

Tobacco Use: Internet-based Interventions to Increase Tobacco Use Cessation

Community Preventive Services Task Force Finding and Rationale Statement Ratified December 2019

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CPSTF Finding and Rationale Statement

Intervention Definition

Internet-based tobacco cessation interventions use websites to provide evidence-based information, strategies, and behavioral support to motivate and assist tobacco users interested in quitting. Interventions include one or more of the following:

- Interactive features that help clients monitor progress and provide guidance, feedback, and support on quit efforts
- Tailored guidance that matches services and advice to information provided by the user
- Coaching, counseling, or social support from peers or trained professionals through e-mails, chat rooms and chat boxes, bulletin boards, blogs, or forums.

Content may be developed or adapted for specific populations and communities. Internet-based interventions may also incorporate text messaging, telephone calls, or medications.

CPSTF Finding (December 2019)

The Community Preventive Services Task Force recommends internet-based cessation interventions based on sufficient evidence of effectiveness in increasing tobacco use cessation among adult tobacco users. Systematic review evidence showed meaningful improvements in tobacco cessation outcomes when measured six or more months following intervention. Results from trials conducted in the United States were inconsistent, likely because most of these studies evaluated the additional impact of adding internet-based interventions to other evidence-based cessation treatments (e.g., counseling, medication).

Rationale

Basis of Finding

The CPSTF considers recently published systematic reviews to provide program planners and decision-makers with effective intervention options. A team of specialists in systematic review methods and smoking cessation research, practice, and policy selected and evaluated the following published review:

McCrabb S, Baker AL, Attia J, Skelton E, Twyman L, et al. Internet-based programs incorporating behavior change techniques are associated with increased smoking cessation in the general population: a systematic review and meta-analysis. *Annals of Behavioral Medicine* 2019;53(2):180-95.

The team abstracted additional information from the included intervention studies and conducted additional analyses. The CPSTF finding is based on results from the published systematic review and meta-analyses, additional analyses of data from included studies, and expert input from team members and the CPSTF. This recommendation updates and replaces the 2011 finding of insufficient evidence for internet-based tobacco cessation interventions.

The published review included 45 studies (search period through September 2017) and examined the impact of internet-based interventions on tobacco use cessation among recruited tobacco users interested in quitting. Of the 45 studies included in their review, 31 provided at least one measure of tobacco use cessation taken six or more months following

intervention. The CPSTF recommendation is based on evidence from this subset of 31 studies. Primary results from this subset are summarized in Table 1.

Table 1. Intervention Effects on Tobacco Use Cessation

Primary Outcomes Examined in the Systematic Review and Meta-Analysis	Number of Studies	Odds Ratio (95% Confidence Interval)	Direction of Effect
Tobacco use cessation at 6 or more months following intervention (prolonged abstinence; 30-day abstinence; 7-day abstinence)	31	1.19 (1.06, 1.35)	Favors the intervention
Prolonged tobacco use abstinence at 6 or more months following intervention	15	1.40 (1.19, 1.63)	Favors the intervention
30-day point prevalence abstinence at 6 or more months following intervention	7	0.87 (0.76, 1.00)	Inconsistent effects
7-day point prevalence abstinence at 6 or more months following intervention	9	1.20 (0.93, 1.55)	Favors the intervention

The CPSTF also translated study outcomes into absolute percent differences in tobacco use cessation rates and grouped trials based on types of interventions provided to comparison groups. Results from the same subset of 31 studies are summarized in Table 2.

Table 2. Intervention Effects on Tobacco Use Cessation by Type of Comparison

CPSTF Translation of Primary Outcomes from Studies Included in the Systematic Review and Meta-Analysis	Number of Studies	Odds Ratio (95% Confidence Interval)	Direction of Effect
Tobacco use cessation at 6 or more months following intervention (prolonged abstinence; 30-day abstinence; 7-day abstinence)	31	1.2 percentage points (IQI: -1.4 to 7.1 percentage points)	Favors the intervention
Subset of studies comparing internet-based interventions to either no intervention, usual care, printed materials, or basic website content	17	1.3 percentage points (IQI: -1.0 to 9.4 percentage points)	Favors the intervention
Subset of studies comparing internet-based interventions to interactive website content, counseling, or medications	14	0.8 percentage points (IQI: -2.1 to 4.9 percentage points)	Inconsistent effects

Internet-based interventions were effective when compared to no intervention or to approaches that used printed materials or static websites containing cessation information. Results were inconsistent, however, when comparison groups received evidence-based cessation treatments (e.g., counseling, medications; USPSTF 2015) or when studies compared internet-based interventions that varied with regard to content or intensity.

The CPSTF further examined results from 24 U.S. studies that measured outcomes six or more months following intervention. Of these studies, 13 measured cessation outcomes at six or more months following intervention. Overall, differences in cessation rates between study arms were small and inconsistent (median absolute percentage point difference=0.1 percentage points [IQR: -2.2 to 4.8]). Factors contributing to small and inconsistent results for this subset included the following:

- Most U.S. studies provided significant cessation interventions to participants in the comparison group. In four studies, comparison group participants also received an interactive website cessation resource. In five studies, comparison group participants received cessation medications, counseling, or both.
- Tobacco users in both intervention and comparison study arms quit at meaningful but similar rates.

Despite small effect estimates for the subset of studies conducted in the United States, the CPSTF concluded that the overall evidence of effectiveness is likely applicable to U.S. populations and settings.

The published review focused on the effectiveness of different behavior change techniques (BCTs) implemented in the included studies. While McCrabb et al. found some BCTs to be more effective than others, most U.S. studies did not provide adequate information to be included in this analysis. The CPSTF did not draw additional conclusions on the effectiveness of specific BCTs when used in internet-based interventions for tobacco use cessation.

Applicability and Generalizability Issues

The McCrabb et al. review included studies conducted in the United States (24 studies), the Netherlands (6 studies), Australia (3 studies), Germany (2 studies), Norway (2 studies), Switzerland (2 studies), and the United Kingdom (2 studies). One study was conducted in England and the Republic of Ireland. Three studies were conducted in both the United States and other countries (e.g., Canada, Spain).

Most studies conducted in the United States provided information on demographic characteristics of study participants. In studies providing such data, the median age was 41 years (22 studies) with 54% of participants being female (24 studies). Study participants included African Americans (10%; 15 studies), and Hispanics (6%; 15 studies). A median of 27% of participants had a high school or less level of education (17 studies), and a median of 32% of participants were unemployed (9 studies). Although studies did not report cessation outcomes stratified on these characteristics, the CPSTF concluded that the evidence reviewed was likely applicable to the general population of U.S. tobacco users interested in quitting.

Most interventions (30 studies) combined web-based features with additional components, including email messages (18 studies), cessation medications (9 studies), text messages (7 studies), telephone calls or support lines (3 studies), one-on-one counseling (2 studies), or printed materials (2 studies). Internet-based interventions were similarly effective with or without such additional components.

Data Quality Issues

The published systematic review by McCrabb et al. included only randomized controlled trials. Study quality was evaluated in the published review using the Cochrane risk of bias assessment tool (Higgins et al. 2011), with 15 of the 45 included studies rated as having high (4 studies) or unclear (11 studies) risk of bias. Inclusion of evidence from studies comparing internet-based interventions to other robust cessation interventions complicated the assessment of primary effectiveness.

Potential Benefits

The McCrabb et al. review did not report on any additional benefits of internet-based interventions, and the included studies did not evaluate additional benefits. The CPSTF notes that internet-based cessation resources provide both tobacco users and family members with information to motivate and inform conversations and decisions about tobacco use.

Potential Harms

The McCrabb et al. review did not report on the presence or absence of intervention-attributable harms. None of the included studies reported harms associated with the interventions. Given the variety of internet content available, the CPSTF noted that practitioners can help tobacco users interested in quitting avoid web content that is not evidence-based, that contains inaccurate information or advice, or that could be misinterpreted or wrongly applied.

Related Reviews and Recommendations

Three recently published systematic reviews examined web-based tobacco cessation interventions alone or as part of a broader review of digital health interventions for tobacco use cessation. Although slightly older, each review provided assessments of studies focused on comparisons of internet-based interventions to lower intensity approaches.

- Do et al. (2018) examined web-based interventions versus no intervention, basic websites, or printed materials and found evidence of effectiveness at 6 months after study enrollment (risk ratio [RR] 2.03; 95% CI 1.73, 2.38; 6 studies), but not at 12 months follow-up (RR 1.06; 95% CI 0.98, 1.16; 11 studies). When coordinated with pharmacotherapy, web-based interventions were generally effective at any follow-up interval (RR 1.29; 95% CI 1.17, 1.43; 11 studies).
- A Cochrane Collaboration review by Taylor et al. (2017) found that internet-based smoking cessation interventions were effective in increasing tobacco cessation when measured at 6 months or longer after study enrollment (RR 1.15, 95% CI 1.01, 1.30, 8 studies).
- Graham et al. (2016) compared internet-based interventions to other broad reach cessation approaches (e.g., print materials) and concluded that internet-based interventions were more effective. They also concluded that internet-based interventions had effects equivalent to those of other recommended treatment modes (i.e., telephone and in-person counseling).

Smoking Cessation: A Report of the Surgeon General [https://www.cdc.gov/tobacco/data_statistics/sgr/index.htm] concluded there is sufficient evidence to infer that web or internet-based interventions increase smoking cessation. The report further noted that interventions are more effective when they contain behavior change techniques and interactive components (U.S. Department of Health and Human Services 2020).

The U.S. Preventive Services Task Force (USPSTF) recommends that clinicians ask all adults about tobacco use, advise tobacco users to stop using tobacco, and provide them with behavioral interventions and U.S. Food and Drug Administration–approved pharmacotherapy ([A grade recommendation](#) [<https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/tobacco-use-in-adults-and-pregnant-women-counseling-and-interventions>]; USPSTF 2015).

Considerations for Implementation

The following considerations for implementation are drawn from studies included in the existing evidence review, the broader literature, and expert opinion from the CPSTF, as noted below.

Based on evidence from McCrabb et al. and CPSTF deliberations, the CPSTF recommends internet-based interventions that include interactive content and tailored guidance or support systems, alone or in combination with additional interventions. The CPSTF has previously recommended other interventions to increase tobacco cessation, including [quitlines](https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-quitline-interventions) [https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-quitline-interventions], [mobile phone-based interventions](https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-mobile-phone-based-cessation-interventions) [https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-mobile-phone-based-cessation-interventions], and policies to [reduce patient out-of-pocket costs](https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-reducing-out-pocket-costs-evidence-based-cessation) [https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-reducing-out-pocket-costs-evidence-based-cessation] for effective cessation treatments. Improving access to effective, evidence-based interventions to help tobacco users in their efforts to quit is an important component of a [comprehensive tobacco prevention and control program](https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-comprehensive-tobacco-control-programs) [https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-comprehensive-tobacco-control-programs], which is another CPSTF-recommended intervention approach.

Internet-based interventions have several conceptual advantages for cessation assistance (McCrabb et al., 2019; CPSTF 2011). These include substantial reach and penetration within important target populations, ease and availability of user access to tailored information and support, potential for consistency in treatment content, scalability to match program resources and consumer demand, and the potential for low per-user costs. Interventions developed in the public sector could be shared or cross-linked by tobacco control programs and organizations.

McCrabb et al. and the CPSTF (2011) also noted that internet-based interventions require ongoing advertising, service promotion, and website enhancements to attract and engage clients. Advertising, cross-promotion, and coordinated web-linkages can help tobacco users access the evidence-based cessation intervention which best suits their needs. Identified barriers to the implementation and use of internet-based interventions include technological concerns (e.g., matching program, network, and client capabilities) and ensuring confidentiality of participant information.

Studies included in the review (Bricker et al. 2013, Stoddard et al. 2008) and the CPSTF support use of the following web-based resources that provide or link to cessation interventions with interactive, dynamic content:

- smokefree.gov [https://smokefree.gov/] is a website from the National Cancer Institute that provides evidence-based cessation information and assistance to tobacco users who want to quit.
 - [SmokefreeVET](https://veterans.smokefree.gov/) [https://veterans.smokefree.gov/] is a section of this page dedicated to helping veterans who want to quit smoking.
- The [Tips From Former Smokers®](https://www.cdc.gov/tobacco/campaign/tips/) [https://www.cdc.gov/tobacco/campaign/tips/] website is designed to support CDC's national tobacco education campaign, and seeks to motivate quit attempts through stories of real people with smoking-related diseases and to help people succeed in quitting smoking by connecting them to cessation resources.
 - [How to Quit Smoking](https://www.cdc.gov/tobacco/campaign/tips/quit-smoking/index.html?s_cid=OSH_tips_D9755) [https://www.cdc.gov/tobacco/campaign/tips/quit-smoking/index.html?s_cid=OSH_tips_D9755]
- [BecomeAnEX](https://www.becomeanex.org/) [https://www.becomeanex.org/] is a free digital resource from The Truth Initiative designed to help tobacco users quit.

Evidence Gaps

The CPSTF and McCrabb et al. identified several areas that have limited information. Additional research and evaluation could help answer the following questions and fill existing gaps in the evidence base.

- How do intervention effects vary by participant characteristics, including income, level of education, and race/ethnicity in U.S. populations and settings?
- How do intervention effects vary by internet-based content? Simplified comparisons would also allow assessments of the effectiveness of various specific behavior change techniques, alone or in combination.
- How do internet-based interventions that use automated, interactive, and tailored guidance compare with interventions that use static websites or printed materials in U.S. populations and settings?
- What are the most effective and efficient ways to increase recruitment and enhance retention?
- What is the impact of these intervention approaches on long-term cessation outcomes (12 months or more)?
- Are these interventions effective with clients who want to quit using e-cigarettes?

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Disclaimer

The findings and conclusions on this page are those of the Community Preventive Services Task Force and do not necessarily represent those of CDC. Task Force evidence-based recommendations are not mandates for compliance or spending. Instead, they provide information and options for decision makers and stakeholders to consider when determining which programs, services, and policies best meet the needs, preferences, available resources, and constraints of their constituents.

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