



# Smoking Cessation Interventions Among Asian Americans: a Scoping Review

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## Abstract

**Background** Tobacco use is the leading cause of morbidity and mortality in the USA, with smoking rates remaining disproportionately high among Asian-Americans, particularly in males with limited English proficiency, including Vietnamese (43%), Korean (37%), and Chinese (29%) Americans. Barriers to smoking cessation in this population include high social acceptability of smoking in participants' countries of origin, low quit intention, and limited use of linguistically appropriate smoking cessation resources. This paper aims to conduct a systematic review of studies evaluating the effectiveness of smoking cessation interventions targeting Asian-Americans.

**Methods** The researchers conducted a thorough search of Scopus, Medline, Cochrane Central, and Google Scholar from 2006 through March 2022, as well as reference lists of relevant articles. The inclusion criteria for the studies were that they described smoking cessation interventions for Asian-Americans and Asian immigrants, and reported outcomes related to feasibility, acceptability, usability, and smoking-related outcomes.

**Results** The review identified 14 studies with a total of 5607 participants, with participant numbers ranging from 26 to 2277. The interventions varied across 14 distinct approaches, with individual counseling being a prominent component. These interventions were found to be feasible and culturally acceptable. All studies reported positive smoking-related outcomes, including abstinence rates ranging from 26.7 to 68% and an increase in quit attempts. Culturally sensitive components and linguistically tailored content played a significant role in promoting participant engagement. The retention rates in the studies ranged from 42 to 100%, highlighting the importance of partnership with the Asian community, cultural and ethnic congruence, and family involvement and support.

**Conclusion** The review highlighted the lack of direct in-language treatment as a disadvantage for Asian-American smokers in accessing evidence-based treatments. Despite this, the review reported the feasibility, acceptability, and effectiveness of a limited number of culturally targeted interventions for Asian-Americans, who are the fastest-growing racial-ethnic group. Future research should focus on exploring novel community-based and culturally adapted approaches for hard-to-reach and high-risk ethnic Asian subgroups to further improve smoking cessation outcomes in this population.

**Keywords** Smoking cessation · Tobacco · Intervention · Asian Americans · Immigrants

## Introduction

Cigarette smoking is an established risk factor for cardiovascular disease, pulmonary disease, cancers, and mortality. Despite the tobacco-control policies in the USA which reduced smoking prevalence in the past decade, racial and ethnic disparities persist. Asian-Americans are a rapidly growing ethnic minority group, and by 2055, they are projected to be the largest minority group in the USA, comprising 36% of the immigrant population [1], which is surpassing Hispanics (34%) [2]. By 2065, Asians are further expected to make up 38% of all immigrants in the USA [2].

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The current smoking prevalence rate among non-Hispanic Whites is 24.9% [3]. Yet, recent immigrant Chinese, Korean, and Vietnamese men have disproportionately high smoking rates ranging from 22 to 37% [4, 5]. Research has continued to highlight that foreign-born Asian-Americans usually have a higher rate of smoking compared to US born counterparts [6, 7]. In addition, there is also a distinctive gender gap in smoking among Asian-American immigrants, with men smoking at a higher rate [8].

In many Asian countries such as China, South Korea, and Vietnam, smoking is an accepted social behavior for men and is often seen as necessary for social and business interactions [9]. Therefore, smoking is highly prevalent among Chinese, South Korean and Vietnamese men in the USA. Although smoke-free is a social norm in the USA, many Asian-American men still smoke, especially if they immigrated to the USA in adulthood [10]. Although only 3% of lung cancers occur in Asian-Americans in the USA, distant metastases are seen more frequently among Asians compared with White, Black, and Hispanic racial groups, which has a significant impact on disparities in lung cancer outcomes [11]. Lung cancer is the leading cause of all cancer-related deaths among Asian-American men [12]. Asian-Americans who smoke are at high risk for advanced lung cancer but continue to be underserved and under-screened.

Most Asian immigrants have low English language proficiency and low health literacy, which may impact their ability to access smoking cessation services, obtain information resources about smoking cessation, and receive support from social support or healthcare providers. For example, Chinese- and Vietnamese-American male smokers with limited English proficiency have lower rates of serious quit attempts compared to the general US population [13]. This may particularly be reflected by the low utilization rate of smoking cessation assistance methods among this population. These Asian subgroups also demonstrate lower rates of Nicotine Replacement Therapy (NRT) use and less understanding of tobacco treatment strategies. Their ability to access smoking cessation assistance services may be restricted by language barriers. Additionally, on the cultural level, counseling may be stigmatized in Asian communities if seen as a mental health service [14]. As smoking counseling interventions are time-consuming and require scheduling a call or visit at a time without interruptions, it can be difficult for underserved Asian immigrants with long hours of employment duties. For example, Chinese immigrants are often engaged in low-wage jobs such as restaurant or construction work with long working hours, limited sick leave, and lack of health care insurance, preventing them from attending in-person, multiple session programs [15].

There is an urgent need for culturally relevant and linguistically appropriate resources for this underserved and fast-growing population, which has a high rate of smoking

prevalence and metastatic lung cancer, and low rates of tobacco cessation. This scoping review aims to “map the literature on a particular topic or research area and provide an opportunity to identify key concepts; gaps in the research; and types and sources of evidence to inform practice, policymaking, and research” [16]. A scoping review was conducted over a systematic review primarily because the research question was broad, and there was a need to identify parameters and gaps in this body of literature [17].

The purpose of this scoping review was to assess the current state of smoking cessation intervention research for Asian-Americans from published studies in 2006–2022. In a previous systematic review of smoking cessation intervention focused on Asian-Americans by Chen and Tang in 2007, the articles about tobacco control interventions for Asian-Americans published between 1995 and 2005 were analyzed. It was found that the community-based trial on tobacco cessation is lacking for Asian-Americans, even though some subgroups bear a heavy burden of smoking [18]. The number of studies about culturally tailored interventions in specific Asian languages was highly insufficient, which could be known by the extremely limited number of studies available to be included in their review [18], despite the fact that these interventions could be effective in smoking cessation for these populations. Therefore, this scoping review was conducted to continue to identify and describe what is known about interventions designed specifically for Asian-Americans and their feasibility, acceptability and effectiveness. It also identified gaps in both practice and research on Asian-American tobacco use reduction and cessation by looking into the studies in 2006–2022. We also focused on examining ways that interventions were culturally tailored with community-based participatory inputs and outreach process in our review. The scoping review was part of a larger study to identify preferred, evidence-based tobacco use prevention and cessation interventions for Asian-Americans.

## Methods

This scoping review was conducted and reported according to the relevant sections of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist (Table 1). Together with the PRISMA-ScR checklist, the Arksey and O’Malley framework was also applied in this scoping review. Our scoping review was aligned with the four objectives of the framework [19]: (1) to examine the extent, range, and nature of research activity; (2) to determine the value of undertaking a full systematic review; (3) to summarize and disseminate research; and (4) to identify research gaps in the literature.

**Table 1** Preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR) checklist

Section	Item	Prisma-ScR checklist item	Reported on page #
Title			
Title	1	Identify the report as a scoping review	1
Abstract			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives	2
Introduction			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach	4–5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives	4–5
Methods			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number	5–6
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale	5–6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed	6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated	6
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review	6
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators	6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made	6
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate)	5–6
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted	6
Results			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram	6
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations	7–9
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12)	7–9
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives	7–9
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives	7–9

**Table 1** (continued)

Section	Item	Prisma-ScR checklist item	Reported on page #
Discussion			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups	9–10
Limitations	20	Discuss the limitations of the scoping review process	10–11
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps	11
Funding			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review	3

JBIG, Joanna Briggs Institute; PRISMA-ScR, Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews

\* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote)

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document)

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473

### Step 1—Rationale for Inclusion of Studies

We defined the objectives for the scoping review with all co-investigators and stakeholders from the Asian-American community-based organizations. An expert panel was convened to guide the review of the smoking cessation interventions from local community-based organizations in Philadelphia, including Pennsylvania United Chinese Coalition, Penn Asian Senior Services, and Korean Dry Cleaners Association of Philadelphia. The experts had a thorough understanding of the target populations, so they were able to provide subject matter suggestions with a focus on culturally relevant aspects and strategies for implementation to address the cultural traits of Asian communities. Collaboratively, the team determined the appropriate keyword search terms and decided to include any interventions aimed to encourage smoking cessation targeting Asian-Americans or an Asian ethnic group. The study does not need to have a control group. If included, control group participants could receive placebo, another cessation interventions, or no intervention.

### Step 2—Data Sources and Searches

We comprehensively mapped publications and identified studies, and selected those to be included for review. A library information specialist searched the published

literature in PubMed, Scopus, Medline, Cochrane Central, and Google Scholar from 2006 to 2022. Keywords were searched to further explore: "smoking cessation intervention," "Asian-American," "tobacco," and "Asian immigrants." Reference lists of relevant articles were also reviewed to ensure that no eligible study was missed. The date of the most recent search is June 27, 2023.

### Step 3—Eligibility Criteria and Study Quality Assessment

Three authors (KYW, JL, DD) independently reviewed and excluded the irrelevant articles. To be included, the literature had to focus on smoking cessation interventions or programs targeting any Asian-American subgroups or Asian immigrants that included a description of the implementation of the program and its evaluation. Excluded articles included observational studies, populations outside of the USA, reported on attitudes, preferences, or intentions about cessation, or the primary focus of the study was on other health issues (e.g., mental health), and editorial or review articles. Any disagreement was resolved via group discussions. A total of 14 articles were identified across the database and sources searched after the duplicates were removed (Fig. 1).

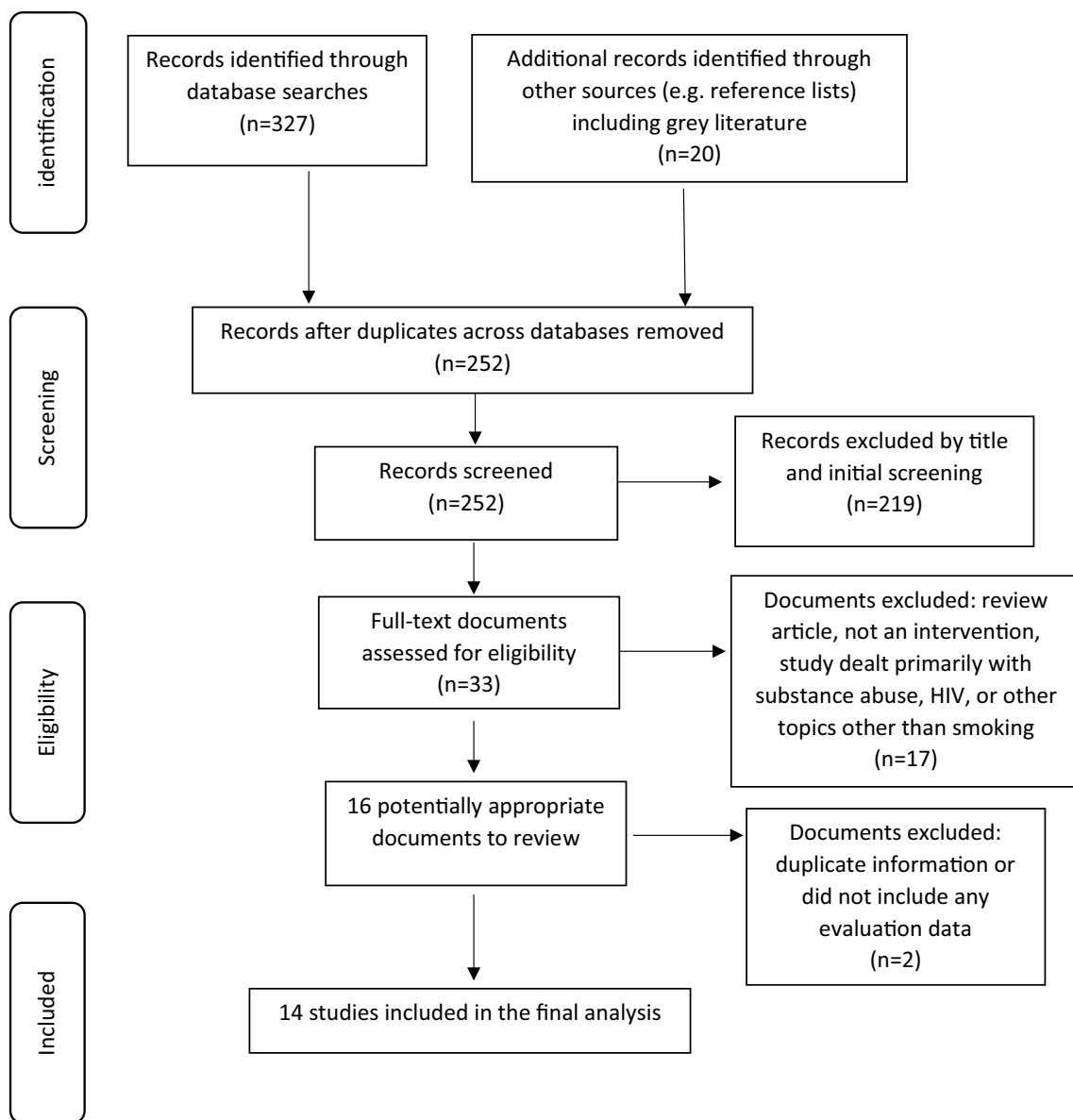


Fig. 1 Flowchart of relevant studies identification

#### Step 4—Data Extraction

Key information from the included studies was charted according to a modified PICO framework (Population, Intervention/Exposure, Comparison, and Outcome) [20]. KYW and JL each extracted half of the included studies and inputted them into an Excel spreadsheet, including their categories of authors, year of publication, study geographical location, study type (e.g., one-arm pilot, RCT, etc.), theoretical framework for intervention design, sample characteristics (Asian subgroup, gender, etc.), control/enhanced usual care group characteristics, intervention characteristics, endpoint follow-up, outcomes, and lessons learned. A third independent reviewer (DD)

conducted a repeat review for verification purposes. Any discrepancies were resolved by consensus among the 3 reviewers.

#### Step 5—Theme Establishment

The research team engaged in a thorough discussion and analysis of the extraction chart to identify meaningful themes that emerged from the collected data. These themes were carefully selected to present a comprehensive and insightful overview of the smoking cessation interventions targeting the Asian-American community. The results were meticulously summarized, focusing on several key aspects, including the various types of interventions employed in the studies, the diverse

participant recruitment strategies employed to engage Asian-American individuals, the effectiveness of retention efforts to retain participants throughout the intervention programs, and the reported study outcomes pertaining to smoking cessation success rates and other relevant health indicators. Furthermore, special attention was given to culturally relevant and community-based participatory strategies implemented within the interventions. Understanding the cultural context and involving the community in the design and execution of these cessation programs were crucial factors for their success and long-term impact. Following the framework proposed by Arksey and O'Malley [19], both numerical summaries and interpretive syntheses based on the data extracted from the studies were provided. This approach allowed for a balanced and comprehensive perspective, combining quantitative data with qualitative insights for a deeper understanding of the interventions' outcomes and effectiveness.

## Results

A search through PubMed, Scopus, Medline, Cochrane Central, and Google Scholar from 2006 to 2022 yielded 347 records with additional records identified through article reference lists and journal reviews. 252 records remained after the removal of duplicate studies. After applying inclusion and exclusion criteria, 14 studies remained relevant to the focus of this search and were included in this review for 14 distinct interventions (Fig. 1). Of these studies, 5 were one-arm pilot studies [21–25], and 7 were randomized interventions with a control/enhanced usual care arm [26–32], and two used factorial designs [33, 34]. Analysis of these 14 studies provided a basis for the following review findings.

### Types of Interventions

As summarized in Table 2, the studies ranged in duration from as little as 4 weeks up to 3 years. Among all, about 40% of the studies, 6 out of 14, set the duration to be 8 weeks. The median follow-up period was 24 weeks, ranging from 1 to 48 weeks. 7 of the 14 studies, half of them, set the follow-up period to be 12 or 24 weeks. 3 studies used in-person counseling [26–28], and 4 used phone counseling [21, 24, 29, 31] as their way to deliver smoking cessation interventions. Moreover, one of them used both phone and video counseling [32]. Half of them, 7 studies were combined or compared to the use of nicotine patches [22, 24–27, 30, 32] and 3 studies compared to the use of self-help materials [22, 29, 31]. For additional interventions, one article involved acupuncture and nicotine replacement therapy [33], two observed the usage of group therapy [25, 28], one held family education sessions [23], and two utilized text messages as a way to provide education [34].

### Framework/Theory Used

For the framework or theory used, as summarized in Table 2, the Theory of Planned Behavior [24, 27, 30] was used by 3 studies. Besides, Behavioral Strategies for Smoking Cessation [21], Social Learning Theory [29], Social Network Theory [23], Extended Parallel Process Model (EPPM) [34], Cognitive–Social Health Information Processing (C-SHIP) model [26] and Trans-Theoretical Model [25] were used by one article respectively. Moreover, one of the studies was based on Community-based Participatory Research [22]. There was also an intervention that cooperated Medical Pluralism and Cultural Tailoring [33]. Nevertheless, one study used both the Health Belief Model and Trans-Theoretical Model of Change [28]. The review highlighted the diverse theoretical approaches used in different smoking cessation interventions for Asian-Americans. These theories and frameworks provide valuable insights into the factors influencing smoking behaviors in this population and can inform the development of culturally appropriate and effective cessation strategies.

### Sample Size and Asian Ethnic Subgroup Characteristic

The sample sizes of the studies ranged from 26 to 2277 with the median of 99. Among the 14 articles, 4 focused on Chinese smokers with all [21, 22, 28] or most [33] of the participants being Chinese. Most of these participants were male. Further, 4 studies [24, 25, 27, 30] looked into the Korean population and most of the participants were male as well. Two study targeted Chinese smokers and Korean or Vietnamese smokers [23, 26], while there were also two studying the Chinese, Korean, and Vietnamese population at the same time [29, 31]. For these studies, the mean age of the participants ranged from 40 to 53.5, suggesting most of them were middle-aged smokers. The participants of some studies shared certain characteristics, including lower income [22, 23], lower education level [23, 28], belonging to the working class [21, 24], and with no insurance or receiving insurance aid [22, 29]. Most of them were foreign-born immigrants [21, 23, 25, 34], and some of them were not able to speak fluent English [28]. On the other hand, only one article specifically aimed at studying Korean female smokers [32]. Concerning tobacco dependence, most of the participants of these studies showed high dependence on tobacco according to Table 2. In 6 of the studies, the participants' number of smoked cigarettes per day was at least 10 [21, 22, 24, 27, 30, 32]. Chang et al. (2013) reported that the participants' number of smoked cigarettes could even reach 16 per day [33].

**Table 2** Published studies documenting Asian American tobacco interventions (arranged in chronological order)

Author (year)	Geographical location	Intervention type	Framework/theory used	Sample characteristics
Fang et al. (2006)	Pennsylvania	2-Arm RCT	Cognitive-Social Health Information Processing (C-SHIP) model	n = 66; Cigarettes per Day: N/A; Age Range: 18–83 Chinese and Korean Male: 95% Immigrant: N/A
Kim et al. (2008)	N/A	1-Arm Study	The Trans-Theoretical Model	n = 26; Cigarettes per Day: N/A; Age Range: 50s–60s Korean Male: 96% Immigrant: 92%
Burton et al. (2010)	NYC	1-Arm Study	Behavioral Strategies for Smoking Cessation	n = 101; Cigarettes per Day: $\geq 10$ ; Age Range: 18–76 Chinese Immigrants Male: 100% Immigrant: 100%
Shelley et al. (2010)	NYC	1-Arm Study	Community-Based Participatory Research; Theory of Planned Behavior	n = 375; Cigarettes per Day: $\geq 10$ ; Age Range: $\geq 18$ Chinese Male: 84% Immigrant: 100%
Kim et al. (2012)	Northeast	2-Arm RCT	Theory of Planned Behavior	n = 30; Cigarettes per Day: $\geq 10$ ; Age Range: 28–70 Korean Male: 77% Immigrant: 100%
Zhu et al. (2012)	California	2-Arm RCT	Social Learning Theory	n = 2277; Cigarettes per Day: $\geq 1$ ; Age Range: 18–75 Korean, Chinese, Vietnamese Male: 90% Immigrant: 100%
Chang et al. (2013)	San Francisco	Factorial without Control	Incorporating Medical Pluralism & Cultural Tailoring	n = 169; Cigarettes per Day: 16; Age Range: $\geq 18$ 83% Chinese and Others Male: 89% Immigrant: N/A
Cummins et al. (2015)	California, Colorado, Hawaii, Washington, Texas	2-Arm Randomized Assignments	N/A	n = 2004; Cigarettes per Day: $\geq 15$ ; Age Range: $\geq 18$ Korean, Chinese, Vietnamese Male: 82% Immigrant: N/A
Kim et al. (2015)	Northeast	2-Arm RCT	Theory of Planned Behavior	n = 109; Cigarettes per Day: $\geq 10$ ; Age Range: $\geq 18$ Korean Male: 84% Immigrant: 100%
Tsoh et al. (2015)	San Francisco	1-Arm Study	Social Network Theory	n = 96 DYADs; Cigarettes per Day: $\geq 1$ ; Age Range: 40–70 Chinese and Vietnamese Male: 100% Immigrant: N/A
Kim et al. (2016)	Georgia, Massachusetts, Virginia, California, New York, Washington	2-Arm RCT	N/A	n = 49; Cigarettes per Day: 10–31; Age Range: 20–63 Korean Female: 100% Immigrant: N/A



Table 2 (continued)

Author (year)	Intervention characteristics	Endpoint follow-up	Outcomes	Lesson
Kim (2017)	NYC	1-Arm Study	Theory of Planned Behavior	$n = 31$ ; Cigarettes per Day: $\geq 10$ ; Age Range 38–65 Korean Male: 94% Immigrant: N/A
Tong et al. (2018)	San Francisco	2-Arm RCT	Health Belief Model; Trans-Theoretical Model of Change	$n = 203$ pairs; Cigarettes per Day: $\geq 11$ ; Age Range: $\geq 18$ Chinese-American Male: 100% Immigrant: N/A
Zhao et al. (2019)	Washington DC	2x2 Design	Extended Parallel Process Model	$n = 71$ ; Cigarettes per Day: $\geq 1$ ; Age Range: $\geq 18$ Male: 100% Immigrant: 100%
Fang et al. (2006)	10 months of cultural and language-specific in-person session for 90–120 min, targeted cognitive-affective reactions to smoking and cessation and instructions for using nicotine replacement therapy and free nicotine patches Control/Enhanced Usual Care Group: General health education session and instructions for using nicotine replacement therapy and free nicotine patches	Week 1, Month 1 and 3 Retention Rate: 100%	3-Month Abstinence: 47% (intervention) 28% (control)	The intervention increased self-efficacy and decreased negative attitudes towards quitting Self-efficacy was the only significant predictor of smoking status
Kim et al. (2008)	8 weeks of linguistically and culturally-tailored supportive group therapy, brief individual counseling & pharmacotherapy Control/Enhanced Usual Care Group: N/A	N/A Retention Rate: 73%	Abstinence after intervention: 68%	Tailored messages are needed to counter the social and cultural roles that smoking plays Statistics of cancer morbidities and mortalities, and education about nicotine replacement therapy are important
Burton et al. (2010)	6 months of at least 9 Proactive Phone Counseling sessions Control/Enhanced Usual Care Group: N/A	Month 6 Retention Rate: 14.1%	32.7% Intent-to-Treat Cessation Rate	Success within proactive field recruitment; long-term support and culture/ethnic congruency
Shelley et al. (2010)	6 weeks of Nicotine Patch Courses with Self-Help Cessation Guide Control/Enhanced Usual Care Group: N/A	Month 4 Retention Rate: 42%	26.7% Intent-to-Treat Cessation Rate	Higher self-efficacy and perceived health risk predicts abstinence
Kim et al. (2012)	8 Weeks of Cognitive Behavior Therapy for 40 min, Cultural Tailored Intervention and Nicotine Patches Control/Enhanced Usual Care Group: Weekly 10 min Individualized Counseling Sessions with a focus on Medication Management and Nicotine Patches	Week 1, Month 1, 3 and 6 Retention Rate: 76.70%	7-Day Point Abstinence: 57.1% (intervention) 18.8% (control)	Noted long-term effect of culturally tailored cognitive behavior therapy intervention Family/partner's support is important for Korean Americans' successful smoking cessation
Zhu et al. (2012)	6 Sessions of Translated Telephone Counseling for 30–40 min + Self-Help Material & 5 Follow-Up Relapse Prevention Calls Control/Enhanced Usual Care Group: Translated Self-Help Materials Only	Month 4 and 7 Retention Rate: 79.5%	7-Day Point Abstinence: 38.2% (intervention) 18.6% (control) 6-Month Prolonged Abstinence: 20% (intervention) 9.5% (control)	In states without quitlines, the lack of direct in-language counseling put Asian-language smokers at a disadvantage in accessing evidence-based treatment
Chang et al. (2013)	3 years of Acupuncture Only, Nicotine Replacement Therapy Only, or Both, All with Individual Counseling and 2 Group Classes Control/Enhanced Usual Care Group: N/A	Week 1, Month 1, 3 and 6 Retention Rate: 99.9%	6 Month Quit Rates: 38% (Acupuncture + NRT) 29% (Only Acupuncture) 0% (Only NRT)	There is a synergistic effect with acupuncture and nicotine replacement therapy and high cultural acceptability in acupuncture primarily in Chinese population



Table 2 (continued)

Cummins et al. (2015)	About 4 Telephone Counseling Sessions lasting about 58.2 min with Self-Help Materials Control/Enhanced Usual Care Group: Self-Help Material Only	Month 4 and 7 Retention Rate: 82%	79.4% (Quit Attempts Made) 39.4% (Abstinent more than 30 days) 22.9% (Abstinent 180 days)	To states that lack resources, it is appealing for multi-site service to offer a broad-reaching centralized infrastructure
Kim et al. (2015)	8 weeks of 40-min Individualized Counseling Sessions In-Person+ Korean-Specified Cultural Elements, and 1 Week Supply of Nicotine Patches During Each Visit Control/Enhanced Usual Care Group (A Brief Standard Intervention): 8 Weekly 10 min. Individualized, In-Person Counseling Sessions for 1 Week and 1 Week Supply of Nicotine Patches each Visit	Month 1, 3, 6, 12 Retention Rate (Intervention Group): 80% Retention Rate (Control/Enhanced Usual Care Group): 63%	Cessation Rate: 38.2% (Intervention) 11.1% (Control)	Intervention effect is mediated by perceived family norms and emphasis on importance toward support family member involvement Smoking cessation intervention for Korean Americans should be culturally adapted and include family members
Tsoh et al. (2015)	2 Months of 2 Small Group Smoker-Family Dyad Educational Sessions, Two Individual Telephone Calls and the Usage of Health Family Action Plan with Culturally Appropriate Text and Graphics Control/Enhanced Usual Care Group: N/A	Month 3 Retention Rate: 97.9%	7-Day Point Abstinence: 30%	Intervention increased knowledge and self-efficacy in both smokers and family participants with high satisfaction reported
Kim et al. (2016)	8 Weeks of 30 min Weekly Individualized Counseling Session (On Video or Telephone), Deep Cultural Smoking Cessation Intervention, and Transdermal Nicotine Patches Control/Enhanced Usual Care Group: N/A	Month 1, 2, and 3 Retention Rate (Month 1): 67% (Video) & 48% (Telephone) Retention Rate (Month 3): 29.2% (Video) & 28% (Telephone)	Abstinence Results Post Quit Month 1: 48% (Telephone Arm); 66.7% (Video Arm) Abstinence Results Post Quit Month 2: 52% (Telephone Arm); 58.3% (Video Arm) Abstinence Results Post Quit Month 3: 40% (Telephone Arm); 41.7% (Video Arm)	Personal preference plays an important factor in treatment match There is a relationship of shame within seeking tobacco treatment within Korean women Videoconferencing is more feasible for Korean women under 50 For ages 50 and up, there is suspicion in face calling and limited access to equipment for those over age 60 There is a higher refusal rate for older Korean women compared to younger
Kim (2017)	8 Weeks of Telephone Cessation Counseling with 4 Weeks of Nicotine Patch Supplies + Additional 2 Weeks if Therapy Continues Control/Enhanced Usual Care Group: N/A	Month 1, 2, and 3 Retention Rate: 83.90%	7-Day Point Abstinence: 45.2% 3-Month Point Abstinence: 41.9%	A culturally adapted cessation intervention was successfully implemented via telephone counseling for Korean Americans, which can be an ideal treatment option for this high-risk ethnic subgroup
Tong et al. (2018)	12 weeks of Moderate-Intensity Group (Two 90 min Education Session over 3 months, Individual Lab Report, Bilingual Booklets, and Three 15min Follow-Up calls) or Brief-Intensity Group (1 Hour Education) Control/Enhanced Usual Care Group: Brief-Intensity Group (1-Hour Education with PPT Presentations and Group Sessions)	Month 6 and Month 12 Retention Rate (Month 6): 98% Retention Rate (Month 12): 94%	6-Month Point Abstinence: 18% 12-Month Point Abstinence: 23% Moderate-Intensity Intervention not more effective than Brief-Intensity Intervention	Engaging a household member with small group sessions may boost smoking-cessation efforts and improve elimination of household non-smoker exposure; Community-academic partnership was key in developing culturally acceptable education materials, recruitment, and retention
Zhao et al. (2019)	4 Weeks of Receiving Text Messages in One of Four Conditions: 1) Graphics and Texts, 2) Text only, 3) Text and Culturally Tailored Tips, 4) Graphics and Culturally Tailored Tips Control/Enhanced Usual Care Group: N/A	N/A Retention Rate: 82.6%	7-Day Point Abstinence: 14.1%	Immigrants are difficult to reach, but graphics showed to enhance effectiveness with the Chinese and Korean Male immigrant populations. Fear and regret used to re-enforce the negative affect by inducing emotional responses to efficacy information In-person recruitment through social networks and assistance from local community organization proved most productive

## Study Outcomes

Majority of the studies employed abstinent results as their outcome measure. Among the 4 studies that recorded the 7-day point abstinent rate, smoking abstinence ranged from 30 to 57.1% with counseling interventions [23, 24, 29, 30]. Cummins et al. (2015) reported a 39.4% abstinence rate after 30 days. For the three-month interval, abstinence rates ranged from 40 to 47% in three articles [24, 26, 32]. The abstinence rates for 6 months varied from 18 to 38% [24, 28, 29, 33]. Two studies reported intent-to-treat cessation rates. Burton et al. (2010) showed a cessation rate of 32.7% when using phone-counseling sessions [21], and Shelley et al. (2010) reported a rate of 26.7% with the use of nicotine patches and a self-help cessation guide [22]. An intervention consisted of individualized counseling sessions together with the use of nicotine patches showed a session rate of 38.2% [27]. One study reported biochemically verified abstinence at 3 months post-quit, which was collected in-person by research staff using exhaled carbon monoxide and saliva cotinine tests, though there were no differences between groups [32]. In a study using qualitative techniques, Zhao et al. (2019) mentioned a significant increase in quitting attitude in the study of receiving text messages [34].

## Participant Recruitment Strategies

Regarding recruitment, more than half of the articles were obtained through advertisement and the methods included newspapers, social media, and radios [22, 24, 25, 27, 30, 32, 34]. Community outreach and public health clinics were additional mechanisms that helped to accrue participants for more than one-third of the articles [21, 22, 26, 28, 33, 35]. Helplines and quitlines accounted for about 16% of the recruitment [29, 31]. Tsoh et al. (2015) showed an additional outlier for recruiting participants [23], which was through a separate independent study involving a social network base.

In terms of US locations, 3 studies were completed only in New York City [21, 22, 24]. Four separate articles recruited individuals solely from California [23, 28, 29, 33], while participants were also recruited in Washington DC and Pennsylvania by two interventions respectively [26, 34]. Two articles recruited participants from various locations [31, 32].

## Participant Retention

Retention rates varied across studies. For studies with a 7-day endpoint, retention rates ranged from 14.1 to 99.9% [33, 34]. About 29% of the articles retrieved their retention rates at the third month, which held retention rates ranging from 28 to 100% [23, 24, 26, 32]. Shelley et al. (2010) reported a retention rate of 42% at month 4 [22]. About

one-fifth of the studies set their endpoint at the sixth month, with retention rates ranging from 74.30 to 99.9% [21, 30, 33]. For retention rates obtained at month 7, the range followed from 79.5 to 82% [29, 31]. Two articles retrieved retention rates at month 12, with rates ranging from 63 to 94% [27, 28].

## The Importance of Culturally Relevant

After observing the data from the studies, four prominent themes were identified: importance of long-term support, high self-efficacy allowing for a higher success rate, emphasis on the value placed on culture or ethnic congruency, and the effectiveness of perceived health risk. More than half of the studies (8 out of 14) emphasized the importance of community type assistance and family participation, showing that the involvement of partners or family members [23, 27, 28, 30] was crucial. High self-efficacy was observed in around 29% (4 out of 14) of the studies [22, 23, 26, 32]. Two of the articles also noted the differences in smokers when provided with perceived health risks [22, 34]. The most prominent difference or barriers found in what keeps Asian immigrants from having a significant difference were providing consistent culturally based tools in specific languages and ethnic congruence. Overall, about 71% (10 out of 14) of the articles, majority of them, showed that consistent culturally relevant resources would allow for higher satisfaction in tobacco cessation [21, 24–31, 33].

## Discussion

As a rapidly growing ethnic minority group, Asian-Americans are projected to make up the largest portion of immigrants in the USA by 2055 [1, 2]. However, smoking cessation promotion programs for this population have not kept pace with this growth. Despite the high smoking rate and higher risk of smoking-related health sequelae among underserved Asian immigrants, there has been minimal research that targets this disadvantaged population.

The objective of the present review was to summarize the effectiveness of smoking cessation interventions targeted to Asian-Americans from 2006 to 2022. We included both randomized and non-randomized clinical trials involving smokers over 18 years old from community and public health clinics that assess continuous abstinence. 14 studies, including 9 RCTs, and 5 non-RCTs with these characteristics were identified.

In the present review, we found that multicomponent interventions included increased abstinence in long term, achieving continuous abstinence after 6 months ranging from 0 to 38% (acupuncture 26 NRT) in comparison with control groups (NRT only). This wide range of percentages

can be attributed to the differences in study participant selection criteria. A lesson of synergic effect with acupuncture and NRT on smoking cessation in Asian-American culture was also learned. Cultural multicomponent strategies, including Asian-specific cultural elements, were more effective when medications were used and a ‘D-day’ was set. Thus, emphasis on cultural value is needed in order to develop smoking cessation strategies for Asian-Americans. Furthermore, to encourage Asian-American smokers’ utilization of evidence-based smoking cessation treatments, providing easily accessible interpreter services and offering patient navigation services or community health worker programs are very important. This could further facilitate and motivate their health care-seeking behaviors, thus increasing their possibility of smoking cessation.

Our data concurred in large part with an earlier review [18], which reported the effectiveness of multiple or complex interventions in achieving sustained smoking cessation, compared with a control group. The same authors found differences between the effect of brief counseling and intensive counseling with a multicomponent intervention, and also when NRT was used to help the smoker. The published literature observed that family participation and support helps smokers to stop smoking. In Asian-American society, they have high values in family; family support is an important factor to encourage any preventive health behavior such as mammogram and colorectal cancer screening [35]. Long-term family support may be critical for smokers to continue smoking cessation.

Regarding intervention models, various trials analyzed in this review used the Theory of Planned Behavior (TPB) [36] with positive results. As one of the constructs of perceived behavioral control in TPB, high self-efficacy allows for a higher success rate in smoking cessation. When smokers encounter internal and external barriers to abstinence, those with high self-efficacy may have a higher ability to control their urge to smoke, which leads to successful smoking cessation. Since they have a stronger belief in their capacity to stop or reduce smoking, they tend to be more confident in doing so. Participants’ self-efficacy to stop smoking needs to be taken into account in future intervention program as it is able to make great impact. Culturally adapted intervention programs to promote the population’s health beliefs, self-efficacy, and behaviors toward smoking prevention and control are necessary.

Further, drawing upon more than one theory in smoking cessation interventions for Asian-Americans can provide a deeper and more holistic understanding of the complexities surrounding smoking behaviors in this population, leading to more effective and tailored strategies to help them quit smoking and improve overall public health outcomes. For example, researchers could integrate Community-Based Participatory Research (CBPR) with the Health Belief Model

(HBM). The HBM focuses on individuals’ perceptions of health threats, benefits of behavior change, and barriers to action. By combining CBPR and HBM, researchers can work closely with the Asian-American community to identify culturally relevant beliefs and attitudes regarding smoking cessation. This collaborative effort ensures that the intervention can address cultural norms, values, and potential barriers that may influence Asian-Americans’ decisions to quit smoking.

The summary of the provided data highlighted that majority of participants in the smoking cessation interventions for Asian-Americans were predominantly male. Besides, there was a significant proportion of immigrants. Specifically, in various interventions targeting Chinese and Korean populations, a considerable percentage of male participants were involved, with some studies reporting up to 100% male representation. Moreover, immigrant participants were prevalent across several interventions, with rates reaching 100% in certain studies. This demographic composition underscored the importance of tailoring smoking cessation efforts to meet the specific needs and cultural contexts of male Asian-American participants, particularly those who have recently immigrated.

The summarized data suggested that smoking cessation interventions targeting Asian-Americans had shown varying degrees of effectiveness. In some interventions, the 3-month abstinence rates were notably higher in the intervention group compared to the control group, indicating the positive impact of the interventions on short-term quit attempts. Additionally, interventions that included acupuncture and nicotine replacement therapy demonstrated relatively higher 6-month and 12-month abstinence rates, highlighting the potential benefits of combining multiple cessation approaches. However, some interventions, such as moderate-intensity interventions, showed relatively lower abstinence rates compared to others. Overall, the findings indicated that tailored interventions had the potential to yield positive outcomes, with varying levels of success depending on specific components and intensity of interventions. Further research is warranted to refine and optimize smoking cessation strategies for Asian-American populations, with a focus on sustained long-term abstinence rates and culturally adapted approaches.

The lesson learned from our findings emphasized the central role of cultural adaptation in smoking cessation interventions for Asian-Americans. These interventions demonstrated that a “one-size-fits-all” approach is inadequate in addressing smoking behaviors within this diverse population. By customizing interventions to align with the cultural beliefs, values, and norms of Asian-American communities, researchers and practitioners can enhance the relevance and acceptance of the programs. Cultural adaptation involves tailoring intervention content, languages, and delivery methods

to resonate with the specific needs and preferences of the target audience. For instance, using graphics and emotional appeals that evoke fear and regret may be particularly effective for certain immigrant populations, such as Chinese and Korean males, by eliciting emotional responses to efficacy information. Additionally, involving family members and utilizing community networks as part of the intervention process was proven successful in fostering support systems and strengthening quit attempts, particularly for Korean Americans. By embracing a culturally adapted approach, smoking cessation interventions can address the unique challenges and barriers faced by Asian-Americans, ensuring that interventions are relevant, effective, and capable of producing long-term impact. Such culturally sensitive strategies not only respect the cultural diversity within the community, but also foster a sense of trust and acceptance, thus ultimately increasing engagement and participation in smoking cessation efforts among Asian-Americans.

Furthermore, acknowledging the technological preferences of different age groups within the Asian-American community is crucial. Utilizing videoconferencing as a feasible option for younger individuals while recognizing the limitations of face-to-face interactions for older age groups can optimize intervention delivery and accessibility. Most studies about mobile health focused on developing and testing sophisticated applications or technologies to serve well-educated English-speaking populations. Use of technologies as tools to deliver health education to underserved populations, particularly marginalized low-income immigrants with limited English proficiency, is largely untested. Even when a version in Asian language is provided, the materials are often direct translation from the original English version, which can be confusing as the cultural relevance is limited. To a certain extent, it hinders the efficacy and effectiveness of the tools as the Asian users could barely feel related as they might live a different lifestyle due to the difference in cultural background and living habits. These factors could weaken the efficacy of the tools, making them less useful than how they should be.

In particular, several reviews concluded that the evidence for the efficacy of text messaging interventions to reduce smoking behavior is well-established [37, 38]. The benefits of mobile text messaging include ease of use, cost-effective intervention delivery, the ability to tailor message content and timing to individual characteristics, and sending and receiving time-sensitive information. Thus, culturally tailored health education should be developed in the corresponding Asian language with appropriate health literacy levels, focusing on the aggressive factors and defensive factors of lung cancer that should be taught to high-risk smokers, in order to achieve optimum efficiency. Information and explanations about the relationship between smoking and lung cancer should be delivered to smokers to raise the

awareness of their risk of lung cancer. Further, using text messaging to support quitting behaviors, and ultimately long-term smoking abstinence and lung cancer screening compliance, should be a priority to be tested in the growing but underserved Asian-American communities.

## Limitation

The review was limited to publications in English. Accordingly, it is possible that some studies were not identified using the search strategies outlined in this paper. While alcohol use, tobacco, and other health risk behaviors may occur together, we focused on tobacco use, which precluded the inclusion of intervention studies that were not primarily focused on tobacco. Our aim of the scoping review was to describe the current state of intervention programs in the focused area of Asian-American smoking cessation, and selection bias was mitigated with explicit inclusion and exclusion criteria and having three independent reviewers for article selection and extraction of information. Due to publication bias, research studies with positive results tend to be published more frequently, which may bias the results in review and mask certain health disparities as well.

## Conclusion

In conclusion, the scoping review shed light on the limited evidence available regarding effective smoking cessation programs and policies for Asian-Americans. The research gap highlighted the importance of further exploration and development of tailored interventions specifically designed for this diverse population. Health promotion practitioners must draw upon evidence from other target populations to inform the implementation and dissemination of tobacco cessation programs for Asian-Americans.

To address this gap, there is a crucial need for community-informed and engaged interventions that consider the unique cultural contexts and preferences of Asian-American communities. These interventions should be developed with active involvement of the target population to ensure relevance and effectiveness. Innovative strategies, such as mobile communication and text messaging approaches, hold potential for reaching Asian-American individuals and facilitating their adoption of tobacco control programs. In moving forward, public health practitioners must actively address the identified research gap by developing evidence-based and culturally relevant strategies specific to Asian-Americans. Innovative approaches, such as mobile communication and text messaging, present opportunities to reach and support this population effectively. By implementing community-informed and engaged interventions,

health promotion efforts can empower Asian-Americans on their tobacco cessation journey, ultimately contributing to improved public health outcomes within these communities. Continued research, collaboration, and program development are imperative to make significant strides in reducing tobacco use among Asian-Americans and promoting a healthier and smoke-free future for all.

**Author Contribution** All authors contributed to the study conception and design. Information extraction, summarization and analysis of literature were performed by Kuang-Yi Wen, Jessica Liang and Debbie Diep. Discussion was performed by Kuang-Yi Wen, Jessica Liang, Debbie Diep and Hee-Soon Juon. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

**Data Availability** The data underpinning the conclusions of this study, encompassing template data collection forms, extracted information from incorporated studies, data utilized for analyses, analytical code, and any additional materials employed in this review, can be obtained from the corresponding author upon inquiry.

## Declarations

**Ethics Approval** This is a review article. It is confirmed that ethical approval is exempted.

**Conflict of Interest** The authors declare no competing interests.

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