Interval

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- Many efficacious interventions exist that could be implemented by screening sites.
- Cessation estimates are lower than the general population.
- Multi-modality interventions appear to be most efficacious.
- Cessation persists at 12-months in two intervention categories.

**Records** identified (n =7,954) dentification **Duplicates removed** (n = 4,141) Records screened Records excluded by abstract (n = 3,813) Screening review (n = 3,481)1,035 - Not a tobacco smoking cessation intervention 759 - Not a randomized controlled trial 742 - Not an original study 486 – Subgroup population 151 - Does not report on 6- or 12-month cessation outcomes 113 – Sample Size <100 107 - No participants aged 55-80 69 – Wrong geography 20 - Does not include smokers with >10 cigarettes per day Full-text articles assessed for eligibility (n = 332) Full-text articles excluded, Eligibility with reasons (n=247) 9 - Not a tobacco smoking cessation intervention 25 - Not a randomized control trial 43 - Not an original study 1 - Subgroup population 116 - Does not report on 6- or 12-month cessation outcomes 5 – Sample Size <100 13 - No participants aged 55-80 5 – Wrong geography 1 - Does not include smokers with >10 cigarettes per day Included 17 – Could not be classified as Trials included in final pharmacotherapy, telephone counseling, analysis (n = 85) in-person counseling, or an electronic intervention 12 - Pharmacotherapy not standard of care



The PRISMA diagram depicts the flow of studies through the phases of the systematic review from study identification to data analysis. A priori reasons for exclusion are presented at each stage.

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Author	Sample Size		OR (95% CI)	% . Weight Author	Sample Size		OR (95% CI)	
Abroms, 2014	503		1.47 (0.87, 2.48)	2.52 Anthenelli, 20	16 3015		2.05 (1.69, 2.49	9)
Bock, 2010	200	•	2.20 (1.09, 4.44)	1.59 Baker, 2016	1086		1.14 (0.81, 1.60	0)
Bolman, 2015	1982		0.98 (0.73, 1.33)	4.91 Bullen, 2010	1100		0.80 (0.59, 1.09	9)
Borland, 2013	2772		1.13 (0.87, 1.46)	5.59 Burns, 2014	1495		0.90 (0.68, 1.20	0)
Brown 2014	4613		1.08 (0.92, 1.27)	7.31 Caldwell, 201	5 502		2.10 (1.41, 3.11	1)
Choi, 2014	145	•	1.04 (0.38, 2.87)	0.84 Carpenter, 20	11 849		1.17 (0.80, 1.71	1)
Cobos-Campos, 2017	7 320		2.31 (1.27, 4.22)	2.03 Cinciripini, 20	13 294		1.56 (0.90, 2.68	8)
Free, 2011	5792	1	1.42 (1.25, 1.62)	7.93 Cummings, 20	011 2806		1.20 (0.97, 1.50	0)
Gilbert, 2012	6697		1.13 (0.93, 1.37)	6.75 Ebbert, 2014	506		1.32 (0.91, 1.90	0) 2)
Houston, 2015	900		1.73 (1.08, 2.77)	2.46 Golizales, 20	325		1.20 (0.78, 1.86	6)
Leykin, 2012	16430	-	1.20 (1.05, 1.36)	7.91 Hughes, 2011	218		2.10 (0.85, 5.18	8)
Loughead, 2016	213		1.85 (0.93, 3.69)	1.64 Lerman, 2015	1246		1.51 (1.08, 2.11	1)
Mason, 2011	1758		0.91 (0.69, 1.20)	5.25 Levine, 2010	349		→ 3.52 (1.98, 6.27)	7)
Moskowitz, 2016	403		1.08 (0.57, 2.05)	1.84 Ramon, 2014	341		1.28 (0.81, 2.02	2)
Reitzel, 2011 Richter, 2015	566		0.98 (0.65, 1.48)	3.50 Renhard, 201	335		- 2.66 (1.20, 5.93	3)
Sherratt, 2018	302 -		0.71 (0.45, 1.14)	2.97 Schnoll, 2010	575		1.77 (1.21, 2.59	9)
Smit, 2012	1123	+ -	1.40 (0.88, 2.22)	2.99 Schnoll, 2015	526		1.35 (0.88, 2.07	7)
Smit, 2016	251		1.12 (0.57, 2.21)	1.68 Selby, 2014	1380		1.66 (1.20, 2.28	8)
Stanczyk, 2016	2099		1.41 (1.10, 1.80)	5.77 Stapleton, 20	13 1071		1.11 (0.85, 1.46	6)
Westmass 2017	1201		1.36 (0.98, 1.90)	4.42 Tonnesen 20	12 479		2 12 (1 28 3 4	4) 9)
Wetter, 2011	302 —	• + ·	0.75 (0.45, 1.23)	2.68 Walker, 2011	1410		1.25 (0.97, 1.62	2)
Overall (I-squared =	57.2%, p = 0.000)	$\diamond$	1.14 (1.03, 1.25)	100.00 Overall (I-squ	ared = 73.7%, p = 0.000)	$\diamond$	1.53 (1.33, 1.77	7)
nol De I	.225		-20 triala)	Danal D	.16	Courseling (n=0	6.27	
nel B: I	n-Person Co	ounseling (n=	=20 trials)	Panel D	.16 : Telephone	Counseling (n=9	trials)	
nnel B: I	n-Person Co	ounseling (n=	=20 trials)	Panel D	.16 : Telephone	Counseling (n=9	trials)	
anel B: I	in-Person Co	punseling (n=	4.44 =20 trials) or (95% Ci)	%	.16 <b>: Telephone</b> Sample Size	Counseling (n=9	6.27 trials)	
Author SANGREY, 2016	225 In-Person Co Sample Jog	punseling (n=		% Weight 2.29	.16 <b>: Telephone</b> Sample Size	Counseling (n=9	6.27 trials)	
Author S Andrews, 2016 4 Bock, 2014 8	225 in-Person Co Sample Size	ounseling (n=		% Weight Author	.16 <b>Telephone</b> Sample Size	Counseling (n=9	6.27 trials) OR (85% CI)	
Author S Andrews, 2016 4 Bock, 2014 8 Catley, 2016 2 Catley, 2016 2	in-Person Co sample size	ounseling (n=		%         .           229         Author           10.01         .           0.29         Bastian, 2013	.16 <b>Telephone</b> Sample Size 496	Counseling (n=9	6.27 trials) or (95% Cl) 1.13 (0.62, 2.04)	
Author S Andrews, 2016 4 Catley, 2016 2 Choi, 2016 4	in-Person Co sample size 255 683 35	ounseling (n=		Weight         Author           2.29         Author           0.01         Bastian, 2013           4.75         Klemperer, 2016	.16 <b>: Telephone</b> Sample Size 496 560	Counseling (n=9	6.27 trials) OR (95% Cl) 1.13 (0.62, 2.04) → 1.86 (0.90, 3.85)	
Author S Andrews, 2016 4 Bock, 2014 8 Catley, 2016 2 Choi, 2016 4 Davis, 2014 1 Davis, 2014 1	225 In-Person Co Sample Size 109 46 525 163 35 78	ounseling (n=		%	.16 <b>:</b> Telephone Sample Size 496 560 560	Counseling (n=9	6.27 trials) OR (95% Cl) 1.13 (0.62, 2.04) → 1.86 (0.90, 3.85) (000, 700, 200)	
Author S Andrews, 2016 4 Bock, 2014 8 Catley, 2016 2 Davis, 2014 1 Garvey, 2012 2 Garvey, 2012 2	225 in-Person Co Sample Size 555 63 35 778 03	ounseling (n=	T 4.44 =20 trials) OR (95% Cl) 2.94 (1.13, 7.68) 1.07 (0.75, 1.52) 6.12 (0.35, 105 52) 1.23 (0.67, 3.51) 1.33 (0.67, 3.51) 2.88 (1.38, 6.04)	%         Panel D           %            2.29            10.01            0.29         Bastian, 2013           4.75         Klemperer, 2016           5.81         Maddison, 2014           3.60	.16 <b>Telephone</b> Sample Size 496 560 906	Counseling (n=9	6.27 trials) OR (95% Cl) 1.13 (0.62, 2.04) → 1.86 (0.90, 3.85) 1.08 (0.79, 1.48)	
Author S Andrews, 2016 4 Bock, 2014 6 Catley, 2016 4 Choi, 2016 4 Garvey, 2012 2 Gifford, 2011 3	1 225 n-Person Co 3ample 3ize 009 446 555 833 35 778 35 778 35 778	ounseling (n=		%           %           2.29           10.01           0.29           Bastian, 2013           4.75           Kiemperer, 2016           5.81           Maddison, 2014           3.60           7.81	.16 <b>: Telephone</b> Sample Size 496 560 906 600	Counseling (n=9	6.27 trials) OR (95% Cl) 1.13 (0.62, 2.04) → 1.86 (0.90, 3.85) 1.08 (0.79, 1.48) 0.82 (0.58, 1.15)	
Author S Andrews, 2016 4 Bock, 2014 8 Catley, 2016 4 Davis, 2014 0 Davis, 2014 0 Javis, 2014 0 Javis, 2014 1 Javis, 2011 1 Javis	225 in-Person Co Sample 109 446 555 63 35 778 103 325 42	ounseling (n=		%	.16 <b>Telephone</b> Sample Size 496 560 906 600 2003	Counseling (n=9	6.27 trials) OR (95% CI) 1.13 (0.62, 2.04) → 1.86 (0.90, 3.85) 1.06 (0.79, 1.48) 0.82 (0.58, 1.15) 1.17 (0.08 (1.58))	
Author \$ Andrews, 2016 Andrews, 2016 Bock, 2014 Bock, 2014 Catley, 2016 Catley, 2012 Garcy, 2012 Garcy, 2012 Garcy, 2012 Hall, 2011 Hall, 2011 Hooper, 2017 Home State S	225 in-Person Co Sample Size 109 446 555 563 355 778 003 225 424 49	ounseling (n=	T 4.44 =20 trials) OR (95% CI) 2.94 (1.13, 7.68) 1.07 (0.75, 152) 6.12 (0.35, 105.62) 1.27 (0.88, 2.39) 1.53 (0.67, 3.51) 2.88 (1.38, 6.04) 2.88 (1.38, 6.04) 1.37 (0.88, 2.12) 1.37 (0.82, 2.24) 1.53 (0.77, 2.09) 1.35 (0.82, 2.24)	%         Author           2.29            10.21         Bastian, 2013           2.55         Klemperer, 2016           5.81         Maddison, 2014           7.81         Ramon, 2013           6.60         Sherman, 2017	.16 <b>Telephone</b> Sample Size 496 560 906 600 2003	Counseling (n=9	6.27 trials) OR (95% Cl) 1.13 (0.62, 2.04) → 1.86 (0.90, 3.85) 1.08 (0.79, 1.48) 0.82 (0.58, 1.15) 1.17 (0.90, 1.51)	
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Author         S           Andrews, 2016         4           Bock, 2014         8           Andrews, 2016         2           Choi, 2016         4           Davis, 2014         1           Garvey, 2014         2           Gifford, 2011         3           Hall, 2011         3           Desis-Katz, 2013         3           Pesis-Katz, 2013         7           Smith, 2014         11           Yolfne, 2017         3           Sheffer, 2017         2           Smith, 2014         11           Yoldrine, 2016         2           Smith, 2014         11           Webb, 2010         1           Wewers, 2017         2           Smith, 2014         11           Webb, 2010         1	225 in-Person Co Sample Size 109 446 555 643 33 577 643 342 449 303 377 000 277 822 03 557 554 557 554 557 554 557 554 557 557	ounseling (n=	1 4.44 =20 trials) 0R (85% Cl) 2.94 (1.13, 7.68) 1.07 (0.75, 152) 6.12 (0.35, 10562) 1.27 (0.68, 2.86) 1.35 (0.67, 3.51) 2.88 (1.38, 6.04) 2.88 (1.38, 6.04) 2.137 (0.88, 2.12) 1.37 (0.82, 2.24) 1.37 (0.82, 2.14) 1.37 (0.82, 2.14) 1.02 (0.53, 1.96) 1.38 (0.65, 2.43) 2.72 (1.22, 6.06) 1.38 (0.84, 2.27) 1.00 (0.65, 1.87)	%         Author           2.29         Author           0.29         Bastian, 2013           4.75         Kilemperer, 2016           5.81         Maddison, 2014           3.60         Sherman, 2013           6.60         Sherman, 2017           3.57         Summer, 2016           4.15         Swan, 2010           1.88         Zhu, 2012           3.51         Dowrall (I-squarec           6.69         6.03	.16 <b>: Telephone</b> Sample Size 496 560 906 600 2003 518 1202 1562 2277 1562 2277 1562	Counseling (n=9	6.27 trials) OR (95% Cl) 1.13 (0.62, 2.04) → 1.86 (0.90, 3.85) 1.08 (0.79, 1.48) 0.82 (0.58, 1.15) 1.17 (0.90, 1.51) 0.90 (0.60, 1.34) 1.17 (0.90, 1.51) 1.35 (1.00, 1.83) 1.94 (1.60, 2.35) 1.21 (0.98, 1.50)	

#### Figure 2: Odds of Smoking Cessation From Random-Effects Meta-Analysis of Trials with Smokers Potentially Eligible for Lung Screening Based on 7-day Point Prevalence of Abstinence at 6-Months by Primary Intervention Type (n= 74 Trials)\*

Forest plots display weighted odds ratios and 95% confidence intervals of included trials. Trial weights are generated from a random effects analysis. Squares around point estimates indicate study weight relative to the lowest weighted study for each meta-analysis. The vertical dashed line represents the pooled odds ratio with the diamond representing the 95% confidence interval.

\* Some trials included more than one intervention of a differing generic type so that the sum of the sample of all intervention types is greater than the total number of trials included.

### Table 1:

Characteristics of Trials Included in Meta-Analysis of Smoking Cessation Efficacy by Category of Intervention.

Authors	Ye ar	Intervention Description	Multi- Modal Interven tion	Biochem ical Verificat ion	Outco me	Sam ple Size	Me an Age (SD )*	Mean Cigarette s per Day (SD)*	Respo nse Rate at 6- month s
Electronic/Web	Based	-				-			
Abroms et al. (43)	2014	Text messaging vs. website control	Yes	Yes	6-months	503	35.7 (10.7)	17.29 (8.03)	76%
Bock et al.(44)	2010	Computer driven individually tailored intervention vs. computer driven individually tailored intervention with NRT	Yes	Yes	6-months	300	~45.5 (10.8)	~18.2 (9.1)	80%
Bolman et al. (45)	2015	Computer tailored cessation messages with action plan vs. computer tailored cessation messages	No	No	6-months	1982	38.8 (11.4)	NR	23%
Borland et al. (46)	2013	Personalized internet- delivered advice program vs. text messaging program	Yes	No	6-months	3530	42.1 (NR)	16.9 (NR)	86%
Bricker et al. (47)	2017	Website based behavioural cessation program vs. standard cessation website	No	No	6- and 12- months	2637	46.2 (13. 4)	NR -33% smoke >20 CPD	88%
Brown et al. (48)	2014	Interactive website vs. control website	No	No	6-months	4613	39.5 (13)	18.7 (8.9)	72%
Calhoun et al. (49)	2016	Internet-based tele-health intervention vs. clinic referral	Yes	No	12- months	413	42.9 (13. 9)	15.2 (8.7)	NR
Choi et al.(50)	2014	Interactive website with nurse counseling by phone vs. state quitline	Yes	No	6-months	145	42 (9.5)	20.9 (9.9)	73%
Cobos- Campos et al. (51)	2017	Texting intervention + brief counseling vs. brief counseling alone	Yes	Yes	6-months	320	45 (9.1)	NR -94.6% >5 CPD	46%
Free et al.(52)	2011	Text message cessation program vs. non-cessation related text message program	Yes	No	6-months	5800	~36.8 (11)	NR	96%
Gilbert et al. (53)	2013	Computer tailored cessation advice and progress report vs. non- tailored information	Yes	No	6-months	6911	44.6 (12.2)	17.8 (9.4)	75%
Houston et al. (54)	2013	Cessation website and brief advice vs. usual care	Yes	No	6-months	576	NR -43.2 % aged 45+	NR	98%
Houston et al. (55)	2015	Enhanced cessation website with counselor messenger vs. enhanced cessation website vs. control website	No	No	6-months	900	NR -33 % aged 55+	NR – 73% smoke >10 CPD	51%

Authors	Ye ar	Intervention Description	Multi- Modal Interven tion	Biochem ical Verificat ion	Outco me	Sam ple Size	Me an Age (SD )*	Mean Cigarette s per Day (SD)*	Respo nse Rate at 6- month s
Leykin et al. (56)	2012	Four internet-based smoking cessation interventions of increasing intensity	Yes	No	6- and 12- months	16430	~36.5 (14.5)	-19.5 (10.1)	25%
Loughead et al.(57)	2016	Web-based relaxation guide and 8-weeks NRT vs. Web-based relaxation and cognitive conditioning with 8-weeks NRT	Yes	Yes	6-months	213	43.3 (12.5)	16.1 (5.7)	83%
Mason et al. (58)	2012	Computer tailored cessation advice and progress report vs. non- tailored content	Yes	No	6-months	1758	37.8 (11.3)	18.2 (8.7)	NR
Moskowitz et al.(59)	2016	Internet-based program vs. virtual support and reinforcement	Yes	No	6-months	403	40.7 (10.6)	13.1 (6.8)	50%
Reitzel et al. (60)	2011	Computer delivered treatment vs. standard treatment; plus pharmacotherapy	Yes	Yes	6- and 12- months	303	41.4 (10.1)	22.5 (10.4)	NR
Richter et al. (61)	2015	4 computer-based telemedicine sessions in primary care setting vs. 4 sessions of telephone counseling	Yes	No	6- and 12- months	566	47.4 (12.9)	19.7 (10.3)	86%
Sherratt et al. (62)	2018	Computer-based lung cancer risk projection and brief counseling and personalized pamphlet vs. generic smoking risk pamphlet	Yes	No	6-months	302	~42 (NR)	~20 (NR)	62%
Smit et al.(63)	2012	Fully automated web- based smoking cessation program vs. no intervention	Yes	No	6-months	1129	~48.4 (12.2)	20.6 (12.4)	26%
Stanczyk et al. (64)	2016	Text messaging vs. video messaging vs. brief message control	No	No	6- and 12- months	2099	45.7 (12.8)	18.8 (8.6)	58%
Westmass et al.(65)	2018	Three varying level of intensity of emailed cessation advice	Yes	No	6-months	1070	40.3 (11.8)	17.4 (7.9)	60%
Wetter et al. (66)	2011	Initial group counseling followed by computer delivered treatment vs. no further treatment	Yes	Yes	6- and 12- months	302	~44 (11. 2)	~20.5 (8)	98%
In-person Coun	seling			•	•	•	•	•	
Andrews et al. (67)	2016	Community health worker and group support sessions vs. written materials	Yes	Yes	6- and 12- months	409	~41.1 (14.1)	~12.6 (7.5)	93%
Bock et al.(68)	2014	Motivational enhancement treatment, physician advice, and NRT vs. standard care	Yes	Yes	6- and 12- months	846	39.6 (11.4)	NR	50%

Authors	Ye ar	Intervention Description	Multi- Modal Interven tion	Biochem ical Verificat ion	Outco me	Sam ple Size	Me an Age (SD )*	Mean Cigarette s per Day (SD)*	Respo nse Rate at 6- month s
Brooks et al. (69)	2017	Multiple visits by Tobacco Treatment Advocate vs. single visit	Yes	Yes	12- months	331	NR -68 % aged 40+	NR 43.2% smoke >10 CPD	76%†
Catley et al. (70)	2016	4 sessions of motivational interviewing vs. 4 sessions of health education vs. brief advice	Yes	Yes	6-months	255	45.8 (10.9)	17.1 (8.9)	89%
Choi et al.(71)	2016	Culturally tailored counseling program vs. untailored counseling program	Yes	Yes	6-months	463	44.3 (NR)	15.4 (NR)	54%
Davis et al. (72)	2014	Mindfulness counseling program vs. American Lung Association matched program	Yes	Yes	6-months	135	44.5 (12.7)	17.7 (8.6)	44%
Garvey et al. (73)	2012	Front-loaded counseling vs. weekly counseling	No	No	6- and 12- months	278	46.9 (11.5)	17.9 (7.9)	90%
Gifford et al. (74)	2011	Bupropion with acceptance and relationship focused behavioural intervention vs. bupropion alone	Yes	Yes	6-months	303	~45.8 (12.8)	~24.0 (8.6)	70%
Hooper et al. (55)	2017	8 group sessions of culturally tailored cognitive behavioral therapy vs. 8 standard cognitive behavioural therapy sessions; both with NRT	Yes	Yes	6- and 12- months	342	49.5 (NR)	18.0 (10.8)	87%
Kim et al.(75)	2015	Culturally tailored counseling vs. standard counseling; plus NRT	Yes	Yes	12- months	109	49.7 (9.3)	17.1 (5.8)	73%
Laude et al. (76)	2017	In-person cognitive behavioral therapy for 26 weeks vs. 48 weeks	Yes	Yes	12- months	219	~42.1 (12.1)	~16.7 (5.9)	93%
Okuyemi et al. (77)	2013	NRT and motivational interviewing vs. NRT and brief advice	Yes	Yes	6-months	430	44.4 (9.9)	19.3 (13.7)	75%
Pesis-Katz et al.(78)	2011	Four sessions with health counselors vs. smoking cessation pamphlets and information on local treatment programs	Yes	Yes	6-months	737	~45.8 (12)	~20.2 (10)	70%
Ramos et al. (79)	2010	Individual counseling vs. group counseling vs. minimal intervention	Yes	Yes	12- months	287	~45 (10.9)	~20 (NR)	50%
Sheffer et al. (80)	2017	6 standard cognitive behavioral therapy sessions vs. 6 socioeconomic status adapted cognitive behavioral therapy session	Yes	Yes	6-months	227	48.2 (9)	13.8 (7.4)	88%
Smith et al. (81)	2014	Culturally tailored in- person counseling for American Indian/Alaska Native vs. non-tailored	Yes	Yes	6-months	103	39.8 (13.1)	14.4 (7.9)	95%

Authors	Ye ar	Intervention Description	Multi- Modal Interven tion	Biochem ical Verificat ion	Outco me	Sam ple Size	Me an Age (SD )*	Mean Cigarette s per Day (SD)*	Respo nse Rate at 6- month s
		counseling; plus varenicline							
Vidrine et al. (82)	2016	Mindfulness-based counseling program vs. cognitive behavioral therapy vs. brief counseling session	Yes	Yes	6-months	485	48.7 (11.9)	19.9 (10.1)	56%
Webb et al. (83)	2010	Group cognitive behavioral therapy vs. group general health education; plus NRT	Yes	No	6-months	154	44 (NR)	13 (NR)	70%
Wewers et al. (84)	2017	In-person counselling from community health worker vs. quitline	Yes	Yes	6- and 12- months	707	NR -30.7 % aged 55+	~22.3 (11.7)	85% <sup>†</sup>
Whiteley et al. (85)	2012	Cognitive behavioral therapy + exercise vs. cognitive behavioral therapy + contact control	No	Yes	6- and 12- months	330	43.52 (9.96)	17.48 (7.16)	81%
Williams et al. (86)	2016	In-person counseling 8 session + medication vs. 8 sessions alone vs. 6 sessions	Yes	No	12- months	820	47.39 (NR)	18.87 (NR)	25%
Pharmacothera	ру	-		_					
Anthenelli et al.(87)	2016	Varenicline vs. bupropion vs. nrt patch vs. placebo	No	Yes	6-months	4028	~46.1 (12.8)	~20.8 (8.2)	78%
Baker <i>et al</i> (88)	2016	Varenicline vs. NRT Patch with Lozenge vs. NRT patch	Yes	Yes	6- and 12- months	1086	48.1 (11.6)	17.0 (8.3)	84% <sup>†</sup>
Bullen et al. (89)	2010	Pre-cessation NRT in quitline vs. quitline usual care	Yes	Yes	6-months	1100	39.6 (13.1)	19 (8.7)	74%
Burns et al. (90)	2014	4 vs. 8 weeks of NRT in state quitline	Yes	No	6-months	1495	NR -15.3% aged 55+	~19.8 (NR)	58%
Caldwell and Crane(91)	2016	NRT inhaler vs. placebo inhaler both with NRT patch 5 weeks	Yes	No	6-months	502	~45.2 (11.2)	~19 (6.7)	62%
Caldwell et al. (92)	2014	Nicotine spray vs. placebo both with NRT patch	Yes	Yes	6- and 12- months	1423	~45.6 (11.4)	~20 (7.3)	20%
Carpenter et al.(93)	2011	NRT sampling and practice quit attempt vs. practice quit attempt alone	Yes	No	6-months	849	~50.5 (11.8)	~18.6 (8.8)	87%
Cinciripini et al.(94)	2013	12-weeks of Varenicline, Bupropion, or Placebo plus intensive counseling	Yes	Yes	6-months	294	44.3 (10.43)	19.7 (9.36)	73%
Cummings et al.(95)	2011	Callers to quitline randomized to 2, 4, or 6 weeks of NRT patch	Yes	No	6-months	2806	NR ~27.9% aged 55+	NR 67.8% smoke >20 CPD	60%
Ebbert et al. (96)	2014	12 weeks of varenicline/ bupro pion combination vs. 12 weeks varenicline/ placebo	Yes	Yes	6- and 12- months	506	~42.2 (12.2)	~19.5 (7.3)	60%

Authors	Ye ar	Intervention Description	Multi- Modal Interven tion	Biochem ical Verificat ion	Outco me	Sam ple Size	Me an Age (SD )*	Mean Cigarette s per Day (SD)*	Respo nse Rate at 6- month s
Gonzales et al. (97)	2014	Varenicline vs. Placebo	No	Yes	6- and 12- months	498	47.5 (NR)	20 (NR)	63% <sup>†</sup>
Hughes et al. (98)	2011	Varenicline vs. placebo; plus behavioral counseling	Yes	Yes	6-months	218	~45 (13)	~19 (9)	70%
Lerman et al. (99)	2015	Verenicline + patch vs. patch + placebo vs. Placebo	Yes	Yes	6- and 12- months	1246	45 (12)	17.5 (5.9)	71%
Ramon et al. (100)	2014	Varenicline + patch vs. Varenicline + placebo	No	No	6-months	341	~44.1 (14.8)	~29.2 (NR)	71%
Rennard et al. (101)	2012	Varenicline vs. placebo	Yes	No	6-months	650	~43.9 (12.5)	~21.3 (NR)	NR
Rose and Behm(102)	2013	NRT patch vs. bupropion + NRT patch vs. varenicline	Yes	Yes	6-months	335	~46.0 (10.8)	~21.9 (8.8)	58%
Schnoll et al. (103)	2015	8 vs. 24 vs. 54 weeks NRT patch	Yes	Yes	6- and 12- months	525	46.4 (12.1) 17.1 (8.4)		65%
Schnoll et al. (104)	2010	Nicotine patch vs. nicotine lozenge	Yes	Yes	6- and 12- months	568	~44.7 (12.7) ~20.6 (8.9)		76%
Selby et al. (105)	2014	NRT, Bupropion, or Varenicline prescription with vs. without payment card	No	Yes	6-months	1380	~46.5 (12.3)	~22.2 (9.5)	65%
Stapleton et al. (106)	2013	NRT vs. bupropion vs. bupropion plus NRT; plus behavioral support	Yes	Yes	6-months	1071	~41.2 (12.1)	~20.3 (9.7)	62%
Tønnesen et al. (107)	2012	NRT mouth spray vs. placebo mouth spray	Yes	Yes	6- and 12- months	470	~47 (10.9)	~22.7 (8.8)	50%
Tulloch et al. (108)	2016	10 weeks NRT patch vs. 10 weeks patch + gum or inhaler vs. 12 varenicline; all receive counseling	Yes	Yes	6- and 12- months	737	48.6 (10.8)	23.2 (10.8)	69%
Walker et al. (109)	2011	Quitline with nicotine sampling vs. standard quitline care	Yes	Yes	6-months	1410	~40.5 (13.4)	~20 (9.6)	81%
Telephone Cour	seling								
Bastian et al. (110)	2013	Counselor initiated counseling calls vs. tailored self-directed materials	Yes	No	6- and 12- months	496	~46 (12)	~20 (11)	100%
Fu et al.(111)	2015	Proactive telephone counseling vs. usual care	Yes	No	12- months	2406	NR -46.1% aged 35-64	13.6 (9.2)	74%
Klemperer et al.(112)	2017	Telephone-based motivational interviewing vs. Telephone based cigarette reduction vs. Brief telephone counseling	Yes	No	6- and 12- months	560	51 (11)	20 (8.4)	63%

Authors	Ye ar	Intervention Description	Multi- Modal Interven tion	Biochem ical Verificat ion	Outco me	Sam ple Size	Me an Age (SD )*	Mean Cigarette s per Day (SD)*	Respo nse Rate at 6- month s
Klesges et al. (113)	2015	Proactive quitline with 8- weeks NRT vs. reactive quitline with 2-weeks NRT	Yes	No	12- months	1298	39.5 (13.7)	17.8 (8.5)	80%
Linqvist et al. (114)	2013	Motivational interviewing vs. standard treatment in a quitline setting	Yes	No	12- months	772	~48 (14.2)	NR	62%
Maddison et al.(115)	2014	Telephone based exercise program vs. Quitline	Yes	No	6-months	906	37.5 (12.2)	19.6 (9.3)	92%
Nohlert et al. (116)	2014	Proactive vs. reactive calls in a national quitline.	No	No	12- months	586	NR -56% aged 50+	NR - 39% smoke >15 CPD	59% †
Sherman et al. (117)	2018	Proactive vs. reactive telephones counseling	No	No	6-months	2003	~53.7 (10.8)	~17.7 (9.9)	79%
Sumner et al. (118)	2016	Directive vs. non-directive telephone counseling	No	No	6- and 12- months	518	~47 (NR)	~11 (NR)	56%
Tzelepis et al. (119)	2010	Proactive telephone cold- calls vs. mailed written materials	Yes	No	6- and 12- months	1562	~45.4 (12.7)	~19.9 (9.6)	82%
Zhu et al.(120)	2012	Culturally tailored multilingual telephone counseling vs. self-help materials	Yes	Yes	6-months	2277	NR -52% aged 45+	NR -54.9% smoke >14 CPD	90%
Zwar et al. (121)	2015	Nurse advice + quitline vs. quitline vs. usual care	Yes	No	12- months	2390	~43.5 (14.3)	~17.4 (10.7)	83%
Multiple Catego	ories					_			
Hall et al.(122)	2011	Combination of extended behavioural therapy, pharmacotherapy and placebo	Yes	Yes	6- and 12- months	406	40.7 (9.8)	19 (7.4)	95%
Levine et al. (123)	2010	Weight concern related smoking cessation vs. standard cessation counseling; both with/ without placebo or bupropion	Yes	Yes	6- and 12- months	349	42.0 (10.1)	20.7 (8.4)	53%
Ramon et al. (124)	2013	Individual counselling, combined telephone and individual counselling, or telephone counselling.	Yes	No	6- and 12- months	600	47.4 (12.1)	~26.7 (12.9)	71% <sup>†</sup>
Smit et al. (125)	2016	Web-based computer tailoring and nurse counseling vs. computer tailoring alone vs. usual care	Yes	No	6- and 12- months	414	48.0 (11.9)	NR	38%
Swan et al. (126)	2010	Web-based counseling vs. telephone-based counseling vs. combined web and telephone; plus varenicline	Yes	Yes	6-months	1202	47.3 (NR)	19.7 (NR)	74%

\*

\* Studies that did not report the information are marked as not reported (NR). Mean age and standard deviation (SD), as well as mean cigarettes per day (CPD) and SD for the entire trial sample, was not reported in all studies. For those studies that only reported mean age and CPD by arm, the values for the intervention arm are provided and marked with a tilde. For those studies that only reported median the median is reported and marked

with a tilde and SD is marked as not reported. For those studies that only included age and CPD categories the categories that are most similar to the age and CPD levels of interest for this analysis are reported.

 $^{\dagger}$ Studies report response rate at 12-months.

## Table 2:

Odds of Smoking Cessation from Random-Effects Meta-Analysis of Trials with Smokers Potentially Eligible for Lung Screening Based on 7-day Point Prevalence of Abstinence at 6-Months and 12-Months by Primary Intervention Type

	Elec b-B	ctronic/We ased		In-F Cou	Person Inseling		Pharmacother apy		Telephone Counseling			
	n	OR (95% CI)	I <sup>2</sup> (% )*	n	OR (95% CI)	I <sup>2</sup> (% )*	n	OR (95% CI)	I <sup>2</sup> (%)	n	OR (95% CI)	I <sup>2</sup> (% )*
Overall at 6- Months	25	1.14 (1.03-1.25)	57.2	20	1.46 (1.25-1.70)	24.7	25	1.53 (1.33-1.77)	73.7	9	1.21 (0.98-1.50)	74.4
Without Pharmacotherapy	17	1.13 (1.01-1.26)	53.7	3	1.16 (0.84-1.62)	0.0	NA	NA	NA	5	1.37 (1.02-1.85)	77.5
With Pharmacotherapy	8	1.13 (0.92-1.40)	60.3	17	1.54 (1.29-1.83)	30.3	NA	NA	NA	4	1.05 (0.89-1.24)	0.0
Single Modality	7	1.15 (0.97-1.35)	55.5	2	1.22 (0.83-1.78)	0.0	4	1.87 (1.47-2.39)	53.9	2	1.07 (0.84-1.37)	16.0
Multi-Modality	18	1.13 (1.00-1.28)	58.2	18	1.51 (1.27-1.79)	29.7	21	1.47 (1.26-1.71)	70.1	7	1.27 (0.98-1.65)	72.2
Minimal or No Intervention Control	13	1.19 (1.04-1.37)	43.1	8	1.57 (1.10-2.25)	54.2	8	1.80 (1.28-2.54)	84.8	6	1.38 (1.08-1.78)	69.9
Active Control	12	1.09 (0.95-1.26)	67.8	12	1.44 (1.23-1.69)	0.0	17	1.42 (1.24-1.62)	56.9	3	0.98 (0.78-1.23)	34.0
Biochemically Verified Results	7	1.31 (0.93-1.83)	65.6	16	1.44 (1.20-1.73)	31.4	19	1.55 (1.33-1.81)	69.0	2	1.52 (0.92-2.49)	89.6
Self-Reported Results	20	1.16 (1.05-1.29)	62.3	9	1.75 (1.40-2.17)	22.0	12	1.51 (1.23-1.86)	78.5	7	1.10 (0.94-1.30)	24.9
High Quality	22	1.11 (1.01-1.23)	57.8	16	1.44 (1.24-1.67)	0.0	24	1.53 (1.32-1.77)	74.6	8	1.22 (0.97-1.53)	77.4
Low Quality	3	1.56 (1.02-2.38)	34.3	4	1.68 (0.96-2.96)	72.0	1	1.66 (1.20-2.28)	. †	1	1.13 (0.62-2.04)	. †
No Conflict of Interest Reported	22	1.14 (1.02-1.28)	62.0	18	1.50 (1.27-1.78)	27.7	16	1.34 (1.19-1.51)	46.8	9	1.21 (0.98-1.50)	74.4
Conflict of Interest Reported	3	1.17 (1.04-1.32)	0.0	2	1.22 (0.82-1.82)	0.0	9	2.01 (1.46-2.77)	82.1	NA ↓	NA ≠	NA ‡
Studies With >50% Enrollment	14	1.16 (1.02-1.31)	64.3	11	1.48 (1.19-1.84)	36.0	13	1.50 (1.25-1.80)	70.4	8	1.22 (0.97-1.53)	77.4
Studies With <50% Enrollment	4	1.35 (0.96-1.92)	58.3	5	1.35 (1.05-1.74)	0.0	8	1.43 (1.16-1.77)	58.7	1	1.13 (0.62-2.04)	. †
Overall at 12- Months	8	1.02 (0.89-1.18)	36.1	15	1.28 (1.09-1.51)	16.8	11	1.46 (1.17-1.84)	67.3	10	1.08 (0.95-1.24)	33.4
Biochemically Verified Results	3	0.84 (0.60-1.67)	0.0	12	1.31 (1.10-1.56)	24.3	11	1.46 (1.17-1.84)	67.3	1	0.86 (0.59-1.25)	. †
Self-Reported Results	5	1.06 (0.90-1.26)	54.6	5	1.32 (1.04-1.67)	0.0	1	1.32 (0.93-1.86)	. †	10	1.08 (0.95-1.24)	34.1

\*The I<sup>2</sup> statistic is a measure of heterogeneity that describes the percentage of variation across studies not due to chance.

 $^{\dot{7}} \text{The I}^2$  cannot be calculated for a single intervention in a given group.

 $\ddagger$ No telephone counseling interventions reported a conflict of interest.