National Institute for Health and Care Excellence

Draft for consultation

# Behaviour change: digital and mobile health interventions

## Evidence review for smoking behaviour
## Evidence review underpinning recommendations 1.1 to 1.3 and 1.5 and the research recommendations in the guideline

*NICE guideline <number>*

*Evidence reviews*

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*These evidence reviews were developed by Public Health Guidelines*

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ISBN:

# Contents

# Review question

## What components and characteristics of digital and mobile health interventions are effective at changing smoking behaviour?

## Introduction

This review will cover digital and mobile health interventions for the individual. It will address established unhealthy behaviour relating to smoking. Addressing this behaviour can help to reduce the risk of developing conditions, for example, cardiovascular diseases, cancer, respiratory diseases as well as improving mental wellbeing.

## PICO table

| PICO Element | Details |
|---|---|
| Population | **Included:**<br>Everyone, including children and young people under 16 (and their families or carers), who would benefit from changing current smoking behaviours.<br><br>Specific consideration will be given to people with the following chronic physical or long-term mental health conditions, who may benefit from managing smoking behaviours because it affects their health or mental wellbeing:<br><br>• Hypertension and cardiovascular disease (including, stroke and coronary heart disease)<br><br>• Respiratory diseases (asthma, chronic obstructive pulmonary disease)<br><br>• Cancers for which managing smoking may improve health outcomes (for example lung cancer)<br><br>• Mental health conditions (including anxiety, depression and dementia for which managing smoking behaviours may improve outcomes)<br><br>Specific consideration will also be given to people with learning disabilities and people with neurodevelopmental disorders such as autism.<br><br>**Excluded**:<br>Those (including children and young people under 16) who have never smoked.<br><br>Previous smokers who have now quit.<br><br>Type and stage of cancers for which managing an established lifestyle behaviour may not improve health outcomes.<br><br>Any condition listed above not associated causally with smoking behaviour. |
| Intervention | **Included:**<br>Digital and mobile health behaviour change interventions that focus on changing current smoking behaviours. That is interventions that are delivered |

| PICO Element | Details |
|---|---|
| | via a digital or mobile platform as a direct interface with participants. Examples include:<br>• Text message-based services (including picture messages and audio messages)<br>• Those delivered by the internet (such as by apps, email, websites, videos, social networking sites and multi-media)<br>• Interactive voice response interventions<br><br>Digital or mobile health interventions are typically automated, interactive and personalised although they may involve some direct or ongoing interaction with a practitioner or health care professional. However, it should be the digital or mobile health technology itself that delivers the primary action, process of intervening or behaviour change techniques (as opposed to the healthcare practitioner or professional).<br><br>The interventions may also focus on digital and mobile health strategies to improve mental wellbeing in those who smoke (for example, building resilience, managing stress, improving sleep and sleep hygiene, and reducing social isolation).<br>**Excluded**:<br>Interventions delivered solely by a healthcare professional or practitioner (for example counselling delivered over the telephone, video-links or by real-time live instant messaging), where the delivery of the primary action or process of intervening or behaviour change techniques is provided by the healthcare professional or practitioner<br><br>Digital and mobile health interventions that aim to maintain healthy behaviours among those who do not currently exhibit unhealthy behaviours relating to diet, physical activity or sedentary behaviour.<br><br>Clinical interventions to help with the diagnosis, treatment or management of a chronic physical or long-term mental health condition.<br><br>Psychiatric interventions delivered as part of the therapeutic process for people with a mental health problem.<br><br>Clinical or pharmacological methods of achieving behaviour change with no public health or health promotion element. For example, appointment reminders, medication reviews or self-care solely to improve medicine adherence.<br><br>National policy, fiscal and legislative measures.<br><br>Changes to the public realm to support behaviour change (such as designing and managing public spaces in a way that encourages and helps people to stop smoking). |
| Comparator | Other intervention for example a healthcare professional led intervention without a digital element or a combination of health professional and digital led interventions.<br><br>Passive control group (usual care, no intervention)<br><br>Trials with more than one comparator will be included if at least one of the experimental arms meets the technology-based intervention inclusion criteria (see above). |

| PICO Element | Details |
|---|---|
| Outcomes | Primary outcomes<br>Descriptive outcomes: Intervention components and study characteristics<br><br>Change in (>6 months follow up from baseline) smoking status measured as:<br>• Point prevalence abstinence<br>• Continued or sustained abstinence<br><br>Where biochemically validated measures are available, these will be preferred to self-reported measures.<br><br>Extent of engagement (measured as self-report or automatically recorded usage data):<br>• program adherence/attrition, number of log-ins/visits, number of pages visited, number of sessions completed, time spent on the device, number of device components/features used).<br>• Self-reported interaction with the digital or m-health behaviour change intervention through quantitative approaches (i.e. self-report questionnaires)<br><br>Secondary outcomes<br>These will be extracted only if the study also reports a primary outcome.<br>• Health-related quality of life<br>• Resources use and costs<br>• Safety or adverse effects, including unintended consequences.<br><br>Cost/resource use associated with the intervention<br>The following outcomes will be extracted in reviews of the health economic evidence, where available:<br>• cost per quality-adjusted life year<br>• cost per unit of effect<br>• net benefit<br>• net present value<br>• cost/resource impact or use associated with the intervention or its components<br><br>**Excluded:**<br>Any study which does not include a primary outcome. |

## Methods and process

This evidence review was developed using the methods and process described in Developing NICE guidelines: the manual. Methods specific to this review question are described in the review protocol in Appendix A. Information on the synthesis and quality assessment of included studies is discussed on page 21.

Declarations of interest were recorded according to NICE's 2018 conflicts of interest policy.

Only randomised controlled trials were included in this review. According to revised protocol ≥ 6 month from baseline follow up data only were eligible in the review. Interventions were grouped according to digital platform in the following categories: Internet based interventions, Text messaging interventions and Mixed interventions (e.g. text& video, internet and mobile phone).

Risk of bias was assessed using the Cochrane Risk of Bias 2.0 tool. With regards to imprecision, minimally important difference (MID) thresholds were used. Specifically, for dichotomous outcomes the default MID value of (0.8-1.25) was used. Uncertainty is present where confidence intervals cross the MID threshold. If the confidence interval crosses one lower MID threshold, this indicates 'serious' risk of imprecision. Crossing both MID thresholds indicates 'very serious' risk of imprecision in the effect estimate. When neither of the confidence intervals crossed the MID and the point estimate is also beyond the MID a minimally important difference is present. Overall, the change in the outcome is not meaningful when the CIs cross the MID. If the MID could not be calculated (e.g. because standard deviation of outcome measure at baseline was not reported in the paper) then we downgraded by 1 level as it was 'not possible to calculate imprecision from the information reported in the study.

Specific decision rules were used for selecting the outcome as follows:

1. Where biochemically validated measures are available, these will be preferred to self-reported measures
2. Longest follow up was used
3. Where continuous or sustained abstinence was reported, will be preferred to point abstinence

## Public health evidence

### Included studies

3781 references were identified from literature searches (between 2000 and 2019) outlined in Appendix E. 278 papers were ordered in full text. In total 19 primary studies met the inclusion criteria outlined below One of the studies provided separate data for men and women. 259 studies were excluded. See Appendix C for Public health evidence study selection.

### Excluded studies

See appendix L for full list of excluded studies with reasons for exclusion.

## 1 Summary of studies included in the evidence review

| Study | Population | Intervention | Comparator | Outcome used (relevant to protocol) | Behaviour change technique (BCT) | Risk of bias |
|---|---|---|---|---|---|---|
| **No chronic conditions (n=18)** | | | | | | |
| Abroms 2014 (USA) | Adults with no chronic conditions<br><br>N= 503 | Tailored text messaging intervention (via mobile phone)<br>Text- messaging program of automated, bidirectional text messages). | Initially received weblink to smoke free website. To prevent contamination, controls were further offer a guidebook. [another intervention] | Point prevalence at 6 months:<br>(7days, 30 days)<br><br>**Biochemically confirmed abstinence at 6 months**<br><br>Engagement reported | Goal and planning, Social support | Some concerns |
| An 2008 (USA) | Adults with no chronic conditions<br><br>N= 517 | Tailored internet-based intervention (via website)<br>Website (email invitation to visit website, interactive quiz with tailored feedback, personalized email using information provided by participants during their website visits) | Control group received access to online health and academic resources (websites) [another intervention] | Self-reported 30-day abstinence at week 30.<br><br>**7-day point prevalence at week 30**<br><br>Engagement reported | Reward and threat, Feedback and monitoring, Social support | Some concerns |
| BinDhim 2017 | Adults with no chronic conditions | Internet- based intervention (via smartphone apps) | smartphone app with information | **Self-reported 6-month** | Goals and planning, Social support | Some concerns |

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| (USA, Australia, UK and Singapore) | N= 684 | | only (control app included non-mandatory information about quitting options) [another intervention] | **continuous abstinence** | | |
| Brendryen 2007 (Norway) | Adults with no chronic conditions (with NRT to be part of the recruitment inducement)<br><br>N= 396 | Multi -media intervention Internet and cell phone-based intervention (consisted of more than 400 contacts by e-mail, web-pages, interactive voice response (IVR) and short message service (SMS) technology | Self- help booklet [another intervention] | **Self-reported 7 -day point abstinence at:**<br>6 months<br>**12 months**<br><br>Engagement reported | Goals and planning, Self-belief | Some concerns |
| Brendryen 2008 (Norway) | Adults with no chronic conditions (without NRT)<br><br>N= 684 | Multi -media intervention-Internet and cell phone-based intervention (consisted of more than 400 contacts by email, Web pages, interactive voice response, and short message service technology | Self- help booklet [another intervention] | **Self-reported 7-day point abstinence at:**<br>6 months<br>**12 months**<br><br>Repeated Point Abstinence (abstinence at all four time points) 1+3+6+12 months | Feedback and monitoring, Goals and planning, Self-belief | Some concerns |

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| | | | | Engagement reported | | |
| Brown 2014 (UK) | Adults with low and high socioeconomic with no chronic conditions<br><br>N= 4613 | Tailored internet- based intervention<br>(via website) which included a screencast explaining how to use the website, and up to five tunnelled dialogue sessions tailored according to their quit date, their intended use of smoking cessation medicines, their success in obtaining and use of medicines, and reasons for quitting | Information-only website- a one-page static website giving brief standard advice. [another intervention] | **Biochemically verified 6-month sustained abstinence**<br><br>Point abstinence prevalence: 7 days at 6 months<br><br>Engagement reported | Goal and planning | Low risk |
| Free 2009 (UK) | People aged <18 years with no chronic conditions<br><br>N= 200 | Tailored text messaging intervention<br>(via mobile phone)<br>Tailored messages according to participant interests and issues about quitting smoking | Control group received fortnightly, simple, short, generic text messages (pure control group) | **Self-reported abstinence (point prevalence—that is, no smoking in the past 7 days) at 6 months post-randomisation, with reports of abstinence verified by salivary cotinine testing using a cut-off of 7 ng/ml of cotinine** | Feedback and monitoring, goal and planning | Some concerns |

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| | | | | Self-reported 28 days continuous abstinence at 6 months | | |
| Free 2011 (UK) | People aged <18 years with no chronic conditions<br><br>N= 5800 | Tailored text messaging intervention<br>(via mobile phone)<br>Tailored messages according to participant interests and issues about quitting smoking | Control group received fortnightly, simple, short, generic text messages. (pure control group) | **Biochemically verified continuous abstinence at 6 months**<br><br>Self-reported 28-day continuous abstinence<br>7-day self-reporting point abstinence at:<br>6 months | Feedback and monitoring, goal and planning | Low risk |
| Graham 2011 (USA) | Adults with no chronic conditions<br><br>N= 2005 | Tailored internet-based intervention (via website) | A static, information-only material based on content of the website [another intervention] | 30 -day single point prevalence abstinence at:<br>6 months<br>12 months<br>18 months<br><br>**Self-reported 30 -day multiple point prevalence abstinence at:**<br>6 months<br>12 months | Feedback and monitoring, goal and planning, social support | Some concerns |

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| | | | | **18 months** | | |
| Liao 2018 (China) | Adults with no chronic conditions<br><br>N= 1369 | Text-messaging intervention (via mobile phone: high frequency or low frequency messages to improve quit date) | Text messages unrelated to quitting [another intervention] | **Biochemically verified continuous smoking abstinence at 24 weeks**<br>Self-reported 7-day point prevalence abstinence | Goals and planning | Low risk |
| Mavrot 2017 (France) | Adults with no chronic conditions<br><br>N= 1120 | Tailored internet- based intervention (via website) providing individualized counselling through personalized and tailored messages based on participant questionnaires answers<br>Coach website+ Stop-Tabc website | Stable website (Stop-Tabac website) [another intervention] | Self- reported abstinence at 6 months<br><br>Engagement reported | Feedback and monitoring, goal and planning | High risk |
| Naughton 2014 (UK) | Adults with no chronic conditions<br><br>N= 602 | Usual care and Tailored advise report and tailored text messaging intervention (via mobile phone) | Usual care (delivered by smoking cessation adviser) [another intervention] | Self-reported 3-month prolonged abstinence at 6-month<br><br>**Self-reported 6-month prolonged abstinence at 6-month** | Goal and planning, social support | Some concerns |

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| Skov-Ettrup 2016 (Denmark) | People aged <18 years with no chronic conditions<br><br>N=905 | Mixed intervention (optional e- mail and text-messages) | Self-help booklet [another intervention] | **Self-reported prolonged abstinence at:**<br>6 months<br>**12 months** | Feedback and monitoring, goal and planning | High risk |
| Stanczyk 2016 (Netherlands) | Adults with no chronic conditions<br><br>N=2551 | Mixed intervention<br>Group 1-Text- based condition: received multiple tailored feedback<br>via text-based messages<br>Group 2- video- based condition received multiple tailored feedback<br>via video messages | Brief generic text advice (general advice on smoking cessation) [another intervention] | **Self-reported prolonged abstinence at 12 months**<br><br>7-day point prevalence abstinence | Feedback and monitoring, goal and planning, self- belief | Some concerns |
| Thanh 2018 (France) | Adults with no chronic conditions<br><br>N=2478 | Tailored, personalised and fully automated internet-based intervention (via e-mails) | Booklet [another intervention] | **Self-reported 7-day point prevalence abstinence at:**<br>6 months<br>**12 Month** | Goal and planning | High risk |
| Vidrine 2018 (USA) | Adults with no chronic conditions<br>**Socioeconomically Disadvantaged Individuals**<br><br>N=624 | NRT+Tailored text-messaging intervention (via mobile phone) | NRT intervention+ Brief advice, self-help written materials, and a referral [another intervention] | **Biochemically verified abstinence at 6 months**<br><br>Self-reported 30-day abstinence | Goal and planning, social support | Some concerns |
| Wangberg 2011 (Norway) | People aged <18 years with no chronic conditions | Tailored internet- based intervention (via e-mails) | Other intervention: | **Self-reported 7-day abstinence** | Feedback and monitoring, goal and planning, self-belief | High risk |

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|---|---|---|---|---|---|---|
| | N=2298 | | Untailored e-mails | **rates at 12months**<br><br>Engagement reported | | |
| Whittaker 2011 (New Zealand) | People aged <18 years with no chronic conditions<br><br>N=226 | Multimedia intervention<br>The group received an automated package of video and text messages over 6 months that was tailored to<br>self-selected quit date, role model, and timing of messages | A general health video message sent to the phone [other intervention] | **Self-reported 6-month continuous abstinence at 6 months**<br><br>7- day point prevalence abstinence at 6 months | Goal and planning, self-belief | Some concerns |
| **Pregnancy (n=1)** | | | | | | |
| Naughton 2017 (UK) | Pregnant women aged <18 years<br><br>N= 407 | Booklet+ Usual care+ Tailored text-messaging intervention<br>Tailoring characteristics include gestation, motivation to quit, the hardest situation to avoid smoking, cessation self-efficacy, cigarette dependence and partner's smoking status. | Booklet+ Usual care [another intervention] | **Biochemically validated abstinence reported from 4 weeks post-randomization until late pregnancy at 36 weeks**<br><br>Validated 7-day point prevalence abstinence at 36 weeks | Goal and planning, social support | Some concerns |

1 A summary of characteristics of the interventions can be found in Appendix G.

See appendix F for full evidence tables.

## Synthesis and quality assessment of effectiveness evidence included in the evidence review

Included studies in the review were RCTs. The Cochrane's Risk of Bias 2.0 tool was used for the quality assessment of the included studies. Meta-analysis was performed to synthesize the evidence using a random effect model in order to take into account the heterogeneity (variability) of the included studies. Cochrane Review Manager software (version 5.3) was used for the meta-analysis. Subgroup analyses were also performed according to digital platform and population of interest. Also, sensitivity analyses on tailored interventions and on low socioeconomic status were conducted.

GRADE methodology was used to appraise the evidence across five potential sources of uncertainty: risk of bias, indirectness, inconsistency, imprecision and other issues. Overall ratings start at 'High' where the evidence comes from RCTs, and 'Low' for evidence derived from observational studies. See appendix H for full GRADE tables.

## Economic evidence

### Included studies

A unified search for economic evidence was conducted across all review questions in the guideline. A total of 5,267 records were assessed against the eligibility criteria. 5,107 records were excluded based on information in the title and abstract. The full-text versions of 160 papers were retrieved and assessed and 7 studies were assessed as meeting the inclusion criteria for this review question on smoking.

A re-run search was carried out in August 2019 to identify any additional economic evidence that was published during guideline development. 1,040 records were excluded based on information in the title and abstract. The full-text versions of 20 papers were retrieved and assessed and none were found to meet the inclusion criteria for this review question.

### Excluded studies

173 full text documents were excluded for this question. The documents and the reasons for their exclusion are listed in appendix L. Documents were excluded for the following reasons: ineligible intervention (n=58), ineligible population (n=39), ineligible outcomes (n=27), limited ability to inform the committee about the factors of interest (n=15), ineligible study design (n=22), systematic review (n=12). The selection process is shown in appendix E.

## Summary of studies included in the economic evidence review

| Study | Intervention and comparator key features | Costs | Effects | Incremental cost effectiveness and uncertainty | Quality assessment |
|---|---|---|---|---|---|
| **Daly 2019 (US)**<br><br>**Currency & cost year:**<br>US $; 2014<br><br>**Cost-effectiveness analysis**<br><br>**Population:**<br>Adult smokers – low socioeconomic status | **INTERVENTION**<br>Enhanced care:<br>• Mobile text messages, designed to increase health knowledge, maintain/increase quit motivation, promote coping skills use and increase social support<br>– Messages sent over 12 weeks<br>– First week after the quit date, 5 messages a day<br>– The number of messages gradually declined to 1 message per day by week 4 and stayed at this level until the end<br>• Access to smoking hotline<br>• Standard care<br><br>**COMPARATOR**<br>Standard care:<br>• General advice to quit smoking (healthcare professional), self-help materials<br>• Nicotine replacement therapy | **Mean cost per patient**<br>Standard care: $103.90<br>Enhanced care: $147.61 | **Mean QALYs (men)**<br>Standard care: 14.27<br>Enhanced care: 14.37<br><br>**Mean QALYs (women)**<br>Standard care: 15.17<br>Enhanced care: 15.19 | **Full incremental analysis**<br>Incremental cost per additional quit (lifetime, irrespective of gender)<br>Enhanced care vs standard care: $887 (£650)<br><br>Incremental cost per QALY (lifetime, men)<br>Enhanced care vs standard care: $426 (£312)<br><br>Incremental cost per QALY (lifetime, women)<br>Enhanced care vs standard care: $2,186 (£1,603)<br><br>**Analysis of uncertainty**<br>One-way analyses were presented varying cost by ±50%. Enhanced care remained cost effective compared to standard care. Probabilistic sensitivity analysis was not conducted. | **Overall applicability:**<br>Partially applicable<br><br>**Overall quality:**<br>Potentially serious limitations |
| **Graham 2013 (US)**<br><br>**Currency & cost year:** | **INTERVENTION**<br>Enhanced internet programme<br>• Basic internet programme (see below)<br>• Plus interactive features and a large online social network | **Total costs:**<br>Basic internet: $679<br>Enhanced internet: $26,040 | **Quitters at 3 months (single-point prevalence)**<br>Basic: 62/679 (9.1%)<br>Enhanced: 68/651 (10.4%) | **Full incremental analysis**<br>Incremental cost per additional quitter (3 months)<br>Enhanced vs basic internet: $4,227 (£3,276) | **Overall applicability:**<br>Partially applicable |

| Study | Intervention and comparator key features | Costs | Effects | Incremental cost effectiveness and uncertainty | Quality assessment |
|---|---|---|---|---|---|
| US $; year not reported (2011 assumed)<br><br>**Cost-effectiveness analysis**<br><br>**Population:** adult smokers | **COMPARATOR**<br>Basic internet programme:<br>• 6 months free access to static content extracted from QuitNet: quitting and medication guides, directory of cessation programmes, and FAQ responses | For basic internet, assumed $1 per person as real-world cost to a payer to provide static web pages at scale<br>actual; for enhanced internet, $40 per person reflected cost to commercial payers for a fully developed and maintained website with a large social network and evidence-based cessation content | **Quitters at 6 months (single-point prevalence)**<br>Basic: 83/679 (12.2%)<br>Enhanced: 94/651 (14.4%)<br><br>**Quitters at 12 months (single-point prevalence)**<br>Basic: 119/679 (17.5%)<br>Enhanced: 98/651 (15.1%)<br><br>**Quitters at 18 months (single-point prevalence)**<br>Basic: 129/679 (19%)<br>Enhanced: 113/651 (17.4%) | Incremental cost per additional quitter (6 months)<br>Enhanced vs basic internet: $2,305 (£1,786)<br><br>Incremental cost per additional quitter (12 months)<br>Enhanced dominated by basic internet.<br><br>Incremental cost per additional quitter (18 months)<br>Enhanced dominated by basic internet.<br><br>**Analysis of uncertainty**<br>Sensitivity analysis was not conducted. | **Overall quality:** Very serious limitations |
| **Guerriero 2013 (UK)**<br><br>**Currency & cost year:** GBP £; 2009-2010<br><br>**Cost-effectiveness** | **INTERVENTION**<br>Mobile phone tailored text messaging intervention added to current practice<br>• Participants received 5 text messages per day for the first 5 weeks and three per week for the next 26 weeks.<br><br>**COMPARATOR**<br>Current practice | **Mean costs for 1,000 smokers (weighted average age)**<br><br>Current practice: £5,299,712<br>Text messages plus current practice: £5,258,203 | **Mean life years gained for 1,000 smokers (weighted average age)**<br><br>Current practice: 20,859<br>Text messages plus current practice: 20,877 | **Full incremental analysis**<br>The addition of mobile text-based support for smoking cessation to current practice was dominant (less costly and more effective) for all ages.<br><br>Lifetime analysis (weighted average age):<br>Incremental cost: -£41,509<br>Incremental QALYs: 29 | **Overall applicability:** Directly applicable<br><br>**Overall quality:** No/minor limitations |

| Study | Intervention and comparator key features | Costs | Effects | Incremental cost effectiveness and uncertainty | Quality assessment |
|---|---|---|---|---|---|
| **and cost-utility analysis**<br><br>**Population:** adult smokers | | | **Mean QALYs gained for 1,000 smokers (weighted average age)**<br><br>Current practice: 15,528<br>Text messages plus current practice: 15,557 | **Analysis of uncertainty**<br>One-way sensitivity analysis did not change the finding that text-based support is health improving and cost saving.<br><br>Probabilistic sensitivity analysis, which varied unit costs, relative risk, lifetime relapse rate and the baseline quit rate showed that there is a greater than 90% chance that the intervention will be cost saving. | |
| **Jones, 2019 (UK)**<br><br>**Currency & cost year:** GBP £; 2014/15<br><br>**Cost-effectiveness and cost-utility analysis**<br><br>**Population**: Pregnant smokers | **INTERVENTION**<br>MiQuit<br>• Mobile phone tailored, automated, interactive, self-help smoking cessation text messaging intervention<br>• Intervention delivery schedule: 0, 1 or 2 daily texts. The frequency depended on the gestational week.<br>• In addition to usual care<br><br>**COMPARATOR**<br>Usual care:<br>• Booklet on smoking cessation and support as part of routine antenatal care advice | **Total costs per person:**<br>Total cost per pregnancy (mother and offspring)<br>MiQuit: £20,876.48<br>Usual care: £20,915.76 | **Total life-years per pregnancy outcomes (mother and offspring)**<br>MiQuit: 49.28<br>Usual care: 49.25<br><br>**Total QALYs per pregnancy outcomes (mother and offspring)**<br>MiQuit: 46.70<br>Usual care: 46.66 | **Full incremental analysis**<br>Incremental costs (lifetime): -£13.76<br>Incremental QALYs: 0.0081<br><br>MiQuit is dominant over usual care<br><br>**Analysis of uncertainty**<br>In probabilistic sensitivity analysis, MiQuit had a 95% probability of being cost saving. | **Overall applicability:** Directly applicable<br><br>**Overall quality:** No/minor limitations |
| **Naughton, 2017 (UK)**<br><br>**Currency & cost year:** | **INTERVENTION**<br>MiQuit<br>• Mobile phone tailored, automated, interactive, self-help smoking | **Total cost per participant**<br>MiQuit: £4.62<br>Usual care: £0 | **Continued abstinence**<br>MiQui: 5.4%<br>Usual care: 2.0% | **Full incremental analysis**<br>Incremental quit rate with MiQuit over usual care (12 weeks): 3.46%, P-value = 0.064. | **Overall applicability:** Directly applicable |

| Study | Intervention and comparator key features | Costs | Effects | Incremental cost effectiveness and uncertainty | Quality assessment |
|---|---|---|---|---|---|
| GBP £; 2014/15<br><br>**Cost-effectiveness analysis**<br><br>**Population:** Pregnant smokers<br><br>**Note:** this is a within-trial analysis of the same RCT that informed Jones 2019 | cessation text messaging intervention<br>• Intervention delivery schedule: 0, 1 or 2 daily texts. The frequency depended on the gestational week.<br>• In addition to usual care<br><br>**COMPARATOR**<br>Usual care:<br>• Booklet on smoking cessation and support as part of routine antenatal care | | | Incremental cost per participant with MiQuit over usual care: £4.62<br><br>Incremental cost per quitter with MiQuit over usual care: £133.53 (95% CI –£395.78 to 843.62).<br><br>**Analysis of uncertainty**<br>Sensitivity analyses were performed on all smoking outcomes but no extensive results were reported. When the ORs were increased for six out of the seven smoking outcomes (OR 3.11, 95% CI: 1.05-10.80) the number of quit attempts between baseline and late pregnancy did not differ significantly. | **Overall quality:** Potentially serious limitations |
| **Skov-Ettrup, 2016 (Denmark)**<br><br>**Currency & cost year:** GBP £; 2014<br><br>**Cost-effectiveness analysis**<br><br>**Population:** adult smokers | **INTERVENTION**<br>Internet- and text-message-based smoking cessation program (e-quit) E-mails and text messages were optional. Website mailed feedback according to quit date. Users opting for text message support could receive up to 118 text messages during their quit attempt, with the highest intensity around the quit date.<br><br>**COMPARATORS**<br>Self-help booklet; setting a quit date was encouraged | **Total costs per person:**<br>Internet- and text-message-based intervention: £968<br>Self-help booklet: £812 | **Prolonged abstinence**<br>Internet- and text-message-based intervention: 5.3%<br>Self-help booklet: 3.6% | **Full incremental analysis**<br>Cost per additional 12-month quitter<br>Internet- and text-message-based intervention vs self-help booklet: £20/additional quitter<br><br>**Analysis of uncertainty**<br>Not undertaken | **Overall applicability:** Partially applicable<br><br>**Overall quality:** Very serious limitations |

| Study | Intervention and comparator key features | Costs | Effects | Incremental cost effectiveness and uncertainty | Quality assessment |
|---|---|---|---|---|---|
| **Stanczyk, 2014 (The Netherlands)**<br><br>**Currency & cost year:**<br>EUR €; 2013<br><br>**Cost-effectiveness and cost-utility analysis**<br><br>**Population**: adult smokers | **INTERVENTIONS**<br>Text-based computer-tailored internet intervention<br>• Tailored text-based messages<br>• 6 sessions over 8 weeks from quit date (longer if relapse occurs)<br><br>Video-based computer-tailored internet intervention<br>• Tailored video messages presented by five different adults in a TV 'news programme' format<br>• 6 sessions over 8 weeks from quit date (longer if relapse occurs)<br><br>**COMPARATOR**<br>Control:<br>• Brief general text advice about quitting | **Mean total costs**<br>Control group: €4,879<br>Text group: €4,939<br>Video group: €5,383 | **Percentage of individuals on prolonged abstinence**<br>Control group: 6.4%<br>Text group: 7.3%<br>Video group: 9.9%<br><br>**Mean QALYs**<br>All 3 interventions: 0.83 QALYs | **Full incremental analysis**<br>Incremental cost per prolonged abstinence (1 year)<br>Video vs Control: €1,500 (£1,372)<br>Video vs Text: Video dominated text<br><br>Incremental cost per QALY (1 year)<br>Video vs Control: €60,000 (£54,870)<br>Video vs Text: Video dominated text<br><br>**Analysis of uncertainty**<br>Nonparametric bootstrap resampling technique was used. At a threshold of €18,000/QALY, the video intervention had a 39% probability of being cost effective; at a threshold of €80,000/QALY, the video intervention had a 41% probability of being cost effective. | **Overall applicability:**<br>Partially applicable<br><br>**Overall quality:**<br>Potentially serious limitations |

## 1 Economic model

2 No original economic modelling was undertaken for this question.

## 3 Summary of the evidence

## 4 Evidence statements

| Outcome | Summary | Confidence | GRADE profile |
|---|---|---|---|
| Long term smoking abstinence | Overall digital and mobile health interventions were effective at changing smoking behaviour (n=15). Behavioural interventions were effective at increasing smoking abstinence both when using biochemical verification (8 studies) and when using self-reporting (12 studies).<br>No subgroup differences identified. | Biochemical: Very low<br>Self-reporting: Very low | 1 |
| Long term smoking abstinence – digital platform | Internet-based interventions were effective at increasing the smoking abstinence, but the change was not meaningful (8 studies).<br>Text message interventions (7 studies) and mixed interventions (5 studies) were both significantly associated with an increase in smoking abstinence.<br>No subgroup differences identified. | Internet interventions: Very low<br>Text messages: Moderate<br>Mixed intervention: Moderate | 2 |
| Long term smoking abstinence - ≥12months | Internet-based interventions at 12 months could not differentiate between interventions and control groups (n=3).<br>Mixed interventions were effective at increasing smoking abstinence at 12 months follow up (n=4).<br>Significant differences were identified between subgroups: mixed interventions were significantly associated with an increase in the smoking abstinence than internet-based interventions. | Internet interventions: Very low<br>Mixed intervention: Moderate | 3 |
| Long term smoking abstinence – tailoring | Tailored digital and mobile health interventions were significantly associated with an increase in smoking abstinence (n=15). | Tailored interventions: Very low | 4 |
| Long term smoking abstinence – socioeconomic status | Digital and mobile health interventions for smoking abstinence in people with low socioeconomic status could not differentiate between intervention and control groups (n=2). | Low socioeconomic status: Low | 5 |

**Economic evidence statements**

One cost-utility analysis (Daly, 2019) found that a mobile phone intervention for low socioeconomic groups is cost effective compared with standard care. The analysis was assessed as partially applicable to the review question with potentially serious limitations.

One cost-effectiveness analysis (Graham, 2013) found that 6 months of access to an enhanced internet intervention with interactive features and an online social network was more effective in terms of quit rate and more costly than a basic static website at 3 and 6 months. However, over longer follow-up (12 and 18 months), the enhanced internet intervention was less effective. The study was an economic evaluation conducted alongside a RCT. The analysis was assessed as partially applicable to the review question with very serious limitations.

One cost-utility analysis (Guerriero, 2013) found that a mobile phone tailored text messaging intervention in addition to current practice was more effective and less costly compared with current practice alone. The analysis was assessed as directly applicable to the review question with no/minor limitations.

One cost-utility analysis (Jones, 2019) compared a mobile phone tailored text messaging intervention in addition to usual care to usual care alone in pregnant women and found the text messaging intervention is more effective and less costly. The analysis was assessed as directly applicable to the review question with no/minor limitations. Naughton 2017 was a within trial analysis reporting incremental cost per quitter based on the same effectiveness data as Jones 2019.

One cost-effectiveness analysis (Skov-Ettrup, 2016) reported that an internet and text messaging intervention was more effective and more costly than a self-help booklet (£20/additional quitter). The study was partially applicable to the review question with very serious limitations.

One cost-effectiveness and cost-utility analysis (Stanczyk, 2014) reported a video-based computer-tailored internet intervention was more effective and more costly compared to a text-based computer-tailored internet intervention on quitting but was unlikely to be cost effective. The study was partially applicable to the review question with potentially serious limitations.

# Recommendations

Please refer to the separate guideline document for recommendations.

# Rationale and impact

Please refer to the separate guideline document for the rationale and impact.

# The committee's discussion of the evidence

## Interpreting the evidence

### *The outcomes that matter most*

The committee agreed that the primary outcomes of interest were smoking abstinence and the level of engagement. Due to variability of outcome reporting, rules of preferences were set up. Biochemically validated abstinence (validated with saliva samples tested for cotinine) was preferred to self-reporting, the longest follow up was used (12 months follow up from baseline preferred to 6 months follow up) and continuous or sustained abstinence was preferred to point prevalence abstinence. In terms of point prevalence abstinence, the longest follow up was also used (30-day point abstinence was preferred to 7-day point abstinence). Nineteen randomised controlled trials assessed the effectiveness of digital and mobile health intervention on changing smoking status, and therefore were included in the review. One of the 19 studies provided data for men and women separately. 7 of the 19 studies reported data on 12 months follow up. Only 7 out of 19 studies reported engagement, these studies did not report this in a consistent way. No study reported on specific chronic conditions as listed in the protocol and only one study included pregnant women.15 out of 19 studies reported on the tailoring of the interventions. The committee agreed that, although insufficient evidence of effectiveness was found for low socioeconomic groups, (relative quit rate 1.27 [0.88, 1.82]; 2 studies), it is important to consider digital and mobile health interventions that should be tailored to target underserved groups and therefore they made a research recommendation based on that. The experts further discussed with the committee that there is very limited information about socioeconomic status on digital interventions to support stop smoking in pregnancy. The committee also noted that there is gap in the evidence for people with specific chronic conditions and mental health conditions.

### *The quality of the evidence*

The quality of the evidence ranged from moderate to very low, with most of the evidence graded as very low. The low confidence in the quality of the evidence meant that the committee agreed that though there are studies in this area they were unable to make strong recommendations. The main reasons for downgrading was concerns of risk of bias (due to high attrition rates and lack of blinding), inconsistency (percentage of heterogeneity~ 70%), and imprecision (the confidence intervals of the pooled studies crosses one or both default MID used). The committee noted that in smoking research as opposed to other (behavioural) research, there can be an argument made to assume that someone who has dropped out of a study is still smoking. For example, expert testimony discussed that people who drop out of diet and physical activity studies may do so because they have successfully changed their behaviour and no longer need the study as incentive to drive their behaviour. By adding the numbers who have dropped out to the numbers who are still smoking in the study, the committee were more confident that this reflects the behaviour change success more accurately than in other behaviour change areas where there is less confidence on what people are doing after they have dropped out. Therefore, the committee did not want the quality of the evidence to be downgraded for not using intention to treat analyses.

The committee agreed that there is evidence that digital and mobile health interventions can be effective at increasing smoking abstinence, based on a minimum six month follow-up

(relative quit rate: 1.38 [95% CI:1.21-1.58] from 20 study comparisons, and 1.28[1.10-1.48] on a one-year basis; 8 comparisons). This was found whether interventions are based on text messages, internet, or a mix of these delivery modes. The committee also discussed and agreed that tailoring according to individual characteristics may be important in digital and mobile health interventions. (relative quit rate: 1.30 [1.11-1.52]; 15 study comparisons).

Only two of the included studies had a no intervention control group; whereas the other 16 studies had another intervention in the comparison group. Therefore, a further sensitivity analysis was conducted according to comparison group. Digital and mobile health interventions were effective at increasing smoking abstinence at 6-month follow up (relative quit rate: 1.32 [95% CI:1.21-1.58] compared to any other intervention. No data were available for text message interventions at 12 months follow up.

Subgroup analyses were conducted to explore heterogeneity, according to smoking abstinence ascertainment (biochemical vs self- reporting), digital platform (text, internet and mixed interventions), length of interventions (≥ 6months, ≥ 12 months) and condition. The committee noted that there are no subgroup differences in studies that assessed smoking using either biochemical or self-reporting. The committee noted that no evidence was found for people with chronic conditions (hypertension, respiratory diseases, cancer and mental health conditions). The committee agreed that considering the length of intervention was challenging, as some interventions such as text messages have a finite period for the intervention; and others such as apps and websites do not or may not. All of the modes of delivery showed effectiveness with smoking cessation at 6 months (internet based; RR=1.21 [1.01, 1.44], text message; RR=1.75 [1.31, 2.34], mixed intervention; RR= 1.43 [1.23, 1.67]). Further sensitivity analyses showed that all modes of deliveries were effective at increasing smoking abstinence at 6 months when compared to any other intervention as a comparison group. The evidence from 2 text message interventions (RR=2.14 [1.68, 2.71]) showed an increase in smoking abstinence compared with no intervention.

At 12 months, data from 7 studies were available, of which: 3 were internet-based interventions (RR=1.08 [0.93, 1.25]), and 4 were mixed interventions (RR=1.52 [1.29, 1.79]). No text messages studies were found at 12 months follow up. At 12 months there was only evidence that mixed interventions showed effectiveness. The committee discussed that the effect sizes between the types of interventions at 12 months may actually be fairly similar to each other, yet only one is statistically significant.

The committee highlighted the difficulties and challenges in the categorisation of the digital and mobile health interventions. The interventions were categorised according to digital platform using broader categories (internet-based interventions, text message interventions and mixed interventions). All modes of delivery were found to be effective at changing smoking status; with text message being the most effective, followed by mixed interventions and internet-based interventions. The committee discussed that there are likely to be differences in the approaches used by apps and websites, with apps more likely to have notifications and be more proactive. However, the committee acknowledged that by splitting the interventions in smaller categories of modes of delivery, this may result in subgroup analyses that are too small to draw meaningful conclusions from. The committee highlighted that there is some evidence according to digital platform (especially for text, and mixed interventions) that shows that these may have a role in smoking cessation. The committee, taking into account the evidence of effectiveness arising from the use of text message interventions, discussed that it seemed to be important that the text messages received are personalised and regular in order to increase smoking abstinence. The committee agreed that there are some suggestions that text message seems to be the most effective. They also discussed that mixed intervention were effective at 12 months follow up. The committee acknowledged that components and characteristics of interventions varied substantially and therefore no further analysis could be performed. However, the committee discussed that the digital platform may be more important than the content and that further evidence on this is needed.

The committee discussed that timeliness and frequency of text messages may be important factors. This is because they knew that at certain times of the day people are more likely to smoke, such as just after waking or after food. Text messages sent around these times may pre-empt people's regular cigarette habits and stop them from smoking at these times. The committee also discussed that it is unclear what content of text messages was effective, they discussed that further research would be helpful and made a research recommendation.

The committee noted that there is some evidence of effectiveness for tailoring interventions. They agreed that the evidence showed that tailored interventions were found to be effective at increasing smoking abstinence. They also noted that the majority of the included studies had tailored the interventions to the participants, this made it difficult to consider if these interventions were more effective than the small number of studies that did not include (or did not report) tailoring of the intervention. The committee concluded that the evidence does suggest that tailoring is an important component of the interventions and also agreed that interventions should be tailored according to user baseline characteristics.

The committee discussed that public health practitioners will be interested in specific behaviour change techniques used. The most common group of behaviour change techniques used were found to be goal and planning followed by feedback and monitoring and social support. The committee agreed that no further categorisation of behaviour change techniques could be conducted due to the likely under-reporting of these techniques in the papers. The committee specifically noted that there is inconsistency in the reporting of the BCTs used, and also variability in the way BCTs were used. They agreed that instead of proposing specific behaviour change techniques it would be better to use a broader approach. For this reason, they stated that it will be useful that digital and mobile health interventions should be developed carefully with a focus on specific characteristics/ approaches, such as providing tailored feedback.

The extent of engagement was identified by the committee to be an important outcome, but only 7 studies reported the extent of engagement. Furthermore, engagement was not consistently reported making difficult to clearly draw any conclusions about the level of an individual's engagement with a digital and mobile health intervention.

The committee agreed that the delivery method of the intervention may be a factor in terms of accessibility and different age groups. Therefore, committee mentioned that there may be a role for digital and mobile health interventions in reaching people who wouldn't normally engage with face-to-face services (e.g. rural population, young people, people with long working hours) that may be beneficial.

The committee discussed the general approaches that can help smokers to stop smoking. Those who smoke may considered different options to help them change their smoking status. The committee also discussed that current stop smoking services and interventions may be effective in order to support people change their smoking status.

The committee also discussed that it will be difficult to make decisions against the gold standard (usual care) as they noted that the majority of the interventions had a comparator group which was less than the gold standard (e.g. static websites/ booklets).

***Benefits and harms***

The committee acknowledged that there is evidence that overall digital and mobile health interventions were effective at changing smoking behaviour and made related recommendations. The committee acknowledged that it is unclear what components/ mechanisms work, but the digital platform is effective. Internet, text message and mixed interventions were all found to be effective at 6 months follow up. The committee also noted that there is some, even though low quality evidence, that text message intervention was the

most effective digital platform for changing smoking behaviour (see NG92: Stop smoking interventions and services).

The committee also took into account that many interventions used specific tailoring characteristics. Therefore, the committee discussed this and using the evidence and their expertise agreed that this general intervention approach would be beneficial.

The committee mentioned that for some people who cannot or will not be able to attend, for example weekly face to face services, that this is a group may benefit from using digital interventions. The committee noted that this may include groups such as people with long or antisocial working hours, carers and other groups where face to face interventions may not be convenient or practical. Therefore, digital and mobile health interventions may be beneficial.

The committee also agreed that specific consideration should be given to preventing health inequality issues by ensuring that access to digital and mobile health intervention should be equal to all people, including underserved populations. The committee mentioned as an example the prisoners who can't have access to text messages but only to websites.

The committee agreed that delivery method of the intervention is also likely to be important in terms of accessibility and different age groups. The committee considered it to be important to maximise reach and choice by offering different interventions across several digital platforms.

The experts advised the committee that participants may be more likely to 'book a stop smoking appointment' (target behaviour) and engage to the end of a stop smoking programme when the digital invitation comes from a credible source such as invitation to attend smoking cessation from a healthcare source e.g. GP. The experts considered that referral to stop smoking provided by a health care professional has been associated with higher smoking abstinent rates. In a similar way, experts said that evidence from smoking pregnancy studies showed that the source of the message is important, and they further explained that pregnant women receiving message about importance of stopping smoking from their GP had higher uptake from smoking

The committee discussed that digital and mobile health interventions can reach people who do not typically make use of health services. The committee discussed that there is variability in the evidence of the effectiveness of the digital and mobile health interventions and preference of those using services needs consideration. Therefore, the committee discussed the importance of not de-commissioning from existing services and therefore they agreed that digital interventions can't replace existing health care services.

The committee also discussed the possibility that interventions should meet current standards of reputable resources such as NICE evidence standards, PHE and digital assessment questionnaire.

**Cost effectiveness and resource use**

The committee discussed evidence from 7 published economic analyses relating to 6 different randomised controlled trials of digital interventions aimed at changing smoking behaviour. Three of the analyses were conducted in a UK setting and were considered directly applicable to the review question. Guerriero 2013 compared tailored smoking cessation advice by text message in addition to usual care versus usual care alone in people aged 16 years or older. The study concluded that the addition of text message support generated more quality-adjusted life years (QALYs) and was less costly (due to the avoidance of future healthcare costs as a result of reduced smoking) compared to usual care alone. Naughton 2017 reported a within-trial economic analysis of a tailored, self-help smoking cessation text message intervention for pregnant women delivered in addition to standard NHS smoking advice and antenatal care. The analysis was limited to a 3-month

time horizon whereas Jones 2019 modelled the lifetime cost effectiveness (including future health gains and cost savings associated with both mother and infant) of the same intervention described in Naughton 2017. Therefore, the committee placed more emphasis on the Jones 2019 analysis because it was more closely aligned with the NICE reference case. Jones 2019 concluded that the text message intervention produced more QALYs and lower costs than usual care alone in pregnant women.

Four other economic analyses of digital interventions for changing smoking behaviour conducted outside of the UK were identified as partially applicable to the evidence review. One study from the US (Daly 2019) was conducted in adults of low socioeconomic status and compared a text message intervention plus standard care to standard care alone and found the addition of the text message intervention was cost effective ($426/QALY [£312/QALY] in men and $2,186/QALY [£1,603/QALY] in women). Stanczyk 2014 compared 2 different internet-based computer-tailored smoking cessation interventions (text-based and video-based) to brief general advice in the Netherlands and concluded that the video-based internet intervention was the most effective in terms of abstinence and generated the most QALYs but resulted in an incremental cost-effectiveness ratio (ICER) of €60,000/QALY (£54,870/QALY) versus brief general advice. It was noted that the time horizon for the analysis was only 12 months and therefore did not capture long-term health gains or reductions in future healthcare costs, which would likely reduce the ICER.

The 2 remaining published cost-effectiveness analyses reported incremental results in terms of cost per additional quitter and did not quantify outcomes in terms of QALYs. Graham 2013 was a US analysis that compared a basic internet-based intervention (static content) to an enhanced internet-based intervention (with interactive features plus online social network). The enhanced internet-based intervention resulted in both more quitters and higher costs at 3 ($4,227/additional quitter [£3,276/additional quitter]) and 6 months ($2,355/additional quitter [£1,786/additional quitter]) but the effectiveness was not consistently sustained over longer periods of follow-up, most likely because the intervention was only provided for free for 6 months. Skov-Ettrup 2016 was a Danish study that compared a combined internet plus text message digital intervention to the use of a self-help booklet. At 12 months follow-up, the digital intervention resulted in both more quitters and higher costs with an incremental cost of £20 per additional quitter.

The committee felt that the 2 published UK cost-utility analyses (Guerriero 2013, Jones 2019) provided the most relevant evidence for formulating recommendations. It noted that the interventions in both studies had 2 characteristics in common: they were both text messaging interventions and involved tailoring of content. As a result, the committee felt confident in recommending these as effective characteristics of digital interventions for changing smoking behaviour. The committee also noted that both of these studies compared the use of the text messaging intervention in addition to usual care versus usual care alone and felt it was important to emphasise in the recommendation that the digital intervention should be used in addition to, rather than instead of, usual care. This was consistent with the committee's experience and knowledge of related NICE guidance and the effectiveness of non-digital stop smoking interventions used in current practice.

### Overall discussion of the evidence across all review questions

The committee noted that digital and mobile health interventions is a fast-growing field. The committee discussed the overall evidence across the review questions and identified a number of gaps in the available evidence and therefore expert testimony was sought in these areas (Appendix K).

Overall, the committee acknowledged that there is some evidence that digital and mobile health interventions are effective at changing unhealthy behaviours such as smoking, high alcohol consumption, unhealthy diet, sedentary behaviour, and unsafe sex. Therefore, the committee decided to recommend the use of these interventions. However, the committee

discussed and agreed that the evidence of effectiveness of digital and mobile health interventions has considerable limitations, as noted in the evidence reviews for each question in this guideline. In addition, the evidence did not allow for a comparison between these interventions and usual care or healthcare professional-delivered care. Therefore, it was not possible to say with certainty whether these interventions should or should not replace or be used alongside current services.

However, the committee did not want interventions with less certain effectiveness to replace services that are known to work. This is especially because when and in whom digital and mobile health interventions work is not known. The committee agreed that, given the currently available evidence, digital and mobile health interventions should not be used to replace existing services or to reduce the access to existing effective non-digital interventions. By using their expertise, the committee agreed that digital and mobile health interventions across the four behaviours could add value and therefore could be used in addition to existing services. The committee concluded that digital and mobile health interventions should be considered as part of an overall approach to behaviour change and be part of existing strategies of behaviour change rather than as a standalone approach.

The committee noted that there is inconsistency and variability in the reporting of behaviour change techniques (BCTs). They further discussed that BCTs were not clearly described in the studies and discussed that it is likely that there was an under-reporting in BCT techniques across behaviours. In addition, expert testimony identified that some BCTs are by their nature difficult to administer on digital platforms. However, the committee discussed that the most common techniques used across the four behaviours were goals and planning, feedback and monitoring, and social support. These behaviour change techniques are recommended in the current NICE guidance on individual behaviour change (PH49). Therefore, the committee decided to make a recommendation for developers of digital and mobile health interventions to use evidence-based behaviour change techniques that help people start and maintain changes.

The committee noted that the components and characteristics of the digital and mobile health interventions varied substantially in each included behaviour change area but also across the behaviours. To try to elucidate which components and characteristics are driving behaviour change in these interventions, components and effectiveness were extracted from each study arm and entered into intervention matrices (Appendix M in evidence review 1; Appendix L in evidence review 2; Appendix K in evidence review 3; Appendix L in evidence review 4). Due to the complexity of interventions in terms of components and characteristics, it was difficult to identify any common pattern across the behaviours as there were no components or characteristics that were consistently more effective compared to others. Furthermore, evidence from the expert testimony indicated that evidence of which components work and in whom is limited. The only component that the committee were confident in recommending was personalised normative feedback (see evidence review 2: alcohol). The committee agreed that it was not clear which other components and characteristics work better across the behaviours and made a research recommendation in this area.

The committee noted that the majority of the evidence based on 6-month follow up data. Experts highlighted that keeping people engaged long-term in digital and mobile health interventions and conducting long-term trials of digital interventions is difficult. The committee were concerned that if these interventions do not create long-lasting positive behaviours and people revert to their original behaviour then the cost and resource that goes into creating these interventions would result in almost no benefit. In addition, the committee discussed expert testimony that said longer lasting behaviour change is more likely to result in behaviours becoming habits and for them to translate into permanent changes. Therefore, the committee agreed that there was a need for evidence on the long-term effectiveness of the interventions (≥12 months) in order to establish whether there is sustainability in the behaviour change (research recommendation 5).

The committee also noted that the interventions across the four behaviours did not report harms, unintended consequences or adverse effects. The committee raised that unintended consequences which affect all technologies, such as unwarranted data sharing and targeted advertising, will also affect mobile and digital health technologies. The committee appreciated that people know what to consider when choosing and using apps but discussed that people may have more faith and trust in health technologies. This may mean that people are not as cautious when using health technologies because they would not expect these technologies to cause inconvenience or harm or to potentially share data. Many health technologies are made by commercial developers. Expert testimony stated that data should be continually collected as a resource to improve products. A documented pathway for continual improvement could be made from the data gleaned from users on usage patterns and behaviour change. The committee were wary to recommend this because of the risks of data harvesting and they strongly noted the dangers that may arise from data harvesting by commercially available products. Therefore, the committee made a recommendation to remind users to check data usage, be aware of data sharing, be wary of advertising and any potential extra costs of technologies. However, the committee discussed and considered the expert testimony relating to harms and noted that it is important to identify the potential harms associated with the use of digital and mobile health interventions in peer reviewed studies and therefore developed a research recommendation to explore these.

Expert testimony highlighted the importance of engagement in digital technologies as it can be a mediator of outcomes. Expert testimony described that higher engagement tends to lead to better outcomes, but that this relationship is complex. Expert testimony further highlighted the importance of iterative human-centred design processes in the development of usable and engaging interventions. Experts also discussed with the committee that there is limited evidence on the factors that lead to people's disengagement largely due to problems accessing those who have disengaged in research settings. The evidence from the experts highlighted that co-production between developers and the target population at the earliest stage may increase engagement with digital interventions and may also increase their effectiveness. The experts further described that having interesting content that is co-produced, liked and appealing to consumers can be crucial to uptake and engagement. The experts also highlighted that it is more likely to get engagement from groups with a vested interest in the target behaviour and where digital engagement already happening. After discussing this evidence, the committee have included a recommendation to reflect the importance of working with stakeholders in developing digital and mobile health intervention. In addition, the committee expressed that further research into which factors lead to engagement and engagement with which components and characteristics lead to better health outcomes.

A limited number of studies across the evidence reviews reported usage data that could indicate the engagement with the intervention, and this was not reported in consistently. The committee discussed that it was difficult to reach a conclusion on how much people engage with digital and mobile health interventions. The experts discussed that there is still a gap in engaging underserved groups in the first instance. In addition, rural communities may have more difficulty accessing sufficient internet bandwidth and mobile data, and lower socioeconomic groups may have restricted data plans. The experts described to the committee that older age groups are engaging with the technology as much as younger age groups. The committee discussed that an important part of delivering a customer-focused approach is addressing the challenge of health inequality making sure that digital and mobile health interventions can reach all people including those from all socio-demographic and socio-economic status and underserved populations. Experts discussed with the committee that digital services broaden access and can possibly assist with reaching underserved populations. Therefore, the committee agreed after taking into account the expert testimony discussion, that there is a lack in the research on how best to target and tailor interventions to reach underserved populations and thus made a research recommendation to address this.

Evidence from expert testimonies highlighted that method of referral may affect retention. More specifically, they mentioned that when people self-refer to digital programmes targeting diet, physical activity, sexual health and alcohol consumption people may be more likely to engage, than when advised by a doctor to do so. Though this view was not universal as experts also suggested that referral to stop smoking services from a healthcare professional is associated with higher abstinence rates. The committee noted that this difference may arise from people viewing professional-accredited services as important for smoking cessation. However, the committee discussed expert testimony that showed there is a lack of evidence in relation to sustained engagement with digital and mobile health interventions.

The committee discussed that specific consideration should be given to prevent health inequality issues and therefore develop a recommendation to consider equality of access when developing or commissioning digital and mobile health interventions.

Expert testimony further described that it is important to make use of key digital infrastructure that already reaches target populations to apply behavioural science-based content. Experts also described the possible importance of standardising implementation and reducing variation in across regions. Experts also told the committee that when developing a digital health intervention, developers should take into account best practice and clinical guidelines, but also incorporate user experience into the design of the user interface.

Therefore, the committee discussed that developers should adopt evidence-based approaches and should do this with reference to advisory frameworks such as the NICE evidence standards framework for digital technologies, and the Digital Assessment Questionnaire. The committee further discussed that the creation of NHSX will offer support and information that can help with designing and choosing digital interventions.

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# 1 Appendices

# Appendix A – Review protocols

## Review protocol for smoking

| Field (based on PRISMA-P | Content |
|---|---|
| Review question | What components and characteristics of digital and mobile health interventions are effective at changing smoking behaviour? |
| Type of review question | Effectiveness |
| Objective of the review | This review aims to describe individual-level digital and mobile health interventions for changing smoking behaviour in the target area of smoking and identify the critical components and intervention characteristics shown to be effective. Intervention components may include:<br>• Specific behaviour change techniques used<br>• Mode of delivery (digital platform type)<br>• Intervention intensity and duration of provision (e.g. number of sessions or messages, total digital contact time or duration of active digital support).<br>• Recommendation or professional endorsement of an intervention<br>Other intervention characteristics may include:<br>• Particular groups of interest (see 'population')<br>• Extent of targeting to a group or tailoring/personalisation to an individual |

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| | • Sociodemographic factors of the target audience (such as age, gender, socioeconomic group, and ethnicity and digital literacy)<br>• Level of healthcare professional/practitioner induction or interaction<br>• Level of user engagement |
| Eligibility criteria – population/disease/condition/issue/domain | **Included**:<br><br>Everyone, including children and young people under 16 (and their families or carers), who would benefit from changing current smoking behaviours.<br><br>Specific consideration will be given to people with the following chronic physical or long-term mental health conditions, who may benefit from managing smoking behaviours because it affects their health or mental wellbeing:<br><br>• Hypertension and cardiovascular disease (including, stroke and coronary heart disease)<br>• Respiratory diseases (asthma, chronic obstructive pulmonary disease)<br>• Cancers for which managing smoking may improve health outcomes (for example lung cancer)<br>• Mental health conditions (including anxiety, depression and dementia for which managing smoking behaviours may improve outcomes)<br><br>Specific consideration will also be given to people with learning disabilities and people with neurodevelopmental disorders such as autism.<br><br>**Excluded**: |

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| | Those (including children and young people under 16) who have never smoked.<br><br>Previous smokers who have now quit.<br><br>Type and stage of cancers for which managing an established lifestyle behaviour may not improve health outcomes.<br><br>Any condition listed above not associated causally with smoking behaviour. |
| Eligibility criteria – intervention(s)/ exposure(s)/pr ognostic factor(s) | Digital and mobile health behaviour change interventions that focus on changing current smoking behaviours. That is interventions that are delivered via a digital or mobile platform as a direct interface with participants. Examples include:<br>• Text message-based services (including picture messages and audio messages)<br>• Those delivered by the internet (such as by apps, email, websites, videos, social networking sites and multi-media)<br>• Interactive voice response interventions<br><br>Digital or mobile health interventions are typically automated, interactive and personalised although they may involve some direct or ongoing interaction with a practitioner or health care professional. However, it should be the digital or mobile health technology itself that delivers the primary action, process of intervening or behaviour change techniques (as opposed to the healthcare practitioner or professional). |

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| | The interventions may also focus on digital and mobile health strategies to improve mental wellbeing in those who smoke (for example, building resilience, managing stress, improving sleep and sleep hygiene, and reducing social isolation).<br><br>Studies must primarily focus on changing behaviours in regard to smoking. If the intervention focuses on changing multiple behaviours, then results on smoking must be reported separately in order for extraction and analysis to be carried out and will be included and extracted as applicable into separate reviews. If the intervention reports on separate behaviours it may be included in multiple reviews with the relevant outcomes extracted according to the protocol and could be further considered in a multi-behaviour meta-regression if data requirements are met for such an approach.<br><br>**Excluded**:<br><br>Interventions delivered solely by a healthcare professional or practitioner (for example counselling delivered over the telephone, video-links or by real-time live instant messaging), where the delivery of the primary action or process of intervening or behaviour change techniques is provided by the healthcare professional or practitioner.<br><br>Digital and mobile health interventions that aim to prevent the uptake of smoking behaviours and/or to help maintain healthy behaviours, including relapse prevention.<br><br>Clinical interventions to help with the diagnosis, treatment or management of a chronic physical or long-term mental health condition.<br><br>Psychiatric interventions delivered as part of the therapeutic process for people with a mental health problem. |

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| | Clinical or pharmacological methods of achieving behaviour change with no public health or health promotion element. For example, appointment reminders, medication reviews or self-care solely to improve medicine adherence.<br><br>National policy, fiscal and legislative measures<br><br>Changes to the public realm to support behaviour change (such as designing and managing public spaces in a way that encourages and helps people to be physically active).<br><br>**Settings:**<br><br>Any setting where people may be referred to, self-refer to, or access digital or mobile health behaviour change interventions, including online or other digital access platforms.<br><br>All countries to be included. |
| Eligibility criteria – comparator(s)/ control or reference (gold) standard | **Included**:<br><br>Other intervention for example a healthcare professional led intervention or a combination of health professional and digital led interventions.<br><br>Passive control group (usual care, no intervention).<br><br>If longitudinal cohort and 'before-and-after' intervention studies need to be included (see 'study design'), then before and after (time) will be a comparator. |

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| | Trials with more than one comparator will be included if at least one of the experimental arms meets the technology-based intervention inclusion criteria (see above). |
| Outcomes and prioritisation | <u>Primary outcomes</u><br><br>Descriptive outcomes: Intervention components and study characteristics<br><br>Short- and long-term change in smoking status measured as:<br>• Point prevalence abstinence<br>• Continued or sustained abstinence<br><br>*Where biochemically validated measures are available, these will be preferred to self-reported measures*.<br><br>Extent of engagement (measured as self report or automatically recorded usage data):<br><br>• program adherence/attrition, number of logins/visits, number of pages visited, number of sessions completed, time spent on the device, number of device components/features used.<br>• Self-reported interaction with the digital or m-health behaviour change (i.e. self-report questionnaires)<br><br><u>Secondary outcomes</u><br><br>These will be extracted only if the study also reports a primary outcome.<br><br>• Health-related quality of life<br>• Resources use and costs<br>• Safety or adverse effects, including unintended consequences. |

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| | Follow-up<br>Studies must report change from baseline of ≥6 months.<br><br>**Cost/resource use associated with the intervention**<br><br>The following outcomes will be extracted in reviews of the health economic evidence, where available:<br><br>• cost per quality-adjusted life year<br>• cost per unit of effect<br>• net benefit<br>• net present value<br>• cost/resource impact or use associated with the intervention or its components<br><br>**Excluded**:<br><br>Any study which does not include a primary outcome. |
| Eligibility criteria – study design | **Included study designs**:<br><br>Effectiveness studies:<br><br>• Systematic reviews of effectiveness studies<br>• Studies of effectiveness including:<br>  – RCTs (including cluster RCTs)<br><br>Economic studies:<br><br>• Cost-utility (cost per QALY)<br>• Cost benefit (i.e. net benefit) |

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| | • Cost-effectiveness (Cost per unit of effect)<br>• Cost minimization<br>• Cost-consequence<br><br>**Excluded study designs**:<br><br>• Cross-sectional studies |
| Other inclusion exclusion criteria | Systematic reviews (SRs) identified from database searches may be included as a primary source of data. Quality of identified SRs will be assessed against the inclusion criteria for this protocol. Where partially or fully applicable, the quality of the SR will be assessed using the ROBIS tool. Where the SR is:<br><br>- Fully applicable and moderate or high quality: details or data from systematic review will be used.<br>- Partially applicable and moderate or high quality: details or data from systematic review will be used. Any sections of the protocol not covered by the SR will be covered by usual searches.<br><br>In addition to any SRs meeting the above criteria, other primary studies will be included if they were published after the publication date of the SR and meet the protocol inclusion criteria.<br><br>Where SRs identified from database searches do not meet the above criteria, the included studies will be sifted to identify any primary studies not already identified by the searches that meet the inclusion criteria for this review.<br><br>Full economic analyses and costing studies identified from searches will be included. Costing data will not be used for the purpose of the effectiveness review. Health economics reviews and modelling will be conducted by the York Health Economics Consortium (YHEC).<br><br>Only papers published in the English language will be included. |

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| | Only studies published since the year 2000 will be included.<br><br>Only full published studies (not protocols or summaries) will be included. |
| Proposed sensitivity/sub-group analysis, or meta-regression | Where sufficient data are available, subgroup analysis or meta-regression will be used to identify the critical components or characteristics of interventions shown to be effective. Intervention components may include:<br><br>• Specific behaviour change techniques used<br><br>• Mode of delivery (digital platform type)<br><br>• Intervention intensity and duration of provision (e.g. number of sessions or messages, total digital contact time or duration of active digital support).<br><br>• Recommendation or professional endorsement of an intervention<br><br>Other intervention characteristics may include:<br><br>• Particular groups of interest (see 'population')<br><br>• Extent of targeting to a group or tailoring/personalisation to an individual<br><br>• Sociodemographic factors of the target audience (such as age, gender, socioeconomic group, and ethnicity and digital literacy)<br><br>• Level of healthcare professional/practitioner induction or interaction<br><br>• Level of user engagement |

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| Selection process – duplicate screening/selection/analysis | The review will use the priority screening function within the EPPI-reviewer systematic reviewing software.<br><br>Double screening will be carried out for 10% of titles and abstracts by a second reviewer. Disagreements will be resolved by discussion. Inter-rater reliability will be assessed and reported. If below 90%, a second round of 10% double screening will be undertaken.<br><br>The study inclusion and exclusion lists will be checked with members of the PHAC to ensure no studies are excluded inappropriately. |
| Data management (software) | EPPI Reviewer will be used:<br><br>• to store lists of citations<br>• to sift studies based on title and abstract<br>• to record decisions about full text papers<br>• to order freely available papers via retrieval function<br>• to request papers via NICE guideline Information Services<br>• to store extracted data<br><br>Cochrane Review Manager 5 will be used to perform meta-analyses. R will be used for meta-regression. |
| Information sources – databases and dates | The purpose of the search is to identify the best available evidence to address the questions without producing an unmanageable volume of results.<br><br>The following methods will be used to identify the evidence:<br>• the databases listed below will be searched with an appropriate strategy.<br>• the websites listed below will be searched or browsed with an appropriate strategy.<br><br>**Database strategies** |

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| | The database strategy will be adapted as appropriate from the one used in PH49 in 2013, taking into account the resources available to this review, the subscriptions that NICE has, changes in indexing policies and the final scope for the current evidence reviews.<br><br>The principal search strategy is listed in Appendix A. The search strategy will take this broad approach:<br><br>Behaviour change AND unhealthy behaviours (as detailed in the scope) AND digital OR mobile health interventions AND 2000-Current AND Limits<br><br>Each unhealthy behaviour (lack of physical activity, unhealthy eating patterns or sedentary behaviour, smoking, hazardous or binge drinking and unsafe sexual behaviour) will be searched separately according to the individual Review Protocols.<br><br>Feedback on the principal database strategy was sought from PHAC members.<br><br>The principal search strategy will be developed in MEDLINE (Ovid interface) and then adapted, as appropriate, for use in the other sources listed, taking into account their size, search functionality and subject coverage. The databases will be:<br><br>• Cochrane Central Register of Controlled Trials (CENTRAL) via Wiley<br>• Cochrane Database of Systematic Reviews (CDSR) via Wiley<br>• DARE (records up to March 2014 only) (CRD<br>• Embase via Ovid<br>• Health Management Information Consortium (HMIC) via Ovid<br>• MEDLINE via Ovid |

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| | • MEDLINE-in-Process (including Epub Ahead-of-Print) via Ovid<br>• PsycINFO via Ovid<br>• Social Policy and Practice (SPP) via Ovid<br><br>**Database search limits**<br><br>Database functionality will be used, where available, to exclude:<br>• non-English language papers<br>• animal studies<br>• editorials, letters and commentaries<br>• conference abstracts and posters<br>• registry entries for ongoing or unpublished clinical trials<br>• duplicates.<br><br>Sources will be searched from 2000 to current.<br><br>The database search strategies will not use any search filters for specific study types.<br><br>**Cost effectiveness evidence**<br><br>A separate search will be done for cost effectiveness evidence. The following databases will be searched again with agreed study-type search filters applied to a strategy based on the one in Appendix A:<br><br>• Embase via Ovid<br>• MEDLINE via Ovid<br>• MEDLINE-in-Process (including Epub Ahead-of-Print) via Ovid |

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| | In addition, the following sources will be searched without study filters:<br><br>• EconLit via Ovid<br>• HTA database via CRD https://www.crd.york.ac.uk/CRDWeb/<br>• NHS EED via CRD https://www.crd.york.ac.uk/CRDWeb<br><br>**Website searching**<br><br>The following websites will be searched with an appropriate strategy and the first 50 results examined to identify any UK reports or publications relevant to the review that have not already been identified:<br><br>• Google (restricting to UK domains) www.google.co.uk<br>• Google Scholar www.scholar.google.com<br>• NICE Evidence Search https://www.evidence.nhs.uk<br><br>Searches will also be conducted on the following key websites for relevant UK reports or publications:<br><br>• Public Health England (www.gov.uk/government/organisations/public-health-england)<br>• Public Health Wales (www.wales.nhs.uk)<br>• Scottish Public Health Observatory (www.scotpho.org.uk)<br>• Department of Health (www.gov.uk/government/organisations/department-of-health)<br>• Public Health Agency (Northern Ireland) (www.publichealth.hscni.nt)<br>• Public Health Institute (www.cph.org.uk)<br>• Royal Society for Public Health (https://www.rsph.org.uk/) |

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| | • Centre for Behaviour Change UCL (https://www.ucl.ac.uk/behaviour-change)<br>• The Kings Fund (https://www.kingsfund.org.uk/)<br>• The Behavioural Insights Team (https://www.behaviouralinsights.co.uk/)<br>• Nesta (https://www.nesta.org.uk/)<br>• dblb computer science bibliography (https://dblp.uni-trier.de/)<br>• ACM Digital library (https://dl.acm.org/)<br><br>The website results will be reviewed on screen and documents in English that are potentially relevant to review questions will be listed with their title and abstract (if available) in a Word document.<br><br>**Quality assurance**<br>The guidance Information Services team at NICE will quality assure the principal search strategy and peer review the strategies for the other databases.<br><br>Any revisions or additional steps will be agreed by the review team before being implemented. Any deviations and a rationale for them will be recorded alongside the search strategies.<br><br>**Search results**<br>The database search results will be downloaded to EndNote before duplicates are removed using automated and manual processes. The de-duplicated file will be exported in RIS format for loading into EPPI-Reviewer for data screening.<br><br>. |
| Identify if an update | [If anupdate to an existing review, include question and date of original search. If helpful, add recommendations that might change as a result of this update.] |

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| Author contacts | Please see the guideline development page |
| Highlight if amendment to previous protocol | For details please see section 4.5 of Developing NICE guidelines: the manual |
| Search strategy – for one database | For details please see appendix F of the full guideline |
| Data collection process – forms/duplicate | A standardised evidence table format will be used and published as appendix F (effectiveness evidence tables) or I (economic evidence tables) of the full guideline. |
| Data items – define all variables to be collected | For details please see evidence tables in appendix F (effectiveness evidence tables) or I (economic evidence tables) of the full guideline. |
| Methods for assessing bias at outcome/study level | Standard study checklists were used to critically appraise individual studies. For details please see Appendix H of Developing NICE guidelines: the manual<br><br>Where appropriate, the risk of bias across all available evidence was evaluated for each outcome using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group http://www.gradeworkinggroup.org/<br><br>When applying GRADE, where RCTs are considered the best available evidence for the question and outcome in question, they will start as high quality evidence. Where RCTs are not the most appropriate |

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| | study design for a particular question or outcome, GRADE will be modified to allow for the study design considered most appropriate to start as high quality.<br><br>Any adaptations of GRADE will be explained fully including a rationale to support the adaptation. |
| Criteria for quantitative synthesis (where suitable) | Studies will be grouped according to the type of intervention as appropriate. For details please see section 6.4 of Developing NICE guidelines: the manual |
| Methods for analysis – combining studies and exploring (in)consistency | For full details please see the methods chapter of the full guideline.<br><br>Meta-analysis will be firstly used to determine the effect of digital and mobile health interventions within the specified behaviour area by synthesising all available data, regardless of study components or characteristics. This will provide an overall estimate of the effect of the interventions on behaviour. In order to carry out a meta-analysis, there will need to be similar studies meeting the inclusion criteria. Data from different studies will be meta-analysed if the studies are similar enough in terms of population, interventions, comparators and outcomes.<br><br>Where meta-analysis is appropriate, a random effects model will be used to allow for the anticipated heterogeneity. This assumption will be tested with a fixed effects model. Unexplained heterogeneity will be examined where appropriate with sensitivity analysis. If the studies are found to be too heterogeneous to be pooled statistically, a narrative synthesis will be conducted.<br><br>Methods for pooling cluster and individual randomised controlled trials will be considered where appropriate. If data are suitable for meta-analysis, subgroup meta-analyses will be used to answer the sub-questions identified above.<br><br>If meta-analysis is deemed possible, subgroup analysis or meta-regression may (if appropriate) be used to assess whether between-study variation in intervention effectiveness can be attributed to the |

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| | presence of various study components or characteristics. Regression coefficients and their test of significance will be reported. |
| Meta-bias assessment – publication bias, selective reporting bias | For details please see section 6.2 of Developing NICE guidelines: the manual. |
| Assessment of confidence in cumulative evidence | For details please see sections 6.4 and 9.1 of Developing NICE guidelines: the manual |
| Rationale/context – Current management | For details please see the introduction to the evidence review in the full guideline. |
| Describe contributions of authors and guarantor | A multidisciplinary committee will develop the guideline. The committee will be convened by Public Health Internal Guidelines Development (PH-IGD) team and chaired by Ralph Bagge in line with section 3 of Developing NICE guidelines: the manual.<br><br>Staff from Public Health Internal Guidelines Development team will undertake systematic literature searches, appraise the evidence, conduct meta-analysis where appropriate and draft the guideline in collaboration with the committee. Cost-effectiveness analysis will be conducted by YHEC where appropriate. For details please see Developing NICE guidelines: the manual. |
| Sources of funding/support | PH-IGD is funded and hosted by NICE. YHEC are contracted/funded by NICE to deliver cost effectiveness reviews and economic modelling for public health guidelines. |

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| Name of sponsor | PH-IGD is funded and hosted by NICE |
| Roles of sponsor | NICE funds PH-IGD to develop guidelines for those working in the NHS, public health and social care in England |
| PROSPERO registration number | [If registered, add PROSPERO registration number] |

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# Appendix B – Research recommendations

## Engaging people with digital and mobile interventions

How can providers and healthcare professionals identify groups that do not initially engage, or do not stay engaged, with digital and mobile behaviour change interventions?

| Criterion | Explanation |
|---|---|
| Population | Everyone who needs to change their current behaviours (smoking, sexual health, diet and exercise, alcohol consumption) but currently do not use digital and mobile health behaviour change interventions, do not traditionally engage in healthcare services, or do not stay engaged with digital and mobile health interventions<br><br>Providers and healthcare professionals trying to identify people who need to engage in the interventions.<br><br>Evidence for the following groups should be a specific consideration as they may improve their health through a change in behaviour, either as a subpopulation of the study or as the main population of the study:<br>• Overweight obesity (may be relevant for diet and physical activity)<br>• Hypertension and cardiovascular disease (may be relevant for diet, physical activity, smoking and drinking)<br>• Cancers for which managing certain behaviours (may be relevant for diet, physical activity, smoking, and drinking)<br>• Mental health conditions (may be relevant for diet, physical activity, or drinking)<br>Evidence for the following groups should be a specific consideration as some components may be more or less effective in these groups. These could be either as a subpopulation of the study or as the main population of the study:<br>• Age<br>• Gender<br>• Socioeconomic group<br>• Ethnicity<br>• Less digitally literate |

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| | Any associations between population and effective components should be explored wherever possible. |
| Setting | • Primary, secondary and community care<br>• Online<br>• Educational settings |
| Intervention | Quantitative research, RCT, factorial RCT – trials should be designed to test which factors, components, or characteristics promote engagement with behaviour change services.<br><br>Qualitative research to determine what works and in what context by assessing the views and preferences of people of which factors, components and characteristics used in behaviour change are effective.<br><br>Components and characteristics include:<br><br>• Behaviour change techniques (well-described and fully reported in methods section)<br>• Digital platform (examples include text messages, apps, websites, wearables)<br>• Frequency, duration and intensity of use (examples include interventions that are used once, interventions that are used daily, interventions that last 10 minutes, or that take 2 hours to complete)<br>• Extent of tailoring, personalisation or targeting to a group, and what type of tailoring is most effective<br>• Level of healthcare professional/practitioner or interaction<br>• Level of user engagement (associations may be drawn from engagement with certain components and extent of behaviour change)<br>• Particular groups of interest (see population)<br>Qualitative research that assesses the views and preferences of people who initially engaged and have remained engaged, and those who did not engage or disengaged. |
| Comparators | • No intervention<br>• Usual care |

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| | • Other intervention (different components/ characteristics from the intervention) |
| Outcomes | Engagement (initial, medium, long term)<br><br>Number of people identified<br><br>Acceptability, views and preferences of people assessed using qualitative and mixed methods |
| Study design | RCT, qualitative studies or mixed methods |
| Timeframe | A minimum of 12 months. Check specific timepoints (follow up: 1 and 6 month) |

## Effective components of behaviour change interventions

What components and characteristics of digital and mobile interventions are most effective, separately and combined, to achieve behaviour change?

| Criterion | Explanation |
|---|---|
| Population | Anyone who would benefit from a change in behaviour<br><br>Evidence for the following groups should be a specific consideration as they may improve their health through a change in behaviour, either as a subpopulation of the study or as the main population of the study:<br>• Overweight obesity (may be relevant for diet and physical activity)<br>• Hypertension and cardiovascular disease (may be relevant for diet, physical activity, smoking and drinking)<br>• Cancers for which managing certain behaviours (may be relevant for diet, physical activity, smoking, and drinking)<br>• Mental health conditions (may be relevant for diet, physical activity, or drinking)<br>Evidence for the following groups should be a specific consideration as some components may be more or less effective in these groups. These could be either as a subpopulation of the study or as the main population of the study:<br>• Age<br>• Gender |

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| | • Socioeconomic group<br>• Ethnicity<br>• Less digitally literate<br>Any associations between population and effective components should be explored wherever possible. |
| Setting | • Primary, secondary and community care<br>• Online<br>• Educational settings |
| Intervention | Quantitative research, RCT, factorial RCT – trials should be designed to test which factors, components, or characteristics promote positive behaviour change, separately and combined, and not only which interventions work<br><br>Qualitative research to determine what works and in what context by assessing the views and preferences of people of which factors, components and characteristics used in behaviour change are effective.<br><br>Components and characteristics include:<br>• Behaviour change techniques (well-described and fully reported in methods section)<br>• Digital platform (examples include text messages, apps, websites, wearables)<br>• Frequency, duration and intensity of use (examples include interventions that are used once, interventions that are used daily, interventions that last 10 minutes, or that take 2 hours to complete)<br>• Extent of tailoring, personalisation or targeting to a group, and what type of tailoring is most effective<br>• Level of healthcare professional/practitioner or interaction<br>• Level of user engagement (associations may be drawn from engagement with certain components and extent of behaviour change)<br>• Particular groups of interest (see population) |
| Comparators | • No intervention<br>• Usual care |

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| | • Other intervention (assessing different factors, components, or characteristics from intervention) |
| Outcomes | Engagement (initial, medium, long term).<br><br>Change in behaviour, for example smoking abstinence, condom use, number of units of alcohol a week, number of steps per day, portions of fruit and vegetables a day.<br><br>Change in behaviour associated with components and characteristics of the intervention, or associated with the study population.<br><br>Acceptability, views and preferences of people assessed using qualitative and mixed methods. |
| Study design | RCT, qualitative studies (interviews and focus groups) |
| Timeframe | A minimum of 12 months. Check specific timepoints (follow up: 1 and 6 month) |

## Effects of digital and mobile interventions on health inequalities

What is the effectiveness and cost effectiveness of digital and mobile health interventions in low socioeconomic and other underserved groups?

| Criterion | Explanation |
|---|---|
| Population | People with in lower socioeconomic groups or underserved populations who would benefit from a change in their current behaviours (smoking, sexual health, diet and exercise, alcohol consumption).<br><br>Underserved populations include:<br><br>• People with chronic conditions<br><br>• People with physical disabilities<br><br>• People with sensory impairments<br><br>• People with neurodevelopmental disorders |

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| | • People who live far from face-to-face services<br>• People who distrust or fear government or health services<br>• People who have limited ability to understand or give consent without the assistance of language services<br>• People who have a lowered capacity to communicate effectively<br><br>Evidence for the following groups should be a specific consideration as they may improve their health through a change in behaviour, either as a subpopulation of the study or as the main population of the study:<br><br>• Overweight obesity (may be relevant for diet and physical activity)<br>• Hypertension and cardiovascular disease (may be relevant for diet, physical activity, smoking and drinking)<br>• Cancers for which managing certain behaviours (may be relevant for diet, physical activity, smoking, and drinking)<br>• Mental health conditions (may be relevant for diet, physical activity, or drinking)<br><br>Evidence for the following groups should be a specific consideration as some components may be more or less effective in these groups. These could be either as a subpopulation of the study or as the main population of the study:<br><br>• Age<br>• Gender<br>• Socioeconomic group<br>• Ethnicity<br>• Less digitally literate<br><br>Any associations between population and effective components should be explored wherever possible. |
| Setting | • Primary, secondary and community care<br>• Online<br>• Educational settings |

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|---|---|
| Intervention | Quantitative research, RCT, factorial RCT – trials should be designed to test which factors, components, or characteristics promote positive behaviour change, separately and combined, and not only which interventions work<br><br>Qualitative research to determine what works and in what context by assessing the views and preferences of people of which factors, components and characteristics used in behaviour change are effective.<br><br>Components and characteristics include:<br><br>• Behaviour change techniques (well-described and fully reported in methods section)<br>• Digital platform (examples include text messages, apps, websites, wearables)<br>• Frequency, duration and intensity of use (examples include interventions that are used once, interventions that are used daily, interventions that last 10 minutes, or that take 2 hours to complete)<br>• Extent of tailoring, personalisation or targeting to a group, and what type of tailoring is most effective<br>• Level of healthcare professional/practitioner or interaction<br>• Level of user engagement (associations may be drawn from engagement with certain components and extent of behaviour change)<br>• Particular groups of interest (see population) |
| Comparators | • No intervention<br>• Usual care<br>• Other intervention (assessing different components/ characteristics from intervention) |
| Outcomes | <u>Effectiveness</u><br>Engagement (initial, medium, long term).<br><br>Acceptability, views and preferences.<br><br>Short or long-term behaviour change (smoking status, drinking behaviour, physical activity, sedentary behaviour or diet, sexual behaviour).<br><br><u>Cost-effectiveness</u> |

| | |
|---|---|
| | Cost effectiveness measured as incremental cost per additional quality-adjusted life year<br><br>Benefit–cost ratio |
| Study design | RCT, or mixed methods study |
| Timeframe | A minimum of 12 months. Check specific timepoints (follow up: 1 and 6 month) |

## Populations who will benefit most from digital and mobile health interventions

Are digital and mobile health interventions as effective as face-to-face or standard care for some populations?

| Criterion | Explanation |
|---|---|
| Population | Everyone who need to change their current behaviours (smoking, sexual health, diet and exercise, alcohol consumption).<br><br>Populations of interest include:<br>• Age<br>• Gender<br>• Socioeconomic group<br>• Ethnicity<br>• Less digitally literate<br>• People who are overweight or obesity (may be relevant for diet and physical activity)<br>• Hypertension and cardiovascular disease (may be relevant for diet, physical activity, smoking and drinking)<br>• Cancers for which managing certain behaviours (may be relevant for diet, physical activity, smoking, and drinking)<br>• Mental health conditions (may be relevant for diet, physical activity, or drinking)<br>Any associations between population and effective components should be explored wherever possible. |
| Setting | • Primary, secondary and community care |

| | |
|---|---|
| | • Online<br>• Educational settings |
| Intervention | Quantitative research, RCT or observational studies, on identifying populations in which digital and mobile health interventions are as effective as face-to-face or standard care interventions change health behaviour.<br><br>Any associations between population and effective components should be explored wherever possible.<br><br>Qualitative research on identifying populations which will interact with and benefit most from digital and mobile health interventions. |
| Comparators | • No intervention<br>• Usual care<br>• Other intervention (different components/ characteristics from the intervention) |
| Outcomes | Engagement (initial, medium, long term)<br><br>Change in behaviour, for example smoking abstinence, condom use, number of units of alcohol a week, number of steps per day, portions of fruit and vegetables a day.<br><br>Acceptability, views and preferences of people assessed using qualitative and mixed methods<br><br>Cost effectiveness. |
| Study design | Qualitative research method study (interviews and focus groups)<br><br>Quantitative studies, RCTs<br><br>Mixed methods |
| Timeframe | A minimum of 12 months. Check specific timepoints (follow up: 1 and 6 month) |

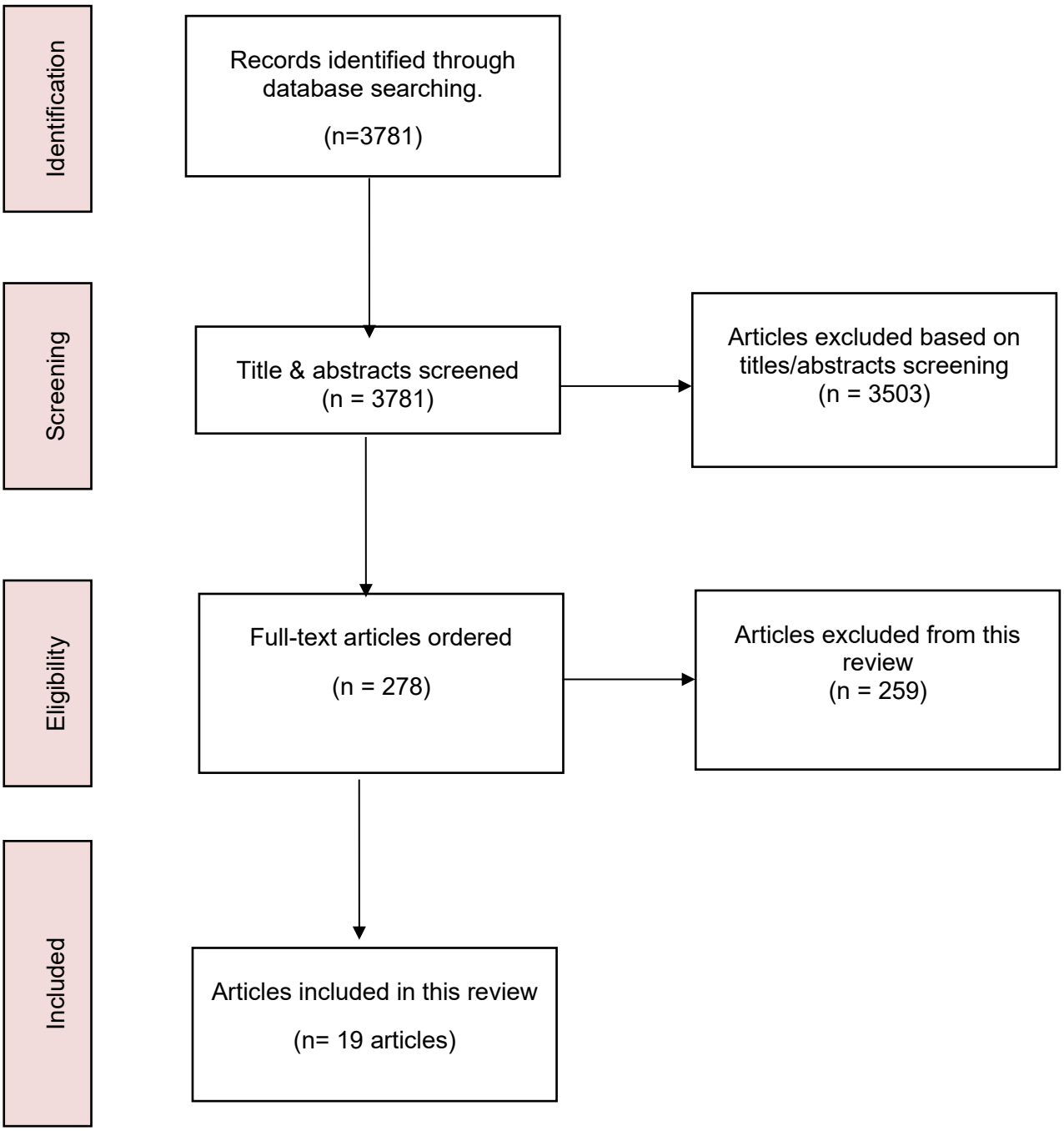
## Sustainability of behaviour change using digital and mobile interventions

What is the long-term (more than 12 months) effectiveness and cost-effectiveness of digital and mobile health interventions at changing behaviours relating to smoking, alcohol consumption, unsafe sex, diet and physical activity?

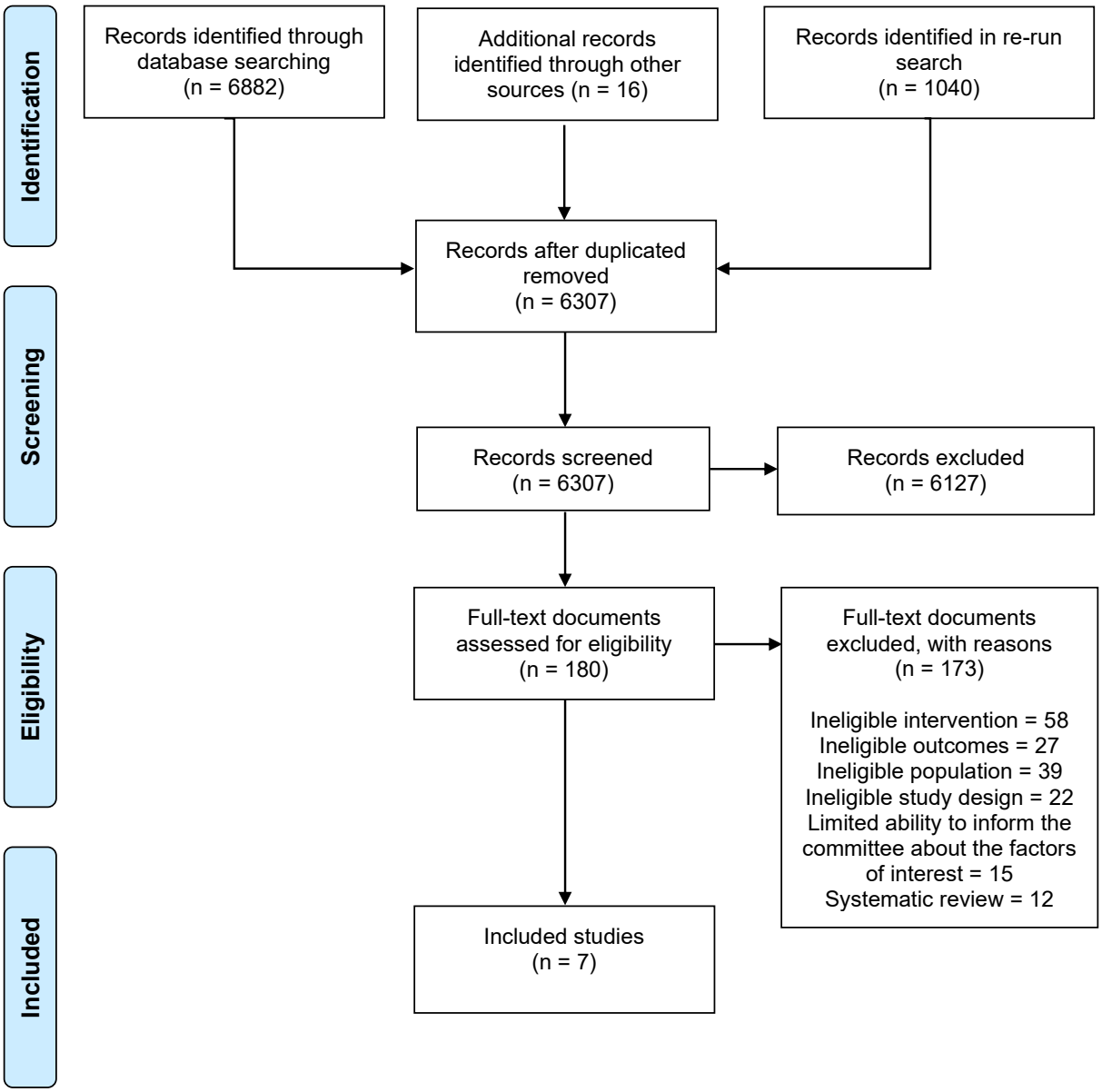
| Criterion | Explanation |
|---|---|
| Population | Everyone who would benefit from a change in behaviour, including public and patients<br><br>Evidence for the following groups should be a specific consideration as they may improve their health through a change in behaviour, either as a subpopulation of the study or as the main population of the study:<br><br>• Overweight obesity (may be relevant for diet and physical activity)<br><br>• Hypertension and cardiovascular disease (may be relevant for diet, physical activity, smoking and drinking)<br><br>• Cancers for which managing certain behaviours (may be relevant for diet, physical activity, smoking, and drinking)<br><br>• Mental health conditions (may be relevant for diet, physical activity, or drinking)<br><br>Evidence for the following groups should be a specific consideration as some components may be more or less effective in these groups. These could be either as a subpopulation of the study or as the main population of the study:<br><br>• Age<br><br>• Gender<br><br>• Socioeconomic group<br><br>• Ethnicity<br><br>• Less digitally literate<br><br>Any associations between population and effective components should be explored wherever possible. |

| | |
|---|---|
| Setting | • Primary, secondary and community care<br>• Online<br>• Educational settings |
| Intervention | Quantitative research, RCT, of a digital and mobile health intervention that changes behaviour relating to diet, physical activity, smoking, sexual behaviour or alcohol for at least 12 months.<br><br>Interventions should be designed to promote behaviour change with the aim for it to be sustained |
| Comparators | • No intervention<br>• Usual care<br>• Other intervention (assessing different components/ characteristics from intervention) |
| Outcomes | <u>Effectiveness</u><br>• Engagement (initial, medium, long term)<br>• long term change in smoking status<br>• long term change in drinking behaviour<br>• long term change in physical activity, sedentary behaviour or diet<br>• long term changes in sexual behaviours<br><br><u>Cost-effectiveness</u><br>• cost effectiveness measured as incremental cost per additional quality-adjusted life year<br>• benefit–cost ratio |
| Study design | RCT |
| Timeframe | More than 12 months. |

# Appendix C – Public health evidence study selection



# Appendix D – Economic evidence study selection



# Appendix E – Literature search strategies

### Public health evidence

#### Database name: MEDLINE

1 Health Behavior/ (45998)

2 Health Knowledge, Attitudes, Practice/ (100865)

3 Risk Reduction Behavior/ (11213)

4 Behavior Therapy/ (26580)

5 PSYCHOTHERAPY/ (52215)

6 Cognitive Therapy/ (22800)

7 MOTIVATION/ (62037)

8 Patient Education as Topic/ (81276)

9 Patient acceptance of healthcare/ (41250)

10 Health promotion/ (68489)

11 "Outcome and Process Assessment (Health Care)"/ (25522)

12 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (31704)

13 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab,kw. (88724)

14 motivat*.ti. (14510)

15 or/1-14 (536362)

16 SMOKING/ (134753)

17 SMOKING CESSATION/ (26364)

18 "TOBACCO USE CESSATION"/ or exp "TOBACCO USE"/ or "TOBACCO USE DISORDER"/ (13254)

19 SMOKERS/ (620)

20 Electronic Nicotine Delivery Systems/ or Vaping/ (2220)

21 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (2052)

22 "TOBACCO USE CESSATION PRODUCTS"/ (1540)

23 exp Pipe smoking/ (77)

24 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (1458)

25 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (205322)

26 (tobacco* or nicotin* or cigar* or cigs).tw. (181417)

27 or/16-26 (345447)

28 TELEMEDICINE/ (18800)

29 Therapy, Computer-Assisted/ (6426)

30 User-Computer Interface/ (35277)

31 Software Design/ (5745)

32 MULTIMEDIA/ (1812)

33 Computers, Handheld/ (3309)

34 Videotape Recording/ (11143)

35 Internet/ (67139)

36 Social Networking/ (2375)

37 Online Social Networking/ (18)

38 Blogging/ (899)

39 Social Media/ (5446)

40 Electronic Mail/ (2497)

41 Cell Phones/ (7646)

42 Text Messaging/ (2135)

43 Smartphone/ (2586)

44 Mobile Applications/ (3730)

45 WEARABLE ELECTRONIC DEVICES/ (808)

46 Video Games/ (4564)

47 Virtual Reality/ (665)

48 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (41615)

49 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw. (10819)

50 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (5012)

51 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (2389)

52 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (7469)

53 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (9549)

54 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (6581)

55 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (8536)

56 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (280473)

57 (e-mail* or email* or electronic mail*).tw. (11530)

58 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (10364)

59 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*).tw. (34101)

60 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (41293)

61 ((virtual or augmented) adj3 reality).tw. (6746)

62 Speech Recognition Software/ (650)

63 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw,kw. (708)

64 IVR.tw. (952)

65 or/28-64 (493916)

66 and/15,27,65 (2474)

67 Meta-Analysis.pt. (97015)

68 Network Meta-Analysis/ (636)

69 Meta-Analysis as Topic/ (16706)

70 Review.pt. (2318258)

71 exp Review Literature as Topic/ (11888)

72 (metaanaly$ or metanaly$ or (meta adj3 analy$)).tw. (115177)

73 (review$ or overview$).ti. (377372)

74 (systematic$ adj5 (review$ or overview$)).tw. (116572)

75 ((quantitative$ or qualitative$) adj5 (review$ or overview$)).tw. (7413)

76 ((studies or trial$) adj2 (review$ or overview$)).tw. (35528)

77 (integrat$ adj3 (research or review$ or literature)).tw. (8779)

78 (pool$ adj2 (analy$ or data)).tw. (22678)

79 (handsearch$ or (hand adj3 search$)).tw. (7549)

80 (manual$ adj3 search$).tw. (4682)

81 or/67-80 (2528618)

82 Randomized Controlled Trial.pt. (475681)

83 Controlled Clinical Trial.pt. (92882)

84 Clinical Trial.pt. (514173)

85 exp Clinical Trials as Topic/ (321696)

86 Placebos/ (34221)

87 Random Allocation/ (97558)

88 Double-Blind Method/ (149490)

89 Single-Blind Method/ (26248)

90 Cross-Over Studies/ (44557)

91 ((random$ or control$ or clinical$) adj3 (trial$ or stud$)).tw. (975109)

92 (random$ adj3 allocat$).tw. (27650)

93 placebo$.tw. (182980)

94 ((singl$ or doubl$ or trebl$ or tripl$) adj (blind$ or mask$)).tw. (146764)

95 (crossover$ or (cross adj over$)).tw. (68920)

96 or/82-95 (1712382)

97 81 or 96 (3920585)

98 66 and 97 (889)

99 limit 98 to yr="2000 -Current" (863)

100 limit 99 to english language (843)

101 Animals/ not Humans/ (4512858)

102 100 not 101 (843)

103 limit 102 to (clinical conference or comment or editorial or historical article or letter or news) (3)

104 102 not 103 (840)

**Database name: MiP/epub ahead of print**

1 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (5816)

2 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab. (17525)

3 motivat*.ti. (2494)

4 or/1-3 (22693)

5 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (1078)

6 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (483)

7 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (25123)

8 (tobacco* or nicotin* or cigar* or cigs).tw. (22000)

9 or/5-8 (39150)

10 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (16574)

11 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw. (1980)

12 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (2245)

13 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (493)

14 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (2413)

15 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (5603)

16 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (5868)

17 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (7421)

18 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (69440)

19 (e-mail* or email* or electronic mail*).tw. (3073)

20 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (2480)

21 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or fitbit*).tw. (10582)

22 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (12606)

23 ((virtual or augmented) adj3 reality).tw. (2133)

24 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw. (97)

25 IVR.tw. (318)

26 or/10-25 (117363)

27 and/4,9,26 (192)

28 Meta-Analysis.pt. (42)

29 Review.pt. (159953)

30 (metaanaly* or metanaly* or (meta adj3 analy*)).tw. (28086)

31 (review* or overview*).ti. (83068)

32 (systematic* adj5 (review* or overview*)).tw. (33457)

33 ((quantitative* or qualitative*) adj5 (review* or overview*)).tw. (1914)

34 ((studies or trial*) adj2 (review* or overview*)).tw. (6880)

35 (integrat* adj3 (research or review* or literature)).tw. (2100)

36 (pool* adj2 (analy* or data)).tw. (4190)

37 (handsearch* or (hand adj3 search*)).tw. (1071)

38 (manual* adj3 search*).tw. (908)

39 or/28-38 (242740)

40 Randomized Controlled Trial.pt. (277)

41 Controlled Clinical Trial.pt. (20)

42 Clinical Trial.pt. (404)

43 ((random* or control* or clinical*) adj3 (trial* or stud*)).tw. (144673)

44 (random* adj3 allocat*).tw. (4701)

45 placebo*.tw. (18600)

46 ((singl* or doubl* or trebl* or tripl*) adj (blind* or mask*)).tw. (14844)

47 (crossover* or (cross adj over*)).tw. (11600)

48 or/40-47 (161861)

49 39 or 48 (370340)

50 27 and 49 (102)

51 limit 50 to yr="2000 -Current" (102)

52 9 and 26 (2292)

53 49 and 52 (655)

54 limit 53 to yr="2017 -Current" (449)

55 51 or 54 (481)

56 limit 55 to english language (474)

57 limit 56 to (clinical conference or comment or editorial or historical article or letter or news) (0)

58 56 not 57 (474)

**Database name: Cochrane Library**

#1 [mh ^"Health Behavior"]

#2 [mh ^"Health Knowledge, Attitudes, Practice"]

#3 [mh ^"Risk Reduction Behavior"]

#4 [mh ^"Behavior Therapy"]

#5 [mh ^Psychotherapy]

#6 [mh ^"Cognitive Therapy"]

#7 [mh ^Motivation]

#8 [mh ^"Patient Education as Topic"]

#9 [mh ^"Patient acceptance of healthcare"]

#10 [mh ^"Health promotion"]

#11 [mh ^"Outcome and Process Assessment (Health Care)"]

#12 ((behaviour* or behavior* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)):ti

#13 ((behaviour* or behavior* or lifestyle* or "life style*") near/2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)):ab,kw

#14 motivat*:ti

#15 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14

#16 [mh ^Smoking]

#17 [mh ^"Smoking cessation"]

#18 [mh ^"Tobacco Use Cessation"]

#19 [mh "Tobacco Use"]

#20 [mh ^"Tobacco Use Disorder"]

#21 [mh ^Smokers]

#22 [mh "Electronic Nicotine Delivery Systems"]

#23 [mh ^Vaping]

#24 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*):ab,kw

#25 [mh ^"Tobacco Use Cessation Products"]

#26 [mh "Pipe smoking"]

#27 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas):ab,kw

#28 (smoking* or smoker* or antismok* or anti smok* or anti-smok*):ab,kw

#29 (tobacco* or nicotin* or cigar* or cigs):ti,ab,kw

#30 #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29

#31 [mh ^Telemedicine]

#32 [mh ^"Therapy, Computer-Assisted"]

#33 [mh ^"User-Computer Interface"]

#34 [mh ^"Software design"]

#35 [mh ^Multimedia]

#36 [mh ^"Computers, Handheld"]

#37 [mh ^"Videotape Recording"]

#38 [mh ^Internet]

#39 [mh ^"Social networking"]

#40 [mh ^"Online social networking"]

#41 [mh ^Blogging]

#42 [mh ^"Social media"]

#43 [mh ^"Electronic mail"]

#44 [mh ^"Cell Phones"]

#45 [mh ^"Text messaging"]

#46 [mh ^Smartphone]

#47 [mh ^"Mobile applications"]

#48 [mh ^"Wearable electronic devices"]

#49 [mh ^"Video games"]

#50 [mh ^"Virtual reality"]

#51 ((digital* or digitis* or digitiz* or electronic*) near/3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)):ab

#52 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*):ab

#53 (ehealth* or e-health* or mhealth* or m-health* or mobile health*):ab

#54 ((laptop or palm or handheld or tablet or pda or pc) near/2 comput*):ab

#55 ((mobile* or cell* or tablet*) near (phone* or telephone* or handset* or hand-set*)):ab

#56 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*):ab

#57 ((mobile or electronic* or digital*) near/2 (device* or tablet*)):ab

#58 ((mobile or electronic* or digital* or device* or software*) near/3 application*):ab

#59 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*):ab

#60 (e-mail* or email* or electronic mail*):ab

#61 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*):ab

#62 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or fitbit*):ab

#63 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*):ab

#64 ((virtual or augmented) near/3 reality):ab

#65 [mh ^"Speech recognition software"]

#66 ((voice* or speech or speak*) near/3 response* near/3 (interact* or unit*)):ab,kw

#67 IVR:ab

#68 {Or #31-#67}

#69

#70 #15 and #30 and #68 with Cochrane Library publication date Between Jan 2000 and Feb 2019

#71 "clinicaltrials.gov":so

#72 #70 not #71

#73 "conference":pt

#74 #72 not #73

**Database name: Embase**

1 behavior change/ (30444)

2 health behavior/ (60877)

3 attitude to health/ or risk reduction/ (196107)

4 behavior therapy/ (41151)

5 psychotherapy/ (82217)

6 cognitive therapy/ (43214)

7 motivation/ (92768)

8 patient education/ (106934)

9 patient attitude/ (63002)

10 health promotion/ (90507)

11 Outcome assessment/ (462956)

12 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (45279)

13 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab,kw. (145344)

14 motivat*.ti. (18266)

15 or/1-14 (1231018)

16 smoking/ (278726)

17 smoking cessation/ (54021)

18 smoking habit/ (21243)

19 cigarette smoking/ or cigar smoking/ (51856)

20 exp "tobacco use"/ or tobacco dependence/ (367934)

21 smoking cessation program/ or smoking reduction/ (3122)

22 "smoking and smoking related phenomena"/ (181)

23 electronic cigarette/ or vaping/ or pipe smoking/ (4632)

24 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (3570)

25 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (2328)

26 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (334320)

27 (tobacco* or nicotin* or cigar* or cigs).tw. (237702)

28 or/16-27 (562383)

29 telemedicine/ (20170)

30 computer assisted therapy/ (4489)

31 computer interface/ (29452)

32 digital computer/ (2383)

33 software design/ (595)

34 multimedia/ (3567)

35 personal digital assistant/ (1309)

36 videorecording/ (73914)

37 Internet/ (101548)

38 social network/ (13526)

39 Online support group/ (66)

40 blogging/ (260)

41 social media/ (14164)

42 e-mail/ (18157)

43 mobile phone/ (14928)

44 text messaging/ (3882)

45 smartphone/ (7433)

46 mobile application/ (7521)

47 electronic device/ (1911)

48 video game/ (2487)

49 virtual reality/ (14317)

50 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (84359)

51 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw. (17069)

52 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (8292)

53 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (3816)

54 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (12477)

55 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (21376)

56 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (12891)

57 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (15383)

58 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (468882)

59 (e-mail* or email* or electronic mail*).tw. (28887)

60 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (17828)

61 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*).tw. (62408)

62 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (64785)

63 ((virtual or augmented) adj3 reality).tw. (11653)

64 automatic speech recognition/ (947)

65 interactive voice response system/ (582)

66 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw,kw. (1144)

67 IVR.tw. (1828)

68 or/29-67 (867700)

69 and/15,28,68 (4562)

70 Systematic Review/ (193259)

71 Meta Analysis/ (157344)

72 Review/ (2320702)

73 Review.pt. (2407121)

74 (metaanaly$ or metanaly$ or (meta adj3 analy$)).tw. (188476)

75 (review$ or overview$).ti. (526935)

76 (systematic$ adj5 (review$ or overview$)).tw. (187820)

77 ((quantitative$ or qualitative$) adj5 (review$ or overview$)).tw. (11319)

78 ((studies or trial$) adj2 (review$ or overview$)).tw. (51130)

79 (integrat$ adj3 (research or review$ or literature)).tw. (12606)

80 (pool$ adj2 (analy$ or data)).tw. (39846)

81 (handsearch$ or (hand adj3 search$)).tw. (10524)

82 (manual$ adj3 search$).tw. (6858)

83 or/70-82 (2975277)

84 exp Clinical Trial/ (1365483)

85 Randomization/ (81161)

86 Placebo/ (330268)

87 Double Blind Procedure/ (157997)

88 Single Blind Procedure/ (33890)

89 Crossover Procedure/ (58176)

90 ((random$ or control$ or clinical$) adj3 (trial$ or stud$)).tw. (1538192)

91 (random$ adj3 allocat$).tw. (40333)

92 placebo$.tw. (284981)

93 ((singl$ or doubl$ or trebl$ or tripl$) adj (blind$ or mask$)).tw. (220701)

94 (crossover$ or (cross adj over$)).tw. (97886)

95 or/84-94 (2598686)

96 83 or 95 (5092940)

97 69 and 96 (1738)

98 limit 97 to yr="2000 -Current" (1719)

99 limit 98 to english language (1684)

100 Nonhuman/ not human/ (4311829)

101 99 not 100 (1683)

102 limit 101 to (conference abstract or conference paper or "conference review" or editorial or letter) (185)

103 101 not 102 (1498)

**Database name: HMIC**

1 behaviour change/ (538)

2 health behaviour/ or behaviour adaption/ or behaviour adjustment/ (1542)

3 behaviour therapy/ (249)

4 Psychotherapy/ (734)

5 Motivation/ or Achievement motivation/ (550)

6 Patient education/ (519)

7 Patient attitudes/ (164)

8 Health promotion/ (6622)

9 Patient outcome/ (3156)

10 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (893)

11 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab,sh. (2967)

12 motivat*.ti. (364)

13 or/1-12 (15780)

14 Smoking/ or exp Smoking implements/ or Smoking cessation/ (4891)

15 Smokers/ (432)

16 exp tobacco/ or exp tobacco products/ or tobacco smoke/ or Tobacco consumption/ (1260)

17 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (76)

18 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (13)

19 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (7522)

20 (tobacco* or nicotin* or cigar* or cigs).tw. (3687)

21 or/14-20 (9383)

22 telemedicine/ or telehealth/ or telecare/ (2056)

23 exp Digital technology/ (24)

24 exp Digital media/ (47)

25 Computer software/ or Computer programs/ (635)

26 Multi media/ (54)

27 Personal digital assistants/ (2)

28 Videos/ or Video cameras/ (245)

29 Internet/ or exp Internet websites/ (2531)

30 Social networking/ (39)

31 Blogging/ (6)

32 Email/ (146)

33 Mobile telephones/ (278)

34 Text messaging/ (84)

35 Health technology/ or Telemeters/ (677)

36 Computer games/ (37)

37 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (1567)

38 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw. (1361)

39 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (318)

40 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (55)

41 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (298)

42 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (140)

43 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (68)

44 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (112)

45 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (9096)

46 (e-mail* or email* or electronic mail*).tw. (642)

47 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (223)

48 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*).tw. (648)

49 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (1579)

50 ((virtual or augmented) adj3 reality).tw. (51)

51 Speech transmission systems/ (8)

52 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw. (13)

53 IVR.tw. (8)

54 or/22-53 (16911)

55 and/13,21,54 (92)

56 limit 55 to yr="2000 -Current" (87)

**Database name: PsycINFO**

1 Behavior Change/ (10065)

2 READINESS TO CHANGE/ or CHANGE STRATEGIES/ (1679)

3 Lifestyle Changes/ (1212)

4 Health Behavior/ or Health Knowledge/ (31526)

5 Health Attitudes/ or Harm Reduction/ (12386)

6 Attitude Change/ or Behavioural Intention/ (3339)

7 Behavior Therapy/ (8299)

8 PSYCHOTHERAPY/ (41242)

9 Cognitive Behavior Therapy/ or Cognitive Therapy/ (29167)

10 MOTIVATION/ (40252)

11 Client Education/ (3407)

12 Health Promotion/ (22949)

13 Treatment Outcomes/ (30158)

14 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (31691)

15 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab. (83199)

16 motivat*.ti. (27515)

17 or/1-16 (280905)

18 TOBACCO SMOKING/ (27059)

19 Smoking Cessation/ (12240)

20 electronic cigarettes/ (814)

21 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (1205)

22 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (557)

23 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (46188)

24 (tobacco* or nicotin* or cigar* or cigs).tw. (43254)

25 or/18-24 (64135)

26 TELEMEDICINE/ (4658)

27 Computer Assisted Therapy/ (989)

28 Human Computer Interaction/ (9890)

29 Computer Assisted Instruction/ or Computer Software/ (21540)

30 MULTIMEDIA/ (2284)

31 Digital Computers/ (977)

32 Videotapes/ (1653)

33 INTERNET/ or Websites/ or Electronic Learning/ (31689)

34 Social Networks/ (11072)

35 Blog/ or Online Social Networks/ (7191)

36 Social Media/ (6127)

37 Computer Mediated Communication/ (5448)

38 Cellular Phones/ (4218)

39 Text Messaging/ (723)

40 Mobile Devices/ (2155)

41 Computer Applications/ (9222)

42 TECHNOLOGY/ or Electronic Communication/ (37568)

43 Computer Games/ (6683)

44 Virtual Reality/ (7441)

45 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (13138)

46 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw. (3090)

47 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (2440)

48 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (1176)

49 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (5057)

50 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (5231)

51 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (3240)

52 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (2389)

53 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (134650)

54 (e-mail* or email* or electronic mail*).tw. (9035)

55 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (4520)

56 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*).tw. (25349)

57 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (70615)

58 ((virtual or augmented) adj3 reality).tw. (5646)

59 Automated Speech Recognition/ (964)

60 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw. (342)

61 IVR.tw. (277)

62 or/26-61 (286223)

63 and/17,25,62 (1316)

64 limit 63 to yr="2000 -Current" (1264)

65 limit 64 to english language (1238)

66 limit 65 to ("comment/reply" or editorial or letter) (37)

67 65 not 66 (1201)

**Database name: Social Policy and Practice**

1 (behaviour or behaviour change or behaviour modification).de. (4625)

2 health behaviour.de. (4)

3 Attitudes.de. (11601)

4 (risk reduction* or risk perception*).de. (24)

5 Psychotherapy.de. (2773)

6 cognitive behavioural therapy.de. (386)

7 Motivation.de. (965)

8 (patient education or health education).de. (1593)

9 compliance*.de. (74)

10 patient participation.de. (5)

11 (health promotion or health improvement or outcomes).de. (8476)

12 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (1180)

13 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab,de. (3986)

14 motivat*.ti. (487)

15 or/1-14 (31269)

16 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).de. (867)

17 (tobacco* or nicotin* or cigar* or cigs).de. (227)

18 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping).de. (0)

19 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (7)

20 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).de. (4)

21 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (5)

22 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (1387)

23 (tobacco* or nicotin* or cigar* or cigs).tw. (650)

24 or/16-23 (1927)

25 (telemedicine or telehealth or telecare).de. (336)

26 (Computers or Digital Technology).de. (2036)

27 Software.de. (99)

28 multimedia.de. (13)

29 Information technology.de. (3831)

30 videos.de. (212)

31 Internet.de. (2900)

32 Online services.de. (108)

33 (Social networks or Social Networking).de. (2652)

34 Blogging.de. (1)

35 (online communities or websites).de. (13)

36 Social media.de. (578)

37 email.de. (77)

38 mobile phones.de. (166)

39 text messag*.de. (1)

40 Computer apps.de. (55)

41 Computer games.de. (99)

42 virtual reality.de. (3)

43 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw,de. (892)

44 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw,de. (679)

45 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw,de. (48)

46 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw,de. (46)

47 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw,de. (290)

48 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw,de. (123)

49 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw,de. (94)

50 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw,de. (59)

51 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw,de. (9013)

52 (e-mail* or email* or electronic mail*).tw,de. (524)

53 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw,de. (112)

54 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*).tw,de. (3860)

55 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw,de. (5985)

56 ((virtual or augmented) adj3 reality).tw,de. (65)

57 assistive technology.de. (1578)

58 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw,de. (4)

59 IVR.tw,de. (8)

60 or/25-59 (22654)

61 and/15,24,60 (27)

62 limit 61 to yr="2000 -Current" (26)

**Database name: DARE**

1 MeSH DESCRIPTOR Health Behavior

2 MeSH DESCRIPTOR Health Knowledge, Attitudes, Practice

3 MeSH DESCRIPTOR Risk Reduction Behavior

4 MeSH DESCRIPTOR Behavior Therapy

5 MeSH DESCRIPTOR PSYCHOTHERAPY

6 MeSH DESCRIPTOR Cognitive Therapy

7 MeSH DESCRIPTOR MOTIVATION

8 MeSH DESCRIPTOR Patient Education as Topic

9 MeSH DESCRIPTOR Patient Acceptance of Health Care

10 MeSH DESCRIPTOR Health promotion

11 MeSH DESCRIPTOR Outcome and Process Assessment (Health Care)

12 (behavio?r* or lifestyle* or "life style*") AND (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)

13 (motivat*):TI

14 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13

15 MeSH DESCRIPTOR Smoking

16 MeSH DESCRIPTOR Smoking cessation

17 MeSH DESCRIPTOR Tobacco use cessation

18 MeSH DESCRIPTOR Tobacco use  EXPLODE ALL TREES

19 MeSH DESCRIPTOR Tobacco use disorder

20 MeSH DESCRIPTOR Vaping

21 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*)

22 MeSH DESCRIPTOR tobacco use cessation products

23 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas)

24 (smoking* or smoker* or antismok* or anti smok* or anti-smok*)

25 (tobacco* or nicotin* or cigar* or cigs)

26 #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25

27 MeSH DESCRIPTOR Telemedicine

28 MeSH DESCRIPTOR Therapy, computer-assisted

29 MeSH DESCRIPTOR User-computer interface

30 MeSH DESCRIPTOR software design

31 MeSH DESCRIPTOR multimedia

32 MeSH DESCRIPTOR computers, handheld

33 MeSH DESCRIPTOR videotape recording

34 MeSH DESCRIPTOR Internet

35 MeSH DESCRIPTOR Social networking

36 MeSH DESCRIPTOR Blogging

37 MeSH DESCRIPTOR Social media

38 MeSH DESCRIPTOR Electronic mail

39 MeSH DESCRIPTOR cell phones

40 MeSH DESCRIPTOR text messaging

41 MeSH DESCRIPTOR Smartphone

42 MeSH DESCRIPTOR Mobile applications

43 MeSH DESCRIPTOR Video games

44 MeSH DESCRIPTOR Virtual Reality Exposure Therapy

45 (digital* or digitis* or digitiz* or electronic*) AND (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)

46 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*)

47 (ehealth* or e-health* or mhealth* or m-health* or mobile health*)

48 (laptop or palm or handheld or tablet or pda or pc) AND (comput*)

49 (mobile* or cell* or tablet*) AND (phone* or telephone* or handset* or hand-set*)

50 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*)

51 (mobile or electronic* or digital*) AND (device* or tablet*)

52 (mobile or electronic* or digital* or device* or software*) AND (application*)

53 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*)

54 (e-mail* or email* or electronic mail*)

55 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*)

56 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*)

57 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*)

58 (virtual or augmented) AND (reality)

59 MeSH DESCRIPTOR speech recognition software

60 (voice* or speech or speak*) AND (response*) AND (interact* or unit*)

61 (IVR)

62 #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61

63 #14 AND #26 AND #62

64 (#63) IN DARE  FROM 2000 TO 2019

**Supplementary search techniques**

Grey literature searching – see results below:

**Search engines**

| **Search engine** | |
|---|---|
| Name | dblb computer science bibliography |
| URL | https://dblp.uni-trier.de/ |
| Date searched | 30/11/2018 |
| Searcher | Andrea Heath |
| Search terms | “Behaviour change” AND Apps OR Digital OR Technology OR mhealth OR ehealth OR internet OR smartphone OR social media OR online OR smoker or smokers or smoking |
| How the results were selected | Used search engine to perform Boolean searches on a range of selected terms (as above). Also browsed all results for “Smoking” search and viewed all that were publication type papers, thesis, informal publications or “parts in books or collections”. Viewed results and exported potentially relevant results to Endnote if not already found in other database searches. |
| Results | 15 |

| Search engine | |
|---|---|
| Name | ACM Digital library |
| URL | https://dl.acm.org/ |
| Date searched | 3/12/2018 |
| Searcher | Andrea Heath |
| Search terms | Used search engine to search “behaviour change” AND (digital OR apps OR technology OR mhealth OR ehealth OR internet OR online OR social media or smartphone) OR (smoker or smokers or smoking). Limited to 2000 to date and Periodicals only |
| How the results were selected | Viewed results of search combinations and exported potentially relevant results to Endnote |
| Results | 5 |

**Websites**

| Website | |
|---|---|
| Name | Public Health England |
| URL | www.gov.uk/government/organisations/public-health-england |
| Date searched | 6/12/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Used search box to browse PHE documents using search terms digital, apps, smartphone, technology, internet, “behaviour change”, “smoking”, “smoker”, “smokers”. Also browsed “Smoking” in Health Improvement section |
| Results | 1 |

| Website | |
|---|---|
| Name | Public Health Wales |
| URL | www.wales.nhs.uk |
| Date searched | 22/11/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Browsed Lifestyle section Smoking |
| Results | 0 |

| Website | |
|---|---|
| Name | Scottish Public Health Observatory |
| URL | www.scotpho.org.uk |
| Date searched | 22/11/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Browsed “Tobacco use” in Behaviours section. Also browsed “Reported and Papers”. |
| Results | 0 |

| Website | |
|---|---|
| Name | Department of Health |
| URL | www.gov.uk/government/organisations/department-of-health |
| Date searched | 6/12/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Used search box to browse DoH documents using search terms “digital technology”, apps, smartphone, internet, “behaviour change”, smoking, smoker, smokers. Also searched NICE Evidence Search using same key words and limiting to source (DoH) Did not include results that had already been picked up by other database searches eg HMIC |
| Results | 1 |

| Website | |
|---|---|
| Name | Public Health Agency (Northern Ireland) |
| URL | www.publichealth.hscni.nt |
| Date searched | 22/11/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Searched Publications using key terms – digital, apps, smartphone, technology, internet, “behaviour change”, smoking, smoker, tobacco |
| Results | 0 |

| Website | |
|---|---|
| Name | Public Health Institute |
| URL | www.cph.org.uk |
| Date searched | 22/11/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Browsed area of expertise “Tobacco”. Also searched via “advanced Google search” terms smoking, smoker and tobacco and website url. |
| Results | 0 |

| Website | |
|---|---|
| Name | Royal Society for Public Health |

| | |
|---|---|
| URL | https://www.rsph.org.uk/ |
| Date searched | 22/11/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Browsed Reports. Also searched via “advanced Google search” using key terms and website url |
| Results | 0 |

| **Website** | |
|---|---|
| Name | Centre for Behaviour Change UCL |
| URL | https://www.ucl.ac.uk/behaviour-change |
| Date searched | 5/12/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Browsed website including link to Digital Health Hub. Also searched via Google advanced search combining site search with(smoking OR smokers OR smoker) |
| Results | 10 |

| **Website** | |
|---|---|
| Name | The Kings Fund |
| URL | https://www.kingsfund.org.uk |
| Date searched | 6/12/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Browsed Topic “Technology and data”, searched Publications using key terms. Also searched via “advanced Google search” using key terms and website url |
| Results | 1 |

| **Website** | |
|---|---|
| Name | The Behavioural Insights Team |
| URL | https://www.behaviouralinsights.co.uk/ |
| Date searched | 6/12/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Browsed Health category in Blogs & read potentially relevant blogs looking for links to publications. Also searched via “advanced Google search” using key terms and website url and browsed publications |
| Results | 1 |

| **Website** | |
|---|---|
| Name | nesta |
| URL | https://www.nesta.org.uk/ |
| Date searched | 6/12/2018 |
| Searcher | Andrea Heath |

| | |
|---|---|
| Search terms (including any specific sections browsed) | Browsed “Health” section, used search function to search key terms (smoking, smokers). Also searched via “advanced Google search” using key terms and website url |
| Results | 2 |

| **Website** | |
|---|---|
| Name | NICE Evidence Search |
| URL | www.evidence.nhs.uk |
| Date searched | 5/12/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | Used searched box to perform Boolean searches combining (behaviour change or digital technology, apps, computers, smartphone, internet) AND (smoking OR smoker OR smokers).<br>Imported most results to Endnote. One result added to Word doc and saved on k:drive |
| Results | 16 |

| **Website** | |
|---|---|
| Name | Google |
| URL | Google.co.uk |
| Date searched | 5/12/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | (Behaviour OR Behavior) AND ("digital technology" or apps or smartphone) AND (smoking OR smoker OR smokers)<br>Browsed first 50 results and copy & pasted relevant ones to search document, plus imported eight to Endnote |
| Results | 11 |

| **Website** | |
|---|---|
| Name | Google Scholar |
| URL | www.scholar.google.com |
| Date searched | 5/12/2018 |
| Searcher | Andrea Heath |
| Search terms (including any specific sections browsed) | (Behaviour OR Behavior) AND ("digital technology" or apps or smartphone) AND (smoking or smoker or smokers)<br>Browsed first 50 results and exported relevant results (if not duplicates) to Endnote |
| Results | 15 |

## Economic evidence

Note: a unified search for economic evidence was conducted for all review questions in this guideline

**Database name: MEDLINE**

1 Health Behavior/ (45965)
2 Health Knowledge, Attitudes, Practice/ (100524)
3 Risk Reduction Behavior/ (11188)
4 Behavior Therapy/ (26562)
5 PSYCHOTHERAPY/ (52164)
6 Cognitive Therapy/ (22511)
7 MOTIVATION/ (61890)
8 Patient Education as Topic/ (81150)
9 Patient acceptance of healthcare/ (41100)
10 Health promotion/ (68389)
11 "Outcome and Process Assessment (Health Care)"/ (25495)
12 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (31617)
13 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab,kw. (88489)
14 motivat*.ti. (14483)
15 or/1-14 (535137)
16 exp EXERCISE/ (174008)
17 exp EXERCISE MOVEMENT TECHNIQUES/ (7290)
18 exp SPORTS/ (168645)
19 exp exercise therapy/ (44950)
20 ((physical* or keep* or cardio* or aerobic or fitness or increas* or more or become or becoming or be or encourag*) adj3 (fit* or activ* or train*)).ti. (60086)
21 SEDENTARY LIFESTYLE/ (7220)
22 exercis*.ti. (97711)
23 (sedentary adj3 (behavio?r* or lifestyle* or less or time or change* or changing or modification* or modify or modifying or program* or intervention*)).tw. (8381)
24 FOOD HABITS/ (76202)
25 FOOD PREFERENCES/ (13168)
26 Nutrition therapy/ (1923)
27 *DIET/ (71783)
28 Body Mass Index/ (114816)
29 Healthy diet/ (2044)
30 diet*.ti. (155010)
31 ((health* or unhealthy or poor* or chang* or behav* or advic* or recommend*) adj3 (eat* or diet* or food* or nutrition* or weight* or overweight)).tw. (129962)
32 ((fruit* or vegetable*) adj2 (intake* or consum* or eat* or ate)).tw. (12879)
33 or/16-32 (767389)
34 SMOKING/ (134671)
35 SMOKING CESSATION/ (26370)

36 "TOBACCO USE CESSATION"/ or exp "TOBACCO USE"/ or "TOBACCO USE DISORDER"/ (13229)
37 SMOKERS/ (587)
38 Electronic Nicotine Delivery Systems/ or Vaping/ (2213)
39 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (2057)
40 "TOBACCO USE CESSATION PRODUCTS"/ (1512)
41 exp Pipe smoking/ (75)
42 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (1453)
43 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (204950)
44 (tobacco* or nicotin* or cigar* or cigs).tw. (181144)
45 or/34-44 (344859)
46 exp ALCOHOL-RELATED DISORDERS/ (108758)
47 exp ALCOHOL DRINKING/ (64438)
48 exp Alcoholic Beverages/ (18633)
49 Drinking Behavior/ (6548)
50 ((Alcohol* or Drunk* or Drink* or beer* or wine* or liqor* or liquor* or spirit* or alcopop* or cider*) adj4 (consum* or misus* or abus* or intoxicat* or inebriat* or excess* or bing* or hazardous or harmful or heavy or problem* or risk* or frequen* or behavio?r* or temperance or abstinence or abstain* or stop or stopping)).tw. (102554)
51 or/46-50 (213234)
52 exp Sexual Behavior/ (99473)
53 Sexual Health/ (397)
54 Sex education/ (8530)
55 exp Sexually Transmitted Diseases/ (323661)
56 HIV/ (18005)
57 Blood-Borne Pathogens/ (2917)
58 Pregnancy, Unplanned/ (1647)
59 Birth control/ (18923)
60 Pregnancy in Adolescence/ (7591)
61 Pregnancy Unwanted/ (2539)
62 Contraceptive Agents/ (4490)
63 Condoms/ (9681)
64 Contraceptive behavior/ (7488)
65 Condoms, Female/ (426)
66 (contracep* or condom*).tw. (73799)
67 ((sex* or intercourse or coit*) adj3 (risk* or protected or unprotected or safe* or unsafe* or behavio?r* or health* or unhealth* or educat*)).tw. (71922)
68 (STD* or STI or "sexually transmitted disease*" or "sexually transmitted infection*" or HIV*).tw. (285872)
69 (pregnan* adj3 (unplanned or planned or unwanted or unintended or unintentional* or repeat* or adolescen* or teen*)).tw. (14081)
70 (birth adj control*).tw. (4473)
71 (famil* adj3 plan*).tw. (24787)

72 or/52-71 (592222)
73 or/33,45,51,72 (1805988)
74 TELEMEDICINE/ (18725)
75 Therapy, Computer-Assisted/ (6424)
76 User-Computer Interface/ (35219)
77 Software Design/ (5745)
78 MULTIMEDIA/ (1809)
79 Computers, Handheld/ (3301)
80 Videotape Recording/ (11137)
81 Internet/ (67068)
82 Social Networking/ (2350)
83 Online Social Networking/ (16)
84 Blogging/ (897)
85 Social Media/ (5412)
86 Electronic Mail/ (2493)
87 Cell Phones/ (7642)
88 Text Messaging/ (2119)
89 Smartphone/ (2534)
90 Mobile Applications/ (3700)
91 WEARABLE ELECTRONIC DEVICES/ (754)
92 Video Games/ (4558)
93 Virtual Reality/ (636)
94 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (41380)
95 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw. (10768)
96 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (4993)
97 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (2388)
98 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (7450)
99 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (9457)
100 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (6537)
101 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (8487)
102 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (279509)
103 (e-mail* or email* or electronic mail*).tw. (11476)
104 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (10318)

105 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*).tw. (33899)
106 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (41146)
107 ((virtual or augmented) adj3 reality).tw. (6719)
108 Speech Recognition Software/ (648)
109 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw,kw. (705)
110 IVR.tw. (944)
111 or/74-110 (492045)
112 and/15,73,111 (12571)
113 Economics/ or exp "Costs and Cost Analysis"/ or Economics, Dental/ or exp Economics, Hospital/ or exp Economics, Medical/ or Economics, Nursing/ or Economics, Pharmaceutical/ or Budgets/ or exp Models, Economic/ or Markov Chains/ or Monte Carlo Method/ or Decision Trees/ (325711)
114 (Economic* or cost or costs or costly or costing or costed or price or prices or pricing or pharmacoeconomic* or pharmaco economic* or budget*).ti,ab. (591398)
115 ((monte adj carlo) or markov or (decision adj2 (tree* or analys*))).ti,ab. (49362)
116 (value adj2 (money or monetary)).ti,ab. (1766)
117 Quality of Life/ or Health Status Indicators/ or Quality-Adjusted Life Years/ or Value of Life/ (201539)
118 (quality of life or quality adjusted life or qaly* or qald* or qale* or qtime* or quality of wellbeing or quality of well-being or willingness to pay or standard gamble* or time trade off* or time tradeoff*).ti,ab. (205307)
119 (disability adjusted life or daly).ti,ab. (2537)
120 health* year* equivalent*.ti,ab. (38)
121 (sf36 or sf 36 or short form 36 or shortform 36 or sf thirtysix or sf thirty six or shortform thirtysix or shortform thirty six or short form thirtysix or short form thirty six).ti,ab. (20533)
122 (sf6 or sf 6 or short form 6 or shortform 6 or sf six or sfsix or shortform six or short form six).ti,ab. (1222)
123 (sf12 or sf 12 or short form 12 or shortform 12 or sf twelve or sftwelve or shortform twelve or short form twelve).ti,ab. (4252)
124 (sf16 or sf 16 or short form 16 or shortform 16 or sf sixteen or sfsixteen or shortform sixteen or short form sixteen).ti,ab. (27)
125 (sf20 or sf 20 or short form 20 or shortform 20 or sf twenty or sftwenty or shortform twenty or short form twenty).ti,ab. (364)
126 (euroqol or euro qol or eq5d or eq 5d).ti,ab. (7253)
127 or/113-126 (1022455)
128 (((energy or oxygen) adj cost*) or (metabolic adj cost*) or ((energy or oxygen) adj expenditure*)).ti,ab. (25248)
129 127 not 128 (1015741)
130 112 and 129 (1997)
131 limit 130 to yr="2000 -Current" (1930)
132 limit 131 to english language (1877)

133 Animals/ not Humans/ (4506319)
134 132 not 133 (1867)
135 limit 134 to (clinical conference or comment or editorial or historical article or letter or news) (6)
136 134 not 135 (1861)

**Database name: MIP/Epubs**

1 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (5835)
2 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab. (17570)
3 motivat*.ti. (2478)
4 or/1-3 (22736)
5 ((physical* or keep* or cardio* or aerobic or fitness or increas* or more or become or becoming or be or encourag*) adj3 (fit* or activ* or train*)).ti. (10100)
6 exercis*.ti. (12653)
7 (sedentary adj3 (behavio?r* or lifestyle* or less or time or change* or changing or modification* or modify or modifying or program* or intervention*)).tw. (2011)
8 diet*.ti. (18984)
9 ((health* or unhealthy or poor* or chang* or behav* or advic* or recommend*) adj3 (eat* or diet* or food* or nutrition* or weight* or overweight)).tw. (21928)
10 ((fruit* or vegetable*) adj2 (intake* or consum* or eat* or ate)).tw. (2112)
11 or/5-10 (60183)
12 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (1052)
13 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (483)
14 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (25197)
15 (tobacco* or nicotin* or cigar* or cigs).tw. (21826)
16 or/12-15 (39043)
17 ((Alcohol* or Drunk* or Drink* or beer* or wine* or liqor* or liquor* or spirit* or alcopop* or cider*) adj4 (consum* or misus* or abus* or intoxicat* or inebriat* or excess* or bing* or hazardous or harmful or heavy or problem* or risk* or frequen* or behavio?r* or temperance or abstinence or abstain* or stop or stopping)).tw. (12511)
18 (contracep* or condom*).tw. (5959)
19 ((sex* or intercourse or coit*) adj3 (risk* or protected or unprotected or safe* or unsafe* or behavio?r* or health* or unhealth* or educat*)).tw. (10438)
20 (STD* or STI or "sexually transmitted disease*" or "sexually transmitted infection*" or HIV*).tw. (31223)
21 (pregnan* adj3 (unplanned or planned or unwanted or unintended or unintentional* or repeat* or adolescen* or teen*)).tw. (1632)
22 (birth adj control*).tw. (388)

23 (famil* adj3 plan*).tw. (2532)
24 or/18-23 (45570)
25 or/11,16-17,24 (148454)
26 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (16498)
27 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw. (1976)
28 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (2199)
29 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (480)
30 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (2400)
31 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (5555)
32 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (5858)
33 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (7401)
34 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (69069)
35 (e-mail* or email* or electronic mail*).tw. (3056)
36 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (2488)
37 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or fitbit*).tw. (10560)
38 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (12606)
39 ((virtual or augmented) adj3 reality).tw. (2107)
40 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw. (98)
41 IVR.tw. (320)
42 or/26-41 (116943)
43 and/4,25,42 (1103)
44 25 and 42 (10238)
45 limit 44 to yr="2017 -Current" (6808)
46 43 or 45 (7192)
47 (Economic* or cost or costs or costly or costing or costed or price or prices or pricing or pharmacoeconomic* or pharmaco economic* or budget*).ti,ab. (126735)
48 ((monte adj carlo) or markov or (decision adj2 (tree* or analys*))).ti,ab. (21570)
49 (value adj2 (money or monetary)).ti,ab. (338)
50 (quality of life or quality adjusted life or qaly* or qald* or qale* or qtime* or quality of wellbeing or quality of well-being or willingness to pay or standard gamble* or time trade off* or time tradeoff*).ti,ab. (39946)
51 (disability adjusted life or daly).ti,ab. (571)

52 health* year* equivalent*.ti,ab. (2)
53 (sf36 or sf 36 or short form 36 or shortform 36 or sf thirtysix or sf thirty six or shortform thirtysix or shortform thirty six or short form thirtysix or short form thirty six).ti,ab. (2807)
54 (sf6 or sf 6 or short form 6 or shortform 6 or sf six or sfsix or shortform six or short form six).ti,ab. (716)
55 (sf12 or sf 12 or short form 12 or shortform 12 or sf twelve or sftwelve or shortform twelve or short form twelve).ti,ab. (795)
56 (sf16 or sf 16 or short form 16 or shortform 16 or sf sixteen or sfsixteen or shortform sixteen or short form sixteen).ti,ab. (5)
57 (sf20 or sf 20 or short form 20 or shortform 20 or sf twenty or sftwenty or shortform twenty or short form twenty).ti,ab. (22)
58 (euroqol or euro qol or eq5d or eq 5d).ti,ab. (1768)
59 or/47-58 (182507)
60 (((energy or oxygen) adj cost*) or (metabolic adj cost*) or ((energy or oxygen) adj expenditure*)).ti,ab. (3669)
61 59 not 60 (181259)
62 46 and 61 (959)
63 limit 62 to yr="2000 -Current" (959)
64 limit 63 to english language (953)
65 limit 64 to (clinical conference or comment or editorial or historical article or letter or news) (0)
66 64 not 65 (953)

**Database name: Embase**

1 behavior change/ (30212)
2 health 111nglish111111/ (60586)
3 attitude to health/ or risk reduction/ (195169)
4 behavior therapy/ (40905)
5 psychotherapy/ (81847)
6 cognitive therapy/ (42796)
7 motivation/ (92282)
8 patient education/ (106609)
9 patient attitude/ (62747)
10 health promotion/ (90169)
11 Outcome assessment/ (459747)
12 ((behavio?r* or lifestyle* or “life style*”) and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (44885)
13 ((behavio?r* or lifestyle* or “life style*”) adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab,kw. (144310)
14 motivat*.ti. (18165)
15 or/1-14 (1224078)

16 exp exercise/ (303603)
17 exp kinesiotherapy/ (69470)
18 exp sport/ (145038)
19 ((physical* or keep* or cardio* or aerobic or fitness or 112nglish112* or more or become or becoming or be or 112nglish112112*) adj3 (fit* or 112nglis* or train*)).ti. (83120)
20 sedentary lifestyle/ or sitting/ (30759)
21 physical activity/ (135422)
22 exercis*.ti. (132758)
23 (sedentary adj3 (behavio?r* or lifestyle* or less or time or change* or changing or modification* or modify or modifying or program* or intervention*)).tw. (13654)
24 feeding 112nglish112112/ or Food intake/ or Portion size/ (179314)
25 food preference/ (12426)
26 diet therapy/ (48807)
27 *diet/ (65042)
28 unhealthy diet/ or healthy diet/ (2365)
29 body mass/ (366272)
30 diet*.ti. (191322)
31 ((health* or unhealthy or poor* or chang* or 112nglis* or 112nglis* or recommend*) adj3 (eat* or diet* or food* or nutrition* or weight* or overweight)).tw. (200415)
32 ((fruit* or vegetable*) adj2 (intake* or consum* or eat* or ate)).tw. (19034)
33 or/16-32 (1387258)
34 smoking/ (277521)
35 smoking cessation/ (53791)
36 smoking habit/ (21151)
37 cigarette smoking/ or cigar smoking/ (51706)
38 exp “tobacco use”/ or tobacco dependence/ (366278)
39 smoking cessation program/ or smoking reduction/ (3105)
40 “smoking and smoking related phenomena”/ (180)
41 electronic cigarette/ or vaping/ or pipe smoking/ (4551)
42 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (3494)
43 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (2308)
44 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (332911)
45 (tobacco* or nicotin* or cigar* or cigs).tw. (236781)
46 or/34-45 (559889)
47 drinking 112nglish112112/ (45140)
48 alcohol consumption/ (114518)
49 exp alcohol abuse/ (34844)
50 alcohol intoxication/ (11483)
51 alcohol abstinence/ (6164)
52 exp alcoholic beverage/ or alcohol/ (256320)
53 drunkenness/ (3118)
54 ((Alcohol* or Drunk* or Drink* or beer* or wine* or liqor* or liquor* or spirit* or alcopop* or cider*) adj4 (consum* or misus* or abus* or intoxicat* or inebriat* or excess* or bing* or

hazardous or harmful or heavy or problem* or risk* or frequen* or behavio?r* or temperance or abstinence or abstain* or stop or stopping)).tw. (155984)
55 or/47-54 (426009)
56 exp sexual 113nglish113113/ (193908)
57 sexual health/ (13872)
58 sexual education/ (10789)
59 exp sexually transmitted disease/ (82663)
60 Human immunodeficiency virus/ (107533)
61 bloodborne bacterium/ (1919)
62 unplanned pregnancy/ (4958)
63 birth control/ (3680)
64 adolescent pregnancy/ (9109)
65 unwanted pregnancy/ (3097)
66 contraceptive agent/ (17643)
67 condom/ (19065)
68 contraceptive 113nglish113113/ (3665)
69 female condom/ (331)
70 (113nglish113113t* or condom*).tw. (92337)
71 ((sex* or intercourse or coit*) adj3 (risk* or protected or unprotected or safe* or unsafe* or behavio?r* or health* or unhealth* or educat*)).tw. (108297)
72 (STD* or STI or “sexually transmitted disease*” or “sexually transmitted infection*” or HIV*).tw. (403110)
73 (pregnan* adj3 (unplanned or planned or unwanted or unintended or unintentional* or repeat* or adolescen* or teen*)).tw. (19148)
74 (birth adj control*).tw. (4414)
75 (famil* adj3 plan*).tw. (25694)
76 or/56-75 (763969)
77 or/33,46,55,76 (2864133)
78 telemedicine/ (20032)
79 computer assisted therapy/ (4478)
80 computer interface/ (29361)
81 digital computer/ (2380)
82 software design/ (586)
83 multimedia/ (3553)
84 personal digital assistant/ (1301)
85 videorecording/ (73411)
86 Internet/ (101111)
87 social network/ (13368)
88 blogging/ (257)
89 social media/ (13901)
90 e-mail/ (17996)
91 mobile phone/ (14846)
92 text messaging/ (3838)
93 smartphone/ (7244)

94 mobile application/ (7400)
95 electronic device/ (1838)
96 video game/ (2420)
97 virtual reality/ (14185)
98 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (83470)
99 (telemed* or tele-med* or telehealth* or tele-health* or 114nglish114* or tele-car*).tw. (16924)
100 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (8205)
101 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (3795)
102 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (12384)
103 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (21092)
104 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (12736)
105 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (15189)
106 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (464892)
107 (e-mail* or email* or electronic mail*).tw. (28650)
108 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (17696)
109 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*).tw. (61766)
110 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (64114)
111 ((virtual or augmented) adj3 reality).tw. (11530)
112 automatic speech recognition/ (941)
113 interactive voice response system/ (577)
114 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw,kw. (1138)
115 IVR.tw. (1818)
116 or/78-115 (860579)
117 and/15,77,116 (23998)
118 health-economics/ or exp economic-evaluation/ or exp health-care-cost/ or pharmacoeconomics/ or Monte Carlo Method/ or Decision Tree/ (541174)
119 (Economic* or cost or costs or costly or costing or costed or price or prices or pricing or pharmacoeconomic* or pharmaco economic* or budget*).ti,ab. (928134)
120 ((monte adj carlo) or markov or (decision adj2 (tree* or analys*))).ti,ab. (77974)
121 (value adj2 (money or monetary)).ti,ab. (2925)

122 Quality of Life/ or Quality Adjusted Life Year/ or Quality of Life Index/ or Short Form 36/ or Health Status/ (535533)
123 (quality of life or quality adjusted life or qaly* or qald* or qale* or qtime* or quality of wellbeing or quality of well-being or willingness to pay or standard gamble* or time trade off* or time tradeoff*).ti,ab. (385660)
124 (disability adjusted life or daly).ti,ab. (3883)
125 Health* year* equivalent*.ti,ab. (40)
126 (sf36 or sf 36 or short form 36 or shortform 36 or sf thirtysix or sf thirty six or shortform thirtysix or shortform thirty six or short form thirtysix or short form thirty six or sf6 or sf 6 or short form 6 or shortform 6 or sf six or sfsix or shortform six or short form six or sf12 or sf 12 or short form 12 or shortform 12 or sf twelve or sftwelve or shortform twelve or short form twelve or sf16 or sf 16 or short form 16 or shortform 16 or sf sixteen or sfsixteen or shortform sixteen or short form sixteen or sf20 or sf 20 or short form 20 or shortform 20 or sf twenty or sftwenty or shortform twenty or short form twenty or euroqol or euro qol or eq5d or eq 5d).ti,ab. (61852)
127 or/118-126 (1743470)
128 (((energy or oxygen) adj cost*) or (metabolic adj cost*) or ((energy or oxygen) adj expenditure*)).ti,ab. (35250)
129 127 not 128 (1734611)
130 117 and 129 (4845)
131 limit 130 to yr=”2000 -Current” (4793)
132 limit 131 to 115nglish language (4708)
133 exp animal/ or exp animal-experiment/ or nonhuman/ (25358585)
134 (rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep).ti,ab,sh. (5378979)
135 exp human/ or human-experiment/ (19263219)
136 133 or 134 (25494592)
137 136 not (136 and 135) (6232240)
138 (comment or editorial or letter or news).pt. (1648938)
139 137 or 138 (7818751)
140 132 not 139 (4617)
141 limit 140 to (conference abstract or conference paper or “conference review”) (1044)
142 140 not 141 (3573)

**Database name: HTA/NHS EED**

1 MeSH DESCRIPTOR Health Behavior
2 MeSH DESCRIPTOR Health Knowledge, Attitudes, Practice
3 MeSH DESCRIPTOR Risk Reduction Behavior
4 MeSH DESCRIPTOR Behavior Therapy
5 MeSH DESCRIPTOR PSYCHOTHERAPY
6 MeSH DESCRIPTOR Cognitive Therapy
7 MeSH DESCRIPTOR MOTIVATION
8 MeSH DESCRIPTOR Patient Education as Topic

9 MeSH DESCRIPTOR Patient Acceptance of Health Care
10 MeSH DESCRIPTOR Health promotion
11 MeSH DESCRIPTOR Outcome and Process Assessment (Health Care)
12 (behavio?r* or lifestyle* or "life style*") AND (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)
13 (motivat*):TI
14 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13
15 MeSH DESCRIPTOR Exercise EXPLODE ALL TREES
16 MeSH DESCRIPTOR Exercise Movement Techniques EXPLODE ALL TREES
17 MeSH DESCRIPTOR Sports EXPLODE ALL TREES
18 MeSH DESCRIPTOR Exercise therapy EXPLODE ALL TREES
19 (physical* or keep* or cardio* or aerobic or fitness or increas* or more or become or becoming or be or encourag*):TI AND (fit* or activ* or train*):TI
20 MeSH DESCRIPTOR Sedentary Lifestyle
21 (exercis*):TI
22 (sedentary) AND (behavio?r* or lifestyle* or less or time or change* or changing or modification* or modify or modifying or program* or intervention*)
23 MeSH DESCRIPTOR Feeding Behavior
24 MeSH DESCRIPTOR FOOD PREFERENCES
25 MeSH DESCRIPTOR Nutrition therapy
26 MeSH DESCRIPTOR Diet
27 MeSH DESCRIPTOR body mass index
28 MeSH DESCRIPTOR healthy diet
29 (diet*):TI
30 (health* or unhealthy or poor* or chang* or behav* or advic* or recommend*) AND (eat* or diet* or food* or nutrition* or weight* or overweight)
31 (fruit* or vegetable*) AND (intake* or consum* or eat* or ate)
32 #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31
33 MeSH DESCRIPTOR Smoking
34 MeSH DESCRIPTOR Smoking cessation
35 MeSH DESCRIPTOR Tobacco use cessation
36 MeSH DESCRIPTOR Tobacco use  EXPLODE ALL TREES
37 MeSH DESCRIPTOR Tobacco use disorder
38 MeSH DESCRIPTOR vaping EXPLODE ALL TREES
39 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*)
40 MeSH DESCRIPTOR tobacco use cessation products
41 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas)
42 (smoking* or smoker* or antismok* or anti smok* or anti-smok*)
43 (tobacco* or nicotin* or cigar* or cigs)
44 #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43

45 MeSH DESCRIPTOR Alcohol-related disorders EXPLODE ALL TREES
46 MeSH DESCRIPTOR Alcohol drinking EXPLODE ALL TREES
47 MeSH DESCRIPTOR Alcoholic beverages EXPLODE ALL TREES
48 MeSH DESCRIPTOR drinking behavior
49 (Alcohol* or Drunk* or Drink* or beer* or wine* or liqor* or liquor* or spirit* or alcopop* or cider*) AND (consum* or misus* or abus* or intoxicat* or inebriat* or excess* or bing* or hazardous or harmful or heavy or problem* or risk* or frequen* or behavio?r* or temperance or abstinence or abstain* or stop or stopping)
50 #45 OR #46 OR #47 OR #48 OR #49
51 MeSH DESCRIPTOR sexual behavior EXPLODE ALL TREES
52 MeSH DESCRIPTOR reproductive behavior EXPLODE ALL TREES
53 MeSH DESCRIPTOR sex education
54 MeSH DESCRIPTOR sexually transmitted diseases EXPLODE ALL TREES
55 MeSH DESCRIPTOR HIV
56 MeSH DESCRIPTOR blood-borne pathogens
57 MeSH DESCRIPTOR pregnancy, unplanned
58 MeSH DESCRIPTOR contraception EXPLODE ALL TREES
59 MeSH DESCRIPTOR pregnancy in adolescence
60 MeSH DESCRIPTOR pregnancy, unwanted
61 MeSH DESCRIPTOR contraceptive agents
62 MeSH DESCRIPTOR condoms
63 MeSH DESCRIPTOR condoms, female
64 MeSH DESCRIPTOR contraception behavior EXPLODE ALL TREES
65 (contracep* or condom*)
66 (STD* or STI or "sexually transmitted disease*" or "sexually transmitted infection*" or HIV*)
67 (sex* or intercourse or coit*) AND (risk* or protected or unprotected or safe* or unsafe* or behavio?r* or health* or unhealth* or educat*)
68 (pregnan*) AND (unplanned or planned or unwanted or unintended or unintentional* or repeat* or adolescen* or teen*)
69 (birth) AND (control*)
70 (famil*) AND (plan*)
71 #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62 OR #63 OR #64 OR #65 OR #66 OR #67 OR #68 OR #69 OR #70
72 #32 OR #44 OR #50 OR #71
73 MeSH DESCRIPTOR Telemedicine
74 MeSH DESCRIPTOR Therapy, Computer-Assisted
75 MeSH DESCRIPTOR User-Computer Interface
76 MeSH DESCRIPTOR Software design
77 MeSH DESCRIPTOR Multimedia
78 MeSH DESCRIPTOR Computers, Handheld
79 MeSH DESCRIPTOR Videotape Recording
80 MeSH DESCRIPTOR Internet
81 MeSH DESCRIPTOR Social Networking

82 MeSH DESCRIPTOR Blogging
83 MeSH DESCRIPTOR social media
84 MeSH DESCRIPTOR Electronic Mail
85 MeSH DESCRIPTOR cell phones
86 MeSH DESCRIPTOR text messaging
87 MeSH DESCRIPTOR Smartphone
88 MeSH DESCRIPTOR Mobile Applications
89 MeSH DESCRIPTOR Video games
90 MeSH DESCRIPTOR Virtual Reality Exposure Therapy
91 ((digital* or digitis* or digitiz* or electronic*)) AND ((intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or media* or device* or platform* or forum* or community* or communities* or discussion*))
92 ((telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*))
93 ((ehealth* or e-health* or mhealth* or m-health* or mobile health*))
94 ((laptop or palm or handheld or tablet or pda or pc)) AND (comput*)
95 ((mobile* or cell* or tablet*)) AND ((phone* or telephone* or handset* or hand-set*))
96 ((smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*))
97 ((mobile or electronic* or digital*)) AND ((device* or tablet*))
98 ((mobile or electronic* or digital* or device* or software*)) AND (application*)
99 ((app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*))
100 ((e-mail* or email* or electronic mail*))
101 ((text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*))
102 ((Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or siri or fitbit*))
103 ((social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*))
104 ((virtual or augmented)) AND (reality)
105 MeSH DESCRIPTOR Speech Recognition Software
106 ((voice* or speech or speak*)) AND (response*) AND ((interact* or unit*))
107 (IVR)
108 #73 OR #74 OR #75 OR #76 OR #77 OR #78 OR #79 OR #80 OR #81 OR #82 OR #83 OR #84 OR #85 OR #86 OR #87 OR #88 OR #89 OR #90 OR #91 OR #92 OR #93 OR #94 OR #95 OR #96 OR #97 OR #98 OR #99 OR #100 OR #101 OR #102 OR #103 OR #104 OR #105 OR #106 OR #107
109 #14 AND #72 AND #108
110 (#109) IN NHSEED, HTA  FROM 2000 TO 2019

**Database name: Econlit**

1 ((behavio?r* or lifestyle* or "life style*") and (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ti. (1335)
2 ((behavio?r* or lifestyle* or "life style*") adj2 (change* or changing or modification* or modify or modifying or therapy or therapies or program* or intervention* or technique* or establish* or individual*)).ab. (4267)
3 motivat*.ti. (2385)
4 or/1-3 (7713)
5 ((physical* or keep* or cardio* or aerobic or fitness or increas* or more or become or becoming or be or encourag*) adj3 (fit* or activ* or train*)).ti. (313)
6 exercis*.ti. (982)
7 (sedentary adj3 (behavio?r* or lifestyle* or less or time or change* or changing or modification* or modify or modifying or program* or intervention*)).tw. (30)
8 diet*.ti. (589)
9 ((health* or unhealthy or poor* or chang* or behav* or advic* or recommend*) adj3 (eat* or diet* or food* or nutrition* or weight* or overweight)).tw. (3617)
10 ((fruit* or vegetable*) adj2 (intake* or consum* or eat* or ate)).tw. (140)
11 or/5-10 (5350)
12 (ecig* or e-cig* or e-voke* or juul* or vape* or vaping*).tw. (26)
13 (waterpipe* or water pipe* or dokha or dokhas or hookah or hookahs or hooka or hookas or shisha or shishas or sheesha or sheeshas).tw. (18)
14 (smoking* or smoker* or antismok* or anti smok* or anti-smok*).tw. (2028)
15 (tobacco* or nicotin* or cigar* or cigs).tw. (2513)
16 or/12-15 (3638)
17 ((Alcohol* or Drunk* or Drink* or beer* or wine* or liqor* or liquor* or spirit* or alcopop* or cider*) adj4 (consum* or misus* or abus* or intoxicat* or inebriat* or excess* or bing* or hazardous or harmful or heavy or problem* or risk* or frequen* or behavio?r* or temperance or abstinence or abstain* or stop or stopping)).tw. (1658)
18 (contracep* or condom*).tw. (1206)
19 ((sex* or intercourse or coit*) adj3 (risk* or protected or unprotected or safe* or unsafe* or behavio?r* or health* or unhealth* or educat*)).tw. (936)
20 (STD* or STI or "sexually transmitted disease*" or "sexually transmitted infection*" or HIV*).tw. (2056)
21 (pregnan* adj3 (unplanned or planned or unwanted or unintended or unintentional* or repeat* or adolescen* or teen*)).tw. (280)
22 (birth adj control*).tw. (191)
23 (famil* adj3 plan*).tw. (959)
24 or/18-23 (4585)
25 or/11,16-17,24 (14591)
26 ((digital* or digitis* or digitiz* or electronic*) adj3 (intervention* or therap* or treatment* or medicine* or medical* or health* or monitoring or clinical* or communicat* or technol* or

media* or device* or platform* or forum* or community* or communities* or discussion*)).tw. (1567)
27 (telemed* or tele-med* or telehealth* or tele-health* or telecar* or tele-car*).tw. (50)
28 (ehealth* or e-health* or mhealth* or m-health* or mobile health*).tw. (61)
29 ((laptop or palm or handheld or tablet or pda or pc) adj2 comput*).tw. (62)
30 ((mobile* or cell* or tablet*) adj (phone* or telephone* or handset* or hand-set*)).tw. (1151)
31 (smartphone* or smart-phone* or smart telephone* or iphone* or i-phone* or ipad* or i-pad* or blackberry* or smartwatch* or smart-watch* or android or device-based or mobile-based or podcast*).tw. (342)
32 ((mobile or electronic* or digital*) adj2 (device* or tablet*)).tw. (218)
33 ((mobile or electronic* or digital* or device* or software*) adj3 application*).tw. (346)
34 (app or apps or wearable* or online* or on-line* or internet* or www or web or website* or webpage* or portal or search engine*).tw. (15934)
35 (e-mail* or email* or electronic mail*).tw. (528)
36 (text messag* or texting or texter* or texted or SMS or short messag* or multimedia messag* or multi-media messag* or mms or instant messag* or picture messag* or audio messag*).tw. (263)
37 (Facebook* or YouTube* or Twitter* or LinkedIn* or Pinterest* or Google* or Tumblr* or Instagram* or WhatsApp* or Reddit* or Flickr* or SnapChat* or Yahoo* or Bing* or MSN* or Wikipedia* or Web 2* or alexa or fitbit*).tw. (1824)
38 (social media* or social network* or blog* or vlog* or video-blog* or gaming or game or games or gamification or wii fit or discussion board* or online forum*).tw. (36084)
39 ((virtual or augmented) adj3 reality).tw. (78)
40 ((voice* or speech or speak*) adj3 response* adj3 (interact* or unit*)).tw. (6)
41 IVR.tw. (8)
42 or/26-41 (54807)
43 and/4,25,42 (20)
44 limit 43 to yr="2000 -Current" (19)

# Appendix F – Public health evidence tables

## Intervention mode: internet-based programme in those without a chronic condition

### An 2008

| | |
|---|---|
| **Bibliographic reference/s** | **An LC, Klatt C, Perry CL, Lein EB, Hennrikus DJ, Pallonen UE, Bliss RL, Lando HA, Farley DM, Ahluwalia JS, Ehlinger EP. The RealU online cessation intervention for college smokers: a randomized controlled trial. Preventive medicine. 2008 Aug 1;47(2):194-9.** |
| **Study name** | The RealU online cessation intervention for college smokers:<br>A randomized controlled trial |
| **Registration** | |
| **Study type** | Two-group randomized controlled trial. |
| **Study dates** | Recruitment started in October 2004 |
| **Objective** | To determine if an online intervention with college smokers could increase self-reported 30- day abstinence rates at the end of a two semester intervention. |
| **Country/ Setting** | USA |
| **Number of participants / clusters** | 517 participants (260 in intervention; 257 in control)<br>A sample size of 250 participants per group provides an 85% power to detect a 12% absolute difference in abstinence rates between the treatment groups (i.e. control 20% vs. intervention 32%, two-sided alpha=0.05). |
| **Attrition** | Among 1618 eligible smokers, 517 (32%) completed the baseline survey and enrolled in the study with 260 randomized to the control condition and 257 randomized to the intervention condition. |
| **Participant /community characteristics.** | See nested table below |
| **Method of allocation** | Participants who completed the baseline survey and provided online consent were enrolled and randomized in real time following a blocked random number sequence generated by the study statistician.<br>Neither participants nor investigators could be blinded as to group assignment. |

| | Intervention (257) | Control (260) |
|---|---|---|
| Mean age (SD) | 20.1 (1.6) | 19.8 (1.6) |
| Gender (%female) | 181 (70.4) | 196 (75.4) |
| Employment (%)<br>Not working<br>Part-time<br>Full-time | <br>81 (31.6)<br>161 (62.9)<br>14 (5.5) | <br>84 (32.3)<br>159 (61.2)<br>17 (6.5) |
| Average cigarettes on smoking days (SD) | 3.8 (4.7) | 4.2 (5.0) |
| Internet use (%)<br>1–5 days/week<br>6–7 days/week | <br>32 (12.5)<br>225 (87.6) | <br>26 (10.0)<br>233 (90.0) |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **An LC, Klatt C, Perry CL, Lein EB, Hennrikus DJ, Pallonen UE, Bliss RL, Lando HA, Farley DM, Ahluwalia JS, Ehlinger EP. The RealU online cessation intervention for college smokers: a randomized controlled trial. Preventive medicine. 2008 Aug 1;47(2):194-9.** | |
| **Study name** | The RealU online cessation intervention for college smokers:<br>A randomized controlled trial | |
| **Inclusion criteria** | Respondents were eligible for this study if they 1) smoked cigarettes in the past 30 days, 2) were age 18 or older, and 3) indicated that they intended to be in school for<br>the next two semesters. | |
| **Exclusion criteria** | Not reported. | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | RealU intervention |
| | **Rationale/theory/Goal** | The development of RealU intervention<br>Strategies was based upon social cognitive and problem behavior theory. |
| | **Materials used** | Intervention: At the start of each week |
| | **Procedures used** | participants received an email invitation to visit the study website to 1) report on health<br>and lifestyle habits for the prior week (e.g. days smoking, drinking, stress, etc.), 2) take an interactive quiz with tailored feedback to learn about a smoking-related (e.g. nicotine<br>dependence) or general interest topic, then 3) view a student authored general interest online college life magazine.<br>Intervention group participants also received weekly emails written by one of nine peer coaches. Email message content was based upon templates developed by study<br>investigators and personalized by peer coaches using information provided by<br>participants during their weekly visits to the website<br><br>Participants randomized to the control group received a confirmation email containing<br>links to online health and academic resources Quit&Win. This contest was promoted using advertisements in the student newspaper, campus posters, direct mail and email to all university students |
| | **Provider** | online |
| | **Digital platform** | online |
| | **Location** | online |
| | **Duration** | 30-week period |
| | **Intensity** | There was a total of 20 weekly visits to the study website over a 30-week period. |
| | **Tailoring/adaptation** | interactive quiz with tailored feedback |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">An LC, Klatt C, Perry CL, Lein EB, Hennrikus DJ, Pallonen UE, Bliss RL, Lando HA, Farley DM, Ahluwalia JS, Ehlinger EP. The RealU online cessation intervention for college smokers: a randomized controlled trial. Preventive medicine. 2008 Aug 1;47(2):194-9.</td></tr>
<tr><td>Study name</td><td colspan="2">The RealU online cessation intervention for college smokers:<br>A randomized controlled trial</td></tr>
<tr><td rowspan="3"></td><td>Planned treatment fidelity</td><td>-</td></tr>
<tr><td>Actual treatment fidelity</td><td>-</td></tr>
<tr><td>Other details</td><td>-</td></tr>
<tr><td>Follow up</td><td colspan="2">8, 20 and 30 weeks</td></tr>
<tr><td>Data collection</td><td colspan="2">Nicotine dependence was assessed by asking participants to report the time to first morning cigarette<br><br>The primary outcome was a self-reported 30-day abstinence at week 30. Individuals who reported 30-day abstinence at the final evaluation were offered $50 to complete an in-person exit interview during which exhaled carbon monoxide (CO)was measured using standardized techniques with a Bedfont Micro II® Smokerlyzer device. A cut-off of 8 pper m was used as the definition of CO confirmed abstinence.<br><br>Secondary outcomes were 7- day point prevalent abstinence at 8, 20, and 30 weeks, and quit attempts. At the 30-week evaluation, study participants were also asked to report the duration since they last smoked cigarettes (even a puff). This information was used to calculate the prevalence of a 6-month prolonged abstinence measured at the 30-week evaluation.</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td colspan="2">Self-reported abstinence rates at 30 weeks, University of Minnesota Twin Cities, 2004–2005 (Adjusted for baseline difference in age).
<table>
<tr><td></td><td>Intervention (SE)</td><td>Control (SE)</td><td>Unadjusted odds ratio</td><td>Adjusted odds ratio</td></tr>
<tr><td>Primary outcome</td><td></td><td></td><td></td><td></td></tr>
<tr><td>7- day abstinence (week 30)</td><td>152 (59.1)</td><td>100 (38.5)</td><td>2.32 (1.63–3.30)</td><td>2.43 (1.70–3.48)</td></tr>
<tr><td>30-day abstinence (week 30)</td><td>104 (40.5)</td><td>60 (23.1)</td><td>2.26 (1.55-3.32)</td><td>2.31 (1.58-3.40)</td></tr>
</table>
Adjusted for baseline difference in age.<br><br>
<table>
<tr><td>Secondary outcome</td><td></td><td></td></tr>
<tr><td>Used any behavioural programs<br>Yes (%)</td><td>N=239<br>33 (13.8)</td><td>N=237<br>14 (5.9)</td></tr>
</table></td></tr>
<tr><td>Important outcomes measures and</td><td colspan="2">Participants in the intervention group completed the weekly check-in and interactive quiz at an average of 18.9 (SD 2.5) times during the 20 active weeks of the study.</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **An LC, Klatt C, Perry CL, Lein EB, Hennrikus DJ, Pallonen UE, Bliss RL, Lando HA, Farley DM, Ahluwalia JS, Ehlinger EP. The RealU online cessation intervention for college smokers: a randomized controlled trial. Preventive medicine. 2008 Aug 1;47(2):194-9.** | | |
| **Study name** | The RealU online cessation intervention for college smokers:<br>A randomized controlled trial | | |
| **effect size. (time points)** | Among intervention group participants, 227 (88%) completed these tasks at least 18 of the 20 weeks while 172 (67%) visited every week. | | |
| **Statistical Analysis** | Logistic regression modeling was used to compare the rates of 30-day and 7-day abstinence with and without adjustment for participants' baseline characteristics.<br>Analysis was by intention-to-treat with all non-respondents classified as continuing<br>smokers. | | |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** | | |
| | **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
| | Risk of bias arising from the randomisation process | Low risk | Randomisation present (a blocked random number sequence generated by the study statistician)<br>Was the allocation sequence random? Was it concealed until participants were enrolled and assigned? Did baseline differences suggest a problem with randomisation process? |
| | Risk of bias due to deviations from intended interventions (assignment) | Some concerns | Neither participants nor investigators could be blinded as to group assignment. |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| | Missing outcome data | Low risk | Follow-up survey response rates exceeded 90% and did not differ between the groups at any time point? |
| | Risk of bias in measurement of the outcome | Some concerns | Self-reported outcome assessment, participants could potentially be influenced by knowledge of intervention received |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | This work was supported by grant RC 2002-0025 from ClearWay Minnesota. Additional support for supplies was provided by the | | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **An LC, Klatt C, Perry CL, Lein EB, Hennrikus DJ, Pallonen UE, Bliss RL, Lando HA, Farley DM, Ahluwalia JS, Ehlinger EP. The RealU online cessation intervention for college smokers: a randomized controlled trial. Preventive medicine. 2008 Aug 1;47(2):194-9.** | |
| **Study name** | The RealU online cessation intervention for college smokers:<br>A randomized controlled trial | |
| | University of Minnesota Transdisciplinary Tobacco Research Center<br>NIH P50 013333. | |
| **Comments** | This study was conducted upon a single campus and it is likely that there was some level of contamination between the study groups.<br><br>This study tested a multicomponent intervention (weekly self-monitoring of behavior, interactive quizzes with tailored feedback, online magazine format, peer email support) vs. control and it is therefore not possible to ascertain the relative contribution of each intervention component<br><br>In addition, this study used a high level of incentives ($10 per week per participant) to encourage adherence. | |
| **Additional references** | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | x |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | x |
| | Goals and planning | |
| | Comparison of the behaviour | |
| | Social support | x |
| | Self-belief | |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

**Brown 2014**

<table>
<tr><td>Bibliographic reference/s</td><td colspan="6">Brown J, Michie S, Geraghty AW, Yardley L, Gardner B, Shahab L, Stapleton JA, West R. Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial. The lancet Respiratory medicine. 2014 Dec 1;2(12):997-1006.</td></tr>
<tr><td>Study name</td><td colspan="6">Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial</td></tr>
<tr><td>Registration</td><td colspan="6">ISRCTN99820519.</td></tr>
<tr><td>Study type</td><td colspan="6">RCT</td></tr>
<tr><td>Study dates</td><td colspan="6">Dec 6, 2011, and Oct 11, 2013</td></tr>
<tr><td>Objective</td><td colspan="6">Aim to assess a new interactive internet-based intervention (StopAdvisor) for smoking<br>cessation that was designed with attention directed to people with low socioeconomic status.</td></tr>
<tr><td>Country/ Setting</td><td colspan="6">UK</td></tr>
<tr><td>Number of participants / clusters</td><td colspan="6">4613 participants were assigned to to the StopAdvisor group (n=2321) or the control group (n=2292).<br><br>Power calculation performed: A minimum total sample size of 4260 with at least 2130 in each subsample was required.</td></tr>
<tr><td>Attrition</td><td colspan="6"></td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="6">
<table>
<tr><td></td><td colspan="2">Low SES (n=2142)</td><td colspan="2">High SES (n=2471)</td><td colspan="2">Total (N=4613)</td></tr>
<tr><td></td><td>StopAdvisor (n=1088)</td><td>Control (n=1054)</td><td>StopAdvisor (n=1233)</td><td>Control (n=1238)</td><td>StopAdvisor (n=2321)</td><td>Control (n=2292)</td></tr>
<tr><td>Age (years)</td><td>39·8 (14·8)</td><td>39·4 (14·3)</td><td>39·2 (11·3)</td><td>38·3 (10·9)</td><td>39·5 (13·0)</td><td>38·8 (12·5)</td></tr>
<tr><td>Gender (% female)</td><td>658 (61%)</td><td>632 (60%)</td><td>804 (65%)</td><td>796 (64%)</td><td>1462 (63%)</td><td>1428 (62%)</td></tr>
<tr><td>Cigarettes smoked per day</td><td>20·5 (9·4)</td><td>20·3 (9·4)</td><td>17·1 (8·1)</td><td>16·9 (8·3)</td><td>18·7 (8·9)</td><td>18·5 (9·0)</td></tr>
</table>
</td></tr>
<tr><td>Method of allocation</td><td colspan="6">Randomisation was automated with an unseen random number function embedded in the website to establish which treatment was revealed after the online baseline assessment.<br>Participants, and researchers who obtained data and did laboratory analyses, were masked to treatment allocation.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="6">We enrolled participants aged 18 years and older who smoked every day and who were willing to make a serious quit attempt, use a stop-smoking website that sends email reminders, be followed up at 7 months, and be contacted by email and telephone.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="6">Not reported</td></tr>
<tr><td>Intervention</td><td colspan="3">TIDieR Checklist criteria</td><td colspan="3">Details</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Brown J, Michie S, Geraghty AW, Yardley L, Gardner B, Shahab L, Stapleton JA, West R. Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial. The lancet Respiratory medicine. 2014 Dec 1;2(12):997-1006.** | |
| **Study name** | Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial | |
| | **Brief Name** | StopAdvisor |
| | **Rationale/theory/Goal** | Based on PRIME theory of motivation and addiction, 33 evidence-based or theory-based behaviour change techniques, 26 web-design principles, and nine principles from user testing with smokers of low socioeconomic status. |
| | **Materials used** | Before their quit date, participants had access to an interactive menu, which included a screencast explaining how to use the website, and up to five tunnelled dialogue sessions tailored according to their quit date, their intended use of smoking cessation medicines, their success in obtaining and use of medicines, and reasons for quitting. These sessions presented behaviour-change techniques that focused on helping with goal setting and action planning around a quit date, emphasising the importance of abrupt cessation, acquiring appropriate medicines and how best to use them, making necessary changes in routines to minimise urges to smoke after the target quit date, developing specific coping strategies for anticipated difficulties in quitting, and having clear expectations about the natures of those difficulties. In each case, delivery of a technique was designed to make use of the interactive nature of the intervention—eg, an interactive calendar to set quit dates and email reminders.<br><br>After their quit date, participants had access to a new interactive menu and up to 13 tunnelled sessions tailored on self-reported abstinence, urges to smoke, self-efficacy, medicine use, and anticipated frequency of stressful or social events. The post-quit menu included frequently asked questions, a “your progress” section, audio and video, and a link to the StopAdvisor Facebook page.<br>Participants who reported meeting either 6 month sustained abstinence or point-prevalence criteria at 7-month follow up were asked to use a cotton dental roll to provide a saliva sample and post it back to a laboratory for analysis. |
| | **Procedures used** | Participants assigned to the intervention had access to an interactive website and those assigned to the control group had access to an |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Brown J, Michie S, Geraghty AW, Yardley L, Gardner B, Shahab L, Stapleton JA, West R. Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial. The lancet Respiratory medicine. 2014 Dec 1;2(12):997-1006.** | |
| **Study name** | Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial | |
| | | information-only control website—a one-page static website giving brief standard advice. |
| | **Provider** | |
| | **Digital platform** | Online |
| | **Location** | Online |
| | **Duration** | 7 months |
| | **Intensity** | Non-responders were sent<br>reminders using both email and telephone contact details (at least one and up to three telephone numbers<br>[daytime, evening, and mobile]), with invitations and contacts structured according to evidence-based methods<br>for maximisation of response rates |
| | **Tailoring/adaptation** | Tailored support was offered for up to 1 month before and after quitting. |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | **6 months** | |
| **Data collection** | The primary outcome was 6 -month sustained, biochemically verified abstinence. Specifically, 6-month sustained abstinence (RS6), defined as a self-report of smoking no more than five cigarettes in the previous 6 months and not smoking in the previous week, verified by a saliva cotinine concentration of less than 15 ng/mL22 or, for participants reporting use of nicotine replacement treatment (including electronic cigarettes) and with a saliva cotinine concentration of more than 14 ng/ml, a saliva anabasine concentration of less than 1 ng/mL.<br><br>The main secondary outcome was 6 month, 7 day biochemically verified point prevalence. | |
| **Critical outcomes measures and effect size. (time points)** | **Effect of StopAdvisor on biochemically verified smoking cessation.** | |

| **Time After Cessation** | StopAdvisor | Control | Relative risk | Odds ratio | P value |
|---|---|---|---|---|---|
| **Primary outcome (abstinence for 6 months)** | | | | | |
| High SES | 147/1233 (12%) | 156/1238 (13%) | 0·95 (0·77 to 1·17) | 0·94 (0·74 to 1·19) | 0·61 |
| Adjusted | | | 0·97 (0·78 to 1·19) | 0·95 (0·75 to 1·22) | 0·75 |
| Low SES | 90/1088 (8%) | 64/1054 (6%) | 1·36 (1·00 to 1·86) | 1·39 (1·00 to 1·94) | 0·0499 |

| | |
|---|---|
| **Bibliographic reference/s** | **Brown J, Michie S, Geraghty AW, Yardley L, Gardner B, Shahab L, Stapleton JA, West R. Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial. The lancet Respiratory medicine. 2014 Dec 1;2(12):997-1006.** |
| **Study name** | Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial |

| | | | | | |
|---|---|---|---|---|---|
| Adjusted | | | 1·43 (1·05 to 1·96) | 1·46 (1·04 to 2·05) | 0·0238 |
| **Second outcome (point prevalence at 6 months)** | | | | | |
| High SES | 222/1233 (18%) | 232/1238 (19%) | 0·96 (0·81 to 1·13) | 0·95 (0·78 to 1·17) | 0·64 |
| Adjusted | | | 0·96 (0·82 to 1·14) | 0·95 (0·77 to 1·17) | 0·66 |
| Low SES | 136/1088 (13%) | 100/1054 (10%) | 1·32 (1·03 to 1·68) | 1·36 (1·04 to 1·79) | 0·0267 |
| Adjusted | | | 1·39 (1·09 to 1·78) | 1·41 (1·07 to 1·88) | 0·0081 |

**Important outcomes measures and effect size. (time points)**

**Usage of StopAdvisor versus the control website**

| | **StopAdvisor (n=2321)** | **Control (n=2292)** | **T test†** | **Mean difference (95%CI)** | **P value** |
|---|---|---|---|---|---|
| **Log-ins** | | | | | |
| High SES | 5·0 (6·2) | 1·4 (0·7) | *T* (1267) 20·1 | 3·6 (3·2–3·9) | <0·0001 |
| Low SES | 4·1 (5·7) | 1·3 (0·6) | T (1113) 16·4 | 2·9 (2·5–3·2) | <0·0001 |
| **Total time (min)** | | | | | |
| High SES | 26·9 (38·9) | 1·3 (3·2) | T (1248) 23·1 | 25·6 (23·5–27·8) | <0·0001 |
| Low SES | 22·1 (34·4) | 1·1 (2·5) | t(1099) 20·1 | 21·1 (19·0–23·1) | <0·0001 |
| **Total page views** | | | | | |
| High SES | 93·1 (119·8) | 6·1 (5·2) | *t*(1237) 25·5 | 87·0 (80·3–93·7) | <0·0001 |
| Low SES | 75·5 (105·0) | 5·3 (4·1) | *t*(1090) 22·0 | 70·2 (64·0–76·5) | <0·0001 |

**Data are mean (SD), unless otherwise indicated. All analyses in this table are unadjusted. SES=socioeconomic status. Data in parentheses are degrees of freedom. †**

| | |
|---|---|
| **Statistical Analysis** | A log-binomial regression was conducted to analyse the dichotomous primary and secondary outcomes.<br>The protocol specified logistic regression and associated odds ratios (ORs) as the measure of effect, but relative risk was used to improve understanding.<br>To provide per-protocol analyses- ORs, percentage-point diff erences, and 95% Cis were calculated. |

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|---|---|---|---|
| **Bibliographic reference/s** | **Brown J, Michie S, Geraghty AW, Yardley L, Gardner B, Shahab L, Stapleton JA, West R. Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial. The lancet Respiratory medicine. 2014 Dec 1;2(12):997-1006.** | | |
| **Study name** | Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial | | |
| | On the basis of the intention-to-treat principle, individuals who did not respond to endpoint follow-up attempts were retained in the analyses and classified as continuing smokers according to the RS6 criteria.<br>Post-hoc sensitivity analyses were also performed, excluding participants in full-time education from the classification of those in the subsample with low socioeconomic status<br>Website usage was compared using t tests without the assumption of equality of variance. | | |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** | | |
| | **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
| | Risk of bias arising from the randomisation process | Low risk | Randomisation was present.<br>Randomisation was automated with no experimenter involvement by use of an unseen random number function embedded in the website to establish which treatment was revealed after the online baseline assessment. No baseline imbalances. |
| | Risk of bias due to deviations from intended interventions (assignment) | Low risk | Participants, and researchers who obtained data and did laboratory analyses, were masked to treatment allocation.<br><br>Were participants / carers / people delivering the intervention aware of their assigned intervention during the trial?<br>Were there deviations from the intended intervention that arose because of experimental context? If so, were the deviations balanced? If not, are they likely to have affected the outcome?<br>Was the effect of *assignment* to the intervention analysed If not, was there potential for a substantial impact on the result of the failure to do this? |

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|---|---|---|---|
| **Bibliographic reference/s** | **Brown J, Michie S, Geraghty AW, Yardley L, Gardner B, Shahab L, Stapleton JA, West R. Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial. The lancet Respiratory medicine. 2014 Dec 1;2(12):997-1006.** | | |
| **Study name** | Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial | | |
| | Risk of bias due to deviations from intended interventions (adherence) | | Not applicable |
| | Missing outcome data | Low risk | At 7 months, 1643 of the 2321 and 1670 of 2292 were contacted in the intervention and control. Therefore, attrition rates approximately 29% in StopAdvisor and 27% in control group. Sensitivity analysis was also performed supporting evidence that results were not biased. |
| | Risk of bias in measurement of the outcome | Low risk | Biochemical verification of outcome. Participants, and researchers who obtained data and did laboratory analyses, were masked to treatment allocation. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Low risk | |
| | **Other outcome details** | | |
| **Source of funding** | National Prevention Research Initiative | | |
| **Comments** | Study shows that the interactive internet-based smoking cessation intervention, StopAdvisor, is more effective than an information-only website in smokers with low, but not high, socioeconomic status. | | |
| **Additional references** | | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | | |
| | Reward and threat | | |
| | Repetition and substitution | | |
| | Antecedents | | |
| | Associations | | |
| | Covert Learning | | |
| | Natural Consequences | | |
| | Feedback and monitoring | | |
| | Goals and planning | | x |
| | Comparison of the behaviour | | |

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|---|---|
| **Bibliographic reference/s** | **Brown J, Michie S, Geraghty AW, Yardley L, Gardner B, Shahab L, Stapleton JA, West R. Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial. The lancet Respiratory medicine. 2014 Dec 1;2(12):997-1006.** |
| **Study name** | Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial |
| | Social support |
| | Self-belief |
| | Comparison of outcomes |
| | Identity |
| | Shaping knowledge |
| | Regulation |

**Graham 2011**

| | |
|---|---|
| **Bibliographic reference/s** | **Graham AL, Cobb NK, Papandonatos GD, Moreno JL, Kang H, Tinkelman DG, Bock BC, Niaura RS, Abrams DB. A randomized trial of Internet and telephone treatment for smoking cessation. Archives of internal medicine. 2011 Jan 10;171(1):46-53.** |
| **Study name** | A Randomized Trial of Internet and Telephone Treatment for Smoking Cessation |
| **Registration** | |
| **Study type** | 3-group RCT |
| **Study dates** | March 2005 to November 2008 |
| **Objective** | To determine the relative effect of Internet and Internet plus telephone treatment for smoking cessation on smoking abstinence among US adults. |
| **Country/ Setting** | USA |
| **Number of participants / clusters** | 2005 participants were allocated as follows: 679 to basic internet BI, 651 to EI enhanced internet, and 675 to EI+P enhanced internet and phone. |
| **Attrition** | From 16021 screened eligible; 4014 gave informed consent and 2005 were participated in the study. |
| **Participant /community characteristics.** | Baseline characteristics of participants<br><br>**Demographic**<br>No. (%) of Participants<br>Age, mean (SD), y: 35.9 (10.8)<br>Women: 1024 (51.1)<br>Daily smoking rate, mean (SD): 20.00 (9.96) |
| **Method of allocation** | Randomization was conducted via random numbers table and was stratified by sex and baseline motivation to quit. After randomization, participants were sent |

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|---|---|---|
| **Bibliographic reference/s** | **Graham AL, Cobb NK, Papandonatos GD, Moreno JL, Kang H, Tinkelman DG, Bock BC, Niaura RS, Abrams DB. A randomized trial of Internet and telephone treatment for smoking cessation. Archives of internal medicine. 2011 Jan 10;171(1):46-53.** | |
| **Study name** | A Randomized Trial of Internet and Telephone Treatment for Smoking Cessation | |
| | an automated e-mail that provided a copy of the study consent form, a Web link (URL) for their assigned Internet treatment condition (ie, BI or EI), and instructions regarding telephone counseling. A unique identifier embedded in the URL was used for tracking Web site use. | |
| **Inclusion criteria** | Eligibility criteria included US residence, current smoking of 5 or more cigarettes per day, age of 18 years or older, and no prior use of the QuitNet Web site as confirmed by the absence of a tracking cookie | |
| **Exclusion criteria** | Not reported | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | QuitNet |
| | **Rationale/theory/Goal** | Interactive, commercial cessation website that provided evidence-based cessation treatment. |
| | **Materials used** | Intervention:The QuitNet provides (1) advice to quit; (2) assistance in setting a quit date; (3) assessment of motivation, smoking history, demographics, and nicotine dependence; (4) individually tailored information based on the assessment; (5) problem solving and skills training content; (6) tailored assistance in using Food and Drug Administration – approved pharmacotherapies; and (7) social support within its large online social network.18 The Web site remained consistent throughout the study period, with minimal upgrades or enhancements.<br><br>Control: The content of BI included general cessation information, cessation pharmacotherapy information and directions for use, a directory of national cessation programs, and a database of frequently asked questions accumulated during the 10-year lifespan of QuitNet. Where possible, the language, graphics, and formatting of QuitNet were retained in the BI condition for usability and credibility. To allow for the examination of theory-driven hypotheses about mediators of treatment outcome, the interactive and individually tailored features of QuitNet and its social network were not available in BI. |
| | **Procedures used** | Participants randomised to an enhanced internet with full access to the full version of QuitNet website.<br><br>Participants randomized to BI were given 6-month free access to a static, information-only comparison condition composed of the content on QuitNet. |
| | **Provider** | Online |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">Graham AL, Cobb NK, Papandonatos GD, Moreno JL, Kang H, Tinkelman DG, Bock BC, Niaura RS, Abrams DB. A randomized trial of Internet and telephone treatment for smoking cessation. Archives of internal medicine. 2011 Jan 10;171(1):46-53.</td></tr>
<tr><td>Study name</td><td colspan="2">A Randomized Trial of Internet and Telephone Treatment for Smoking Cessation</td></tr>
<tr><td rowspan="7"></td><td>Digital platform</td><td>Online</td></tr>
<tr><td>Location</td><td></td></tr>
<tr><td>Duration</td><td>6 months</td></tr>
<tr><td>Intensity</td><td></td></tr>
<tr><td>Tailoring/adaptation</td><td>Website enhanced with tailored content</td></tr>
<tr><td>Planned treatment fidelity</td><td>-</td></tr>
<tr><td>Actual treatment fidelity</td><td>-</td></tr>
<tr><td>Other details</td><td>-</td></tr>
<tr><td>Follow up</td><td colspan="2">3, 6, 12, 18 months</td></tr>
<tr><td>Data collection</td><td colspan="2">Age, race, ethnicity, sex, marital status, household income, education, and employment status were assessed using standard items from the Behavioral Risk Factor Surveillance System.<br><br>The study outcome metric was 30-day PPA determined at each follow-up in accordance with guidelines from the Society for Research on Nicotine and Tobacco.<br>Also,a measure of sustained abstinence was constructed by combining 30-day multiple PPA reports at 3, 6, 12, and 18 months. In these analyses, an individual was coded as an abstainer at a particular follow-up if he or she reported 30-day PPA at 3 months and at all subsequent time points up to the one being measured. We report 30-day single and multiple PPA rates at each follow-up point</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td colspan="2">Thirty-Day Single Point Prevalence Abstinence Rates for ITT and Responder-Only Samples.<br><br>
<table>
<tr><td></td><td colspan="2">Group</td><td>Between-Group Comparisons</td></tr>
<tr><td>6 months<br>No<br>ITT, %<br>Responders</td><td>EI<br>94<br>14.4<br>19.5</td><td>BI<br>83<br>12.2<br>15.8</td><td><br><br>0.23<br>0.12</td></tr>
<tr><td>12 months<br>No<br>ITT, %<br>Responders</td><td>EI<br>98<br>15.1<br>20.9</td><td>BI<br>119<br>17.5<br>24.2</td><td><br><br>0.22<br>0.23</td></tr>
<tr><td>18 months<br>No<br>ITT, %<br>Responders</td><td>EI<br>113<br>17.4<br>25.2</td><td>BI<br>129<br>19.0<br>27.9</td><td><br><br>0.44<br>0.35</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Bibliographic reference/s</td><td>Graham AL, Cobb NK, Papandonatos GD, Moreno JL, Kang H, Tinkelman DG, Bock BC, Niaura RS, Abrams DB. A randomized trial of Internet and telephone treatment for smoking cessation. Archives of internal medicine. 2011 Jan 10;171(1):46-53.</td></tr>
<tr><td>Study name</td><td>A Randomized Trial of Internet and Telephone Treatment for Smoking Cessation</td></tr>
<tr><td></td><td>Thirty-Day Multiple Point Prevalence Abstinence Rates for the Designated Follow-up and All Preceding Intervals.
<table>
<tr><td></td><td>Group</td><td></td><td>Between-Group Comparisons</td></tr>
<tr><td>6 months<br>No[b]<br>ITT, %<br>Responders</td><td>EI<br>48<br>7.4<br>11.0</td><td>BI<br>45<br>6.6<br>9.4</td><td><br><br>0.59<br>0.41</td></tr>
<tr><td>12 months<br>No[b]<br>ITT, %<br>Responders</td><td>EI<br>31<br>4.8<br>7.9</td><td>BI<br>31<br>4.6<br>7.3</td><td><br><br>0.87<br>0.75</td></tr>
<tr><td>18 months<br>No[b]<br>ITT, %<br>Responders</td><td>EI<br>29<br>4.5<br>8.2</td><td>BI<br>24<br>3.5<br>6.2</td><td><br><br>0.39<br>0.30</td></tr>
</table>
bNumber of individuals per group who achieved 30-day point prevalence abstinence for the designated follow-up and all preceding intervals.</td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>As above</td></tr>
<tr><td>Statistical Analysis</td><td>F tests were conducted for continuous variables and X2 tests for categorical variables.<br><br>Abstinence rates were analyzed using generalized estimating equation methods with a working independence correlation matrix.<br>Omnibus X2 tests of any between-group differences at each of the 4 follow- ups were based on multivariate Wald tests conducted at a multiplicity-adjusted significance level α = .05/4.<br><br>The primary analysis was based on an intent-to-treat (ITT) approach in which individuals lost to follow-up were treated as smokers.</td></tr>
<tr><td>Risk of bias (ROB)<br>Overall ROB</td><td>Outcome name
<table>
<tr><th>Outcome</th><th>Judgement (Low / High / some concerns)</th><th>Comments</th></tr>
<tr><td>Risk of bias arising from the randomisation process</td><td>Some concerns</td><td>Randomization was present (Random numbers table and stratified by sex and baseline motivation to quit)</td></tr>
</table></td></tr>
</table>

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|---|---|---|---|
| **Bibliographic reference/s** | **Graham AL, Cobb NK, Papandonatos GD, Moreno JL, Kang H, Tinkelman DG, Bock BC, Niaura RS, Abrams DB. A randomized trial of Internet and telephone treatment for smoking cessation. Archives of internal medicine. 2011 Jan 10;171(1):46-53.** | | |
| **Study name** | A Randomized Trial of Internet and Telephone Treatment for Smoking Cessation | | |
| | | | Was the allocation sequence random? Not information about allocation concealment. There were no significant baseline differences. |
| | Risk of bias due to deviations from intended interventions (assignment) | Some concerns | No information about blinding. |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| | Missing outcome data | Low risk | Approximately 68% in each group completed the study after 18 months follow up. |
| | Risk of bias in measurement of the outcome | Some concerns | Participant-reported outcomes- Subjective outcome assessment (self-reporting), participants possibly aware of the intervention received. |
| | Risk of bias in selection of the reported result | Low risk | Was the trial analysed in accordance with pre-specified plan? Is the result likely to have been selected on the basis of results either from multiple outcome measurements or multiple analyses of data? |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | National Cancer Institute | | |
| **Comments** | Participants were offered a $25 incentive for the completion of each survey and a $20 bonus for completing all 4 surveys.<br><br>The relatively high abstinence rates observed in the BI condition should be considered in the context of the recruitment approach, which may have self-selected participants with unusually high motivation to quit. | | |
| **Additional references** | | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | | |
| | Reward and threat | | |
| | Repetition and substitution | | |
| | Antecedents | | |
| | Associations | | |
| | Covert Learning | | |

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|---|---|
| **Bibliographic reference/s** | **Graham AL, Cobb NK, Papandonatos GD, Moreno JL, Kang H, Tinkelman DG, Bock BC, Niaura RS, Abrams DB. A randomized trial of Internet and telephone treatment for smoking cessation. Archives of internal medicine. 2011 Jan 10;171(1):46-53.** |
| **Study name** | A Randomized Trial of Internet and Telephone Treatment for Smoking Cessation |
| | Natural Consequences |
| | Feedback and monitoring: x |
| | Goals and planning: x |
| | Comparison of the behaviour |
| | Social support: x |
| | Self-belief |
| | Comparison of outcomes |
| | Identity |
| | Shaping knowledge |
| | Regulation |

**Mavrot 2017**

| | |
|---|---|
| **Bibliographic reference/s** | **Mavrot C, Stucki I, Sager F, Etter JF. Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial. Journal of telemedicine and telecare. 2017 Jun;23(5):521-8.** |
| **Study name** | Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial |
| **Registration** | |
| **Study type** | Two- group RCT |
| **Study dates** | From March 2012 to March 2013 |
| **Objective** | The aim of this study was to assess the marginal efficacy of a computer-based, individually tailored program (the Coach) over and above the use of a comprehensive Internet smoking cessation website |
| **Country/ Setting** | France |
| **Number of participants / clusters** | 1120 participants were included; 561 were allocated to the control group and 559 to the intervention group. The participants were not blind to treatment conditions. |
| **Attrition** | Initial, 1226 participants were registered in the study and 1120 were finally participated. The response rate was low: 51.7% (579/1120) after three and 38.9% (436/1120) after six months. |
| **Participant /community characteristics.** | **Participant characteristics at baseline – no statistically significant differences.** |

| | Control group (n=561) | Intervention group (n=559) |
|---|---|---|
| **Gender (Female)** | 66.5% (372) | 65.2% (364) |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Mavrot C, Stucki I, Sager F, Etter JF. Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial. Journal of telemedicine and telecare. 2017 Jun;23(5):521-8.** | |
| **Study name** | Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial | |
| | **Mean age (SD)[a]** | 36.8 (11.2) / 36.1 (10.4) |
| | **Mean cigarettes per day (SD)[a]** | 17.5 (8.1) / 17.2 (8.4) |
| **Method of allocation** | A list of random numbers was used. Participants were assigned automatically by a computer either to the intervention group that received the program Coach or to the control condition, which did not. | |
| **Inclusion criteria** | The eligibility criteria for participating in the trial were: be a current or ex-smoker; be 18 years or older; provide valid e-mail and postal addresses and a phone number; and provide informed consent. | |
| **Exclusion criteria** | Not reported | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | Coach |
| | **Rationale/theory/Goal** | Based on theories of addiction and behaviour change.<br><br>Both Stop-Tabac and the Coach are based on the transtheoretical model of behaviour change and theories of relapse prevention and tobacco dependence. |
| | **Materials used** | The Coach program consisted of the three following elements:<br>1.A series of automatic, personalized feedback reports that were assembled by the computer based on the participant's answers to the tailoring questionnaire.<br>Each report sent to the participants consisted of 30 feedback items selected automatically from a stockpile of over 300 items. These items included paragraphs of text, images and graphs showing the respondents' scores. Different answers to the tailoring questions produced different paragraphs in the feedback reports.<br>2. A personal web page with progress graphs, for a visual representation of change over time in the levels of tobacco dependence, withdrawal symptoms, motivation and self-efficacy.<br>3. A series of automatic, individually tailored, proactive e-mail messages that took into account each participant's smoking status quit date (past or future) and level of dependence. |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">Mavrot C, Stucki I, Sager F, Etter JF. Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial. Journal of telemedicine and telecare. 2017 Jun;23(5):521-8.</td></tr>
<tr><td>Study name</td><td colspan="2">Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial</td></tr>
<tr><td rowspan="10"></td><td></td><td></td></tr>
<tr><td>Procedures used</td><td>Control: The Stop-Tabac.ch website, provides free information and support for smoking cessation. Information is provided through text pages, videos, booklets, discussion forums and testimonials. However, it was stable during the trial to be as a comparator.<br><br>Intervention: In supplement to the above website, the Coach program, provides individualized counselling (information, encouragement, advice and follow-up) through personalized messages in French that are tailored to participants based on their answers to questionnaires.</td></tr>
<tr><td>Provider</td><td></td></tr>
<tr><td>Digital platform</td><td></td></tr>
<tr><td>Location</td><td></td></tr>
<tr><td>Duration</td><td>6 months</td></tr>
<tr><td>Intensity</td><td></td></tr>
<tr><td>Tailoring/adaptation</td><td>Tailored messages to participants were based on questionnaires answers.</td></tr>
<tr><td>Planned treatment fidelity</td><td></td></tr>
<tr><td>Actual treatment fidelity</td><td>-</td></tr>
<tr><td>Other details</td><td></td></tr>
<tr><td>Follow up</td><td colspan="2">3,6 months</td></tr>
<tr><td>Data collection</td><td colspan="2">The primary outcome was self-reported smoking abstinence over four weeks (not a puff of tobacco during the past four weeks). No biochemical validation was performed.<br><br>Motivation to quit was measured by five items (e.g. ‘‘Cigarettes will damage my health’’), withdrawal symptoms by eight items (e.g. ‘‘I am feeling anxious’’), self-change strategies by five items (e.g. ‘‘In order to refrain from smoking, I avoid places where people smoke’’) and self-efficacy by seven items (e.g. ‘‘I am able to refrain from smoking after a meal’’).</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td colspan="2">Self-reported smoking abstinence (no puff in the previous four weeks) at three- and six-month follow-ups – no statistically significant differences (intention-to-treat analysis).
<table>
<tr><th></th><th>Control (n=561)</th><th>Intervention (n=559)</th><th>OR (95% CI)</th><th>p-value</th></tr>
<tr><td colspan="5">Including all participants randomized to control or intervention groups</td></tr>
<tr><td>6 months[a]</td><td>15.5%</td><td>17% (95)</td><td>1.12 (0.80-1.55)</td><td>0.518</td></tr>
</table></td></tr>
</table>

| | |
|---|---|
| **Bibliographic reference/s** | **Mavrot C, Stucki I, Sager F, Etter JF. Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial. Journal of telemedicine and telecare. 2017 Jun;23(5):521-8.** |
| **Study name** | Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial |
| | (87) | | | |
| Including only baseline smokers | | | | |
| | | | | |
| 6 months[a] | 13.7% (72) | 15.1% (81) | 1.12 (0.78–1.60) | 0.542 |

[a] In brackets: number of quitters

**Self-reported smoking abstinence (no puff in the previous four weeks) at three- and six-month follow-ups – statistically significant differences at three-month follow-up (analysis without dropouts).**

| | **Control (n=561)** | **Intervention (n=559)** | **OR (95% CI)** | **p-value** |
|---|---|---|---|---|
| Including all participants randomized to control or intervention groups | | | | |
| 6 months[a] | 37.8% (87) | 46.1% (95) | 1.41 (0.94-2.10) | 0.081 |
| Including only baseline smokers | | | | |
| | | | | |
| 6 months[a] | 34.1% (72) | 42.9% (81) | 1.45 (0.95–2.22) | 0.080 |

[a] In brackets: number of quitters

| | |
|---|---|
| **Important outcomes measures and effect size. (time points)** | **Use of the intervention**<br>In the intervention group, 25.2% (141/559) of participants connected to their personal page only once (i.e. at registration). The median number of connections to the personal page was three, and the median number of e-mail messages received was 47 per person. In the intervention group, the intensity of use of the program was associated with quitting smoking at six months: quitters connected to the program nine times on average, compared with three times for those still smoking (Wilcoxon test [W]=32808, P<0.0001). |
| **Statistical Analysis** | Regarding the primary outcome, both intention-to-treat analyses (ITT), in which non-respondents at follow-up were considered smokers, and analyses including only the respondents were conducted. T-tests to compare means, Wilcoxon tests to compare medians and Fisher tests to compare proportions were used. A regression analysis of the number of visits to the program on the outcome for determining the effect of the program's intensity of use on the chance of quitting. When relevant, ex-smokers were analysed separately from baseline smokers. |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** |

| **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
|---|---|---|
| Risk of bias arising from the randomisation process | Low risk | Randomisation present. A list of random numbers was |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Mavrot C, Stucki I, Sager F, Etter JF. Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial. Journal of telemedicine and telecare. 2017 Jun;23(5):521-8.** | | |
| **Study name** | Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial | | |
| | | | used. Participants were assigned automatically by a computer either to the intervention group. There were no significant differences at baseline between intervention and control groups. |
| | Risk of bias due to deviations from intended interventions (assignment) | Low risk | The participants were not blind to treatment conditions. No evidence of deviations from intervention. |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| | Missing outcome data | High risk | Limitation of the study was the follow-up response rate. High dropout rates |
| | Risk of bias in measurement of the outcome | Some concerns | Self-reported outcome assessment with no further biochemical validation. Assessment of outcome have been potentially influenced by knowledge of intervention received. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | A sample of 4000 participants would have been needed to reach a power of 80% The sample size (1120 participants) constitutes one limitation of the study. | |
| | **Overall Risk of Bias** | High risk | |
| | **Other outcome details** | | |
| **Source of funding** | This work was supported by the Tobacco Control Fund of the Swiss Federal Office of Public Health (grant number 10.003634). | | |
| **Comments** | The sample size (1120 participants) constitutes one limitation of the study. Another limit was the follow-up response rate. | | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Mavrot C, Stucki I, Sager F, Etter JF. Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial. Journal of telemedicine and telecare. 2017 Jun;23(5):521-8.** | |
| **Study name** | Efficacy of an Internet-based, individually tailored smoking cessation program: A randomized-controlled trial | |
| **Additional references** | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | x |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

**Thanh 2018**

| | |
|---|---|
| **Bibliographic reference/s** | **Nguyen Thanh V, Guignard R, Lancrenon S, Bertrand C, Delva C, Berlin I, Pasquereau A, Arwidson P. Effectiveness of a fully automated internet-based smoking cessation program: a randomized controlled trial (STAMP). Nicotine and Tobacco Research. 2018 Jan 23;21(2):163-72.** |
| **Study name** | Effectiveness of a Fully Automated Internet-Based Smoking Cessation Program: A Randomized Controlled Trial (STAMP) |
| **Registration** | ClinicalTrials.gov identifier: NCT01073085. |
| **Study type** | A two-arm randomized controlled trial. |
| **Study dates** | The enrolment period extended from March to November 2010 |
| **Objective** | To assess the effectiveness of a personalized and automated Internet-based program. |
| **Country/ Setting** | France |
| **Number of participants / clusters** | From 4724 eligible participants, 2478 were randomized (1242 intervention and 1242 in the control group). |
| **Attrition** | Assuming an attrition rate of 40%, 1150 participants per group were required. |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="3">Nguyen Thanh V, Guignard R, Lancrenon S, Bertrand C, Delva C, Berlin I, Pasquereau A, Arwidson P. Effectiveness of a fully automated internet-based smoking cessation program: a randomized controlled trial (STAMP). Nicotine and Tobacco Research. 2018 Jan 23;21(2):163-72.</td></tr>
<tr><td>Study name</td><td colspan="3">Effectiveness of a Fully Automated Internet-Based Smoking Cessation Program: A Randomized Controlled Trial (STAMP)</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="3"><table>
<tr><td></td><td>Intervention group (N=1242): E-coaching</td><td>Control group (N=1236): BOOKLET</td><td>p- values</td></tr>
<tr><td>Age (years)<br>18-24<br>25-39<br>40-54<br>≥55</td><td><br>126 (10.1)<br>725 (58.4)<br>333 (26.8)<br>58 (4.7)</td><td><br>160 (12.9)<br>704 (57.0)<br>329 (26.6)<br>43 (3.5)</td><td><br><br>0.086</td></tr>
<tr><td>Mean age (SD)</td><td>36.2 (9.8)</td><td>35.6 (9.7)</td><td>0.133</td></tr>
<tr><td>Gender (%female)</td><td>65.7%</td><td>64%</td><td>0.374</td></tr>
<tr><td colspan="4">On average, participants smoked 16 (SD 7.8) cigarettes per day</td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td colspan="3">Based on computer-generated random digits, eligible participants who fully completed the baseline questionnaire were randomly allocated to either receive the automated intervention (e-coaching group) or the booklet (booklet group) with a 1:1 allocation ratio.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="3">The eligibility criteria were: being 18 years or older, being a current cigarette smoker (manufactured or roll-your-own tobacco cigarettes), having a personal e-mail address, willing to quit within 2 weeks, and not having previously benefited from e-coaching. Eligible participants were asked to provide their informed consent to participate directly on the website. Those who received the baseline questionnaire were checked again to meet eligibility criteria.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="3">Not reported</td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td colspan="2">Details</td></tr>
<tr><td></td><td>Brief Name</td><td colspan="2">E-coaching</td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td colspan="2">A personalized, tailored and fully automated Internet-based cessation program.<br>E-coaching is largely based on techniques inspired by motivational interviewing and cognitive behavioral therapy.</td></tr>
<tr><td></td><td>Materials used</td><td colspan="2">The intervention consisted of an automated program of 45 e-mails (“e-coaching”) sent over a 3-month period. Once a quit date had been chosen by the smoker, e-mails to prepare them for smoking cessation were sent during the 15 days before the date (seven e-mails). From the quit date, e-mails were sent over a 3-month period.<br><br>The control group received a PDF version of a booklet on smoking cessation.<br>The booklet is structured on the stages of change theory,19 like e-coaching, with four chapters: “I smoke,” “I hesitate over quitting,” “I have decided to</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Nguyen Thanh V, Guignard R, Lancrenon S, Bertrand C, Delva C, Berlin I, Pasquereau A, Arwidson P. Effectiveness of a fully automated internet-based smoking cessation program: a randomized controlled trial (STAMP). Nicotine and Tobacco Research. 2018 Jan 23;21(2):163-72.** | |
| **Study name** | Effectiveness of a Fully Automated Internet-Based Smoking Cessation Program: A Randomized Controlled Trial (STAMP) | |
| | | quit," and "I quit". Each chapter contains information, exercises and advice related to the current stage of change in the smoker's behavior. |
| | **Procedures used** | The e-mails sent before the quit date provided information about the harms of smoking, advice on how to anticipate difficulties and develop coping strategies to face them, as well as exercises to enhance motivation. On the quit date, a series of e-mails were sent with congratulations, information about the health benefits already occurring, advice on how to maintain abstinence and how to manage relapses. The content is mainly text, with links to specific brochures, for example for nutrition advice.<br><br>The content of the e-mails of all profiles<br>was based on the stages of the theory of change. |
| | **Provider** | The design of the program and the content of the e-mails were developed by smoking cessation treatment specialists |
| | **Digital platform** | |
| | **Location** | |
| | **Duration** | 3 and a half months |
| | **Intensity** | One e-mail per day was sent forthe first week after quitting tobacco (seven e mails), one e-mail every 2 days for 6 weeks (21 e-mails), then one e-mail every 4 days for the remaining 6 weeks (10 e-mails). No more e-mails were sent after<br>these 3 months after the quit date. |
| | **Tailoring/adaptation** | |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | 3, 6, 12 months | |
| **Data collection** | Self-reported 7-day point prevalence smoking abstinence was measured at 6 months (primary outcome), at 3 and 12 months of follow-up (secondary outcomes).<br>To measure abstinence, the participants at the 3, 6, and 12-month follow-ups were asked if they were current smokers. | |
| **Critical outcomes measures and effect size. (time points)** | **7-Day Point Prevalence Smoking Abstinence at 3, 6, and 12 Months—Unadjusted Analysis.** | |

<table>
<tr><td>Bibliographic reference/s</td><td>Nguyen Thanh V, Guignard R, Lancrenon S, Bertrand C, Delva C, Berlin I, Pasquereau A, Arwidson P. Effectiveness of a fully automated internet-based smoking cessation program: a randomized controlled trial (STAMP). Nicotine and Tobacco Research. 2018 Jan 23;21(2):163-72.</td></tr>
<tr><td>Study name</td><td>Effectiveness of a Fully Automated Internet-Based Smoking Cessation Program: A Randomized Controlled Trial (STAMP)</td></tr>
<tr><td></td><td>
<table>
<tr><td></td><td>E-coaching group N = 1242</td><td>Booklet group N = 1236</td><td>$X^2$<br>df Value<br>p</td><td>OR</td></tr>
<tr><td colspan="5">Intention to treat analysis</td></tr>
<tr><td>Cessation rate at 6 months</td><td>24.7% (N = 307)</td><td>24.7% (N = 305)</td><td>1<br>0.001<br>.98</td><td>1.00 [0.83–1.20]</td></tr>
<tr><td>Cessation rate at 12 months</td><td>20.9% (N = 259)</td><td>20.6% (N = 254)</td><td>1<br>0.03<br>.85</td><td>1.02 [0.84–1.24]</td></tr>
<tr><td colspan="5">Per protocol analyses</td></tr>
<tr><td>Cessation rate at 6 months</td><td>46.1% (N = 265/575)</td><td>38.1% (N = 193/507)</td><td>1<br>7.10<br>.01</td><td>1.39 [1.09–1.77]</td></tr>
<tr><td>Cessation rate at 12 months</td><td>41.8% (N = 213/510)</td><td>37.0% (N = 164/443)</td><td>1<br>2.23<br>.14</td><td>1.22 [0.94–1.58]</td></tr>
</table>
7-Day Point Prevalence Smoking Abstinence at 3, 6, and 12 Months—Per-Protocol Adjusted Analysis<br><br>After adjustment for baseline variables in the PP population, the effect of e-coaching was significant at 6 months (aOR = 1.27 [1.00–1.60], p = .05, N = 1082). At 12 months, there was no significant difference: the adjusted odds-ratio was 1.11<br>[0.83–1.48] (p = .49, N = 953).<br><br>Repeated measures analyses showed a significant group effect both without (p < .001) and with adjustment (p = .003), suggesting an overall higher cessation rate in the e-coaching than in the control group</td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>As above</td></tr>
<tr><td>Statistical Analysis</td><td>Pearson’s chi-square test and Student’s t test were used for categorical and continuous variables, respectively.<br>The primary analysis was the conservative intent-to-treat (ITT) method, where data from all randomized participants were analysed and non-respondents or missing values considered as smokers.<br>The secondary analyses were per-protocol (PP) analyses: only participants for whom at least one abstinence datum was available and who had followed the proposed protocol were included: in the e-coaching group participants had to</td></tr>
</table>

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|---|---|---|---|
| **Bibliographic reference/s** | **Nguyen Thanh V, Guignard R, Lancrenon S, Bertrand C, Delva C, Berlin I, Pasquereau A, Arwidson P. Effectiveness of a fully automated internet-based smoking cessation program: a randomized controlled trial (STAMP). Nicotine and Tobacco Research. 2018 Jan 23;21(2):163-72.** | | |
| **Study name** | Effectiveness of a Fully Automated Internet-Based Smoking Cessation Program: A Randomized Controlled Trial (STAMP) | | |
| | have read the e-mails “systematically” or “often,” and in the booklet group they had to have read the booklet “entirely” or “partially.<br>To evaluate the effects of the intervention on abstinence, cessation rates were compared between the e-coaching and the booklet group, at each time point separately (3, 6 and 12 months) using Pearson’s chi-square test for unpaired data. Then logistic regressions on data from the PP population were used to estimate the effects among people who followed the intervention, by controlling for potential confounders at baseline.<br>Finally, repeated measures analyses were performed using a Generalized Linear Mixed Models for binary data. | | |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** | | |
| | **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
| | Risk of bias arising from the randomisation process | Low risk | Randomisation was based on computer-generated random digits. No significant difference was found between the two groups for the baseline measurements. |
| | Risk of bias due to deviations from intended interventions (assignment) | Some concerns | No information for blinding<br>Intention<br><br>Were participants / carers / people delivering the intervention aware of their assigned intervention during the trial?<br>Were there deviations from the intended intervention that arose because of experimental context? If so, were the deviations balanced? If not, are they likely to have affected the outcome?<br>Was the effect of *assignment* to the intervention analysed If not, was there potential for a substantial impact on the result of the failure to do this? |
| | Risk of bias due to deviations from intended interventions (adherence) | Some concerns | No information for blinding. Not appropriate analysis to estimate the effect of adhering to the intervention. |
| | Missing outcome data | High concerns | Follow-up rate was low: between 50% and 59%. High attrition rates. Attrition rate was higher among certain socio-demographic groups: males, smokers aged 18–25, |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Nguyen Thanh V, Guignard R, Lancrenon S, Bertrand C, Delva C, Berlin I, Pasquereau A, Arwidson P. Effectiveness of a fully automated internet-based smoking cessation program: a randomized controlled trial (STAMP). Nicotine and Tobacco Research. 2018 Jan 23;21(2):163-72.** | | |
| **Study name** | Effectiveness of a Fully Automated Internet-Based Smoking Cessation Program: A Randomized Controlled Trial (STAMP) | | |
| | | | students and unemployed smokers, smokers with a level of education lower than or equal to secondary. |
| | Risk of bias in measurement of the outcome | Some concerns | Tobacco abstinence was self-reported and not biochemically validated and could thus be biased. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | High concerns | |
| | **Other outcome details** | | |
| **Source of funding** | | | |
| **Comments** | Tobacco abstinence was self-reported and not biochemically validated and could thus be biased.<br>The follow-up rate was relatively low compared to other studies: between 50% and 59%. Moreover, there was high attrition rate which may show the lack of engagement of e-coaching group participants. | | |
| **Additional references** | | | |

| **Behaviour change techniques (16 theoretical clusters)** | |
|---|---|
| Scheduled consequences | |
| Reward and threat | |
| Repetition and substitution | |
| Antecedents | |
| Associations | |
| Covert Learning | |
| Natural Consequences | |
| Feedback and monitoring | |
| Goals and planning | x |
| Comparison of the behaviour | |
| Social support | |
| Self-belief | |
| Comparison of outcomes | |
| Identity | |
| Shaping knowledge | |
| Regulation | |

**Wangberg 2011**

<table>
<tr><td>Bibliographic reference/s</td><td colspan="3">Wangberg SC, Nilsen O, Antypas K, Gram IT. Effect of tailoring in an internet-based intervention for smoking cessation: randomized controlled trial. Journal of Medical Internet Research. 2011;13(4):e121.</td></tr>
<tr><td>Study name</td><td colspan="3">Effect of Tailoring in an Internet-Based Intervention for Smoking Cessation: Randomized Controlled Trial</td></tr>
<tr><td>Registration</td><td colspan="3"></td></tr>
<tr><td>Study type</td><td colspan="3">A two-arm, randomized controlled trial</td></tr>
<tr><td>Study dates</td><td colspan="3">August 15, 2006 and December 7, 2007.</td></tr>
<tr><td>Objective</td><td colspan="3">The aim was to isolate the effect of tailored emails in an Internet-based intervention for smoking cessation by comparing two versions of the intervention, with and without tailored content.</td></tr>
<tr><td>Country/ Setting</td><td colspan="3">Norway</td></tr>
<tr><td>Number of participants / clusters</td><td colspan="3">Among the 2298 participants who smoked at enrolment, 1029 were randomly assigned to the intervention and 1043 to the control arm.<br><br>A total sample of 2787 was needed to have 90% power.</td></tr>
<tr><td>Attrition</td><td colspan="3">From an initial of 3054 eligible participants;2298 were included in the study. There was high attrition.</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="3">Baseline comparisons
<table>
<tr><td></td><td>Intervention group (n=1029)</td><td>Control group (n=1043)</td><td>P value</td></tr>
<tr><td>Gender (Female)<br>N (%)<br>95% CI</td><td><br>732 (71.1%)<br>68.3%-73.8%</td><td><br>766 (73.4%)<br>70.8%–76.1%</td><td>0.24</td></tr>
<tr><td>Age (years)<br>mean (95%CI)<br>Range</td><td>37.3<br>36.7–38.0<br>16–71</td><td>36.9<br>36.2–37.5<br>16–68</td><td>0.35</td></tr>
<tr><td>Cigarettes per day</td><td>16.1 (15.6-16.5)</td><td>16.2 (15.7–16.6)</td><td>0.77</td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td colspan="3">The participants were subsequently automatically allocated through use of an online random number generator to the intervention or control arm.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="3">aged 16 years or older</td></tr>
<tr><td>Exclusion criteria</td><td colspan="3"></td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td colspan="2">Details</td></tr>
<tr><td></td><td>Brief Name</td><td colspan="2"></td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td colspan="2"></td></tr>
<tr><td></td><td>Materials used</td><td colspan="2">Basic functionality of website:<br>The website included static information on the dangers of smoking, general advice on smoking cessation, and information about the website. In addition there were interactive tests for nicotine addiction, type of smoker (stress smoker, comfort smoker, etc), and motivation level. There was an</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Wangberg SC, Nilsen O, Antypas K, Gram IT. Effect of tailoring in an internet-based intervention for smoking cessation: randomized controlled trial. Journal of Medical Internet Research. 2011;13(4):e121.** | |
| **Study name** | Effect of Tailoring in an Internet-Based Intervention for Smoking Cessation: Randomized Controlled Trial | |
| | | emphasis on creating opportunities for social interaction using a discussion forum, a guestbook, and a personal diary.<br>There were also some community features: participants could click on other participants 'nicknames in the forum and thereby get a specific profile with some information about the other participant, for example. The possibilities to interact were only as described above, as there were no opportunities for synchronous communication through chat or private messaging between the participants.<br>The participants in the tailored group (intervention) had access to the basic website and also they received tailored messages. |
| | **Procedures used** | Participants filled in an extensive questionnaire, and they further provided a quit date and an email address. They also completed a smoking-cessation maintenance self-efficacy questionnaire. The tailored messages were created on the basis of these questionnaires and were sent to the intervention group on their personal webpage and by email (for a screenshot of My Page) Participants in the control group did not get any messages on their webpage and only emails containing notifications and reminders for the follow-up questionnaires.<br><br>During the 12-month intervention, the participants in the intervention group received up to 150 tailored messages.<br>The self-efficacy messages were more specifically about confidence in refraining from relapsing in different situations, also known as maintenance self-efficacy.<br>In concordance with several stage and process models of health behavioral change, such as the Health Action Process Approach, they aimed at providing these as preparation to transition from conscious behavioral change (action) to lifestyle integration (maintenance). In this intervention we did not assess where participants were in their process through a questionnaire, but we did send maintenance self-efficacy messages to |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Wangberg SC, Nilsen O, Antypas K, Gram IT. Effect of tailoring in an internet-based intervention for smoking cessation: randomized controlled trial. Journal of Medical Internet Research. 2011;13(4):e121.** | |
| **Study name** | Effect of Tailoring in an Internet-Based Intervention for Smoking Cessation: Randomized Controlled Trial | |
| | | those with a low maintenance self-efficacy at 3 months past their quit date.<br><br>Besides the messages concerning addiction, the rest concerning benefits of quitting smoking, social support, etc, were evenly distributed over the year, with decreasing frequency.<br><br>The tailored messages could also be retrieved from a calendar on the participant's My Page. Other tailoring features on this page included a personalized greeting, feedback on number of smoke-free days and the amount of money saved, and a list of the reasons the participant had entered for wanting to quit smoking. |
| | **Provider** | Online (website) |
| | **Digital platform** | |
| | **Location** | Online |
| | **Duration** | 12 months |
| | **Intensity** | In the beginning messages were sent daily, then the frequency was decreasing<br>slowly during the first 3 months with a substantial drop-off 3 months after the quit date. |
| | **Tailoring/adaptation** | The tailoring was set up on the basis of several different types of variables. Personalization-, adaption-, and feedback-type tailoring were all used to varying degrees. |
| | **Planned treatment fidelity** | |
| | **Actual treatment fidelity** | - |
| | **Other details** | |
| **Follow up** | 1,3,12 months | |
| **Data collection** | Motivation was assessed with a single question, "How strong is your motivation for quitting smoking?" The participant answered on a 4-point scale ranging from "very weak" to "very strong.<br>Data on the use of the interventions were gathered through Web logging. The number of log-ins and time spent at the site (in minutes) per user were registered. At the 1-month follow-up, the participants were asked whether they would recommend the site to a friend and to rate from a list of intervention components the one that they found the most useful. | |

<table>
<tr><td>Bibliographic reference/s</td><td>Wangberg SC, Nilsen O, Antypas K, Gram IT. Effect of tailoring in an internet-based intervention for smoking cessation: randomized controlled trial. Journal of Medical Internet Research. 2011;13(4):e121.</td></tr>
<tr><td>Study name</td><td>Effect of Tailoring in an Internet-Based Intervention for Smoking Cessation: Randomized Controlled Trial</td></tr>
<tr><td></td><td>Perceived tailoring was assessed with 4 items from Dijkstra evaluating to what extent the user feels that the information is adapted to his or her personal situation. Agreement with these 4 items was rated on a 6-point scale ranging from 1, completely disagree, to 6, totally agree.<br>Smoking behavior was assessed at the baseline and at 1-, 3-, and 12-month follow-ups as 7-day abstinence rates through the question “Have you during the last 7 days had a smoke, even just a single puff?”</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td>Group 7-day abstinence rates
<table>
<tr><th></th><th colspan="2">Intervention group</th><th colspan="2">Control group</th><th>χ2</th><th>P value</th><th>RRb (95% CIa)</th></tr>
<tr><th>12 months</th><th>Percentage (n/total)</th><th>95% CIa</th><th>Percentage (n/total)</th><th>95% CIa</th><th></th><th></th><th></th></tr>
<tr><td>All nonresponders counted as smokers (intention-totreat)</td><td>11% (47/419)</td><td>8.5–14.6</td><td>12% (50/428)</td><td>9.0–15.1</td><td>0.05</td><td>0.91</td><td>0.96 (0.66 – 1.40)</td></tr>
<tr><td>Responders only</td><td>41% (47/116)</td><td>31.5 – 49.6</td><td>39% (50/128)</td><td>30.5–47.6</td><td>0.1</td><td>0.82</td><td>1.03 (0.76 - 1.41)</td></tr>
</table>
<br>Self-efficacy was higher for the intervention group at 1- (P = .01) and 3-month (P = .002) follow-ups, but not after 1 year (P = .58), paralleling<br>the results for the main outcome.</td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>Number of log-ins and minutes of use overall for some of the core components of the intervention by group.
<table>
<tr><td>Number of log-ins overall</td><td></td><th>Median</th><th>IQR</th><th>Z score</th><th>P value</th></tr>
<tr><td></td><td>Intervention</td><td>3</td><td>5</td><td>4.54</td><td><.001</td></tr>
<tr><td></td><td>control</td><td>2</td><td>4</td><td></td><td></td></tr>
<tr><td>Minutes spent at site overall</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Intervention</td><td>93</td><td>159</td><td>5.46</td><td><.001</td></tr>
<tr><td></td><td>control</td><td>68</td><td>107</td><td></td><td></td></tr>
<tr><td>Minutes spent in discussion forum</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Intervention</td><td>6</td><td>27.5</td><td>0.92</td><td>.36</td></tr>
<tr><td></td><td>control</td><td>6</td><td>29</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

| | |
|---|---|
| **Bibliographic reference/s** | **Wangberg SC, Nilsen O, Antypas K, Gram IT. Effect of tailoring in an internet-based intervention for smoking cessation: randomized controlled trial. Journal of Medical Internet Research. 2011;13(4):e121.** |
| **Study name** | Effect of Tailoring in an Internet-Based Intervention for Smoking Cessation: Randomized Controlled Trial |

| | | | | | |
|---|---|---|---|---|---|
| Minutes spent at My Page | Intervention | 7 | 13 | 2.21 | .027 |
| | control | 6 | 9 | | |
| Minutes spent reading Facts | | | | | |
| | Intervention | 0 | 1 | 3.33 | .001 |
| | control | 0 | 1 | | |

The intervention group had logged on more times (P = .03) and had used the site more overall (P = .02).

Further, in the intervention group, 34.0% (123/362, 95% CI, 29.3–39.0) of the users ranked the tailored emails as the most useful intervention component, compared with 6% (21/355, 95% CI, 3.9–8.9, P < .001) in the control group (who did not receive any emails besides one with username and password upon registration and emails with links to follow-up questionnaires).

| | |
|---|---|
| **Statistical Analysis** | No items had more than 5% missing data at the baseline; was assumed missing data to be missing completely at random. Nonresponse on 7-day abstinence was dealt with by counting all participants with missing data as smokers (ITT). We compared the ITT quit rates with the quit rates for responders only.<br><br>Differences in dichotomous baseline characteristics and in abstinence rates between groups at all time points were analysed with a regular chi-square test. Group differences in continuous variables were analysed with t test. The Mann-Whitney U test was used for comparing the usage of the intervention between groups, as these distributions were non-normal. Effect sizes for group differences at the different time points were calculated as relative risk. |

**Risk of bias (ROB)**
**Overall ROB**

**Outcome name**

| Outcome | Judgement (Low / High / some concerns) | Comments |
|---|---|---|
| Risk of bias arising from the randomisation process | Low risk | Randomisation present. All participants were subsequently automatically allocated through use of an online random number generator to the intervention or control arm. Allocation concealed- central allocation by computer. There were no significant differences |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Wangberg SC, Nilsen O, Antypas K, Gram IT. Effect of tailoring in an internet-based intervention for smoking cessation: randomized controlled trial. Journal of Medical Internet Research. 2011;13(4):e121.** | | |
| **Study name** | Effect of Tailoring in an Internet-Based Intervention for Smoking Cessation: Randomized Controlled Trial | | |
| | | | between the intervention and the control group at baseline. |
| | Risk of bias due to deviations from intended interventions (assignment) | Some concerns | No information for blinding |
| | Risk of bias due to deviations from intended interventions (adherence) | Some concerns | Retention rate was small. |
| | Missing outcome data | High risk | A limitation of this study is a high attrition and, thus, low response rate at follow-up assessments.<br>The overall response rate was 36.8% (728/1981) after 1 month, 28.1% (506/1798) after 3 months, and 28.8% (244/847) after 12 months. |
| | Risk of bias in measurement of the outcome | Some concerns | Subjective outcome assessment. Participants may be aware of the intervention received. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | High risk | |
| | **Other outcome details** | | |
| **Source of funding** | Funding: Norwegian Foundation for Health and Rehabilitation and from the Norwegian Directorate of Health. | | |
| **Comments** | A limitation of this study was that they were not able to separate receiving tailored content from receiving emails per se. Another limitation that this study shares with many other Internet-based interventions is a high attrition and, thus, low response rate at follow-up assessments.<br><br>This randomized controlled trial found that tailoring an Internet-based intervention for smoking cessation increases success rates in the short term, but not in the long term. | | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Wangberg SC, Nilsen O, Antypas K, Gram IT. Effect of tailoring in an internet-based intervention for smoking cessation: randomized controlled trial. Journal of Medical Internet Research. 2011;13(4):e121.** | |
| **Study name** | Effect of Tailoring in an Internet-Based Intervention for Smoking Cessation: Randomized Controlled Trial | |
| **Additional references** | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | x |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | x |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

## Intervention mode: Internet based intervention (smartphone apps) in those without a chronic condition

### BinDhim 2017

| | |
|---|---|
| **Bibliographic reference/s** | **BinDhim NF, McGeechan K, Trevena L. Smartphone Smoking Cessation Application (SSC App) trial: a multicountry double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. BMJ Open 2018;8:e017105. doi:10.1136/ bmjopen-2017-017105** |
| **Study name** | Smartphone Smoking Cessation Application (SSC App) trial: a multi country double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. |
| **Registration** | Australian New Zealand Clinical Trial Registry ACTRN12613000833763. |
| **Study type** | Automated, double-blind randomised controlled |
| **Study dates** | Recruitment process started on 5 May 2014 and continued until the required sample size was reached on 1 September 2014. |
| **Objective** | To test the efficacy of an interactive smoking cessation decision-aid app compared with a smoking cessation static information app on quit rates. |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="3">BinDhim NF, McGeechan K, Trevena L. Smartphone Smoking Cessation Application (SSC App) trial: a multicountry double-blind automated randomised controlled trial of a smoking cessation decision-aid ‘app’. BMJ Open 2018;8:e017105. doi:10.1136/ bmjopen-2017-017105</td></tr>
<tr><td>Study name</td><td colspan="3">Smartphone Smoking Cessation Application (SSC App) trial: a multi country double-blind automated randomised controlled trial of a smoking cessation decision-aid ‘app’.</td></tr>
<tr><td>Country/ Setting</td><td colspan="3">USA, Australia, UK and Singapore</td></tr>
<tr><td>Number of participants / clusters</td><td colspan="3">684 participants<br>A sample size of 672 participants to achieve 80% power at a 0.05 significance level to detect a change in continuous abstinence after 1 month from 5% to 15% allowing for 20% loss to follow-up.</td></tr>
<tr><td>Attrition</td><td colspan="3">Of 742 eligible participants, 682 included</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="3"><table>
<tr><td></td><td>Intervention (342)<br>n (%)</td><td>Control (342)<br>n (%)</td></tr>
<tr><td>Age (mean (SD)) (years)</td><td>27.9 (10.2)</td><td>28.8 (9.8)</td></tr>
<tr><td>Gender (%female)</td><td>181 (52.9)</td><td>195 (57.0)</td></tr>
<tr><td>Education<br>Graduate level or above<br>Less than graduate level</td><td><br>179 (52.3)<br>163 (47.7)</td><td><br>188 (55.0)<br>154 (45.0)</td></tr>
<tr><td>Income level<br>Less than US $20 K/year<br>US$21– 49 K/year<br>More than US$50 K/year</td><td><br>104 (30.4)<br>168 (49.1)<br>63 (18.4)</td><td><br>111 (32.5)<br>164 (48.0)<br>74 (21.6)</td></tr>
<tr><td>Internet use (%)<br>1–5 days/week<br>6–7 days/week</td><td><br>32 (12.5)<br>225 (87.6)</td><td><br>26 (10.0)<br>233 (90.0)</td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td colspan="3">The study app automatically (automated randomisation algorithm) randomised eligible participants to either the intervention or the control sub-app using stratified block (age, gender, country) randomisation.<br>Participants and all investigators were blinded to group allocation (double blind).</td></tr>
<tr><td>Inclusion criteria</td><td colspan="3">The eligibility criteria were daily smokers of cigarettes, 18 years old or over and from<br>the included countries.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="3">Occasional smokers and users of other tobacco products were excluded.</td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td colspan="2">Details</td></tr>
<tr><td></td><td>Brief Name</td><td colspan="2"></td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td colspan="2">The decision-aid design was based on the Ottawa Decision Support Framework: It is based on concepts from general psychology, social psychology, decision analysis, decisional conflict, social support, and economic concepts of expectations and values.</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **BinDhim NF, McGeechan K, Trevena L. Smartphone Smoking Cessation Application (SSC App) trial: a multicountry double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. BMJ Open 2018;8:e017105. doi:10.1136/ bmjopen-2017-017105** | |
| **Study name** | Smartphone Smoking Cessation Application (SSC App) trial: a multi country double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. | |
| | **Materials used** | Both apps motivated the participant to set a quit date.<br>The intervention app included four main components that made optimal use of smartphone features: (1) mandatory information about quitting options, with their benefits and harms; (2) daily motivational messages using push notifications sent from the study server, (3) a quitting diary and (4) a quitting benefits tracker. The intervention app could thus be described as a smartphone 'decision aid with additional support' because it included structured content on the options, benefits and harms of smoking cessation, along with ongoing support and motivation for the implementation and adherence to a quit decision through the use of push notifications, motivational messages, a diary and benefits tracker. The decision-aid design was based on the Ottawa Decision Support Framework that draws on a number of psychological and behavioural theories<br><br>The control app included non-mandatory information about quitting options, benefits and harms, similar to those available in the intervention app. It did not provide any structured process for considering options, benefits and harms of quitting methods nor did it provide ongoing support for adherence to a quit decision. This could therefore be described as a smartphone app with information only.<br><br>The follow-up notification generated an automated process where participants could click 'yes' or 'no' to answer the follow-up questions. |
| | **Procedures used** | Participants were advised by the App Store description that by downloading the app they would be participating in the study, that they could read the provided information about smoking and options for quitting, complete a questionnaire to find out their nicotine dependency test score and rate the information for its helpfulness in motivating them to quit.<br>The app would collect anonymous data about how often the app was used and how long it was used for, and their internet protocol (IP) address would be collected only to identify |

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| **Bibliographic reference/s** | **BinDhim NF, McGeechan K, Trevena L. Smartphone Smoking Cessation Application (SSC App) trial: a multicountry double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. BMJ Open 2018;8:e017105. doi:10.1136/ bmjopen-2017-017105** | |
| **Study name** | Smartphone Smoking Cessation Application (SSC App) trial: a multi country double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. | |
| | | duplication of data in our database and then deleted permanently. No personal identifying information would be collected through the app or the questionnaire.<br>All anonymous information would<br>be sent directly from the app in their phone to an online secure research database.<br>When a participant opened the app for the first time, the app assigned them a unique device identifier and registered the user's smartphone device in our secure remote database.<br>To increase<br>the response rate to the baseline questionnaire, we have implemented a reminder function that will send a notification to the user to complete the baseline questionnaire. |
| | **Provider** | Apple App Store |
| | **Digital platform** | Online via the app's download page |
| | **Location** | Smartphone based |
| | **Duration** | 6 months |
| | **Intensity** | Not reported |
| | **Tailoring/adaptation** | |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | 1, 3 and 6 months | |
| **Data collection** | Baseline data were collected. The number of cigarettes smoked per day and nicotine dependence as measured by the Fagerström test.<br>The primary outcome was the proportion of participants who remained completely abstinent after 1 month. Participants were asked the question "Have you been totally smoke-free ('not even a puff') for the last x days/<br>months?" at 10 days, 1 month, 3 months and 6 months.<br>Secondary outcomes were the proportion who made quitting attempts of at least 24 hours, abstinence rates at 10 days, 3 months and 6 months, the proportion who made an informed choice (based on the Multidimensional Measure of Informed Choice (MMIC)— 10 days after quitting) and the proportion with low decisional conflict (SURE score of less than 4 measured 10 days afterquitting). | |
| **Critical outcomes measures and effect size. (time points)** | **Primary and secondary outcomes (number of imputations=10)** | |

| | Intervention (%) | Control (%) | Relative risk (95%CI) | P value (two sided) |
|---|---|---|---|---|
| **Secondary outcome** | | | | |

| | |
|---|---|
| **Bibliographic reference/s** | **BinDhim NF, McGeechan K, Trevena L. Smartphone Smoking Cessation Application (SSC App) trial: a multicountry double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. BMJ Open 2018;8:e017105. doi:10.1136/ bmjopen-2017-017105** |
| **Study name** | Smartphone Smoking Cessation Application (SSC App) trial: a multi country double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. |

| | | | | |
|---|---|---|---|---|
| Self -reported 6-month continuous abstinence | 10.2 | 4.8 | 2.02 (1.08-3.81) | 0.024 |

**Important outcomes measures and effect size. (time points)**

Self-reported abstinence (intention to treat analysis)

| | Control (%) | Intervention (%) | Relative risk (95% CI) | P value (two-sided |
|---|---|---|---|---|
| Self-reported 6-month continuous abstinence | 3.2 | 7.3 | 2.27 (1.09 to 4.86) | 0.026 |

**Statistical Analysis**

All analyses were undertaken on an intention-to-treat basis.
To account for the non-responses at follow-up, four multiple imputation models were constructed for the non-responses at the follow-up at 10 days, 1 month, 3 months and 6 months continuous abstinence. Ten imputed datasets were generated based on Rubin's formula for relative efficiency to produce about 99% efficiency. Further sensitivity analysis was conducted.

**Risk of bias (ROB)**
**Overall ROB**

**Outcome name**

| Outcome | Judgement (Low / High / some concerns) | Comments |
|---|---|---|
| Risk of bias arising from the randomisation process | Low risk | Randomisation present. using stratified block (age, gender, country) randomisation. Treatment groups were balanced with respect to baseline characteristics |
| Risk of bias due to deviations from intended interventions (assignment) | Low risk | Participants and all investigators were blinded to group allocation (double blind). |
| Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| Missing outcome data | Low risk | Good follow-up response rates in both groups. Attrition rates :84% (289/342) in intervention and 86% (294/342) in control group after 6 months follow up.<br>Intention to treat analysis was performed. Further sensitivity |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **BinDhim NF, McGeechan K, Trevena L. Smartphone Smoking Cessation Application (SSC App) trial: a multicountry double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. BMJ Open 2018;8:e017105. doi:10.1136/ bmjopen-2017-017105** | | |
| **Study name** | Smartphone Smoking Cessation Application (SSC App) trial: a multi country double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. | | |
| | | | analysis was conducted with the assumption that all participants with missing outcome data were smokers. |
| | Risk of bias in measurement of the outcome | Some concerns | Self-reporting of the outcome which is less rigorous than a biochemical verification. |
| | Risk of bias in selection of the reported result | Some concerns | The participants in this study were likely to be more motivated than other smokers because they were searching for smoking cessation apps during the recruitment period. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | The app was developed by NFB as part of a PhD degree, advertisement was covered by a small fund from the PhD sponsor (Ministry of Education, Saudi Arabia). | | |
| **Comments** | Continuous abstinence was measured via self-report through the app questionnaires, which is less rigorous than a biochemically verified abstinence. Possibility of contamination between groups.<br>The participants in this study were likely to be more motivated than other smokers because they were searching for smoking cessation apps during the recruitment<br>period. | | |
| **Additional references** | | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | | |
| | Reward and threat | | |
| | Repetition and substitution | | |
| | Antecedents | | |
| | Associations | | |
| | Covert Learning | | |
| | Natural Consequences | | |
| | Feedback and monitoring | | |
| | Goals and planning | x | |
| | Comparison of the behaviour | | |
| | Social support | x | |
| | Self-belief | | |
| | Comparison of outcomes | | |
| | Identity | | |

| | |
|---|---|
| **Bibliographic reference/s** | **BinDhim NF, McGeechan K, Trevena L. Smartphone Smoking Cessation Application (SSC App) trial: a multicountry double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. BMJ Open 2018;8:e017105. doi:10.1136/ bmjopen-2017-017105** |
| **Study name** | Smartphone Smoking Cessation Application (SSC App) trial: a multi country double-blind automated randomised controlled trial of a smoking cessation decision-aid 'app'. |
| | Shaping knowledge |
| | Regulation |

## Intervention mode: text messages in those without a chronic condition

### Abroms 2014

| | |
|---|---|
| **Bibliographic reference/s** | **Abroms LC, Boal AL, Simmens SJ, Mendel JA, Windsor RA. A randomized trial of Text2Quit: a text messaging program for smoking cessation. American journal of preventive medicine. 2014 Sep 1;47(3):242-50.** |
| **Study name** | A Randomized Trial of Text2Quit: A Text Messaging Program for Smoking Cessation |
| **Registration** | |
| **Study type** | RCT |
| **Study dates** | May 19, 2011 and July 10, 2012. |
| **Objective** | To evaluate the effect of Text2Quit on biochemically confirmed repeated point prevalence abstinence in the context of an RCT conducted in the U.S. |
| **Country/ Setting** | USA |
| **Number of participants / clusters** | 503 participants (262 in intervention; 241 in control) |
| **Attrition** | 7,247 participants took the eligibility survey.<br>Of these, a total of 1,745 individuals consented, filled out the baseline survey, and were randomized. Of 1,745 individuals, 1,242 were excluded and 503 included in the study. |
| **Participant /community characteristics.** | |

| | intervention | control |
|---|---|---|
| Age | 35.9 (10.7) | 35.5 (10.6) |
| Gender (%female) | 68.7% | 62.8% |
| Education<br>• High school or lower<br>• Some college or trade school<br>• College degree or higher | <br>43 (16.4%)<br>146 (55.7%)<br>73 (27.9%) | <br>67 (27.8%)<br>108 (44.8%)<br>66 (27.4%) |
| Cigarettes/day, M(SD) | 17.68 (8.13) | 16.86 (8.02) |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Abroms LC, Boal AL, Simmens SJ, Mendel JA, Windsor RA. A randomized trial of Text2Quit: a text messaging program for smoking cessation. American journal of preventive medicine. 2014 Sep 1;47(3):242-50.** | |
| **Study name** | A Randomized Trial of Text2Quit: A Text Messaging Program for Smoking Cessation | |
| | Texts sent/ received per day | 25.09 (46.36) / 33.58 (55.43) |
| **Method of allocation** | Individuals were randomized by the computer system to intervention or control groups following completion of the baseline survey.<br>- | |
| **Inclusion criteria** | To be eligible for the study, participants were required to be: (1) aged ≥18 years; (2) smoke five or more cigarettes a day; (3) have a U.S. mailing address; (4) have an e-mail address; (5) have a cell phone number with an unlimited short messaging service (SMS) plan; (6) have an interest in quitting smoking in the next month; and (7) not be pregnant. | |
| **Exclusion criteria** | Not reported. | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | Text2Quit- an automated, personalized, interactive mobile health program that sends text messages to offer advice, support, and reminders about quitting smoking. |
| | **Rationale/theory/Goal** | Messages are based on social cognitive theory and are consistent with the U.S. Public Health Service Clinical Practice Guidelines |
| | **Materials used** | Participants randomised to the intervention- Text2Quit was offered for 6 months after enrollment, with the first 3 months offering both outgoing messages about quitting smoking and on-demand help through the use of keywords. After the outgoing messages stopped, participants could still text at any time for help through keywords. SMS keywords included the ability to reset a quit date (DATE), get help with a craving with a tip or a trivia game (CRAVE), get a summary of their quitting statistics (STATS), and to indicate that they had smoked (SMOKED).<br><br>Participants randomized to the control group initially received a web link to Smokefree.gov, a leading website with quitting smoking information run by the NCI. Also, a decision was made to offer future control group participants a guidebook on quitting smoking developed by the NCI that had been used extensively in previous trials as a control material. This guidebook, Clearing the Air, was offered via a web link that led participants to a document containing similar advice and information as Smokefree.gov.20 In addition to the control group materials, the control group also received study-related reminder texts via SMS, particularly in the 2 weeks prior to each follow-up |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Abroms LC, Boal AL, Simmens SJ, Mendel JA, Windsor RA. A randomized trial of Text2Quit: a text messaging program for smoking cessation. American journal of preventive medicine. 2014 Sep 1;47(3):242-50.** | |
| **Study name** | A Randomized Trial of Text2Quit: A Text Messaging Program for Smoking Cessation | |
| | **Procedures used** | Messages are interactive and prompt users to track smoking, report on cravings, and provide smoking status |
| | **Provider** | Text2Quit was developed in by GWU with technical support provided by Voxiva Inc. |
| | **Digital platform** | Text messages. E-mails and a web portal are offered as supportive features. |
| | **Location** | |
| | **Duration** | 6 months |
| | **Intensity** | Participants received five SMSs on their quit date and approximately two SMSs per day in the week after the quit date. Frequency declined in the subsequent weeks to approximately three SMSs per week for the next 2 months and then less than one per week for the remaining portion of the outgoing phase.<br>The SMSs were supplemented by a personalized web portal (text2quit.com) and e-mails. E-mails were sent weekly in the period around the quit date and then every few weeks for the first 3 months. E-mails generally reiterated and expanded upon key messages from the texts |
| | **Tailoring/adaptation** | Messages are tailored around several factors including first name, quit date, top three reasons for quitting, money saved by quitting, and use of quit-smoking medications. |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | 6- months follow up | |
| **Data collection** | The primary outcome was biochemically confirmed repeated point prevalence abstinence, defined as a self-report of no smoking in the past 30 days on the 3- and 6-month surveys and a cotinine level ≤15 ng/mL at 6 months.<br><br>Secondary outcomes consisted of 7- and 30-day abstinence at 1-, 3-, and 6-month follow-up and biochemically confirmed abstinence at the 6-month follow-up.<br><br>The number of text messages participants sent and received prior to enrolling in the study was assessed on the 1-month follow-up survey because this item was inadvertently omitted from the baseline survey<br><br>For participants in the intervention group, Text2Quit engagement was assessed using records of their interaction with the text messaging computer system and self–reported survey data. The number of text messages a participant sent to the | |

<table>
<tr><td>Bibliographic reference/s</td><td>Abroms LC, Boal AL, Simmens SJ, Mendel JA, Windsor RA. A randomized trial of Text2Quit: a text messaging program for smoking cessation. American journal of preventive medicine. 2014 Sep 1;47(3):242-50.</td></tr>
<tr><td>Study name</td><td>A Randomized Trial of Text2Quit: A Text Messaging Program for Smoking Cessation</td></tr>
<tr><td></td><td>computer system, including replies to Text2Quit programmatic surveys and keywords used, was totalled and averages were calculated across participants. The total did not include use of the keyword STOP, a keyword for unsubscribing from the program. The percentage of participants who used this keyword served as an indicator of program disengagement. Self-reported data from the 1-, 3-, and 6-month surveys were used to assess participant use of the Text2Quit website.</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td>Self–reported repeated point prevalence abstinence is defined as not smoking in the past 30 days 6-month follow-ups (unadjusted RR).
<table>
<tr><td></td><td>Intervention (SE)</td><td>Control (SE)</td><td>Relative risk (95% CI)</td></tr>
<tr><td>Primary outcome</td><td></td><td></td><td></td></tr>
<tr><td>Biochemically confirmed repeated point prevalence abstinence</td><td>11.1% (0.02)</td><td>5.0% (0.01)</td><td>2.22 (1.16, 4.26)</td></tr>
<tr><td>Self–reported repeated point prevalence abstinence</td><td>19.9% (0.02)</td><td>10.0% (0.02)</td><td>1.99 (1.27, 3.13)</td></tr>
<tr><td>Biochemically confirmed abstinence</td><td>15.7% (0.02)</td><td>11.2% (0.02)</td><td>1.40 (0.89, 2.20)</td></tr>
</table>
Self–reported repeated point prevalence abstinence is defined as not smoking in the past 30 days at 3- and 6-month follow-ups</td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>
<table>
<tr><td></td><td>Intervention<br>N<br>% quit (SE)</td><td>Control<br>N<br>% quit (SE)</td><td>Subgroup Relative risk (95% CI)</td></tr>
<tr><td>Primary outcome</td><td></td><td></td><td></td></tr>
<tr><td>Frequency of texting<br><25/day<br><br>≥25/day</td><td><br>122<br>13.8% (0.03)<br><br>52<br>13.5% (0.05)</td><td><br>145<br>4.1% (0.02)<br><br>74<br>9.5% (0.03)</td><td><br>3.37 (1.30, 8.70)<br><br>1.42 (0.53, 3.81)</td></tr>
<tr><td>Use of cessation aid<br><br>Used a recommended cessation aid</td><td><br>111<br>15.3% (0.03)</td><td><br>118<br>5.9% (0.02)</td><td><br>2.58 (1.11, 5.99)</td></tr>
</table>
</td></tr>
</table>

| | |
|---|---|
| **Bibliographic reference/s** | **Abroms LC, Boal AL, Simmens SJ, Mendel JA, Windsor RA. A randomized trial of Text2Quit: a text messaging program for smoking cessation. American journal of preventive medicine. 2014 Sep 1;47(3):242-50.** |
| **Study name** | A Randomized Trial of Text2Quit: A Text Messaging Program for Smoking Cessation |

| | | | |
|---|---|---|---|
| No use of recommended cessation aid | 62<br>17.7% (0.05) | 59<br>8.5% (0.04) | 2.09 (0.77, 5.66) |

Based on computer records, most participants (85.1%) sent at least one text message to the computer system during the trial. Participants who interacted with the system at least once had on average 28.47 (SD=25.81) interactions over the course of the 6 months of the program.

Intervention group participants were also provided access to the Text2Quit website. Based on self-report, most participants reported that they had not logged onto the website in the past 7 days at the 1- (64%) and 3-month (81%) follow-ups.

| | |
|---|---|
| **Statistical Analysis** | t-tests or chi-square tests for demographic differences.<br>Chi-squared analyses were conducted to compare the proportion of participants in the treatment and control groups who reported quitting. Additionally, using logistic regression, the unadjusted and adjusted relative risk (RR) of quitting in the intervention group compared with the control group was calculated for the primary and secondary outcomes. Models were adjusted for education, the variable found to be significantly different across groups<br>An intent to treat analysis was also used. Furthermore, separate logistic model was constructed for each subgroup. |

**Risk of bias (ROB)**
**Overall ROB**

**Outcome name**

| Outcome | Judgement (Low / High / some concerns) | Comments |
|---|---|---|
| Risk of bias arising from the randomisation process | Low risk | Randomisation present (by computer system-It represents a strength in that the automated enrolment procedures were not subjected to recruiter biases).<br>No significant baseline imbalances |
| Risk of bias due to deviations from intended interventions (assignment) | Some concerns | No information for blinding.<br>There was a low level of contamination in the control group with a texting program and that the magnitude of effects may be larger than those reported |
| Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| Missing outcome data | Low risk | Follow-up rates for the 1-, 3-, and 6-month surveys were 85.7%, 82.9%, and 75.7% respectively. |

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|---|---|---|---|
| **Bibliographic reference/s** | **Abroms LC, Boal AL, Simmens SJ, Mendel JA, Windsor RA. A randomized trial of Text2Quit: a text messaging program for smoking cessation. American journal of preventive medicine. 2014 Sep 1;47(3):242-50.** | | |
| **Study name** | A Randomized Trial of Text2Quit: A Text Messaging Program for Smoking Cessation | | |
| | Risk of bias in measurement of the outcome | Low risk | The outcome was biochemically validated. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | | | |
| **Comments** | | | |
| **Additional references** | | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | | |
| | Reward and threat | | |
| | Repetition and substitution | | |
| | Antecedents | | |
| | Associations | | |
| | Covert Learning | | |
| | Natural Consequences | | |
| | Feedback and monitoring | | |
| | Goals and planning | x | |
| | Comparison of the behaviour | | |
| | Social support | x | |
| | Self-belief | | |
| | Comparison of outcomes | | |
| | Identity | | |
| | Shaping knowledge | | |
| | Regulation | | |

**Free 2009**

| | |
|---|---|
| **Bibliographic reference/s** | **Free C, Whittaker R, Knight R, Abramsky T, Rodgers A, Roberts IG. Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support. Tobacco control. 2009 Apr 1;18(2):88-91.** |
| **Study name** | Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support |
| **Registration** | |
| **Study type** | Pilot RCT |
| **Study dates** | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Free C, Whittaker R, Knight R, Abramsky T, Rodgers A, Roberts IG. Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support. Tobacco control. 2009 Apr 1;18(2):88-91.** | |
| **Study name** | Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support | |
| **Objective** | To conduct a pilot randomised controlled trial of mobile phone-based smoking cessation support intervention for the UK population. | |
| **Country/ Setting** | UK | |
| **Number of participants / clusters** | From 610 eligible participants, 200 participants were included in the study (102 in the intervention and 98 in the control group). | |
| **Attrition** | Only two participants withdrew from the study.<br>(98% short-term follow-up, and 92% long-term follow-up in both intervention and control groups | |
| **Participant /community characteristics.** | The average age of participants was 36 (SD 9) and 126 participants (62%) were men. Also, participants smoked a median of 20 cigarettes per day (interquartile range (IQR) 12–22). | |
| **Method of allocation** | An electronic link to the computer-based randomisation resulted in the generation of a unique identifying number and allocation to the intervention or control group. The system then automatically generated intervention or control group texts according to the allocation.<br>Allocation was unknown to investigators collecting/analysing data. | |
| **Inclusion criteria** | Eligible participants were aged 16 years or more, currently smoking cigarettes daily and interested in quitting, a current owner of a mobile phone, living within an hour of London, familiar with text messaging capabilities and able to provide informed consent to participate in the study. | |
| **Exclusion criteria** | Not reported | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | Txt2stop |
| | **Rationale/theory/Goal** | |
| | **Materials used**<br>**Procedures used** | Intervention: The txt2stop intervention is a composite intervention that includes key elements of existing effective interventions as identified in systematic reviews.<br>These elements include making a public declaration; setting a quit date; self-monitoring; intra treatment support from a quit buddy; extra treatment support by encouraging testing family and friends for support, problem solving; distraction techniques.<br><br>Participants were offered a quit buddy contactable by mobile phone and an SMS craving helpline with an immediate SMS response, whenever they experience cravings for a cigarette.<br><br>Control: Participants received fortnightly simple, short, generic SMS. |

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| **Bibliographic reference/s** | **Free C, Whittaker R, Knight R, Abramsky T, Rodgers A, Roberts IG. Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support. Tobacco control. 2009 Apr 1;18(2):88-91.** | |
| **Study name** | Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support | |
| | **Provider** | |
| | **Digital platform** | Mobile phone |
| | **Location** | |
| | **Duration** | 26 weeks |
| | **Intensity** | Participants in the intervention received daily SMS before the quit date, then 5 SMS per day for 4 weeks after the quit date. Then, participants continued to receive a maintenance package of three text messages per week for 26 weeks. |
| | **Tailoring/adaptation** | Message content was tailored to participant interests and issues about quitting smoking. |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | 4 weeks and 6 months | |
| **Data collection** | All self-reported outcome data were collected by mobile phone or email. Salivary cotinine testing was used to verify any self-reported smoking cessation at 6 months.<br><br>The primary outcome for the main trial is self-reported abstinence (point prevalence—that is, no smoking in the past 7 days) at 6 months post-randomisation, with reports of abstinence verified by salivary cotinine testing using a cut-off of 7 ng/ml of cotinine.<br>Secondary outcomes at 6 months are 28-day continuous abstinence, self-reported continuous abstinence since a quit day, involvement in any vehicle crashes and pain in the thumb. | |

**Critical outcomes measures and effect size. (time points)**

| **Primary outcome** | Intervention Group N (%) | Control group N (%) | RR (95% CI) | $x^2$ p value |
|---|---|---|---|---|
| **Primary outcome for the main trial** | | | | |
| **6 months**<br>Self-reported no smoking in last 7 days and salivary cotinine <7 ng/m | 8 (8.5) | 6 (6.7) | 1.28 (0.46 to 3.53) | 0.6 |
| **Secondary outcomes—smoking** | | | | |
| Self-reported no smoking in last 7 days | 15 (15.5) | 19 (20.4) | 0.76 (0.41 to 1.40) | 0.3 |
| Self-reported 28 days continuous abstinence | 14 (14.4) | 17 (18.1) | 0.80 (0.42 to 1.53) | 0.4 |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Free C, Whittaker R, Knight R, Abramsky T, Rodgers A, Roberts IG. Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support. Tobacco control. 2009 Apr 1;18(2):88-91.** | | |
| **Study name** | Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support | | |
| **Important outcomes measures and effect size. (time points)** | As above | | |
| **Statistical Analysis** | All analyses were based on the intention-to-treat principle. Findings were reported treating losses to follow-up as smokers and excluding losses to follow-up. | | |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** | | |
| | **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
| | Risk of bias arising from the randomisation process | Low risk | Randomisation present. The intervention is delivered by computer and the allocation is unknown to all investigators collecting or analysing outcome data. |
| | Risk of bias due to deviations from intended interventions (assignment) | Some concerns | Single blinded RCT trial. Participants are aware of the intervention received but not the investigators. No information whether the intended intervention that arose because of experimental context. |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Study participants adhere to the assigned intervention regimen. |
| | Missing outcome data | Low risk | Low losses of follow up (intervention retention: 75%-96%, control group retention:83%-99%). |
| | Risk of bias in measurement of the outcome | Some concerns | Self-reporting of the outcome. Assessment of outcome can potentially be influenced by knowledge of intervention. |
| | Risk of bias in selection of the reported result | Low risk | No evidence of reporting bias |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | Not reported | | |
| **Comments** | | | |
| **Additional references** | | | |
| **Behaviour change** | Scheduled consequences | | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Free C, Whittaker R, Knight R, Abramsky T, Rodgers A, Roberts IG. Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support. Tobacco control. 2009 Apr 1;18(2):88-91.** | |
| **Study name** | Txt2stop: a pilot randomised controlled trial of mobile phone-based smoking cessation support | |
| **techniques (16 theoretical clusters)** | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | x |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

**Free 2011**

| | |
|---|---|
| **Bibliographic reference/s** | **Free C, Knight R, Robertson S, Whittaker R, Edwards P, Zhou W, Rodgers A, Cairns J, Kenward MG, Roberts I. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial. The Lancet. 2011 Jul 2;378(9785):49-55.** |
| **Study name** | **Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial** |
| **Registration** | **ISRCTN 80978588** |
| **Study type** | **Single-blind, randomised trial.** |
| **Study dates** | **Between Oct 15, 2007, and June 1, 2009;** |
| **Objective** | **To assess the effect of an automated smoking cessation programme delivered via mobile phone text messaging on continuous abstinence, which was biochemically verified at 6 months.** |
| **Country/ Setting** | **UK** |
| **Number of participants / clusters** | **From an initial of 11.914 participants for eligibility, 5800 participants were included in the study (2915 smokers were allocated to the txt2stop intervention and 2885 were allocated to the control group).** |
| **Attrition** | It was **calculated that** study size of 5800 participants, allowing for a 10% loss to follow-up, would have a 90% chance of detecting a significant difference. |
| **Participant /community characteristics.** | **Baseline data** |

| | Intervention group (n=2911) | Control group (n=2881) |
|---|---|---|
| Age (years) | 36·8 (11·0) | 36·9 (11·1) |
| Gender (female) | 1303 (45%) | 1296 (45%) |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Free C, Knight R, Robertson S, Whittaker R, Edwards P, Zhou W, Rodgers A, Cairns J, Kenward MG, Roberts I. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial. The Lancet. 2011 Jul 2;378(9785):49-55.** | |
| **Study name** | **Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial** | |
| | Ethnic origin<br>White<br>Black<br>Asian<br>Chinese<br>Other<br>Refused | <br>2589 (89%)<br>119 (4%)<br>117 (4%)<br>3 (<1%)<br>64 (2%)<br>19 (1%) |
| | | <br>2541 (88%)<br>121 (4%)<br>125 (4%)<br>6 (<1%)<br>70 (2%)<br>18 (1%) |
| **Method of allocation** | **Participants were randomised using an independent telephone randomisation system that included a minimisation algorithm balancing for sex (male, female), age (16–18 years, 19– 34 years, and >34 years), educational level (to age ≤16 years, >16 years), and Fagerstrom score for nicotine addiction (≤5, >5).**<br>**The system then automatically generated intervention or control group texts according to the allocation.**<br>**Allocation was unknown to investigators collecting/analysing data.** | |
| **Inclusion criteria** | **Eligible participants** were aged 16 years or more, currently smoking cigarettes daily and interested in quitting, a current owner of a mobile phone, living within an hour of London, familiar with text messaging capabilities and able to provide informed consent to participate in the study. | |
| **Exclusion criteria** | **Not** reported | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | Txt2stop |
| | **Rationale/theory/Goal** | The intervention included motivational messages and behaviour-change techniques |
| | **Materials used**<br>**Procedures used** | Intervention: The txt2stop intervention is a composite intervention that includes key elements of existing effective interventions as identified in systematic reviews.<br>These elements include making a public declaration; setting a quit date; self-monitoring; intra treatment support from a quit buddy; extra treatment support by encouraging testing family and friends for support, problem solving; distraction techniques.<br><br>Messages encouraged participants to persevere with the quit attempt and focused on their success so far. They provided positive feedback and emphasised the benefits achieved by quitting and provided<br>information about the consequences of smoking, how to quit and stay quit, and how others would approve of quit success. They prompted |

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|---|---|---|
| **Bibliographic reference/s** | **Free C, Knight R, Robertson S, Whittaker R, Edwards P, Zhou W, Rodgers A, Cairns J, Kenward MG, Roberts I. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial. The Lancet. 2011 Jul 2;378(9785):49-55.** | |
| **Study name** | **Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial** | |
| | | participants to get rid of cigarettes, ashtrays, and lighters, and to avoid environments where they would normally smoke, and encouraged participants to identify the challenges of quitting and plan how to overcome them. The messages also promoted the use of the QUIT smoking cessation telephone helpline and nicotine replacement therapy<br><br>Participants were offered a quit buddy contactable by mobile phone and an SMS craving helpline with an immediate SMS response, whenever they experience cravings for a cigarette.<br><br>Control: Participants received fortnightly simple, short, generic SMS. |
| | **Provider** | |
| | **Digital platform** | **Mobile** phone |
| | **Location** | |
| | **Duration** | 26 **weeks** |
| | **Intensity** | **Participants received five text messages a day for t**he first 5 weeks and then three a week for the next 26 weeks. |
| | **Tailoring/adaptation** | Message content was tailored to participant interests and issues about quitting smoking. |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | **6 months** | |
| **Data collection** | All self-reported outcome data were collected by mobile phone or email. Salivary cotinine testing was used to verify any self-reported smoking cessation at 6 months.<br><br>**The primary outcome was self-reported continuous smoking abstinence, biochemically verified at 6 months.**<br>**Self-reported continuous abstinence was defined as no more than five cigarettes smoked in the past week at 4 weeks follow-up and no more than five cigarettes smoked since the start of the abstinence period at 6 months of follow-up.**<br><br>Secondary outcomes were point prevalence of abstinence (ie, no smoking in the past 7 days) at 4 weeks and 6 months, and self-reported continuous abstinence since the start of the abstinence period, 28-day abstinence, involvement in any | |

<table>
<tr><td>Bibliographic reference/s</td><td>Free C, Knight R, Robertson S, Whittaker R, Edwards P, Zhou W, Rodgers A, Cairns J, Kenward MG, Roberts I. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial. The Lancet. 2011 Jul 2;378(9785):49-55.</td></tr>
<tr><td>Study name</td><td>Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial</td></tr>
<tr><td></td><td>vehicle crashes, repetitive strain injury (thumb) at 6 months, and use of other smoking cessation services during the trial.<br><br>Postal salivary-cotinine testing was used to verify self-reported continuous abstinence at 6 months, with a cut-off of 7 ng/mL cotinine.</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td>
<table>
<tr><th></th><th>Intervention (SE)</th><th>Control group (SE)</th><th>Relative Risk (95% CI)</th><th>p value</th></tr>
<tr><td colspan="5">Primary outcome</td></tr>
<tr><td>Biochemically verified continuous abstinence at 6 months</td><td>10·7% (0·6)</td><td>4·9% (0·4)</td><td>2·20 (1·80–2·68)</td><td><0·0001</td></tr>
<tr><td colspan="5">Secondary outcomes (6 months)</td></tr>
<tr><td>Self-reported 28-day continuous abstinence</td><td>19·8% (0·8)</td><td>13·5% (0·7)</td><td>1·47 (1·30–1·66)</td><td><0·0001</td></tr>
<tr><td>Self-reported no smoking in past 7 days</td><td>24·2% (0·8)</td><td>18·3% (0·8)</td><td>1·32 (1·19–1·47)</td><td><0·0001</td></tr>
</table>
</td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>As above</td></tr>
<tr><td>Statistical Analysis</td><td>All analyses were undertaken on an intention-to-treat basis.<br>Four univariate imputation models for the incomplete variables: ethnic group, 4-week point-prevalence outcome, 22-week continuous abstinence, and biochemically verified smoking cessation at 22 weeks.<br><br>Homogeneity in treatment effects was assessed within subgroups with a χ2 test. For the primary analysis multiple imputation were used, using the observed predictors of outcome and the predictors of loss to follow-up to impute missing outcome data, thus attempting to correct for any potential bias caused by missing data.</td></tr>
<tr><td>Risk of bias (ROB)<br>Overall ROB</td><td>Outcome name
<table>
<tr><th>Outcome</th><th>Judgement (Low / High / some concerns)</th><th>Comments</th></tr>
<tr><td>Risk of bias arising from the randomisation process</td><td>Low risk</td><td>Randomisation present, using an independent telephone randomisation system that included a minimisation algorithm. The system automatically generated</td></tr>
</table>
</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Free C, Knight R, Robertson S, Whittaker R, Edwards P, Zhou W, Rodgers A, Cairns J, Kenward MG, Roberts I. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial. The Lancet. 2011 Jul 2;378(9785):49-55.** | | |
| **Study name** | **Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial** | | |
| | | | intervention or control group texts according to the allocation.<br>Central randomisation-concealment of allocation. |
| | Risk of bias due to deviations from intended interventions (assignment) | Low risk | Researchers who gathered data and<br>undertook laboratory analyses were masked to treatment allocation. No deviations from intended intervention because of experimental context |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| | Missing outcome data | Low risk | Primary outcome data were available for 94% participants in the intervention group and 97% in the control group.<br>Intention to treat and sensitivity analyses were also performed. |
| | Risk of bias in measurement of the outcome | Low risk | Objective outcome assessment-biochemically verified continuous abstinence. Researchers who undertook laboratory analyses were masked to treatment allocation.<br>However, misclassification is likely to have biased the estimate of the relative risk towards the null |
| | Risk of bias in selection of the reported result | Low risk | No evidence of reporting bias. |
| | Other sources of bias | Although efforts were made to ensure that the research staff remained masked to whether a participant was in the intervention or control group,<br>occasionally trial participants would reveal this information to the study staff. Although this<br>information could have biased the estimates of self-reported abstinence, our primary endpoint, biochemically verified self-reported smoking abstinence, should be unbiased. | |
| | **Overall Risk of Bias** | Low risk | |
| | **Other outcome details** | | |
| **Source of funding** | Not reported | | |
| **Comments** | **A limitation of the trial is that it provides little insight into the mechanism by which txt2stop increases smoking cessation. The £20 top-up voucher** given to participants using pay-as-you-go | | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Free C, Knight R, Robertson S, Whittaker R, Edwards P, Zhou W, Rodgers A, Cairns J, Kenward MG, Roberts I. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial. The Lancet. 2011 Jul 2;378(9785):49-55.** | |
| **Study name** | **Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial** | |
| | schemes for their mobile phone (also known as prepaid in some countries) might have been<br>an incentive for some non-smokers to state they were smokers and to join the trial only to obtain these vouchers. However, any misclassification should be non-differential and would not explain our significant results. | |
| **Additional references** | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | x |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

**Liao 2018**

| | |
|---|---|
| **Bibliographic reference/s** | **Liao Y, Wu Q, Kelly BC, Zhang F, Tang YY, Wang Q, Ren H, Hao Y, Yang M, Cohen J, Tang J. Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial. PLoS medicine. 2018 Dec 18;15(12):e1002713.** |
| **Study name** | Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial |
| **Registration** | ClinicalTrials.gov NCT02693626. |
| **Study type** | Single- blind RCT |
| **Study dates** | From August 17, 2016, to May 27, 2017 |
| **Objective** | The aim of the study was to assess the effectiveness of a phone-based text messaging intervention (Happy Quit) for smoking cessation in China. |
| **Country/ Setting** | China |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">Liao Y, Wu Q, Kelly BC, Zhang F, Tang YY, Wang Q, Ren H, Hao Y, Yang M, Cohen J, Tang J. Effectiveness of a text-messaging-based smoking cessation intervention (“Happy Quit”) for smoking cessation in China: A randomized controlled trial. PLoS medicine. 2018 Dec 18;15(12):e1002713.</td></tr>
<tr><td>Study name</td><td colspan="2">Effectiveness of a text-messaging-based smoking cessation intervention (“Happy Quit”) for smoking cessation in China: A randomized controlled trial</td></tr>
<tr><td>Number of participants / clusters</td><td colspan="2">A total of 1,369 participants—674 in the high-frequency messaging group, 284 in the low-frequency messaging group, and 411 in the control group.<br><br>The authors estimated that a power of 80% requires a sample size of 864 and a power of 90% requires a sample size of 1,158, therefore ended with 1,369 participants ( to have 90% power).</td></tr>
<tr><td>Attrition</td><td colspan="2">From an initial of 2561 eligible participants, 1417 completed baseline assessment and 1369 were included in the study.</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="2">Baseline characteristics of study groups<br><br>
<table>
<tr><th></th><th>HMF group (%)</th><th>LMF group (%)</th><th>Control group (%)</th></tr>
<tr><td>Gender<br>(Male)<br>(Female)</td><td>641 (95.1%)<br>33 (4.9%)</td><td>267 (94.0%)<br>17 (6.0%)</td><td>387 (94.2%)<br>24 (5.8%)</td></tr>
<tr><td>Age (years) mean (SD)</td><td>38.1 (9.74)</td><td>37.2 (9.79)</td><td>38.7 (9.83)</td></tr>
<tr><td>Number of cigarettes smoked per day, mean (SD)</td><td>20.3 (9.49)</td><td>19.8 (8.84)</td><td>20.0 (8.93)</td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td colspan="2">Participants, investigators, and research personnel were masked to treatment allocation. Control participants are likely to have suspected their allocation as they only received text messages unrelated to quitting.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="2">Eligible participants were daily smokers 18 years of age and older living in China. They should also be able to read and write in Chinese, owning a text-capable cell phone and knowing how to text, being willing to make an attempt to quit smoking in the next month, agreeing to smoking cessation status verification by a significant other (e.g., family member, friend), and being willing to provide informed consent to participate in the study.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="2">Not reported</td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td>Details</td></tr>
<tr><td></td><td>Brief Name</td><td>Happy Quit</td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td>Intervention was based on the principles of cognitive behavioural therapy.</td></tr>
<tr><td></td><td>Materials used</td><td>-</td></tr>
<tr><td></td><td>Procedures used</td><td>Participants assigned to intervention receiving high frequency or low frequency messages. These messages were aimed at improving self-efficacy for quitting, describing outcome expectations from</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Liao Y, Wu Q, Kelly BC, Zhang F, Tang YY, Wang Q, Ren H, Hao Y, Yang M, Cohen J, Tang J. Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial. PLoS medicine. 2018 Dec 18;15(12):e1002713.** | |
| **Study name** | Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial | |
| | | quitting, increasing perceived social support for quitting, modeling effective quitting strategies and coping skills, and increasing behavioural capability for quitting.<br>The control group received only text messages unrelated to quitting. Specifically, control group participants only received 1 text message every week, thanking them for being in the study, providing study center contact details, and reminding them of the time until the end of follow-up.<br><br>Participants in both the intervention groups and control group were asked to set a quit date within 1 month of randomization and were encouraged to select a quit date about 2 weeks from the welcome day if they had no disagreement with it. |
| | **Provider** | |
| | **Digital platform** | Text messages |
| | **Location** | |
| | **Duration** | 12 weeks |
| | **Intensity** | For the HFM group, 3 to 5 messages were sent per day for the time leading up to the quit day and the following 12 weeks.<br>For the LFM group, 3 to 5 messages were sent per week for the time leading up to the quit day and the following 12 weeks.<br><br>After 12 weeks, the intervention became much less intensive, with the number of sent text messages reduced to 3 to 5 per week for the HFM group and 1 to 2 per week for the LFM group for the next 12 weeks.<br><br>Control group participants only received 1 text message every week, thanking them for being in the study, providing study center contact details, and reminding them of the time until the end of follow-up. |
| | **Tailoring/adaptation** | - |
| | **Planned treatment fidelity** | - |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">Liao Y, Wu Q, Kelly BC, Zhang F, Tang YY, Wang Q, Ren H, Hao Y, Yang M, Cohen J, Tang J. Effectiveness of a text-messaging-based smoking cessation intervention (“Happy Quit”) for smoking cessation in China: A randomized controlled trial. PLoS medicine. 2018 Dec 18;15(12):e1002713.</td></tr>
<tr><td>Study name</td><td colspan="2">Effectiveness of a text-messaging-based smoking cessation intervention (“Happy Quit”) for smoking cessation in China: A randomized controlled trial</td></tr>
<tr><td></td><td>Actual treatment fidelity</td><td>-</td></tr>
<tr><td></td><td>Other details</td><td></td></tr>
<tr><td>Follow up</td><td colspan="2">1, 4, 8, 12, 16, 20, and 24 weeks</td></tr>
<tr><td>Data collection</td><td colspan="2">The primary outcome was biochemically verified continuous smoking abstinence at 24 weeks. Continuous smoking abstinence at 24 weeks was defined as smoking not more than 5 cigarettes from the quit day to 24 weeks.<br><br>Secondary outcomes included (1) self-reported 7-day point prevalence of abstinence (not even a puff of smoke, for the last 7 days) at 1, 4, 8, 12, 16, 20, and 24 weeks; (2) self-reported continuous abstinence at 4, 12, and 24 weeks; and (3) self-reported average number of cigarettes smoked per day</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td colspan="2">Verified continuous smoking abstinence and 7-day point prevalence (intention-to-treat) by group.
<table>
<tr><th>Outcome</th><th>Control participants (%) (n = 411)</th><th colspan="2">HFM participants</th><th colspan="2">LFM participants</th></tr>
<tr><th></th><th></th><th>Participants (%) (n = 674)</th><th>OR (95% CI), p value</th><th>Participants (%) (n = 284)</th><th>OR (95% CI), p value</th></tr>
<tr><td colspan="6">Primary outcome</td></tr>
<tr><td>Verified abstinence</td><td>8 (1.9%)</td><td>44 (6.5%)</td><td>3.51 (1.64–7.55), p <0.001</td><td>17 (6.0%)</td><td>3.21 (1.36–7.54), p= 0.002</td></tr>
<tr><td colspan="6">Secondary outcomes</td></tr>
<tr><td>Self-reported continuous Abstinence (24 weeks)</td><td>8 (1.9%)</td><td>46 (6.8%)</td><td>3.69 (1.72–7.90), p <0.001</td><td>18 (6.3%)</td><td>3.41 (1.46–7.95), p= 0.004</td></tr>
<tr><td>Self-reported 7-day point prevalence of abstinence (24 weeks)</td><td>27 (6.6%)</td><td>130 (19.3%)</td><td>3.40 (2.20–5.25), p <0.001</td><td>55 (19.4%)</td><td>3.42 (2.10–5.57), p <0.001</td></tr>
</table>
ORs and p-values are for comparison with the control group.<br>*Bonferroni corrected p-values.<br>HFM, high-frequency messaging; LFM, low-frequency messaging; OR, odds ratio.</td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td colspan="2">As above</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Liao Y, Wu Q, Kelly BC, Zhang F, Tang YY, Wang Q, Ren H, Hao Y, Yang M, Cohen J, Tang J. Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial. PLoS medicine. 2018 Dec 18;15(12):e1002713.** | | |
| **Study name** | Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial | | |
| **Statistical Analysis** | For determination of smoking abstinence rate, an intention-to-treat analysis was used.<br>Seven-day abstinence and continuous abstinence were compared between participants in the intervention groups and control group at week 24 after the quit date using a mixed-effects model.<br>Odds ratios (ORs) were used to measure the outcomes for the intervention groups (both HFM and LFM) compared with the control group, and χ2 tests were used to test for statistical significance.<br>The number of cigarettes consumed per<br>day was compared during the intervention and follow-up periods between the HFM group and LFM group by 2-sample t test. Also, Kaplan–Meier curves were used for analyses of time to relapse. | | |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** | | |
| | **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
| | Risk of bias arising from the randomisation process | Low risk | Participants were randomly allocated using an independent telephone randomization system<br>that included a minimization algorithm balancing for sex, age, educational level and Fagerstrom<br>Test for Nicotine Dependence |
| | Risk of bias due to deviations from intended interventions (assignment) | Low risk | Participants, investigators, and research personnel were masked to treatment allocation. |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | High retention rates |
| | Missing outcome data | Low risk | Low losses to follow up: 17% in intervention group 1, 25% in group 2 and 13% in control group |
| | Risk of bias in measurement of the outcome | Low risk | Objective outcome assessment (biochemically verified continuous smoking abstinence) |

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|---|---|---|---|
| **Bibliographic reference/s** | **Liao Y, Wu Q, Kelly BC, Zhang F, Tang YY, Wang Q, Ren H, Hao Y, Yang M, Cohen J, Tang J. Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial. PLoS medicine. 2018 Dec 18;15(12):e1002713.** | | |
| **Study name** | Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial | | |
| | | | Both self-reported response and biochemical verification, which is often considered the "gold standard" in validation studies |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Low risk | |
| | **Other outcome details** | | |
| **Source of funding** | China Medical Board (CMB) Open Competition Program (Grant Number 15-226). | | |
| **Comments** | | | |
| **Additional references** | | | |

| | | |
|---|---|---|
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

**Naughton 2014**

| | |
|---|---|
| **Bibliographic reference/s** | **Naughton F, Jamison J, Boase S, Sloan M, Gilbert H, Prevost AT, Mason D, Smith S, Brimicombe J, Evans R, Sutton S. Randomized controlled trial to assess the short-term effectiveness of tailored web-and text-based facilitation of smoking cessation in primary care (i Q uit in P ractice). Addiction. 2014 Jul;109(7):1184-93.** |
| **Study name** | Randomized controlled trial to assess the short-term effectiveness of tailored web- and text-based facilitation of smoking cessation in primary care (iQuit in Practice) |
| **Registration** | ISRCTN 56702353. |
| **Study type** | RCT |
| **Study dates** | September 2009 and March 2011 |
| **Objective** | The aims of this study were to estimate the short-term effectiveness of the iQuit intervention compared with usual care alone, to assess the acceptability of the intervention to participants and to assess the feasibility of the intervention and of aspects of the trial design and procedures to inform the design of a definitive trial. |
| **Country/ Setting** | England, UK. |
| **Number of participants / clusters** | 602 participants were included and randomised to intervention (n = 299) and (n = 303) to control.<br><br>A sample size of 300 per group would give 80% power to detect an increase in abstinence from 20 to 30% (alpha = 0.05, two-sided test). |
| **Attrition** | Of 776 smokers who screened, 602 were included.<br>Attrition (noncumulative), defined as not obtaining smoking status or a completed questionnaire by post or over the telephone was 30.1% (4 weeks), 15.9% (8 weeks) and 22.3% (6 months) |
| **Participant /community characteristics.** | **Participant characteristics at baseline – no statistically significant differences.**<br><br>**Control n (%)** / **Intervention n (%)**<br>**Gender (Female)**: 158 (52.1) / 159 (53.2)<br>**Mean age (SD)[a]**: 41.3 (13.0) / 42.3 (13.0)<br>**Mean (SD) number of cigarettes smoked per day**: 18.2 (8.2) / 18.4 (7.9) |
| **Method of allocation** | This study was a two parallel-group randomized controlled trial with 1 : 1 individual allocation comparing usual care (control) with usual care plus the iQuit system (intervention). Randomization was stratified by SCA. |
| **Inclusion criteria** | Patients were eligible for inclusion if they met the following criteria: current smoker (usually smokes at least one cigarette a day, has smoked in the 7 days prior to randomization); able to read English and provide written informed consent; willing to set a quit date within 14 days after randomization; aged 18–75 years; has a mobile phone and is familiar with sending and receiving text messages; not enrolled in another formal smoking cessation study or programme; and not using smoking cessation medications at randomization date. |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Naughton F, Jamison J, Boase S, Sloan M, Gilbert H, Prevost AT, Mason D, Smith S, Brimicombe J, Evans R, Sutton S. Randomized controlled trial to assess the short-term effectiveness of tailored web-and text-based facilitation of smoking cessation in primary care (i Q uit in P ractice). Addiction. 2014 Jul;109(7):1184-93.** | |
| **Study name** | Randomized controlled trial to assess the short-term effectiveness of tailored web- and text-based facilitation of smoking cessation in primary care (iQuit in Practice) | |
| **Exclusion criteria** | Not reported | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | iQuit |
| | **Rationale/theory/Goal** | |
| | **Materials used** | Intervention: advice report+ text messaging<br>The four-page advice report contained detailed advice on quitting tailored to 25 items from the programme's 30-item questionnaire was available to intervention group.<br>The text messaging component consisted of a 90-day programme of automated text messages sent to the smoker's mobile phone. The messages were designed to advise smokers on their quit attempt, provide information about the consequences of smoking and expectations for quitting, provide encouragement, boost self-efficacy, maintain motivation to quit and remind smokers how to cope with difficult situations.<br>Text messages were tailored individually using 24 items from the iQuit questionnaire obtained from query messages about smoking status sent to the participant at 3 and 7 weeks after their quit date.<br>Intervention participants could also text HELP or SLIP to immediately receive a support message if they were tempted to smoke (HELP) or had just had a lapse (SLIP). Intervention participants could text STOP to discontinue all text messages.<br><br>Participant in the control group received a brief discussion about smoking habits and history, measurement of expired-air carbon monoxide (CO) (using a supplied Bedfont piCO Smokerlyzer, Maidstone, UK), brief advice to quit, setting a quit date within the next 14 days, options for pharmacotherapy, a prescription and arranging a follow-up visit. |
| | **Procedures used** | Participants assigned to usual care consisted of routine 'level 2' smoking |

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|---|---|---|
| **Bibliographic reference/s** | **Naughton F, Jamison J, Boase S, Sloan M, Gilbert H, Prevost AT, Mason D, Smith S, Brimicombe J, Evans R, Sutton S. Randomized controlled trial to assess the short-term effectiveness of tailored web-and text-based facilitation of smoking cessation in primary care (i Q uit in P ractice). Addiction. 2014 Jul;109(7):1184-93.** | |
| **Study name** | Randomized controlled trial to assess the short-term effectiveness of tailored web- and text-based facilitation of smoking cessation in primary care (iQuit in Practice) | |
| | | cessation advice delivered by SCAs (smoking cessation adviser).<br><br>Participants assigned in the intervention received usual care, plus a tailored advice report and a programme of tailored text messages generated by the iQuit system. Thecontent of the report and text messages were based on relevant theories of smoking cessation and behaviour change, including social cognitive theory and the perspectives on change model. |
| | **Provider** | |
| | **Digital platform** | |
| | **Location** | |
| | **Duration** | 90 day |
| | **Intensity** | The number of messages sent each day varied according to the predetermined schedule and was either 0, 1 or 2 (mean per day over 90 days 1.2). |
| | **Tailoring/adaptation** | Text messages were tailored |
| | **Planned treatment fidelity** | |
| | **Actual treatment fidelity** | - |
| | **Other details** | |
| **Follow up** | 4, 8 weeks and 6 months. | |
| **Data collection** | The primary outcome measure was self-reported 2-week point prevalence abstinence at 8-week follow-up from randomization date.<br><br>Self-reported 3-month prolonged abstinence at 6-month follow-up from randomization date was a secondary outcome measure.<br><br>Two longer-term smoking outcome measures were assessed; 6-month prolonged abstinence at 6-month follow-up and a strict continuous abstinence measure using all outcome timepoints: CO-validated 2-week point prevalence abstinence at 4 weeks, 4-week point prevalence abstinence at 8 weeks and 6-month prolonged abstinence at 6 months. These long-term measures deviated from the Russell Standard | |
| **Critical outcomes measures and effect size. (time points)** | **Smoking outcomes and use of cessation medication** | |

| | Control n (%) | intervention n(%) | Absolute difference (95% CI) | Odds ratio (95% CI)[a,b] |
|---|---|---|---|---|

| | |
|---|---|
| **Bibliographic reference/s** | **Naughton F, Jamison J, Boase S, Sloan M, Gilbert H, Prevost AT, Mason D, Smith S, Brimicombe J, Evans R, Sutton S. Randomized controlled trial to assess the short-term effectiveness of tailored web-and text-based facilitation of smoking cessation in primary care (i Q uit in P ractice). Addiction. 2014 Jul;109(7):1184-93.** |
| **Study name** | Randomized controlled trial to assess the short-term effectiveness of tailored web- and text-based facilitation of smoking cessation in primary care (iQuit in Practice) |
| | **Secondary outcomes** \| \| \| \| \|<br>Self-reported 3-month prolonged abstinence at 6-month follow-up \| 70 (23.1) \| 76 (25.4) \| 2.3% (−4.5 to 9.1%)[d] \| 1.13 (0.78–1.65)<br>**Additional outcomes** \| \| \| \| \|<br>Self-reported 6-month prolonged abstinence at 6-month follow-up \| 27 (8.9) \| 45 (15.1) \| 6.1% (0.9 to 11.4%) \| 1.81 (1.09–3.01)<br>[a]Unadjusted odds ratios for smoking outcomes. Adjusting for baseline characteristics made no noticeable difference to findings. [b]Sensitivity analyses did not result in any noticeable differences in the findings |
| **Important outcomes measures and effect size. (time points)** | As above |
| **Statistical Analysis** | Groups were compared using χ2 tests and logistic regression analysis for binary outcome measures, and independent t-tests, analysis of variance and linear regression analysis for continuous measures and Fisher's exact test and 95% CI by the Clopper–Pearson method for between-group proportions.<br>The group difference in prolonged abstinence at 6-month follow-up was assessed using a Bayesian posterior 95% credibility interval for the absolute difference between trial arms.<br>The smoking outcome analyses were intention-to-treat, where all those randomized were analysed with participants lost to follow-up assumed to be smoking. Sensitivity analyses were also conducted using a range of less severe assumptions, namely a complete-case analysis and relaxation of the 4-week abstinence definition. |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name**<br>**Outcome** \| **Judgement (Low / High / some concerns)** \| **Comments**<br>Risk of bias arising from the randomisation process \| Low risk \| Randomisation present. The allocation |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Naughton F, Jamison J, Boase S, Sloan M, Gilbert H, Prevost AT, Mason D, Smith S, Brimicombe J, Evans R, Sutton S. Randomized controlled trial to assess the short-term effectiveness of tailored web-and text-based facilitation of smoking cessation in primary care (i Q uit in P ractice). Addiction. 2014 Jul;109(7):1184-93.** | | |
| **Study name** | Randomized controlled trial to assess the short-term effectiveness of tailored web- and text-based facilitation of smoking cessation in primary care (iQuit in Practice) | | |
| | | | sequence was generated by a computer-based random number generator using random permuted blocks with block sizes of four and six, stored on a remote web server. The sequence was not accessible to the SCAs (smoking cessation advisers) or participants. |
| | Risk of bias due to deviations from intended interventions (assignment) | Some concerns | No blinding<br>Allocation was made by the web server during the consultation once Part 1 of the iQuit questionnaire was submitted. At this point, the SCA and the participant were unblinded to allocation. |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| | Missing outcome data | Low risk | Attrition rate: 22.3% at 6 months. There were no between-group differences in attrition. Also, sensitivity analyses did not result in any noticeable differences in the findings. |
| | Risk of bias in measurement of the outcome | Some concerns | Subjective reporting of the outcome. Abstinence was not verified biochemically, and they could not avoid the possibility that some assessors at the 6-month follow- |

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|---|---|---|---|
| **Bibliographic reference/s** | **Naughton F, Jamison J, Boase S, Sloan M, Gilbert H, Prevost AT, Mason D, Smith S, Brimicombe J, Evans R, Sutton S. Randomized controlled trial to assess the short-term effectiveness of tailored web-and text-based facilitation of smoking cessation in primary care (i Q uit in P ractice). Addiction. 2014 Jul;109(7):1184-93.** | | |
| **Study name** | Randomized controlled trial to assess the short-term effectiveness of tailored web- and text-based facilitation of smoking cessation in primary care (iQuit in Practice) | | |
| | | | up became unblinded to allocation. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | National Institute for Health Research (NIHR) School for Primary Care Research (SPCR). | | |
| **Comments** | A study limitation was that they were not able to capture accurately the number of individuals approached informally about the study who subsequently decided not to participate.<br>The final 6-month follow-up was undertaken by post/telephone and therefore it was not practical to bring participants into the GP surgery for an additional CO measure, thus abstinence was not validated biochemically at this timepoint | | |
| **Additional references** | | | |

| | | |
|---|---|---|
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | x |
| | Self-belief | |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

## Intervention mode: text messages on socioeconomically disadvantaged individuals

### Vidrine 2018

<table>
<tr><td>Bibliographic reference/s</td><td>Vidrine DJ, Frank-Pearce SG, Vidrine JI, Tahay PD, Marani SK, Chen S, Yuan Y, Cantor SB, Prokhorov AV. Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals: A Randomized Clinical Trial. JAMA internal medicine. 2019 Feb 1;179(2):167-74.</td></tr>
<tr><td>Study name</td><td>Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals A Randomized Clinical Trial</td></tr>
<tr><td>Registration</td><td>ClinicalTrials.gov identifier: NCT00948129</td></tr>
<tr><td>Study type</td><td>3-group randomized clinical trial</td></tr>
<tr><td>Study dates</td><td>August 17, 2017, through May 10, 2018</td></tr>
<tr><td>Objective</td><td>To assess the efficacy of mobile phone–delivered cessation interventions targeted<br>to smokers at neighbourhood sites serving racial/ethnic minority and socioeconomically disadvantaged individuals.</td></tr>
<tr><td>Country/ Setting</td><td>USA (Texas)</td></tr>
<tr><td>Number of participants / clusters</td><td>From 1177 assessed for eligibility, 624 current cigarette smokers, 223 in control group and 213 in the intervention (second arm group)- 188 in 3 arm of the trial</td></tr>
<tr><td>Attrition</td><td>In order the study to reach a 80% power, we used a Holm-Bonferroni method was used for significance (α of 5.0% and 2.5%, respectively)</td></tr>
<tr><td>Participant /community characteristics.</td><td>Sociodemographic, Behavioral, and Psychosocial Characteristics of the Sample at Study Enrolment
<table>
<tr><td></td><td>Intervention (n=223)<br>NRT plus text</td><td>Control (n=213)<br>%<br>NRT</td></tr>
<tr><td>Age, mean (SD), Y</td><td>45.7 (13.1)</td><td>45.6 (12.4)</td></tr>
<tr><td>Gender (%female)</td><td>106 (49.8)</td><td>111 (49.8)</td></tr>
<tr><td>Time smoked, mean (SD), y</td><td>20.37 (12.21)</td><td>21.06 (12.77)</td></tr>
<tr><td>No. of cigarettes smoked per day, No. (%)<br>1-10<br>11-20<br>≥21</td><td><br><br>77 (36.2)<br>96 (45.1)<br>40 (18.8)</td><td><br><br>56 (25.1)<br>104 (46.6)<br>63 (28.3)</td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td>Neighbourhood sites were stratified based on type (ie, church, community centre, or public housing complex) and racial/ ethnic composition, then randomized to a treatment group using a random number list generated by a staff statistician.<br><br>Research staff who recruited, consented, and administered the assessments were blinded to the treatment group<br>assignment.</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Vidrine DJ, Frank-Pearce SG, Vidrine JI, Tahay PD, Marani SK, Chen S, Yuan Y, Cantor SB, Prokhorov AV. Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals: A Randomized Clinical Trial. JAMA internal medicine. 2019 Feb 1;179(2):167-74.** | |
| **Study name** | Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals A Randomized Clinical Trial | |
| **Inclusion criteria** | Participant inclusion criteria consisted of (1) being 18 years or older; (2) smoking at least 100 cigarettes in their lifetime; (3) English or Spanish speaking; (4) smoking at least 5 cigarettes per day; and (5) willing to schedule a quit date within 1 week of enrolment. | |
| **Exclusion criteria** | Exclusion criteria consisted of (1) a history of a condition that precluded nicotine patch use; (2) current use of nicotine replacement therapy (NRT) or other smoking cessation medications; (3) current enrollment in another smoking cessation program; and (4) pregnancy or breastfeeding. | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | |
| | **Rationale/theory/Goal** | |
| | **Materials used** | The content of the messages<br>is designed to fit into one of four different categories: 1) problem solving/coping skills; 2) knowledge/risk perception;<br>3) increasing and maintaining quit motivation; and 4) increasing social support.<br>Additionally, to address<br>the specific needs of each participant, the text messages are tailored on four levels: 1) smoking status; 2) disease history; 3) concern of future disease; and 4) preferred coping skills. |
| | **Procedures used** | Participants in the intervention (NRT plus text group) received NRT group components plus tailored text messaging. Message content was informed by cognitive behavioural and motivational enhancement principles and was designed to increase health knowledge, quit motivation, use of coping skills, support, and self-efficacy.<br><br>Participants randomised to control group NRT group received brief advice to quit smoking (delivered by trained research<br>staff), self-help written materials, a referral (ie, a card with a telephone number to the Texas Quitline), and a 10-week supply of NRT in the form of transdermal patches. |
| | **Provider** | |
| | **Digital platform** | Cell phone delivered text messages and picture messages |
| | **Location** | |
| | **Duration** | 12 -week period |
| | **Intensity** | Message delivery began<br>several days before a scheduled quit date and continued for a 12-week period. |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Vidrine DJ, Frank-Pearce SG, Vidrine JI, Tahay PD, Marani SK, Chen S, Yuan Y, Cantor SB, Prokhorov AV. Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals: A Randomized Clinical Trial. JAMA internal medicine. 2019 Feb 1;179(2):167-74.** | |
| **Study name** | Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals A Randomized Clinical Trial | |
| | | In the first week of treatment, participants receive 5 messages per day. The frequency tapers off to one message per day by week 4,and continues at this frequency until week 12. |
| | **Tailoring/adaptation** | Messages were tailored based on participants' first name and current smoking status (proactively assessed weekly by mobile phone), and on disease history, future disease concerns, and preferred coping skills (each assessed at the baseline audio computer assisted self-interview). |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | **6-month follow-up** | |
| **Data collection** | Variables assessed included sociodemographic characteristics and depressive symptoms (as measured by the Center for Epidemiological Studies–Depression Scale).<br>Smoking associated variables included age of initiation, number of quit attempts, use of other tobacco products, and nicotine dependence (as measured by the Fagerström Test of Nicotine Dependence).<br><br>Biochemical verification of smoking status at the 6-month follow-up was not initiated until the second year of accrual.<br>Therefore, all participants enrolled after accrual year 1 who self-reported abstinence at the time of the 6-month assessment were asked to provide, by mail, a saliva sample for cotinine testing to confirm their stated smoking status.<br><br>The primary outcome was smoking abstinence at 6 months, with follow-up completed by June 12, 2015. Abstinence was defined as (1) biochemically verified smoking abstinence, defined as a negative finding of a saliva cotinine (<20 ng/mL [to convert to nanomoles per liter, multiply by 0.176]) sample24 and (2) self-reported 30-day abstinence (ie, not a single puff of a cigarette in the past 30 days). | |
| **Critical outcomes measures and effect size. (time points)** | **Intention-to-Treat Analyses for Biochemically Verified Abstinence and Self-reported 30-Day Abstinence** | |

| | **Biochemically Verified Abstinence (n = 377)** | **Self-reported 30-d Abstinence (n = 624)** |
|---|---|---|

<table>
<tr><td>Bibliographic reference/s</td><td colspan="5">Vidrine DJ, Frank-Pearce SG, Vidrine JI, Tahay PD, Marani SK, Chen S, Yuan Y, Cantor SB, Prokhorov AV. Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals: A Randomized Clinical Trial. JAMA internal medicine. 2019 Feb 1;179(2):167-74.</td></tr>
<tr><td>Study name</td><td colspan="5">Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals A Randomized Clinical Trial</td></tr>
<tr><td></td><td colspan="5"><table>
<tr><th>Treatment group</th><th>Proportion Abstinent, No. (%)</th><th>Unadjusted RR (95% CI)</th><th>Proportion Abstinent, No. (%)</th><th>Unadjusted RR (95% CI)</th></tr>
<tr><td>NRT</td><td>13 (12.0)</td><td>1 [Reference]</td><td>64 (28.7)</td><td>1 [Reference]</td></tr>
<tr><td>NRT plus text</td><td>19 (12.0)</td><td>0.99 (0.43-2.27)</td><td>70 (32.9)</td><td>1.15 (0.81-1.63)</td></tr>
</table></td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td colspan="5">As above</td></tr>
<tr><td>Statistical Analysis</td><td colspan="5">Data were analysed based on intention to treat (ITT).<br>χ2 tests or 1-way analysis of variance tests were used to identify differences in baseline characteristics between treatment groups.<br><br>To estimate the effect of treatment group on the outcomes of interest while accounting for the group-randomized nature of the study, generalized linear mixed-model analyses were performed.<br><br>Unadjusted and adjusted models for biochemically verified and self-reported abstinence were estimated<br>Several methods were used to handle missing data, including (1) ITT, such that missing abstinence outcomes were considered non abstinent; and (2) sequential multiple imputation.</td></tr>
<tr><td>Risk of bias (ROB)<br>Overall ROB</td><td colspan="5">Outcome name</td></tr>
<tr><td></td><td colspan="2">Outcome</td><td>Judgement (Low / High / some concerns)</td><td colspan="2">Comments</td></tr>
<tr><td></td><td colspan="2">Risk of bias arising from the randomisation process</td><td>Some concerns</td><td colspan="2">Randomisation present using a random number list generated by a staff statistician. No details provided for allocation concealment. No significant between-group differences were observed.</td></tr>
<tr><td></td><td colspan="2">Risk of bias due to deviations from intended interventions (assignment)</td><td>Low risk</td><td colspan="2">No information for blinding of the participants. Research staff who recruited, consented, and administered the assessments were blinded to the treatment group assignment. No reports on deviations.</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Vidrine DJ, Frank-Pearce SG, Vidrine JI, Tahay PD, Marani SK, Chen S, Yuan Y, Cantor SB, Prokhorov AV. Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals: A Randomized Clinical Trial. JAMA internal medicine. 2019 Feb 1;179(2):167-74.** | | |
| **Study name** | Efficacy of Mobile Phone–Delivered Smoking Cessation Interventions for Socioeconomically Disadvantaged Individuals A Randomized Clinical Trial | | |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| | Missing outcome data | Low risk | The overall 6-month follow-up rate was 73.6%. Several methods were used to handle missing data, including(1) ITT, such that missing abstinence outcomes were considered non-abstinent; and (2) sequential multiple imputation. |
| | Risk of bias in measurement of the outcome | Low risk | Self -reporting of the outcome, but also biochemical verification in 60% of the sample. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | National Cancer Institute, the Stephenson Cancer Center, The University of Texas MD Anderson Cancer Center, Oklahoma Tobacco Settlement Endowment Trust, National Institute of General Medical Sciences. | | |
| **Comments** | | | |
| **Additional references** | | | |

| **Behaviour change techniques (16 theoretical clusters)** | |
|---|---|
| Scheduled consequences | |
| Reward and threat | |
| Repetition and substitution | |
| Antecedents | |
| Associations | |
| Covert Learning | |
| Natural Consequences | |
| Feedback and monitoring | |
| Goals and planning | x |
| Comparison of the behaviour | |
| Social support | x |
| Self-belief | |
| Comparison of outcomes | |
| Identity | |
| Shaping knowledge | |
| Regulation | |

## Intervention mode: text messages in pregnant women

### Naughton 2017

<table>
<tr><td>Bibliographic reference/s</td><td>Naughton F, Cooper S, Foster K, Emery J, Leonardi-Bee J, Sutton S, Jones M, Ussher M, Whitemore R, Leighton M, Montgomery A. Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit). Addiction. 2017 Jul 1;112(7):1238-49.</td></tr>
<tr><td>Study name</td><td>Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit)</td></tr>
<tr><td>Registration</td><td>ClinicalTrials.gov NCT02043509</td></tr>
<tr><td>Study type</td><td>A multi-centre, two-arm, parallel group, single-blind, individually randomized controlled trial.</td></tr>
<tr><td>Study dates</td><td>February and September 2014</td></tr>
<tr><td>Objective</td><td>To estimate the effectiveness of pregnancy smoking cessation support delivered by short message service (SMS) text message and key parameters needed to plan a definitive trial</td></tr>
<tr><td>Country/ Setting</td><td>UK</td></tr>
<tr><td>Number of participants / clusters</td><td>In total 407 pregnant smokers were recruited into the study; 203 were randomized to MiQuit and 204 to usual care.</td></tr>
<tr><td>Attrition</td><td>From an initial of 1181 pregnant smokers assessed; 407 were included in the study.</td></tr>
<tr><td>Participant /community characteristics.</td><td>Baseline characteristics by treatment group.
<table>
<tr><th></th><th>MiQuit (n = 203)</th><th>Usual care (n = 204)</th></tr>
<tr><td colspan="3">Age (years)</td></tr>
<tr><td>Mean (SD)</td><td>26.6 (5.7)</td><td>26.4 (5.7)</td></tr>
<tr><td>Median (1st Q, 3rd Q)</td><td>25.7 (22.1, 30.8)</td><td>25.8 (21.9, 29.7)</td></tr>
<tr><td>Min, max</td><td>16.9, 40.0</td><td>16.6, 41.3</td></tr>
<tr><td colspan="3">Cigarettes per day before pregnancy</td></tr>
<tr><td>Mean (SD)</td><td>15.7 (6.7)</td><td>16.4 (6.6)</td></tr>
</table></td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Naughton F, Cooper S, Foster K, Emery J, Leonardi-Bee J, Sutton S, Jones M, Ussher M, Whitemore R, Leighton M, Montgomery A. Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit). Addiction. 2017 Jul 1;112(7):1238-49.** | |
| **Study name** | Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit) | |
| | Median (1st Q, 3rd Q) | 15 (10, 20) / 15 (10, 20) |
| | Min, max | 5, 40 / 5, 40 |
| | **Cigarettes per day now** | |
| | Mean (SD) | 9.0 (5.9) / 9.4 (6.1) |
| | Median (1st Q, 3rd Q) | 8 (5, 10) / 10 (5, 10) |
| | Min, max | 1, 40 / 1, 40 |
| **Method of allocation** | Research midwives (RMs) who identified potential participants in antenatal clinics, researcher and the participant remaining masked to allocation. | |
| **Inclusion criteria** | Participants aged 16 years and over, less than 25 weeks pregnant, had smoked at least five cigarettes daily before pregnancy and at least one per day at enrolment, able to understand written English and owned a mobile phone with text messaging functionality were eligible for this study. | |
| **Exclusion criteria** | Participants already using text message-based smoking cessation support were excluded. | |
| **Intervention** | **TIDieR Checklist criteria** | **Details** |
| | **Brief Name** | MiQuit |
| | **Rationale/theory/Goal** | |
| | **Materials used** | Participants assigned to control group were given a standard NHS booklet on smoking cessation for mothers-to-be and could access smoking cessation information, advice or support for stopping smoking offered as part of routine antenatal care.<br><br>Participants in the intervention group, two days after enrolment, in addition to the booklet and usual care, started to receive MiQuit. Briefly, MiQuit objectives are informed by Social Cognitive Theory, Perspectives on Change Theory, the Elaboration Likelihood Model of Persuasion and several additional cognitive determinants of quitting smoking in pregnancy. It uses 14 participant characteristics to tailor support individually.<br>Also, push support (i.e. automated support sent to participants' Phones) includes motivational messages, advice about quit attempt preparation, managing cravings and withdrawal, dealing with trigger |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Naughton F, Cooper S, Foster K, Emery J, Leonardi-Bee J, Sutton S, Jones M, Ussher M, Whitemore R, Leighton M, Montgomery A. Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit). Addiction. 2017 Jul 1;112(7):1238-49.** | |
| **Study name** | Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit) | |
| | | situations and preventing lapses, information about fetal development and how smoking affects this.<br>At 3 and 7weeks into the programme, users are asked to respond to texts asking about smoking in the previous 3 days, so that subsequent support is further tailored to smoking behaviour. Additionally, system users can 'pull' on-demand support for combatting cravings or temptation to smoke by texting HELP and seek advice on returning to abstinence after a lapse by texting<br>SLIP. Alternatively, texting QUIZ provides a multiple-choice message trivia game designed to distract users from smoking. Support can be discontinued by texting STOP. |
| | **Procedures used** | All participants received a smoking cessation booklet; intervention participants also received a 12-week programme of individually tailored, automated, interactive, self-help smoking cessation text messages (MiQuit). |
| | **Provider** | |
| | **Digital platform** | SMS text messages |
| | **Location** | |
| | **Duration** | 12 weeks |
| | **Intensity** | Push' support was delivered according to a delivery schedule (0, 1 or 2 daily texts).<br>Push message frequency was highest in the first 4 weeks. Participants by texting the keywords MORE or LESS could alter support frequency. |
| | **Tailoring/adaptation** | Tailoring characteristics include gestation, motivation to quit, the hardest situation to avoid smoking, cessation self-efficacy, cigarette dependence and partner's smoking status. ' |
| | **Planned treatment fidelity** | |
| | **Actual treatment fidelity** | Intervention fidelity was high, 98% of MiQuit recipients recalled receiving text message support. |
| | **Other details** | |

| | |
|---|---|
| **Bibliographic reference/s** | **Naughton F, Cooper S, Foster K, Emery J, Leonardi-Bee J, Sutton S, Jones M, Ussher M, Whitemore R, Leighton M, Montgomery A. Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit). Addiction. 2017 Jul 1;112(7):1238-49.** |
| **Study name** | Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit) |
| **Follow up** | 4, 36 weeks |
| **Data collection** | Smoking measures were: (1) self-reported abstinence from 4 weeks post-randomization until late pregnancy collected at late pregnancy follow-up (approximately 36 weeks gestation), with no more than five cigarettes in total between the two time-points, biochemically validated at the later time; (2) as 1 but self-report only; (3) self-reported 7-day point prevalence abstinence at late pregnancy; (4) as 3 but validated biochemically; (5) self-reported 7-day point prevalence abstinence at 4 weeks post-randomization; 6) self-reported 7-day point prevalence abstinence at both 4 weeks post-randomization and late pregnancy; and (7) as 6 but validated biochemically in late pregnancy (It was anticipated by the authors that outcome (1) would be most appropriate for a future RCT).<br><br>Four weeks after randomization, participants were contacted to complete a questionnaire assessing smoking status during the past 7 days; we used text messages to notify them to expect a telephone call and if after several attempts the call was unsuccessful, we posted and e-mailed a link to the questionnaire.<br><br>At 36 weeks gestation participants were contacted similarly and asked about smoking behaviour since 4 weeks post-randomization and in the past 7 days, quit attempts lasting at least 24 hours and use of smoking cessation support. Where 7-day complete abstinence from smoking was reported, we immediately attempted to validate this biochemically with exhaled-breath carbon monoxide (CO) readings and/or saliva samples tested for cotinine, with samples or readings collected at hospital or home visits. If face-to-face collection was not successful, postal saliva sample packs were used. |
| **Critical outcomes measures and effect size. (time points)** | **MiQuit treatment effect estimates on seven smoking outcomes** |

| Outcome | Measure | MiQuit[a] n = 203 (%) | Usual care[a] n = 204 (%) | P value | Adjusted odds ratio (95%CI)[c] |
|---|---|---|---|---|---|
| **Abstinence reported from 4 weeks post-randomization until late pregnancy (smoking outcome 1)[d]** | Validated | 11 (5.42) | 4 (1.96) | 0.064 | 2.70 (0.93–9.35) |
| **7-day point prevalence abstinence** | Validated | 15 (7.39) | 9 (4.41) | 0.202 | 1.67 (0.72–4.03) |

| | |
|---|---|
| **Bibliographic reference/s** | **Naughton F, Cooper S, Foster K, Emery J, Leonardi-Bee J, Sutton S, Jones M, Ussher M, Whitemore R, Leighton M, Montgomery A. Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit). Addiction. 2017 Jul 1;112(7):1238-49.** |
| **Study name** | Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit) |
| | **at late pregnancy (smoking outcome 4)** \| \| \| \| \| \|<br>[a]All smoking outcomes are calculated of a total of 407 participants (203 MiQuit, 204 usual care). Participants lost to follow-up or with missing outcome dataare assumed to be smoking. **b**Unadjusted, from a χ2 test using a two-sided P-value (Fisher's exact test P-values were used in the case of small expected frequencies). [c]Model-based, adjusted by site and gestation at randomization (95% profile confidence intervals reported). [d]Russell standard criterion (permits no more than five cigarettes in total). The criterion for all other smoking outcomes was total abstinence ('not even a puff '). CI = confidence interval· |
| **Important outcomes measures and effect size. (time points)** | As above |
| **Statistical Analysis** | χ2 tests (Fisher's exact tests in cases with small expected frequencies) were performed to assess the association between smoking outcomes and treatment group. Firth (penalized) logistic regression models were then used to estimate ORs with 95% profile Cis to compare smoking outcomes between treatment groups, adjusting for factors used to stratify the randomization via their inclusion as fixed covariates in each model (trial site, gestation at randomization).<br><br>An intention-to-treat (ITT) analysis was used, with all participants analysed within the treatment group to which they were randomized and, where missing outcome data, were assumed smoking.<br><br>The number of quit attempts since baseline was compared between groups using a Mann–Whitney U-test. |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** |

| **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
|---|---|---|
| Risk of bias arising from the randomisation process | Low risk | Randomization used a computer generated pseudo-random code with random permuted blocks of randomly varying size, and stratification. |
| Risk of bias due to deviations from intended interventions (assignment) | Low risk | Single-blinded RCT. Both the RM or researcher and the participant remaining masked to allocation, but unblinded trial team members. |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Naughton F, Cooper S, Foster K, Emery J, Leonardi-Bee J, Sutton S, Jones M, Ussher M, Whitemore R, Leighton M, Montgomery A. Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit). Addiction. 2017 Jul 1;112(7):1238-49.** | | |
| **Study name** | Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit) | | |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not reported |
| | Missing outcome data | Some concerns | Attrition in late pregnancy was:64%. However, completeness of follow-up was not optimal, potentially reducing statistical power. |
| | Risk of bias in measurement of the outcome | Low risk | Abstinence was biochemically validated and self-reported. Researchers collecting outcome data were, where possible, blind to treatment allocations, so outcome ascertainment bias was minimized. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | the National Institute for Health Research (NIHR) under the Programme Grants for Applied Research programme (RP-PG-0109-10 020). | | |
| **Comments** | Those enrolling participants were blind to treatment allocations and abstinence was biochemically validated. Additionally, researchers collecting outcome data were, where possible, blind to treatment allocations, so outcome ascertainment bias was minimized. | | |
| **Additional references** | | | |

| | | |
|---|---|---|
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Naughton F, Cooper S, Foster K, Emery J, Leonardi-Bee J, Sutton S, Jones M, Ussher M, Whitemore R, Leighton M, Montgomery A. Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit). Addiction. 2017 Jul 1;112(7):1238-49.** | |
| **Study name** | Large multi-centre pilot randomized controlled trial testing a low-cost, tailored, self-help smoking cessation text message intervention for pregnant smokers (MiQuit) | |
| | Natural Consequences | |
| | Feedback and monitoring | |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | x |
| | Self-belief | |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

## Intervention mode: multiple intervention in those without a chronic condition

### *Multimedia*

### Brendryen 2007

| | |
|---|---|
| **Bibliographic reference/s** | **Brendryen, Håvar, and Pål Kraft. "Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention." Addiction 103.3 (2008): 478-484.** |
| **Study name** | Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention |
| **Registration** | |
| **Study type** | Two armed RCT |
| **Study dates** | Participants recruited from 9 September-18 September 2005 |
| **Objective** | To assess the long-term efficacy of a fully automated digital multi-media smoking cessation intervention. |
| **Country/ Setting** | Europe (Norway) |
| **Number of participants / clusters** | 396 participants. Treatment (n = 197), Control (n = 199)<br>According to a power analysis, only 400 subjects were required. |
| **Attrition** | 750 were completed baseline questionnaire. Of those 471 were eligible; 400 were included but 396 were analysed (4 were excluded after randomization because of erroneous allocation)<br>The response attrition rate was low in this trial |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">Brendryen, Håvar, and Pål Kraft. "Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention." Addiction 103.3 (2008): 478-484.</td></tr>
<tr><td>Study name</td><td colspan="2">Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="2"><table>
<tr><td></td><td>Treatment (n=197)</td><td>Control (n=199)</td></tr>
<tr><td>Age (years)</td><td>35.9 ± 10.0</td><td>36.4 ± 10.5</td></tr>
<tr><td>Gender (% female)</td><td>100 (50.8)</td><td>99 (49.8)</td></tr>
<tr><td>Cigarettes per day</td><td>18.3 ± 5.9</td><td>18.1 ± 5.8</td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td colspan="2">Based on computer-generated random digits, people were allocated randomly to either the Happy Ending intervention (HE group) or control condition (booklet group). They were informed about the intervention they were about to receive.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="2">People who were willing to make an attempt to quit smoking on 17 October were aged 18 years or older, smoked 10 or more cigarettes daily and had access to the internet,<br>e-mail and a cell-phone on a daily basis included in the study.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="2">Not reported</td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td>Details</td></tr>
<tr><td></td><td>Brief Name</td><td>Happy Ending</td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td>Fully automated and digitally delivered intervention.</td></tr>
<tr><td></td><td>Materials used</td><td>Early in the morning, the user receives an e-mail with instructions to open the day’s web page. Each day for 6 weeks, the client opens a web page that is unique to that particular programme day. By means of cell-phone, the user receives one pre-recorded audio message, and up to three text messages throughout each day. The audio message is received when the client logs on to the programme<br>in the morning, by calling an interactive voice response (IVR) service.<br>Each evening the client receives a<br>proactive log-off call, which asks whether or not they have been smoking. If the user<br>does not log on to the programme or answers the log-off call, they will receive a reminder call, and up to two reminder text messages.<br>The programme also includes a<br>craving helpline. The helpline is IVR-based and is available 24 hours a day from day 15 (cessation day) throughout the programme.<br><br>The control group received a self-help booklet. The booklet contains general cessation information, a 48-day quit calendar, a 10-day quit log, the telephone number of the national quit-line and links</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Brendryen, Håvar, and Pål Kraft. "Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention." Addiction 103.3 (2008): 478-484.** | |
| **Study name** | Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention | |
| | | to relevant and open on-line tobacco cessation resources. |
| | **Procedures used** | The intervention programme consisted of more than 400 contacts by e-mail, web-pages, interactive voice response (IVR) and short message service (SMS) technology.<br><br>Participants in the booklet group were told that they would receive a booklet published by the Norwegian Directorate for Health and Social Affairs, and were encouraged to read the booklet thoroughly prior to the<br>cessation date.<br><br>Prior to the quitting date, all participants in both groups received a sample packet of NRT products. Free supply of NRT, however, was part of the recruitment<br>Inducement.<br>Data were collected by means of web-based questionnaires at the baseline and at 1, 3, 6 and 12 months post-cessation. An e-mail containing a link to the questionnaire was sent to the subjects. Two subsequent e-mail reminders were sent to non-responders. Finally, telephone interviews were performed with non-responders |
| | **Provider** | |
| | **Digital platform** | Internet and cell phone |
| | **Location** | |
| | **Duration** | 54 weeks |
| | **Intensity** | Until week 11 the intervention has multiple daily contact points and is highly intensive, but from week 11 onwards the intervention switches to a markedly lower intensity. |
| | **Tailoring/adaptation** | Not reported |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | 1,3,6 and 12 months | |
| **Data collection** | Abstinence was defined as ‘not even a puff of smoke, for the last 7 days’, and assessed by means of internet surveys or telephone interviews. Data on abstinence was based on self-report.<br>The main outcome in this trial was repeated point abstinence at 1, 3, 6 and 12 months post-cessation. | |

<table>
<tr><td>Bibliographic reference/s</td><td>Brendryen, Håvar, and Pål Kraft. "Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention." Addiction 103.3 (2008): 478-484.</td></tr>
<tr><td>Study name</td><td>Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention</td></tr>
<tr><td></td><td>Nicotine dependence was assessed by the Fagerström Test for Nicotine Dependence (FTND).<br><br>Smoking cessation self-efficacy (SE) was assessed at baseline and at 1 month post-cessation with two items rated on seven-point scales.</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td>Abstinence rates across conditions at specified time-points.<br><br>
<table>
<tr><td></td><td>Treatment n=197</td><td>Control n=199</td><td></td><td></td></tr>
<tr><td>Time post-cessation</td><td>N (%)</td><td>N(%)</td><td>OR (95% CI)</td><td>P value</td></tr>
<tr><td>6 months</td><td>73 (37.1)</td><td>43 (21.6)</td><td>2.14 (1.37–3.33)</td><td>0.001</td></tr>
<tr><td>12 months</td><td>74 (37.6)</td><td>48 (24.1)</td><td>1.89 (1.23-2.92)</td><td>0.005</td></tr>
</table>
Abstinence was based on 7-day point prevalence (intent-to-treat). OR: odds ratio; CI: confidence interval.<br><br>A complete case analysis showed the repeated point abstinence rate at 12 months to be 25.4% (treatment) versus 15.5% (control), respectively; c2 = 4.58, OR = 1.86, CI: 1.08–3.20, P = 0.03<br><br>Mean number of active client actions for three components of Happy Ending
<table>
<tr><td>Active client action</td><td>Range</td><td>Mean</td><td>SD</td><td>%</td></tr>
<tr><td>Log on call</td><td>0–42</td><td>30</td><td>16</td><td>71.4</td></tr>
<tr><td>Opening web pages</td><td>0–44</td><td>30</td><td>13</td><td>68.2</td></tr>
<tr><td>Responding to log-off call</td><td>0–104</td><td>69</td><td>35</td><td>66.3</td></tr>
</table>
Computerized logging routines revealed that to a large extent, subjects in the treatment condition adhered to the intended programme.</td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>As above</td></tr>
<tr><td>Statistical Analysis</td><td>Applying the intent-to-treat principle, x2 tests for experimental conditions were carried out to detect treatment effect. The moderating role of baseline characteristics on abstinence was investigated using logistic regression.</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Brendryen, Håvar, and Pål Kraft. "Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention." Addiction 103.3 (2008): 478-484.** | | |
| **Study name** | Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention | | |
| | A x2 test was employed to test whether there was a higher proportion of NRT users in the treatment versus the control condition. Moreover, t-tests were used to test for differences in NRT adherence and self-efficacy changes between conditions.<br>Hierarchical logistic regression was applied to test whether NRT adherence or self-efficacy change mediated the effect from experimental condition on abstinence. | | |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** | | |
| | **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
| | Risk of bias arising from the randomisation process | Low risk | Random allocation (Computer-generated random digit). Concealment- Centralised system used. No significant differences at baseline. |
| | Risk of bias due to deviations from intended interventions (assignment) | Some concerns | Participants were informed about the intervention they were about to receive. No further information for blinding.<br><br>Were there deviations from the intended intervention that arose because of experimental context? If so, were the deviations balanced? If not, are they likely to have affected the outcome?<br>Was the effect of *assignment* to the intervention analysed If not, was there potential for a substantial impact on the result of the failure to do this? |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | To a large extent, subjects in the treatment condition adhered to the intended programme. |
| | Missing outcome data | Low risk | 4 participants excluded from analysis due to erroneous allocation. Response rates were generally high. Participants were included in an ITT analysis. |
| | Risk of bias in measurement of the outcome | Some concerns | Outcome based on self- report (Subjective outcome assessment may be affected by knowledge of intervention received). |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Brendryen, Håvar, and Pål Kraft. "Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention." Addiction 103.3 (2008): 478-484.** | | |
| **Study name** | Happy Ending: a randomized controlled trial of a digital multi-media smoking cessation intervention | | |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | | | |
| **Comments** | Generalizability is a main concern with this trial, due to recruitment by self-selection. Additionally, NRT being part of recruitment inducement may have influenced the representativeness of this sample.<br>The results from that trial may apply only to smokers willing to use NRT | | |
| **Additional references** | | | |

| **Behaviour change techniques (16 theoretical clusters)** | | |
|---|---|---|
| | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | x |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

***Internet and cell phone- based intervention***

**Brendryen 2008**

<table>
<tr><td>Bibliographic reference/s</td><td colspan="3">Brendryen, Håvar, Filip Drozd, and Pål Kraft. "A digital smoking cessation program delivered through internet and cell phone without nicotine replacement (happy ending): randomized controlled trial." Journal of medical Internet research 10.5 (2008): e51.</td></tr>
<tr><td>Study name</td><td colspan="3">A Digital Smoking Cessation Program Delivered Through Internet<br>and Cell Phone Without Nicotine Replacement (Happy Ending): Randomized Controlled Trial</td></tr>
<tr><td>Registration</td><td colspan="3"></td></tr>
<tr><td>Study type</td><td colspan="3">Two armed RCT</td></tr>
<tr><td>Study dates</td><td colspan="3">Participants recruited from February 6 to 10, 2006.</td></tr>
<tr><td>Objective</td><td colspan="3">The objectives were to describe the rationale for the design of HE, to assess the 12-month efficacy of HE in a sample of smokers willing to attempt to quit without the use of nicotine replacement therapy, and to explore the potential effect of HE on coping planning and self-efficacy (prior to quitting) and whether coping planning and self-efficacy mediate treatment effect.</td></tr>
<tr><td>Country/ Setting</td><td colspan="3">Europe (Norway)</td></tr>
<tr><td>Number of participants / clusters</td><td colspan="3">A total of 290 participants received either the HE intervention (n=144) or the control booklet (n=146)<br>Adequate power</td></tr>
<tr><td>Attrition</td><td colspan="3">427 subjects assessed for eligibility. Of those 290 were included. (seven subjects were excluded randomly because the required number of participants was 296 (according to a power analysis)</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="3"><table><tr><td></td><td>Intervention (n=144)</td><td>Control (n=146)</td></tr><tr><td>Age (years)</td><td>39.5 ± 11.0</td><td>39.7 ± 10.8</td></tr><tr><td>Gender (% female)</td><td>72 (50)</td><td>73 (50)</td></tr><tr><td>Cigarettes smoked per day</td><td>16.6 ± 7.2</td><td>17.6 ± 7.0</td></tr></table></td></tr>
<tr><td>Method of allocation</td><td colspan="3">Based on computer-generated random digits, people were allocated randomly to either the Happy Ending intervention (HE group) or control condition (booklet group). Stratified block randomization was applied to ensure equal numbers of both males and females in each group.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="3">Inclusion criteria were willingness to quit on a prescribed day without using nicotine replacement and being aged 18 years or older.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="3">Not reported</td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td colspan="2">Details</td></tr>
<tr><td></td><td>Brief Name</td><td colspan="2">Happy Ending</td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td colspan="2">Fully automated and digitally delivered intervention.<br>Principles from cognitive<br>behavioral therapy. Main ingredient of the program is to educate the participants<br>about the cognitive, affective, and behavioral reactions. Focused on self- efficacy.</td></tr>
<tr><td></td><td>Materials used</td><td colspan="2">Every morning, the client receives an email containing a hyperlink. By activating</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Brendryen, Håvar, Filip Drozd, and Pål Kraft. "A digital smoking cessation program delivered through internet and cell phone without nicotine replacement (happy ending): randomized controlled trial." Journal of medical Internet research 10.5 (2008): e51.** | |
| **Study name** | A Digital Smoking Cessation Program Delivered Through Internet and Cell Phone Without Nicotine Replacement (Happy Ending): Randomized Controlled Trial | |
| | | **the link, the smoker has access to that particular day's website.**<br><br>Early in the morning, the user receives an e-mail with instructions to open the day's web page. Each day for 6 weeks, the client opens a web page that is unique to that particular programme day. By means of cell-phone, the user receives one pre-recorded audio message, and up to three text messages throughout each day. The audio message is received when the client logs on to the programme in the morning, by calling an interactive voice response (IVR) service. Each evening the client receives a proactive log-off call, which asks whether or not they have been smoking. If the user does not log on to the programme or answers the log-off call, they will receive a reminder call, and up to two reminder text messages. The programme also includes a craving helpline. The helpline is IVR-based and is available 24 hours a day from day 15 (cessation day) throughout the programme.<br><br>**In addition to the website, the participants stay in touch with HE via short message service (SMS) text messaging and interactive voice response (IVR).**<br><br>**The control group received a 44 page self-help booklet. The booklet contains general cessation information, a 48-day quit calendar, a 10-day quit log, the telephone number of the national quit-line and links to relevant and open on-line tobacco cessation resources.** |
| | **Procedures used** | **The treatment group received the digital multimedia intervention.**<br>The intervention programme consisted of more than 400 contacts by e-mail, web-pages, interactive voice response (IVR) and short message service (SMS) technology. |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Brendryen, Håvar, Filip Drozd, and Pål Kraft. "A digital smoking cessation program delivered through internet and cell phone without nicotine replacement (happy ending): randomized controlled trial." Journal of medical Internet research 10.5 (2008): e51.** | |
| **Study name** | A Digital Smoking Cessation Program Delivered Through Internet and Cell Phone Without Nicotine Replacement (Happy Ending): Randomized Controlled Trial | |
| | | **Participants in the booklet group were told that they would receive a booklet published by the Norwegian Directorate for Health and Social Affairs.**<br><br>Prior to the quitting date, all participants in both groups received a sample packet of NRT products. Free supply of NRT, however, was part of the recruitment<br>Inducement.<br>Data were collected by means of web-based questionnaires at the baseline and at 1, 3, 6 and 12 months post-cessation. An e-mail containing a link to the questionnaire was sent to the subjects. Two subsequent e-mail reminders were sent to non-responders. Finally, telephone interviews were performed with non-responders |
| | **Provider** | |
| | **Digital platform** | Internet and cell phone |
| | **Location** | |
| | **Duration** | 54 weeks |
| | **Intensity** | The IVR messages are received every morning in the active quitting phase when the client logs on to the program by calling<br>HE. |
| | **Tailoring/adaptation** | Not reported |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | **1,3,6 and 12 months** | |
| **Data collection** | Abstinence was defined as having been completely smoke-free for the past 7 days. Abstinence data were based on self-reports with no biochemical verification and were assessed at 1, 3, 6, and 12 months after cessation.<br><br>The main outcome in this trial was repeated point abstinence at 1, 3, 6 and 12 months post-cessation.<br><br>Nicotine dependence was assessed by the Fagerström Test for Nicotine Dependence (FTND).<br><br>Coping planning refers to behavioural and cognitive strategies used to connect anticipated barriers with suitable coping responses | |

<table>
<tr><td>Bibliographic reference/s</td><td>Brendryen, Håvar, Filip Drozd, and Pål Kraft. "A digital smoking cessation program delivered through internet and cell phone without nicotine replacement (happy ending): randomized controlled trial." Journal of medical Internet research 10.5 (2008): e51.</td></tr>
<tr><td>Study name</td><td>A Digital Smoking Cessation Program Delivered Through Internet and Cell Phone Without Nicotine Replacement (Happy Ending): Randomized Controlled Trial</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td>Point abstinence and repeated point abstinence rates across conditions at specified time points
<table>
<tr><td>Time After Cessation</td><td>Intervention n=144</td><td>Control n=146</td><td></td><td></td></tr>
<tr><td>Point abstinence*</td><td>N (%)</td><td>N (%)</td><td>OR (95% CI)</td><td>P value</td></tr>
<tr><td>6 months</td><td>42 (29)</td><td>20 (14)</td><td>2.59 (1.43–4.69)</td><td>0.002</td></tr>
<tr><td>12 months</td><td>47 (33)</td><td>33 (23)</td><td>1.66 (0.99-2.79)</td><td>0.07</td></tr>
<tr><td>Repeated point abstinence</td><td></td><td></td><td></td><td></td></tr>
<tr><td>6 months</td><td>34 (24)</td><td>10 (7)</td><td>4.24 (1.99-8.89)</td><td>0.001</td></tr>
<tr><td>12 months</td><td>29 (20)</td><td>10 (7)</td><td>3.43 (1.60-7.34)</td><td>0.002</td></tr>
</table>
*Point abstinence was based on 7-day point prevalence and intent-to-treat.<br><br>Mean number of active client actions for three components of HE (n = 144).
<table>
<tr><td>Active client action</td><td>Range</td><td>Mean</td><td>SD</td><td>%</td></tr>
<tr><td>Log on call</td><td>0–42</td><td>26</td><td>16</td><td>62</td></tr>
<tr><td>Opening web pages</td><td>0–44</td><td>26</td><td>13</td><td>59</td></tr>
<tr><td>Responding to log-off call</td><td>0–102</td><td>53</td><td>37</td><td>52</td></tr>
</table></td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>As above</td></tr>
<tr><td>Statistical Analysis</td><td>To check for differences between experimental conditions at baseline, t tests were used for scales and chi-square tests were performed for categorical data.<br>All chi-square tests based on 2 x 2 contingency tables were applied the Yates continuity correction. Outcomes were examined using the intent-to-treat principle.<br><br>Hierarchical logistic regression was applied to test whether NRT adherence or self-efficacy change mediated the effect from experimental condition on abstinence.</td></tr>
<tr><td>Risk of bias (ROB)<br>Overall ROB</td><td>Outcome name
<table>
<tr><td>Outcome</td><td>Judgement (Low / High / some concerns)</td><td>Comments</td></tr>
</table></td></tr>
</table>

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Brendryen, Håvar, Filip Drozd, and Pål Kraft. "A digital smoking cessation program delivered through internet and cell phone without nicotine replacement (happy ending): randomized controlled trial." Journal of medical Internet research 10.5 (2008): e51.** | | |
| **Study name** | A Digital Smoking Cessation Program Delivered Through Internet and Cell Phone Without Nicotine Replacement (Happy Ending): Randomized Controlled Trial | | |
| | Risk of bias arising from the randomisation process | Low risk | Randomization present by computer. Stratified block randomization was applied to ensure equal numbers of both males and females in each group. Concealed as centralised system was used. No significant baseline differences. |
| | Risk of bias due to deviations from intended interventions (assignment) | Low risk | Information on the type of treatment provided to the other group was withheld for subjects in both experimental conditions. |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | No information on deviations from intended interventions |
| | Missing outcome data | Low risk | The response attrition rate was low in this trial. At follow ups, 57 discontinued intervention and none of the control group. Generally high response rates across groups. All randomised participants were included in ITT analysis |
| | Risk of bias in measurement of the outcome | Some concerns | Outcome based on self- report (Subjective outcome assessment may be affected by knowledge of intervention received). |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | | | |
| **Comments** | Selective attrition was not a problem for interpretation of 12-month repeated point abstinence. This trial could not biochemically verify self-reported claims of abstinence.This trial significantly adds to the generalizability of the findings; as findings now apply to both NRT users and nonusers. However, generalizability may still be a concern because of recruitment by self-selection. | | |
| **Additional references** | | | |
| **Behaviour change techniques (16** | Scheduled consequences | | |
| | Reward and threat | | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Brendryen, Håvar, Filip Drozd, and Pål Kraft. "A digital smoking cessation program delivered through internet and cell phone without nicotine replacement (happy ending): randomized controlled trial." Journal of medical Internet research 10.5 (2008): e51.** | |
| **Study name** | A Digital Smoking Cessation Program Delivered Through Internet and Cell Phone Without Nicotine Replacement (Happy Ending): Randomized Controlled Trial | |
| **theoretical clusters)** | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | x |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | x |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

**Skov-Ettrup 2016**

***Internet and text-message- based intervention***

| | |
|---|---|
| **Bibliographic reference/s** | **Skov-Ettrup LS, Dalum P, Bech M, Tolstrup JS. The effectiveness of telephone counselling and internet-and text-message-based support for smoking cessation: results from a randomized controlled trial. Addiction. 2016 Jul;111(7):1257-66.** |
| **Study name** | The effectiveness of telephone counselling and internet and text-message-based support for smoking cessation: results from a randomized controlled trial. |
| **Registration** | NCT01487642 (Clinicaltrials.gov). |
| **Study type** | RCT with equal allocation to four groups. |
| **Study dates** | Participants were enrolled from August to October 2011. Follow-up was completed in January 2013. |
| **Objective** | To compare the effectiveness and cost-effectiveness of proactive telephone counselling, reactive telephone counselling, an internet- and text-message based smoking cessation program with a self-help booklet. |
| **Country/ Setting** | Denmark |
| **Number of participants / clusters** | 1810 people were included in this study.<br>With a power of 80% and a 5% significance level, 245 people were needed in each group to detect a difference. |
| **Attrition** | In total, 3474 people responded to the invitation, of these, 1810 were included and allocated to: proactive telephone counselling (n=452), reactive telephone counselling (n=453), internet based program (n=453), booklet (n=452) |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">Skov-Ettrup LS, Dalum P, Bech M, Tolstrup JS. The effectiveness of telephone counselling and internet-and text-message-based support for smoking cessation: results from a randomized controlled trial. Addiction. 2016 Jul;111(7):1257-66.</td></tr>
<tr><td>Study name</td><td colspan="2">The effectiveness of telephone counselling and internet and text-message-based support for smoking cessation: results from a randomized controlled trial.</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="2">Baseline Characteristics for the Modified Intent-to-Treat Sample for Mobile Mindfulness Training With Experience Sampling (MMT-ES) or Experience Sampling-Only (ES)
<table>
<tr><td></td><td>Intervention (E-quit)</td><td>Control (self-help booklet)</td></tr>
<tr><td>Gender (Female)</td><td>58.7</td><td>57.4</td></tr>
<tr><td>Age, median (IQR)</td><td>52 (42–59)</td><td>53 (41–62)</td></tr>
<tr><td>Cigarettes/day, median</td><td>15 (10–20)</td><td>15 (10–20)</td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td colspan="2">Participants were allocated to the four groups by applying a fixed sequence of four numbers repeatedly, as participants were enrolled while the person performing the allocation was blinded to names and ID numbers. This method is not truly random.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="2">Eligibility criteria were daily cigarette smoking, age ≥ 16 years, having a mobile phone and e-mail address.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="2">Not reported.</td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td>Details</td></tr>
<tr><td></td><td>Brief Name</td><td>Internet- and text-message-based smoking cessation program (e-quit)</td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td>Self-Regulation<br>Theory, the Transtheoretical Model, Social<br>Cognitive Theory and Appreciative Inquiry.</td></tr>
<tr><td></td><td>Materials used</td><td>The website included the following<br>components:<br>• My page: mailed feedback according to quit date and overview of program components<br>• Video of the day: a video of a person at the same stage of the smoking cessation process<br>• Exercises: text- and image-based exercises for increasing motivation and identifying coping strategies. The<br>Fagerström Test for Nicotine Dependence is available with tailored feedback. Pharmacotherapy is encouraged<br>for those with high nicotine dependence<br>• Blog: users can make a blog as well as read and comment other blogs<br>• Action plan: a tool for making individual coping strategies for difficult situations<br>• Urgent assistance: advice on how to handle craving<br>• The library: information about smoking and health</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Skov-Ettrup LS, Dalum P, Bech M, Tolstrup JS. The effectiveness of telephone counselling and internet-and text-message-based support for smoking cessation: results from a randomized controlled trial. Addiction. 2016 Jul;111(7):1257-66.** | |
| **Study name** | The effectiveness of telephone counselling and internet and text-message-based support for smoking cessation: results from a randomized controlled trial. | |
| | | E-mails and text messages from e-quit were optional. |
| | **Procedures used** | Intervention: Participants received a link to the e-quit program and were encouraged to sign up. The program is inspired by Self-Regulation Theory, the Transtheoretical Model, Social Cognitive Theory and Appreciative Inquiry. When signing up for the program, all users answered the Wisconsin Inventory of Smoking Dependence Motives (WISDM-68) followed by a tailored feedback letter.<br><br>Control group: participants received a 36-page self-help booklet by letter. It is included advice on how to identify difficult situations and develop coping strategies at specific stages in the smoking cessation process. Setting a quit date was encouraged. The Fagerström Test for Nicotine Dependence was also included along with information about pharmacotherapy. |
| | **Provider** | |
| | **Digital platform** | Online |
| | **Location** | |
| | **Duration** | |
| | **Intensity** | Users opting for text message support could receive up to 118 text messages during their quit attempt, with the highest intensity around the quit date. |
| | **Tailoring/adaptation** | e-mails and text messages were tailored according to a chosen quit date, preferred coping strategies and the answers from the WISDM-68. |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | |
| **Follow up** | 1,6 and 12 months | |
| **Data collection** | The primary outcome reported here is prolonged self-reported abstinence for 12 months after the intervention period.<br>Secondary outcome measures were prolonged abstinence for 6 months and 30-day point prevalence abstinence (p.p.a.) at 1-, 6- and 12-month follow-up.<br><br>The study was designed originally with 30- day p.p.a. as the primary outcome. This change was due to a request by the journal to apply Russell Standard criteria for outcomes in smoking cessation trials | |

<table>
<tr><td>Bibliographic reference/s</td><td>Skov-Ettrup LS, Dalum P, Bech M, Tolstrup JS. The effectiveness of telephone counselling and internet-and text-message-based support for smoking cessation: results from a randomized controlled trial. Addiction. 2016 Jul;111(7):1257-66.</td></tr>
<tr><td>Study name</td><td>The effectiveness of telephone counselling and internet and text-message-based support for smoking cessation: results from a randomized controlled trial.</td></tr>
<tr><td></td><td>Prolonged abstinence was defined as having been abstinent since the end of the intervention period.</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td>Thirty-day point prevalence abstinence (p.p.a.) (%) and prolonged abstinence (%) in groups allocated to proactive telephone counselling, reactive telephone counselling, e-quit program and self-help booklet. Between-group comparisons odds ratio (OR) [95% confidence interval (CI)] in intention-to-treat (ITT) (n = 1809) and responder-only samples.
<table>
<tr><td></td><td colspan="2">abstinence</td><td>Comparison to self-help booklet group OR[d] (95% CI) and P-values[e]</td></tr>
<tr><td></td><td>E-quit</td><td>Self-help booklet</td><td>E-quit</td></tr>
<tr><td>6 months prolonged abstinence</td><td></td><td></td><td></td></tr>
<tr><td>ITT[b]<br>ITT[c]</td><td>6.6<br>8.3</td><td>4.2<br>5.4</td><td><br>1.7 (0.9–3.0), p= 0.16<br>1.6 (0.9–2.9) 0.17</td></tr>
<tr><td>30-day p.p.a.<br>ITT[b]<br>ITT[c]</td><td>11.5<br>13.5</td><td>8.7<br>10.7</td><td>1.4 (0.9–2.1),<br>p= 0.29<br>1.3 (0.8–2.0) 0.45</td></tr>
<tr><td>12 months prolonged abstinence</td><td></td><td></td><td></td></tr>
<tr><td>12 months prolonged abstinence<br>ITT[b]<br>ITT[c]</td><td>5.3<br>6.8</td><td>3.6<br>4.4</td><td>1.6 (0.8–3.0)<br>P= 0.18<br>1.6 (0.8–3.1) 0.16</td></tr>
<tr><td>30-day p.p.a.<br>ITT[b]<br>ITT[c]</td><td>15.5<br>19.7</td><td>17.5<br>19.9</td><td>0.9 (0.6–1.2) 0.66<br>1.0 (0.7–1.4) 1.00</td></tr>
</table>
bNon-responders assumed to be smokers. C Multiple imputation of smoking status. D Adjusted for age, sex, education and cigarettes/day e Adjusted for multiple comparisons using the Hochberg method.</td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>As above</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Skov-Ettrup LS, Dalum P, Bech M, Tolstrup JS. The effectiveness of telephone counselling and internet-and text-message-based support for smoking cessation: results from a randomized controlled trial. Addiction. 2016 Jul;111(7):1257-66.** | | |
| **Study name** | The effectiveness of telephone counselling and internet and text-message-based support for smoking cessation: results from a randomized controlled trial. | | |
| **Statistical Analysis** | Logistic regression was used for between-group comparisons.<br>In intention-to-treat analysis, we used two approaches to handle missing information about smoking status: (1) assuming that non-responders are smokers in accordance with the Russell standard and (2) multiple imputation by chained equations (m = 20 imputations) using mi impute in Stata version 13.1.<br><br>Subgroup analysis (sex, age, education) was performed using the 30-day p.p.a. outcome at 12-month follow-up and included likelihood ratio test for interaction and stratified logistic regression. | | |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** | | |
| | **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
| | Risk of bias arising from the randomisation process | High risk | Participants were allocated to the four groups by applying a fixed sequence of four numbers repeatedly, as participants were enrolled while the person performing the allocation was blinded to names and ID numbers. This method is not truly random. |
| | Risk of bias due to deviations from intended interventions (assignment) | Some concerns | People may be aware of their intervention. No information whether deviations from the intended intervention arose because of experimental content. Also, all interventions were freely available to anyone implying a risk of contamination |
| | Risk of bias due to deviations from intended interventions (adherence) | | Not applicable |
| | Missing outcome data | Low risk | The primary outcome was available for 80% of participants. |
| | Risk of bias in measurement of the outcome | Some concerns | Lack of biochemical validation of smoking abstinence is an important limitation which may have caused overestimation. Participants may be aware of the intervention received. |
| | Risk of bias in selection of the reported result | Low risk | Data does not appear to be reported based on results. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | High risk | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Skov-Ettrup LS, Dalum P, Bech M, Tolstrup JS. The effectiveness of telephone counselling and internet-and text-message-based support for smoking cessation: results from a randomized controlled trial. Addiction. 2016 Jul;111(7):1257-66.** | |
| **Study name** | The effectiveness of telephone counselling and internet and text-message-based support for smoking cessation: results from a randomized controlled trial. | |
| | **Other outcome details** | |
| **Source of funding** | Danish Cancer Society. | |
| **Comments** | Lack of biochemical validation of smoking abstinence is an important limitation which may have caused overestimation. | |
| **Additional references** | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | x |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

**Stanczyk 2016**

***Text and video messages- based intervention***

| | |
|---|---|
| **Bibliographic reference/s** | **Stanczyk NE, de Vries H, Candel MJ, Muris JW, Bolman CA. Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine. 2016 Jan 1;82:42-50.** |
| **Study name** | Effectiveness of video- versus text-based computer-tailored smoking cessation interventions among smokers after one year |
| **Registration** | - |
| **Study type** | RCT |
| **Study dates** | Respondents were recruited in the Netherlands from December 2010 until June 2012 to take part in the intervention. |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">Stanczyk NE, de Vries H, Candel MJ, Muris JW, Bolman CA. Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine. 2016 Jan 1;82:42-50.</td></tr>
<tr><td>Study name</td><td colspan="2">Effectiveness of video- versus text-based computer-tailored smoking cessation interventions among smokers after one year</td></tr>
<tr><td>Objective</td><td colspan="2">This study assessed the effectiveness of two CT smoking cessation interventions after twelve months: (1) a text-based multiple CT intervention providing tailored feedback via text-based messages and (2) a video-based multiple CT smoking cessation intervention providing tailored feedback via video messages.</td></tr>
<tr><td>Country/ Setting</td><td colspan="2">Netherlands</td></tr>
<tr><td>Number of participants / clusters</td><td colspan="2">2551 participants were included in this study and were allocated to: video condition(851), text condition (842), control (858). Number analysed: video condition (670), text condition (708), control condition (721)</td></tr>
<tr><td>Attrition</td><td colspan="2">During this study, 362 out of 670 (54.0%) respondents were followed-up after 12 months in the VC, versus 425 (60.0%) out of 708 in the TC and 422 (58.5%) out of 721 in the CC</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="2">Baseline characteristics by treatment group
<table>
<tr><td></td><td>Video (n=670)</td><td>Text (n = 203)</td><td>control (n = 721)</td></tr>
<tr><td>Gender (female) %</td><td>62.2</td><td>60.9</td><td>59.6</td></tr>
<tr><td>Age (mean, SD)</td><td>45.5 (13.0)</td><td>45.4 (12.8)</td><td>46.2 (12.5)</td></tr>
<tr><td>Number of cigarettes smoked per day; M (SD)</td><td>19.0 (8.1)</td><td>18.7 (8.4)</td><td>19.0 (9.2)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td colspan="2">Respondents were informed at the study website (before their decision to participate in the study, and before their online account registration and baseline measurement) that they would be randomly allocated to one of three conditions, of which one was the control condition. Respondents were not told about the content of the intervention conditions (video; text) and control condition (i.e. general advice on smoking cessation), nor to which group they would be allocated.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="2">Respondents were included in the study when they were daily smokers of 18 years or older, when they were motivated to quit smoking within the following six months and when they had access to the Internet.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="2">-</td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td>Details</td></tr>
<tr><td></td><td>Brief Name</td><td>-</td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td>The two web-based multiple computer-tailored smoking cessation interventions were based on two earlier tested computer-tailored interventions that have been shown to be effective</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Stanczyk NE, de Vries H, Candel MJ, Muris JW, Bolman CA. Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine. 2016 Jan 1;82:42-50.** | |
| **Study name** | Effectiveness of video- versus text-based computer-tailored smoking cessation interventions among smokers after one year | |
| | | The I-Change model formed the theoretical framework of the two interventions |
| | **Materials used** | |
| | **Procedures used** | Respondents who set their quit date within a month were directed to **routing 1,** which aimed to help smokers transform their intention to quit smoking into action (the actual quitting) by providing personalized feedback messages on issues facilitating this transformation. |
| | **Provider** | Text based messages and video messages. |
| | **Digital platform** | Respondents in the text condition received multiple tailored feedback via text-based messages (without any graphics or animations). In the video condition, exactly the same tailored messages were used by adults giving this information in video messages. Five adults delivered the tailored advices in a TV 'news program' format (see Figs. 2 and 3). The contents of the two interventions were exactly the same to test potential differences of the two delivery strategies (text-based messages vs. video-based messages). |
| | **Location** | - |
| | **Duration** | Routing 1 consisted of six different sessions. Respondents who were not ready to quit within one month were directed to routing 2, which including several sessions. |
| | **Intensity** | **Routing 1:** Session 1 was based on the baseline assessment and provided feedback on smoking behaviour, attitude, social influence and self-efficacy towards quitting, and included an invitation to choose a quit date. Session 2 was one week before their quit attempt and respondents received tailored feedback on their preparatory plans for their quit attempt, on their perceived self-efficacy to deal with difficult situations and on howto plan to copewith these situations |

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| **Bibliographic reference/s** | **Stanczyk NE, de Vries H, Candel MJ, Muris JW, Bolman CA. Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine. 2016 Jan 1;82:42-50.** | |
| **Study name** | Effectiveness of video- versus text-based computer-tailored smoking cessation interventions among smokers after one year | |
| | | (coping plans). Session 3 occurred three days after their quit attempt; respondents received feedback on their perceived self-efficacy to cope with difficult situations and feedback on their coping plans to prevent potential relapse. Sessions 4, 5 and 6 occurred two, four and eight weeks, respectively, after the quit date, in which respondents received tailored feedback on their perceived selfefficacy, on how to deal with difficult situations and on their attitude towards smoking, quitting smoking and how to maintain non-smoking. During these last three sessions, respondents could choose to receive feedback on different items. This option was provided since it was expected that they would encounter different problems during their quit attempt and thus to provide a greater depth of tailoring.<br>**Routing 2:** Session 1 occurred directly after baseline, and encouraged respondents to use the nextmonth to reflect on their motivation to quit smoking. Session 2 happened one month after baseline providing respondents tailored feedback on their smoking behavior, their attitude regarding smoking and quitting smoking, their perceived social support and their readiness to quit smoking; respondents ready to quit within a month were directed to routing 1. Session 3 occurred two months after baseline, and provided respondents not ready to quit similar feedback as used in session 2; respondents who were ready to quit within one month were directed to routing 1. Respondents at the end of this session not prepared to quit received a kind message, indicating that it was respected that they were not yet ready to quit smoking, and outlining that for them, the program ended at this stage in order to avoid unnecessary irritation (based on a pilot that preceded the final |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Stanczyk NE, de Vries H, Candel MJ, Muris JW, Bolman CA. Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine. 2016 Jan 1;82:42-50.** | |
| **Study name** | Effectiveness of video- versus text-based computer-tailored smoking cessation interventions among smokers after one year | |
| | | **program).** |
| | **Tailoring/adaptation** | After filling out the baseline measurement, respondents received tailored feed Back on their smoking behavior, attitude, perceived social influence, perceived self-efficacy and several preparatory action plans to effectively plan their quit date. The personal information was gathered by means of the individual's answers to a questionnaire about his or her smoking behaviour, beliefs, social support and motivation to change. Depending on respondents' readiness to quit smoking within the following month, they received personalized feedback during multiple compute rtailored sessions and were directed into one of two routings **(Routing 1 and Routing 2).** |
| | **Planned treatment fidelity** | - |
| | **Actual treatment fidelity** | - |
| | **Other details** | - |
| **Follow up** | 12 months | |
| **Data collection** | At twelve months of follow-up, prolonged abstinence was the main outcome and was measured by asking respondents whether they refrained from smoking (allowing for a two-week grace period during which the respondent could smoke one to five cigarettes) since their last quit attempt twelve months ago (0 = no or 1 = yes; self-report). The question was: Have you smoked since your last quit attempt? Those who reported that they had quit less than nine months before the follow-up were regarded as smokers This was done since smokers had the possibility to quit smoking within the intervention period (three months) (Moore, 2000). For secondary analyses, seven-day point prevalence abstinence was assessed by one item asking respondents whether they had refrained from smoking during the last seven days (0 = no or 1 = yes). Seven-day point prevalence was defined as not having smoked during the last seven days (measured from follow-up after twelve months).<br>Respondents who indicated that they had quit smoking after twelve months (n = 167) of follow-up were invited to biochemically validate their self-reported smoking status. NicAlert® test strips were used to measure cotinine in saliva. A cutoff point of ≥2 for saliva indicated that respondents still smoked tobacco (Marrone et al., 2011). Sixty-two respondents (37%) completed the test and sent it back by mail to the research team. In 95.2% (N = 59) the cotinine assessment verified the non-smoking | |

<table>
<tr><td>Bibliographic reference/s</td><td>Stanczyk NE, de Vries H, Candel MJ, Muris JW, Bolman CA. Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine. 2016 Jan 1;82:42-50.</td></tr>
<tr><td>Study name</td><td>Effectiveness of video- versus text-based computer-tailored smoking cessation interventions among smokers after one year</td></tr>
<tr><td></td><td>status. In 4.8% (N=3), cotinine was detected. Smoking status of these respondents<br>was changed to ‘smoker.’</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td>Twelve- month prolonged abstinence<br><table><tr><td></td><td>video</td><td>control</td></tr><tr><td>Prolonged abstinence</td><td>66</td><td>46</td></tr><tr><td></td><td>604</td><td>675</td></tr><tr><td>Total</td><td>670</td><td>721</td></tr></table><br><table><tr><td></td><td>text</td><td>control</td></tr><tr><td>Prolonged abstinence</td><td>52</td><td>46</td></tr><tr><td></td><td>656</td><td>675</td></tr><tr><td>Total</td><td>708</td><td>721</td></tr></table></td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td>As above</td></tr>
<tr><td>Statistical Analysis</td><td>First, descriptive analyses were performed to test for significant differences between the three conditions. We used Chi-square tests for categorical variables with Bonferroni post hoc comparisons (alpha=.05/3=.017) and analyses of variance (ANOVA) for continuous variables with Tukey’s HSD (honestly significant difference) post hoc comparisons.<br>Second, in order to detect possible dropout at twelvemonths followup, logistic regression was used, including baseline factors and group assignment as predictors. All significant baseline differences and predictors of dropoutwere included in all effect analyses that are explained in the following part.<br>Third, logistic regression analyseswere performed to investigate the effectiveness of the intervention on prolonged abstinence after twelve months of follow-up, including all respondents who met inclusion criteria.<br><br>(intention to treat (ITT)), analysis was also conducted.</td></tr>
<tr><td>Risk of bias (ROB)<br>Overall ROB</td><td>Outcome name<br><table><tr><th>Outcome</th><th>Judgement (Low / High / some concerns)</th><th>Comments</th></tr></table></td></tr>
</table>

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Stanczyk NE, de Vries H, Candel MJ, Muris JW, Bolman CA. Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine. 2016 Jan 1;82:42-50.** | | |
| **Study name** | Effectiveness of video- versus text-based computer-tailored smoking cessation interventions among smokers after one year | | |
| | Risk of bias arising from the randomisation process | Low risk | Randomisation present. No information on blinding but respondents did not know to which group they had been allocated and had no information about the content of both experimental conditions. No significant differences in baseline characteristics. |
| | Risk of bias due to deviations from intended interventions (assignment) | Low risk | No deviations from intended intervention specified. |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | Not applicable |
| | Missing outcome data | Some concerns | Considerable dropout rates (over 50%) for each condition at 12 months follow up. |
| | Risk of bias in measurement of the outcome | Some concerns | Subjective outcome assessment, although biochemical validation in 37% of subjects. At home (not done by study assessors) It is conceivable that self-reports in respondents who did not undergo the test may not have been completely accurate, which may have led to some overestimation of quit rates. |
| | Risk of bias in selection of the reported result | Some concerns | Results not presented according to measurement used (self-report or biochemically validated measures) |
| | Other sources of bias | - | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Stanczyk NE, de Vries H, Candel MJ, Muris JW, Bolman CA. Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine. 2016 Jan 1;82:42-50.** | |
| **Study name** | Effectiveness of video- versus text-based computer-tailored smoking cessation interventions among smokers after one year | |
| | **Overall Risk of Bias** | Some concerns |
| | **Other outcome details** | |
| **Source of funding** | the National Institute for Health Research (NIHR) under the Programme Grants for Applied Research programme (RP-PG-0109-10 020). | |
| **Comments** | Those enrolling participants were blind to treatment allocations and abstinence was biochemically validated. Additionally, researchers collecting outcome data were, where possible, blind to treatment allocations, so outcome ascertainment bias was minimized. | |
| **Additional references** | | |
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | x |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | |
| | Self-belief | x |
| | Comparison of outcomes | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

**Whittaker 2011**

***Video and text messages -based intervention***

| | |
|---|---|
| **Bibliographic reference/s** | **Whittaker R, Dorey E, Bramley D, Bullen C, Denny S, Elley CR, Maddison R, McRobbie H, Parag V, Rodgers A, Salmon P. A theory-based video messaging mobile phone intervention for smoking cessation: randomized controlled trial. Journal of medical Internet research. 2011;13(1):e10.** |
| **Study name** | A Theory-Based Video Messaging Mobile Phone Intervention for Smoking Cessation: Randomized Controlled Trial |
| **Registration** | |
| **Study type** | Single blinded RCT. |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="3">Whittaker R, Dorey E, Bramley D, Bullen C, Denny S, Elley CR, Maddison R, McRobbie H, Parag V, Rodgers A, Salmon P. A theory-based video messaging mobile phone intervention for smoking cessation: randomized controlled trial. Journal of medical Internet research. 2011;13(1):e10.</td></tr>
<tr><td>Study name</td><td colspan="3">A Theory-Based Video Messaging Mobile Phone Intervention for Smoking Cessation: Randomized Controlled Trial</td></tr>
<tr><td>Study dates</td><td colspan="3">November 2007 and August 2009</td></tr>
<tr><td>Objective</td><td colspan="3">The objective of this study was to assess the effectiveness of a multimedia mobile phone intervention for smoking cessation.</td></tr>
<tr><td>Country/ Setting</td><td colspan="3">New Zealand</td></tr>
<tr><td>Number of participants / clusters</td><td colspan="3">226 participants (intervention=110), control (n=116).<br>A sample size of 1300 participants was calculated to be adequate in order to detect 90% power at P = .05</td></tr>
<tr><td>Attrition</td><td colspan="3">Not reported</td></tr>
<tr><td>Participant /community characteristics.</td><td colspan="3">Baseline characteristics of randomized participants, n (%)[a]<br><br>
<table>
<tr><td></td><td>Intervention (n=110)</td><td>Control (n=116)</td></tr>
<tr><td>Mean (SD) age, years</td><td>27.5 (9.5)</td><td>26.6 (7.8)</td></tr>
<tr><td>Female</td><td>58 (52.7)</td><td>49 (42.2)</td></tr>
<tr><td>Ethnicity<br>• New Zealand European<br>• Maori<br>• Pacific<br>• Asian<br>• Other<br>• Missing</td><td><br>55 (50.0)<br>24 (21.8)<br>12 (10.9)<br>10 (9.1)<br>6 (5.5)<br>3 (2.7)</td><td><br>63 (54.3)<br>30 (25.9)<br>5 (4.3)<br>13 (11.2)<br>5 (4.3)<br>0 (0)</td></tr>
</table></td></tr>
<tr><td>Method of allocation</td><td colspan="3">Participants were aware of which group they were allocated to.<br>Computer randomization allocated participants to an intervention or control group, using stratified minimization for age, ethnicity, and level of nicotine dependence.</td></tr>
<tr><td>Inclusion criteria</td><td colspan="3">Participants were eligible if they were at least 16 years of age, smoked daily, and wanted to quit. Participants were required to have a mobile phone that was capable of receiving video messages.</td></tr>
<tr><td>Exclusion criteria</td><td colspan="3">Not reported</td></tr>
<tr><td>Intervention</td><td>TIDieR Checklist criteria</td><td>Details</td></tr>
<tr><td></td><td>Brief Name</td><td></td></tr>
<tr><td></td><td>Rationale/theory/Goal</td><td>Social cognitive theory</td></tr>
<tr><td></td><td>Materials used</td><td>The intervention group received an automated package of video and text messages over 6 months that was tailored to self-selected quit date, role model, and timing of messages. Extra messages were</td></tr>
</table>

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Whittaker R, Dorey E, Bramley D, Bullen C, Denny S, Elley CR, Maddison R, McRobbie H, Parag V, Rodgers A, Salmon P. A theory-based video messaging mobile phone intervention for smoking cessation: randomized controlled trial. Journal of medical Internet research. 2011;13(1):e10.** | |
| **Study name** | A Theory-Based Video Messaging Mobile Phone Intervention for Smoking Cessation: Randomized Controlled Trial | |
| | | available on demand to beat cravings and address lapses.<br>Additional website for intervention group participants to review video messages they had been sent (and rate them if desired), change their selected time periods and change (or add to) their selected role model.<br><br>The control group also set a quit date and received a general health video message sent to their phone every 2 weeks. |
| | **Procedures used** | The video messages were sent as a text message with a universal resource locator (URL) address in the text. Participants highlighted the URL to trigger automatic downloading and playing of the video on the phone.<br><br>The video messages were filmed as video diaries during a quit attempt, with the role models discussing issues they had found difficult and the techniques and coping strategies they used to remain smoke-free. These vignettes were based on the role model's own story (all six role models were ex-smokers), plus theory and evidence-based behavior change techniques usually taught in cessation counselling (such as setting goals, being reminded of reasons for quitting, identifying triggers and cues to smoking, planning to manage or avoid triggers and cues, receiving positive reinforcement, and using social support).<br>Intervention group participants could also ask for extra support messages on demand by texting keywords to the study short code (four-digit number). |
| | **Provider** | |
| | **Digital platform** | |
| | **Location** | |
| | **Duration** | 6 months |
| | **Intensity** | Frequency of messages varied from 1/day in the lead up to QD, 2/day from QD for 4 weeks, then reducing to 1 every 2 days for 2 weeks and then 1 every 4 days for about 20 weeks until 6 months after randomisation. |
| | **Tailoring/adaptation** | video and text messages were tailored to self-selected quit date, role model, and timing of messages. |

<table>
<tr><td>Bibliographic reference/s</td><td colspan="2">Whittaker R, Dorey E, Bramley D, Bullen C, Denny S, Elley CR, Maddison R, McRobbie H, Parag V, Rodgers A, Salmon P. A theory-based video messaging mobile phone intervention for smoking cessation: randomized controlled trial. Journal of medical Internet research. 2011;13(1):e10.</td></tr>
<tr><td>Study name</td><td colspan="2">A Theory-Based Video Messaging Mobile Phone Intervention for Smoking Cessation: Randomized Controlled Trial</td></tr>
<tr><td rowspan="3"></td><td>Planned treatment fidelity</td><td>-</td></tr>
<tr><td>Actual treatment fidelity</td><td>-</td></tr>
<tr><td>Other details</td><td>-</td></tr>
<tr><td>Follow up</td><td colspan="2">6 months</td></tr>
<tr><td>Data collection</td><td colspan="2">Smoking status was verified on a random sample of 10% of eligible participants prior to randomization. Verification of quitting status was attempted in all participants reporting continuous abstinence at 6 months using salivary cotinine reading on a mailed-out and returned NicAlert test-strip pack.</td></tr>
<tr><td>Critical outcomes measures and effect size. (time points)</td><td colspan="2">Continuous abstinence from quit day to 6 months, n (%)
<table>
<tr><th>Have you smoked tobacco at all since quit day?</th><th>Intervention</th><th>Control</th><th>P value</th></tr>
<tr><td>Intention to treat</td><td></td><td></td><td>0.08</td></tr>
<tr><td>Not a single puff or between 1 and 5 cigarettes</td><td>29 (26.4)</td><td>32 (27.6)</td><td></td></tr>
<tr><td>More than 5 cigarettes or missing data</td><td>81 (73.6)</td><td>84 (72.4)</td><td></td></tr>
</table>
Point prevalence abstinence at 4 weeks, 12 weeks, and 6 months, n (%)
<table>
<tr><th>Have you smoked at all in the past 7 days?</th><th>Intervention</th><th>Control</th><th>P value</th></tr>
<tr><td>6 months</td><td></td><td></td><td>0.99</td></tr>
<tr><td>Not a single puff</td><td>25 (22.7)</td><td>26 (22.4)</td><td></td></tr>
<tr><td>Yes or missing data</td><td>85 (77.3)</td><td>88 (77.6)</td><td></td></tr>
</table></td></tr>
<tr><td>Important outcomes measures and effect size. (time points)</td><td colspan="2">Aspects of the program that aided cessation in the intervention group
<table>
<tr><th>Which aspects helped you to stop smoking even if you relapsed later?</th><th>Yes</th></tr>
<tr><td>Watching someone like me go through the quitting process</td><td>59 (88)</td></tr>
<tr><td>Being supported to feel like I could do it</td><td>55 (86)</td></tr>
<tr><td>Feeling like I belonged/like others were going through same thing</td><td>52 (81)</td></tr>
</table></td></tr>
</table>

| | |
|---|---|
| **Bibliographic reference/s** | **Whittaker R, Dorey E, Bramley D, Bullen C, Denny S, Elley CR, Maddison R, McRobbie H, Parag V, Rodgers A, Salmon P. A theory-based video messaging mobile phone intervention for smoking cessation: randomized controlled trial. Journal of medical Internet research. 2011;13(1):e10.** |
| **Study name** | A Theory-Based Video Messaging Mobile Phone Intervention for Smoking Cessation: Randomized Controlled Trial |

| | |
|---|---|
| Things the people in the video clips said | 50 (76) |
| Getting messages at the right times | 47 (75) |
| The free stuff | 44 (69) |
| It was fun | 39 (61) |
| Made me get support from my friends or family | 39 (60) |
| The website/other people videos | 35 (57) |
| Realizing I had been manipulated by tobacco industry | 31 (48) |
| Messages/games/whatever distracting me from cravings | 30 (47) |
| Crave messages | 29 (45) |

| | | | |
|---|---|---|---|
| **Statistical Analysis** | Intention to treat analysis was conducted. No further information reported. | | |
| **Risk of bias (ROB)**<br>**Overall ROB** | **Outcome name** | | |
| | **Outcome** | **Judgement (Low / High / some concerns)** | **Comments** |
| | Risk of bias arising from the randomisation process | Low risk | Randomisation present. On submission of this information, computer randomization allocated participants to an intervention or control group, using stratified minimization for age, ethnicity and level of nicotine dependence. Central allocation by computer. |
| | Risk of bias due to deviations from intended interventions (assignment) | Low risk | Only participants aware of the intervention received (single blinded RCT). However, most data were collected via web-based forms completed by participants, and researchers involved in data collection, particularly outcome assessment, were blind to allocation.<br>No evidence of intervention contamination or deviation from assignment. |

| | | | |
|---|---|---|---|
| **Bibliographic reference/s** | **Whittaker R, Dorey E, Bramley D, Bullen C, Denny S, Elley CR, Maddison R, McRobbie H, Parag V, Rodgers A, Salmon P. A theory-based video messaging mobile phone intervention for smoking cessation: randomized controlled trial. Journal of medical Internet research. 2011;13(1):e10.** | | |
| **Study name** | A Theory-Based Video Messaging Mobile Phone Intervention for Smoking Cessation: Randomized Controlled Trial | | |
| | Risk of bias due to deviations from intended interventions (adherence) | Low risk | No indication of deviations from intended interventions. |
| | Missing outcome data | Some concerns | Some subjects lost to follow up (retention rate: 77% in intervention and 68% in control). However, the trial was substantially underpowered due to the failure to recruit sufficient participants to reach the desired sample size and the higher than expected self-reported control group quit rate. |
| | Risk of bias in measurement of the outcome | Low risk | No significant difference was found between the groups in the intention-to-treat point prevalence abstinence which was recorded at three time points. Also, researchers involved in the outcome assessment were blind to allocation. |
| | Risk of bias in selection of the reported result | Low risk | No evidence of reporting bias. |
| | Other sources of bias | | |
| | **Overall Risk of Bias** | Some concerns | |
| | **Other outcome details** | | |
| **Source of funding** | National Cancer Institute | | |
| **Comments** | . | | |
| **Additional references** | | | |

| | | |
|---|---|---|
| **Behaviour change techniques (16 theoretical clusters)** | Scheduled consequences | |
| | Reward and threat | |
| | Repetition and substitution | |
| | Antecedents | |
| | Associations | |
| | Covert Learning | |
| | Natural Consequences | |
| | Feedback and monitoring | |
| | Goals and planning | x |
| | Comparison of the behaviour | |
| | Social support | x |
| | Self-belief | |
| | Comparison of outcomes | |

| | | |
|---|---|---|
| **Bibliographic reference/s** | **Whittaker R, Dorey E, Bramley D, Bullen C, Denny S, Elley CR, Maddison R, McRobbie H, Parag V, Rodgers A, Salmon P. A theory-based video messaging mobile phone intervention for smoking cessation: randomized controlled trial. Journal of medical Internet research. 2011;13(1):e10.** | |
| **Study name** | A Theory-Based Video Messaging Mobile Phone Intervention for Smoking Cessation: Randomized Controlled Trial | |
| | Identity | |
| | Shaping knowledge | |
| | Regulation | |

# Appendix G – Summary of characteristics of intervention tables

| Study | Key features | Intensity | Tailoring | Engagement |
|---|---|---|---|---|
| **Evidence for effective studies (comparison between arms in primary studies was statistically significant)** | | | | |
| **An 2008**<br><br>Internet based intervention | Based on social cognitive and problem behaviour theory<br><br>Participants received an invitation to visit the website to<br><br>-report health/ lifestyle habits previous week<br><br>-Interactive quiz<br><br>-Personalised email using information from participants weekly visits to website | 20 weekly visits to website over a 30- week period | Interactive quiz with tailored feedback | Participants in the intervention group completed the:<br><br>-weekly check-in and interactive quiz at an average of 18.9 (SD 2.5) times during the 20 active weeks of the study<br><br>-227 (88%) completed these tasks at least 18 of the 20 weeks<br><br>-172 (67%) visited every week. |
| **BinDhim 2017**<br><br>Internet based intervention (via smartphone apps) | Apps motivated participants to set a quit date, using 4 components:<br><br>-quitting options information, with benefits & harms<br><br>- daily motivation messages using push notifications from study server<br><br>-quitting diary<br><br>-quitting benefit tracker<br><br>(described as decision aid with additional support) | Reminder notification (no other information) and daily motivation messages | Not reported | Not reported |
| **Brendryen 2007**<br><br>Mixed intervention | Daily;<br><br>- email instructions on webpage<br><br>- pre-recorded audio message | To week 11;<br><br>- multiple daily contact points<br><br>From week 11 onwards the intervention switches | Not reported | Subjects in the treatment condition adhered to the intended programme<br><br>-71.4% log on call<br><br>-68.2% open web pages |

| | | | | |
|---|---|---|---|---|
| | - up to 3 text messages<br>- each evening, proactive log-off call<br>Consisted of more than 400 contacts by e-mail, web-pages, interactive voice response (IVR) and short message service (SMS) technology.<br>The programme also includes a craving helpline. The helpline is IVR-based and is available 24 hours a day from day 15 (cessation day) throughout the programme. | to a markedly lower intensity.<br>If the user does not log on to the programme or answers the log-off call, they will receive a reminder call, and up to two reminder text messages. | | -66.3% responded to log-off call |
| **Brendryen 2008**<br>Mixed intervention | As Brendryen 2007 | As Brendryen 2007 | Not reported | -62% log on call<br>-59% open web pages<br>-52% responded to log-off call<br>In total, 57 subjects discontinued the intervention, of which 36 did so during the first 6 weeks |
| **Brown 2014**<br>Internet based intervention | Based on PRIME theory of motivation and addiction, evidence based or theory based behaviour change techniques<br>Access to material (interactive menu) before quit date & 5 tunnelled sessions tailored to<br>-Quit date<br>-Indented use of smoking cessation medicines<br>-reason for quitting | Non- responder reminders (no other details on recommended use reported) | Tailored support | Digital intervention was used more regularly than the control website in terms of:<br>-log-ins (mean; 5 vs 1.4 for high SES & 4.1 vs 1.3 for low SES)<br>-page views (93.1 vs 6.1 for high SES, 75.5 vs 5.3 for low SES)<br>-and time spent on the website (time on page) (min; 26.9 vs 1.3 for high SES, 22.1 VS 1.1 for low |

| | | | | |
|---|---|---|---|---|
| | These sessions presented behaviour change techniques<br><br>After quitting 13 tailored tunnelled sessions<br>-Self report abstinence<br>-Self efficacy<br>-Medicine use<br>-Anticipated frequency of stressful/ social events<br><br>After quit also interactive menu included<br>-Your progress sections<br>-Audio & video<br>-Link to intervention facebook page | | | SES) in both socioeconomic status subsamples |
| **Free 2011**<br>Text messaging intervention | Key elements of existing effective interventions<br>-making a public declaration<br>- setting quit date<br>-self- monitoring<br>-family/ friends support<br>-problem solving<br>- distraction techniques | Daily SMS before quit<br>-5 messages/ day for 4 weeks<br>-3 messages/ day for 26 weeks | To participants interests and issues around quitting | Not reported |

| | | | | |
|---|---|---|---|---|
| | Motivational messages focused on: quit and success so far | | | |
| **Liao 2018**<br><br>Text messaging intervention | Based on cognitive behavioural therapy.<br><br>High & low frequency motivational messaged received to improve quit day, messages aimed at;<br><br>- Improving self-efficacy<br>- Outcome expectations from quitting<br>- Increasing social support<br>- Modelling effective strategies and coping skills<br>- Increasing behavioural capacity for quitting | Initially and for 12 weeks:<br><br>-3-5 daily messages (HFG)<br><br>-3-5 weekly messages (LFG)<br><br>After 12 weeks<br><br>-intervention less intensive<br><br>-3-5 weekly text messages<br><br>-1-2 weekly text messages | Not reported | Not reported |
| **Naughton 2014**<br><br>Text messaging intervention | The content of text messages was based on social cognitive theory and the perspectives on change model and informed by previous research and extensive qualitative work with smokers.<br><br>Text messages;<br><br>- advice on quit attempt<br>- information about consequences of smoking and expectations of quitting<br>- provide encouragement | The number of messages sent each day varied according to the predetermined schedule and was either 0, 1 or 2 (mean per day over 90 days 1.2). | Tailored text messages using 24 items from iQuit questionnaire | Not reported |

| | | | | |
|---|---|---|---|---|
| | - boost self-efficacy, maintain motivation | | | |
| **Stanczyk 2016**<br><br>Mixed intervention (group 1: text - based, group 2 video- based) | Base on I-Change model.<br><br>Routing 1 (ready to quit in 1 month) aimed to help smokers transform their intention to quit smoking into action by providing personalised feedback messages.<br><br>The goal of routing 2 was to increase the smoker's motivation to quit by increasing perceptions of the pros of quitting and how to obtain support for quitting. | Routing 1 consisted of six different sessions. Respondents who were not ready to quit within one month were directed to routing 2, which including three sessions. | Respondents received tailored feedback on their smoking behaviour, attitude, perceived social influence, perceived<br><br>self-efficacy and several preparatory action plans to effectively plan their quit date | Not reported |
| **Studies which did not show evidence of effectiveness** | | | | |
| **Abroms 2014**<br><br>Text messaging intervention | Messages are based on social cognitive theory and are consistent with the U.S. Public Health Service Clinical Practice Guidelines First 3 months;<br><br>Outgoing messages about quitting smoking<br><br>- On-demand help through the use of keywords<br><br>After the end of outgoing messages participants could text, at any time, for help through keywords | On quit date: 5 SMS<br><br>Week after quit date: 2 SMS/ day<br><br>For the next 2 months: 3 SMS/week & then <=1 SMS/ week | Messages are tailored around several factors including: first name, quit date, top three reasons for quitting, money saved by quitting, and use of quit-smoking medications | 85.1% of the participants sent at least 1 text message to the computer system during the trial (excluding the keyword STOP). In addition, 30.1% of participants (n=79) used the keyword STOP to unsubscribe from the program during the 6-month intervention period. Participants who interacted with the system at least once had on average 28.47 (SD=25.81) interactions over the course of the 6 months of the program. |

| | | | | |
|---|---|---|---|---|
| **Free 2009** | As Free 2011 | As Free 2011 | As Free 2011 | Not reported |
| **Graham 2011**<br><br>Internet based intervention | Access to website provides;<br>-advise to quit<br>-set a quit date<br>-assessment motivation/smoking history<br>-problem solving/skills training content<br>-social support | Intensity not reported | Website enhanced with tailored content based on assessment (no more information) | Not reported |
| **Mavrot 2017**<br>Internet based intervention | Based on transtheoretical model of behaviour change and theories of relapse prevention and tobacco dependence<br>Website includes:<br>-Personalised feedback reports<br>-Personal web page with progress graphs<br>-Tailored emails | Duration not reported | Tailored email messages based on participants<br>-smoking status<br>-quit date<br>-level of dependence | 25.2% (141/559) connected to the personal page only once; with a median number of connections to the personal page was three.<br>Quitters connected to the program 9 times on average, compared with 3<br>times for those still smoking. |
| **Naughton 2017**<br>Text messaging | Based on Social Cognitive Theory, Perspectives on Change Theory, the Elaboration Likelihood Model of Persuasion | 4 weeks: higher push support (0,1 or 2 daily texts) | Tailoring characteristics include | Not reported |

| | | | | |
|---|---|---|---|---|
| intervention (pregnancy) | Also, Push support with;<br>- motivational messages;<br>- Advice about quit preparation<br>- Managing cravings and withdrawal<br>- Trigger situations and preventing lapses<br>- Information on the impact of smoking on foetal development<br><br>At 3-7 weeks participants could respond to texts asking about smoking status the last 3 days.<br><br>Can use on demand support by texting messages to trigger this | | -gestation, motivation to quit<br><br>-the hardest situation to avoid smoking, -cessation self-efficacy,<br><br>-cigarette dependence<br><br>-partner's smoking status | |
| **Skov-Ettrup 2016**<br><br>Mixed intervention | Based on Self-Regulation<br><br>Theory, the Transtheoretical Model, Social Cognitive Theory and Appreciative Inquiry.<br><br>Tailored Feedback according to quit date.<br><br>Link to e-quit programme and encouragement to sign up – no further details reported | Users opting for text message support could receive up to 118 text messages during their quit attempt, with the highest intensity around the quit date | E-mails and text messages were tailored according to a chosen quit date, preferred coping strategies and the answers from the Wisconsin Inventory of Smoking Dependence Motives | Not reported |
| **Vidrine 2018** | Content of the messages designed to be in one of 4 categories;<br><br>-problem solving/coping skills; | First week:5 messages/ day. 1 message/day by week 4- 12. | Tailored messages based on | Not reported |

| | | | | |
|---|---|---|---|---|
| Text messaging intervention | -knowledge/risk perception<br>-increasing and maintaining quit motivation<br>-increasing social support | | -current smoking status<br>-disease history/ future disease concerns<br>-preferred coping skills | |
| **Wangberg 2011**<br>Internet based intervention | Website;<br>- Static messages<br>- Interactive tests for nicotine addiction, type of smoker, motivational level<br>- Community features, forum with other users<br>Received up to 150 tailored messages during the intervention – including messages on self-efficacy | Initially daily e-mail messages, frequency was decreasing<br>slowly during the first 3 months with a substantial drop-off 3 months after the quit date.<br>In total, during the 12 months participants received 150 tailored messages. | Personalisation-, adaption-, and feedback-type tailoring were all used to varying degrees. | 34% in the intervention group (123/362) ranked tailored email as the most useful intervention component compared to 6% in control group<br>Discussion forum the most used component<br>Intervention group had:<br>-Higher number of log-ins (median: 3 vs 2)<br>-had spent more minutes in the site (median: 93 vs 68) |
| **Whittaker 2011**<br>Mixed intervention | Based on social cognitive theory.<br>Used 6 role models via short video messages providing observational learning.<br>Video messages based on;<br>- role model's own story | - 1 message/day in the lead up to quit date,<br>-2/day from quit date for 4 weeks, -then 1 every 2 days for 2 weeks -and then 1 every 4 days for about 20 weeks until 6 months | Automated package of video and text messages over 6 months that was tailored to:<br>-self-selected quit date | Not reported |

| | | | | |
|---|---|---|---|---|
| | - theory and evidence based behaviour change techniques such as;<br>-setting goals,<br>-reminding reasons for quitting<br>-identifying triggers/<br>cues to smoking<br>-planning to manage or avoid triggers and cues<br>-receiving positive reinforcement<br>-social support<br><br>Also, mobile phone messages received included<br>- the role model videos -SMS text messages<br>- other video messages<br><br>Extra video and text messages available on demand<br>Website to review the intervention and select preferences | | -role model<br>-timing of messages | |

# Appendix H – GRADE tables

## GRADE profile 1: Measurement for long term smoking abstinence

| Quality assessment | | | | | | | No of patients | | Effect | | Confidence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No of studies | Design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | Smoking measurement | Control | Relative (95% CI) | Absolute | |
| **long term smoking abstinence - biochemical verification (follow-up 6-18 months)** | | | | | | | | | | | |
| 8[a] | randomised trials | serious[1] | very serious[2] | no serious indirectness | Serious[3] | none | 15867 | - | RR 1.56 (1.15 to 2.11) | -<br>- | ⊕OOO VERY LOW |
| **long term smoking abstinence - self-reported measurement (follow-up 6-18 months)** | | | | | | | | | | | |
| 12[b] | randomised trials | very serious[4] | Serious[5] | no serious indirectness | Serious[6] | none | 10043 | - | RR 1.3 (1.14 to 1.49) | -<br>- | ⊕OOO VERY LOW |

[a] Abroms 2014, Brown 2014, Free 2011, Liao 2018, Naughton 2017, Stanczyk 2016, Vidrine 2018
[b] An 2008, BinDhim 2017, Brendryen 2007, Brendryen 2008, Free 2009, Graham 2011, Mavrot 2017, Naughton 2014, Skov-Ettrup 2016, Thanh 2018, Wangberg 2011, Whittaker 2011

[1] Downgraded 1 level as 4 studies had some concerns, mainly due to loss to follow up in 2 studies, no information for blinding in 1 study and no information for allocation concealment in one study.
[2] Downgraded 2 levels,I2 >75%, indicating high level of heterogeneity
[3] Downgraded 1 level as the upper end of the CI crosses the default MID (0.8-1.25)
[4] Downgraded 2 levels as failure to blind and loss to follow-up in some studies. Also,4 of the 12 studies indicated as high risk of bias.
[5] Downgraded 1 level as I2 >50%, indicating moderate level of heterogeneity
[6] Downgarded 1 level as the lower end of the CI crosses the default MID (0.8-1.25)

## GRADE profile 2: Mode of delivery for smoking

| Quality assessment | | | | | | | No of patients | | Effect | | Confidence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No of studies | Design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | Mode of delivery | Control | Relative (95% CI) | Absolute | |
| **subgroup by digital platform- internet interventions (>=6 months)** | | | | | | | | | | | |
| 8[a] | randomised trials | very serious[1] | serious[2] | no serious indirectness | serious[3] | none | 13715 | - | RR 1.21 (1.01 to 1.44) | -<br>- | ⊕OOO VERY LOW |
| **subgroup by digital platform - text messages (6 months)** | | | | | | | | | | | |
| 7[b] | randomised trials | Serious[4] | Serious[2] | no serious indirectness | no serious imprecision | none | 9505 | - | RR 1.75 (1.31 to 2.34) | -<br>- | ⊕⊕OO LOW |
| **subgroup by digital platform - mixed intervention (>=6 months)** | | | | | | | | | | | |
| 5[c] | randomised trials | Serious[5] | no serious inconsistency | no serious indirectness | serious[3] | none | 4762 | - | RR 1.43 (1.23 to 1.67) | -<br>- | ⊕⊕OO LOW |

[a] An 2008, BinDhim 2017, Brown 2014, Graham 2011, Mavrot 2017, Thanh 2018, Wangberg 2011
[b] Abroms 2014, Free 2009, Free 2011, Liao 2018, Naughton 2014, Naughton 2017, Vidrine 2018
[c] Brendryen 2007, Brendryen 2008, Skov-Ettrup 2016, Stanczyk 2016, Whittaker 2011

[1] Downgraded 2 levels as failure to blind in 4 the studies and loss to follow up in 3 studies.
[2] Downgraded 1 level as I2 >50% but lower than 75%, indicating moderate level of heterogeneity
[3] Downgraded 1 level as the lower end of the CI crosses the default MID (0.8-1.25).
[4] Downgraded 1 level as some studies have some concerns, mainly due to no information for blinding in 2 studies, no information for the allocation concealment in 1 study and not optimal drop outs in 2 studies
[5] Downgraded 1 level as failure to blind

## GRADE profile 3: Mode of delivery on ≥12 months follow up for smoking

| Quality assessment | | | | | | | No of patients | | Effect | | Confidence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No of studies | Design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | Subgroup by digital platform on ≥12 months follow up | Control | Relative (95% CI) | Absolute | |
| **long term smoking abstinence - internet based intervention (>=12 months)** | | | | | | | | | | | |
| 3[a] | randomised trials | very serious[1] | no serious inconsistency | no serious indirectness | serious[2] | none | 6781 | - | RR 1.08 (0.93 to 1.25) | -<br>- | ⊕OOO VERY LOW |
| **long term smoking abstinence - mixed interventions (>=12 months)** | | | | | | | | | | | |
| 4[b] | randomised trials | serious[3] | no serious inconsistency | no serious indirectness | no serious imprecision | none | 4536 | - | RR 1.52 (1.29 to 1.79) | -<br>- | ⊕⊕⊕O MODERATE |

[a] Graham 2011, Thanh 2018, Wangberg 2011
[b] Brendryen 2007, Brendryen 2008, Skov-Ettrup 2016, Stanczyk 2016

[1] Downgraded 2 levels as failure to blind in all of the 3 studies and loss to follow up in 2 of the 3 studies
[2] Downgraded 1 level as the upper end of the CI crosses the default MID (0.8-1.25)
[3] Downgraded 1 level as loss to follow up in 2 of the 4 studies

## GRADE profile 4: Tailoring interventions for smoking

| Quality assessment | | | | | | | No of patients | | Effect | | Confidence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No of studies | Design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | Tailoring interventions | Control | Relative (95% CI) | Absolute | |
| **tailored interventions (follow-up 6-18 months)** | | | | | | | | | | | |
| 15[a] | | | serious[2] | | serious[3] | none | 23944 | - | | - | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | randomised trials | very serious[1] | | no serious indirectness | | | | | RR 1.3 (1.11 to 1.52) | - | ⊕OOO VERY LOW |

[a] Abroms 2014, An 2008, Brown 2014, Free 2009, Free 2011, Graham 2011, Mavrot 2017, Naughton 2014, Naughton 2017, Stanczyk 2016, Thanh 2018, Vidrine 2018, Wangberg 2011, Whittaker 2011

[1] Downgraded 2 levels as 3 studies were assessed as high concerns. The main reasons for downgrading was the failure to blind and the loss to follow up leading to attrition bias.
[2] Downgrade 1 level as I2>50% but less than 75% (however very close to high heterogeneity as I2 as 74%)..
[3] Downgraded 1 level as the lower end of the CI crosses the default MID (0.8-1.25).

## GRADE profile 5: Low socioeconomic status analysis for smoking

| Quality assessment | | | | | | | No of patients | | Effect | | Confidence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **No of studies** | **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Analysis on socioeconomic status** | **Control** | **Relative (95% CI)** | **Absolute** | |
| **low socioeconomic status (6 months follow up on adults aged>18 years)** | | | | | | | | | | | |
| 2[a] | randomised trials | no serious risk of bias | no serious inconsistency | no serious indirectness | serious[1] | none | 4613 | - | RR 1.27 (0.88 to 1.82) | - | ⊕⊕OO MODERATE |
| | | | | | | | | | | - | |

[a] Brown 2014, Vidrine 2018

[1] Downgraded 1 level as upper end of the CI crosses default MID (0.8-1.25)

# Appendix I – Health economic evidence profiles

| Study | Daly 2019 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Daly 2019 (US)**<br><br>**Type of analysis:** CEA and CUA. The analysis was based on two decision analytic models that obtained most of the evidence from the Project ACTION study plus other published literature.<br>**Perspective:** Societal<br>**Time horizon:** Lifetime<br>**Discounting:** 3% for costs and benefits | **Population:**<br>Smokers (at least 5 cigarettes per day) aged 18 years or older<br><br>**Population – sociodemographic factors/cohort settings:**<br>All participants (n=626) from the project ACTION (Adult smoking Cessation Treatment through Innovative Outreach to Neighbours) study. They came from low socioeconomic backgrounds. Other demographics not reported.<br><br>**INTERVENTION Description:**<br>Enhanced care: cell phone text/graphic messages and access to smoking hotline added to standard care (brief advice to quit, nicotine | **Mean cost per patient**<br>Standard care: $103.90<br>Enhanced care: $147.61<br><br>**Currency & cost year:**<br>US $; 2014<br><br>**Cost components incorporated:**<br>Health brochures, nicotine replacement therapy, healthcare professionals' and participant's time, cost for the hotline operator and text message system technician. | **Mean QALYs (men)**<br>Standard care: 14.27<br>Enhanced care: 14.37<br><br>**Mean QALYs (women)**<br>Standard care: 15.17<br>Enhanced care: 15.19 | **Full incremental analysis**<br>Incremental cost per additional quit (irrespective of gender):<br>Enhanced care vs standard care: $887 (£650)<br><br>Incremental cost per QALY (men)<br>Enhanced care vs standard care: $426 (£312)<br><br>Incremental cost per QALY (women)<br>Enhanced care vs standard care: $2,186 (£1,603)<br><br>**Analysis of uncertainty**<br>One-way sensitivity analyses were presented varying cost by ±50%. Enhanced care remained cost effective compared to standard care.<br><br>In two-way sensitivity analyses, the most cost-effective strategy changed when quit rates for enhanced care and intensive care (outside scope) were varied over their 95% CIs.<br><br>Probabilistic sensitivity analysis was not conducted. |

| Study | Daly 2019 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | replacement therapy and self-help written materials). The messages were designed to increase health knowledge, maintain/increase quit motivation, promote coping skills use and increase social support.<br><br>**Mode:** Cell phone messages<br><br>**Intensity and duration:** Messages started the week of participants' scheduled quit date and continued for a 12-week period. During the first week after the quit date, participants received 5 messages a day. The number of messages gradually declined to 1 message per day by week 4 and stayed at this level until the end of the receipt of the intervention at week 12. | | | |

| Study | Daly 2019 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | **Healthcare professional involvement:** Only in integrated care and not related to digital intervention<br><br>**Tailoring:** Not specified<br><br>**Behaviour change techniques used:** Goals and planning; social support<br><br>**COMPARATOR 1**<br>**Description:** Standard care: general advice to quit smoking from a healthcare professional, self-help materials and nicotine replacement therapy<br><br>The decision space included 1 other arm with an ineligible intervention (data for this arm not extracted in full here):<br><br>**COMPARATOR 2**<br>**Description:** Intensive care: enhanced care | | | |

| Study | Daly 2019 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | as above plus 11 scheduled over the phone counselling sessions over the 12-week treatment period. | | | |
| **Data sources** | | | | |
| **Health outcomes:** Health outcomes were mainly taken from the ACTION study (Vidrine 2012) **Quality-of-life weights:** Utility weights were obtained from a published study (Fiscella and Franks) **Cost sources:** Resource use was taken from the ACTION study and unit costs mainly from national averages and standard US sources. | | | | |
| **Comments** | | | | |
| **Source of funding:** Financial support for this study was provided in part by a grant from the National Cancer Institute **Limitations:** The authors recognised limitations including the short 6-month quit rate time horizon, the self-reported quit rate and the fact that smoking intensity was not taken into account. **Other:** None | | | | |
| **Overall applicability:** Partially applicable | | **Overall quality:** Potentially serious limitations | | |
| *Abbreviations: CEA: cost-effective analysis; CUA: cost-utility analysis; QALY: quality-adjusted life year; US: United States* | | | | |

| Study | Graham 2013 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Graham 2013 (US)**<br><br>**Type of analysis:** CEA conducted alongside an RCT in which the main outcome was the number or quitters<br>**Perspective:** Payer (US)<br>**Time horizon:** 3, 6, 12 and 18 months | **Population:**<br>Adult smokers<br><br>**Population – sociodemographic factors/cohort settings:**<br>Total (n=2005)<br>Age: 35.9 ± 10.8 years<br>Women: 51.1%<br>Caucasian: 86.5% | **Total costs:**<br>Basic internet: $679<br>Enhanced internet: $26,040<br><br>**Currency & cost year:**<br>US $; no price year was reported.<br><br>**Cost components incorporated:** for basic internet, assumed $1 per | **Quitters at 3 months (single-point prevalence)**<br>Basic: 62/679 (9.1%)<br>Enhanced: 68/651 (10.4%)<br><br>**Quitters at 6 months (single-point prevalence)**<br>Basic: 83/679 (12.2%) | **Full incremental analysis**<br>Incremental cost per additional quitter (3 months):<br>Enhanced vs basic internet: $4,227 (£3,276)<br><br>Incremental cost per additional quitter (6 months)<br>Enhanced vs basic internet: $2,305 (£1,786)<br><br>Incremental cost per additional quitter (12 months) |

| Study | Graham 2013 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Discounting:** Not applicable | Daily smoking rate (cigarettes per day): 20.00±9.96<br><br>**INTERVENTION**<br>**Description:** Enhanced Internet smoking cessation: basic internet programme plus interactive features and a large online social network.<br><br>**Mode:** Internet (website)<br><br>**Intensity and duration:** 6 months free access<br><br>**Tailoring:** Yes<br><br>**Healthcare professional involvement:** None<br><br>**COMPARATOR 1**<br>**Description:** Basic internet smoking cessation: 6 months of free access to static content extracted from QuitNet, including | person as real-world cost to a payer to provide static web pages at scale actual; for enhanced internet, $40 per person reflected cost to commercial payers for a fully developed and maintained website with a large social network and evidence-based cessation content | Enhanced: 94/651 (14.4%)<br><br>**Quitters at 12 months (single-point prevalence)**<br>Basic: 119/679 (17.5%)<br>Enhanced: 98/651 (15.1%)<br><br>**Quitters at 18 months (single-point prevalence)**<br>Basic: 129/679 (19%)<br>Enhanced: 113/651 (17.4%) | Enhanced dominated by basic internet<br><br>Incremental cost per additional quitter (18 months)<br>Enhanced dominated by basic internet<br><br>**Analysis of uncertainty**<br>Sensitivity analysis was not conducted. |

| Study | Graham 2013 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | quitting and medication guides, a national directory of cessation programmes, and responses to 'Frequently Asked Questions'.<br><br>**Mode:** Internet (website)<br><br>**Intensity and duration:** 6 months free access<br><br>**Healthcare professional involvement:** None<br><br>**Tailoring:** None<br><br>**Behaviour change techniques used:** Feedback and monitoring; goals and planning; social support<br><br>The decision space included 1 other arm with ineligible interventions (data for | | | |

| Study | Graham 2013 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | this arm not extracted in full here):<br><br>**COMPARATOR 2**<br>**Description:** Enhanced internet plus telephone counselling: enhanced internet plus proactive telephone counselling provided by trained cessation counsellors. | | | |
| **Data sources** | | | | |
| **Health outcomes:** Within trial analysis (Graham 2006, 2011) **Quality-of-life weights:** Not applicable **Cost sources:** Costs were quantified from the RCT while commercial charges were used for internet platforms. | | | | |
| **Comments** | | | | |
| **Source of funding:** Primary funding for this work was from the National Cancer Institute at the National Institutes of Health. **Limitations:** The authors acknowledged some limitations of the analysis: difficulty in establishing a threshold for cost per quitter; some costs could be underestimated; the generalisability of the analysis is limited to the sample enrolled in the study. The analysis was conducted for a relatively short time-horizon and no sensitivity analyses were performed. **Other:** None | | | | |
| **Overall applicability:** Partially applicable **Overall quality:** Very serious limitations | | | | |
| *Abbreviations: CEA: cost-effective analysis; ICER: incremental cost-effectiveness ratio* | | | | |

| Study | Guerriero 2013 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Guerriero 2013 (UK)**<br><br>**Type of analysis:** CEA and CUA. The analysis | **Population:**<br>Smokers aged 16 years or older | **Mean costs for 1,000 smokers** | **Mean LYs gained for 1,000 smokers** | **Full incremental analysis**<br>The addition of mobile text-based support for smoking cessation to current practice was |

| Study | Guerriero 2013 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| was based on Markov model with 3 health states. Efficacy data were mainly taken from a RCT. Costs and QALYs were projected over participants' lifetime on the basis of risk of five main health consequences of smoking: lung cancer, stroke, myocardial infarction, chronic obstructive pulmonary disease and coronary heart disease.<br>**Perspective:** UK NHS<br>**Time horizon:** Lifetime<br>**Discounting:** 3.5% for costs and benefits | **Population – sociodemographic factors/cohort settings:**<br>Three hypothetical groups with mean age 25, 35 and 48 years.<br><br>**INTERVENTION 1**<br>**Description:** Mobile phone test messaging support for smoking cessation added to current practice: five text messages per day for the first 5 weeks and three per week for the next 26 weeks<br><br>**Mode:** Mobile (text messages)<br><br>**Intensity and duration:** Participants received five text messages per day for the first 5 weeks and three per week for the next 26 weeks.<br><br>**Tailoring**: Yes | Current practice (age 25): £3,177,185<br>Text messages plus current practice (age 25): £3,166,119<br><br>Current practice (age 35): £4,690,512<br>Text messages plus current practice (age 35): £4,660,193<br><br>Current practice (age 48): £7,446,703<br>Text messages plus current practice (age 48): £7,374,176<br><br>Current practice (weighted average): £5,299,712<br>Text messages plus current practice (weighted average): £5,258,203<br><br>**Currency & cost year:**<br>GBP £; 2009-2010<br><br>**Cost components incorporated:**<br>Cost of text-based support and cost of future health consequences of smoking: lung cancer, stroke, myocardial infarction, | Current practice (age 25): 23,546<br>Text messages plus current practice (age 25): 23,555<br><br>Current practice (age 35): 21,591<br>Text messages plus current practice (age 35): 21,607<br><br>Current practice (age 48): 18,244<br>Text messages plus current practice (age 48): 18,271<br><br>Current practice (weighted average): 20,859<br>Text messages plus current practice (weighted average): 20,877<br><br>**Mean QALYs gained for 1,000 smokers**<br><br>Current practice (age 25): 17,772<br>Text messages plus current practice (age 25): 17,792 | dominant (less costly and more effective) for all ages.<br><br>**Analysis of uncertainty**<br>One-way sensitivity analyses and probabilistic sensitivity analysis (PSA) were conducted. Varying the relapse rate and the baseline quit rate did not change the finding that text-based support is health improving and cost saving. If a higher intervention cost is assumed and advertising costs are similar to those observed in the txt2stop trial, then the incremental cost-effectiveness would be £141 per LY gained and £89 per QALY gained. The PSA showed that there is a greater than 90% chance that the intervention will be cost saving. |

| Study | Guerriero 2013 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | **Healthcare professional involvement:** None<br><br>**Behaviour change techniques used:** Feedback and monitoring; goals and planning<br><br>**User engagement:** Not reported<br><br>**COMPARATOR**<br>**Description:** Current practice: could include one-to-one counselling, telephone counselling, and medications, such as nicotine replacement therapy and varenicline | chronic obstructive pulmonary disease and coronary heart disease. | Current practice (age 35): 16,136<br>Text messages plus current practice (age 35): 16,163<br><br>Current practice (age 48): 13,341<br>Text messages plus current practice (age 48): 13,379<br><br>Current practice (weighted average): 15,528<br>Text messages plus current practice (weighted average): 15,557 | |
| **Data sources** | | | | |
| **Health outcomes:** Health outcomes were mainly taken from the txt2stop trial (T2S) (Free 2011) **Quality-of-life weights:** Quality of life weights were taken from published studies (Tengs and Wallace, Rutten-van Molken, Tillman and Silcock) **Cost sources:** Cost of the intervention was taken from the RCT, while costs of health consequences were taken from standard UK sources (e.g. NHS Reference cost, NICE technology appraisals etc). | | | | |
| **Comments** | | | | |
| **Source of funding:** The T2S trial and this economic evaluation was funded by the UK Medical Research Council **Limitations:** The authors acknowledged that this study underestimates the benefits of text-based support as a smoking cessation intervention in that it does not take into account the effects of reduced passive smoking, nor does it account for short-term effects (e.g. reduction in respiratory problems) associated with smoking cessation or a wide range of other less common smoking-related diseases. Moreover, the cost of the intervention depends on the numbers using the service, since this may influence the cost of text messages and royalty payments. **Other:** None | | | | |

| Study | Guerriero 2013 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Overall applicability:** Directly applicable | | **Overall quality:** No/minor limitations | | |

*Abbreviations: LY: life year; NHS: National Health Service; NICE: National Institute for Health and Care Excellence; QALY: quality-adjusted life year; RCT: randomised control trial; UK: United Kingdom*

| Study | Jones 2019 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Jones 2019 (UK)** – see also Naughton 2017 for within-trial analysis<br><br>**Type of analysis:** CEA and CUA based on the Economics of Smoking in Pregnancy (ESIP) model, which is based on a decision tree and a subsequent Markov model, in a hypothetical cohort of 1000 singleton-pregnancy women who smoke. The ESIP model links the pregnancy outcomes of mothers and their offspring to estimate the burdens of smoking-related disease they experience with different rates of smoking in pregnancy, both in pregnancy and throughout their life times. | **Population:**<br>Pregnant smokers<br><br>**Population – sociodemographic factors/cohort settings:**<br>Mean age in years (SD):<br>MiQuit: 26.6 (5.7)<br>Usual care: 26.4 (5.7)<br><br>White ethnicity:<br>MiQuit: 92.6%<br>Usual care: 90.7%<br><br>**INTERVENTION Description:** MiQuit: 12-week programme of individually tailored, automated, interactive, self-help smoking cessation SMS text messages in addition to usual care | **Total costs per person:**<br>Total cost per pregnancy (mother and offspring)<br>MiQuit: £20,876.48<br>Usual care: £20,915.76<br><br>**Currency & cost year:**<br>GBP £; 2014/15<br><br>**Cost components incorporated:**<br>Costs for delivering MiQuit, cost of maternal and infant morbidities, lifetime morbidity treatments. | **Total life-years per pregnancy outcomes (mother and offspring)**<br>MiQuit: 49.2847<br>Usual care: 49.2519<br><br>**Total QALYs per pregnancy outcomes (mother and offspring)**<br>MiQuit: 46.7017<br>Usual care: 46.6614 | **Full incremental analysis**<br>Incremental cost per life-year gained with MiQuit over usual care: dominant<br><br>Incremental cost per QALY gained with MiQuit over usual care: dominant<br><br>**Analysis of uncertainty**<br>The study reports that in probabilistic sensitivity analysis, MiQuit had a 95% probability of being cost saving. |

| Study | Jones 2019 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Perspective:** NHS and Personal Social Services perspective<br>**Time horizon:** Lifetime<br>**Discounting:** 3.5% for costs and benefits | **Mode:** Mobile (text messages)<br><br>**Intensity and duration:** The intervention was delivered according to a delivery schedule (0, 1 or 2 daily texts). The frequency depended on the gestational week.<br><br>**Tailoring:** Yes<br><br>**Healthcare professional involvement:** Not reported<br><br>**Behaviour change techniques used:** Goals and planning; social support<br><br>**COMPARATOR**<br>**Description:** Usual care: Participants were given a standard NHS booklet on smoking cessation for mothers-to-be and could access smoking | | | |

| Study | Jones 2019 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | cessation information, advice or support for stopping smoking offered as part of routine antenatal care. | | | |
| **Data sources** | | | | |
| **Health outcomes:** Within trial analysis (Naughton 2017) and published sources **Quality-of-life weights:** Published utility tariffs and assumptions. **Cost sources:** NHS reference costs and published studies. | | | | |
| **Comments** | | | | |
| **Source of funding:** The study was conducted as part of a programme funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research programme. **Limitations:** The authors acknowledged that the model may overestimate the benefits and cost-effectiveness of cessation in pregnancy. Other assumptions may have affected the validity of the study. **Other:** None | | | | |
| **Overall applicability:** Directly applicable **Overall quality:** No/minor limitations | | | | |
| *Abbreviations: CEA: cost-effective analysis; CUA: cost-utility analysis; ESIP: Economics of Smoking in Pregnancy; QALY: quality-adjusted life yearly; SD: standard deviation; SMS: short message service* | | | | |

| Study | Naughton 2017 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Naughton 2017 (UK)** – this is a within-trial analysis of the same RCT that informed Jones 2019<br><br>**Type of analysis:** CEA conducted alongside an RCT in which the main outcome was the number or quitters. | **Population:** Pregnant smokers<br><br>**Population – sociodemographic factors/cohort settings:**<br>Mean age in years (SD)<br>MiQuit: 26.6 (5.7)<br>Usual care: 26.4 (5.7) | **Total cost per participant**<br>MiQuit: £4.62<br>Usual care: £0<br><br>**Currency & cost year:**<br>GBP £; 2014/15<br><br>**Cost components incorporated:**<br>The cost for delivering MiQuit was considered and included the text messages | **Continued abstinence from 4-weeks post randomization until 36 weeks gestation**<br>MiQui: 5.4%<br>Usual care: 2.0% | **Full incremental analysis**<br>Incremental cost per participant with MiQuit over usual care: £4.62<br><br>Incremental cost per quitter with MiQuit over usual care: £133.53 (95% CI –£395.78 to 843.62).<br><br>Incremental quit rate with MiQuit over usual care: 3.46%. P-value = 0.064.<br><br>**Analysis of uncertainty** |

| Study | Naughton 2017 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Perspective:** NHS and Personal Social Services perspective<br>**Time horizon:** 12 weeks<br>**Treatment effect duration:** Not relevant<br>**Discounting:** Not applicable | White ethnicity<br>MiQuit: 92.6%<br>Usual care: 90.7%<br><br>**INTERVENTION Description: MiQuit:** 12-week programme of individually tailored, automated, interactive, self-help smoking cessation SMS text messages in addition to usual care<br><br>**Mode:** Mobile (text messages)<br><br>**Intensity and duration:** The intervention was delivered according to a delivery schedule (0, 1 or 2 daily texts). The frequency depended on the gestational week.<br><br>**Tailoring**: Yes<br><br>**Healthcare professional involvement:** Not reported | and the annual running cost. | | Sensitivity analyses were performed on all smoking outcomes but no extensive results were reported. When the ORs were increased for six out of the seven smoking outcomes (OR 3.11, 95% CI: 1.05-10.80) the number of quit attempts between baseline and late pregnancy did not differ significantly.<br><br>MiQuit median = 2 (IGR = 1,3)<br>Usual care median = 1 (IGR – 0,3) |

| Study | Naughton 2017 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | **Behaviour change techniques used:** Goals and planning; social support<br><br>**COMPARATOR**<br>**Description:** Usual Care: A standard NHS booklet on smoking cessation for mothers-to-be and could access smoking cessation information, advice or support for stopping smoking offered as part of routine antenatal care. | | | |
| **Data sources** | | | | |
| **Health outcomes:** Within trial analysis **Quality-of-life weights:** Not applicable **Cost sources:** Costs were derived from official tariffs. | | | | |
| **Comments** | | | | |
| **Source of funding:** The study was funded by the National Institute for Health Research (NIHR) under the Programme Grants for Applied Research programme. **Limitations:** The RCT did not have a specified primary outcome and did not consider the impact of the interventions on patients' health. Completeness of follow-up and biochemical validation rates were not optimal, potentially reducing statistical power. A further limitation is the unknown generalizability of findings to all pregnant smokers. **Other:** None | | | | |
| **Overall applicability:** Directly applicable **Overall quality:** Potentially serious limitations | | | | |
| *Abbreviations: CEA: cost-effective analysis; NHS: National Health Service; SMS: short message service* | | | | |

| Study | Skov-Ettrup 2016 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Skov-Ettrup 2016 (Denmark)** | **Population:** | **Total costs per person:** | **Prolonged abstinence** (assessed | **Incremental cost per quitter** |

| Study | Skov-Ettrup 2016 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Type of analysis:** CEA conducted alongside an RCT in which the main outcome was the number or quitters.<br>**Perspective:** Not reported (appears to have been that of the health care system)<br>**Time horizon:** One year<br>**Discounting:** Not applicable | Adult smokers<br><br>**Population – sociodemographic factors/cohort settings:**<br>Median age in years (IQR)<br>Internet- and text-message-based intervention: 52 (42–59)<br>Self-help booklet: 53 (41–62)<br><br>Females<br>Internet- and text-message-based intervention: 58.7%<br>Self-help booklet: 57.4%<br><br>**INTERVENTION Description:** Internet- and text-message-based smoking cessation program (e-quit): participants received a link to the e-quit program, were encouraged to sign up, and followed a tailored feedback letter. | Internet- and text-message-based intervention: £968<br>Self-help booklet: £812<br><br>**Currency & cost year:**<br>GBP £; 2014<br><br>**Cost components incorporated:**<br>For the e-quit program, costs were text-message fees, maintenance of the website and hosting fee.<br>For the booklet, costs included printing, packing and postage. | by one item asking respondents whether they had refrained from smoking, including a grace-period of 2 weeks when it was allowed to smoke a maximum of 5 cigarettes, since the last quit attempt).<br><br>Internet- and text-message-based intervention: 5.3%<br>Self-help booklet: 3.6% | Internet- and text-message-based intervention vs self-help booklet: £20<br><br>**Analysis of uncertainty**<br>Not undertaken |

| Study | Skov-Ettrup 2016 | | | |
|---|---|---|---|---|
| Study details | Population & interventions | Costs | Health outcomes | Cost-effectiveness |
| | **Mode:** Internet and mobile<br><br>**Intensity and duration:** A schedule of emails or text messages was provided for each intervention over a 12-month period.<br><br>**Tailoring**: Yes<br><br>**Healthcare professional involvement:** None<br><br>**Behaviour change techniques used:** Feedback and monitoring; goals and planning<br><br>**COMPARATOR**<br>**Description:** Self-help booklet - participants received a 36-page booklet by letter and setting a quit date was encouraged.<br><br>The decision space included 2 other arms with ineligible | | | |

| Study | Skov-Ettrup 2016 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | interventions (data for these arms not extracted in full here):<br><br>**COMPARATOR 2**<br>Proactive telephone counselling: participants were contacted by a counsellor within 1 week and given the offer of five counsellor-initiated sessions.<br><br>**COMPARATOR 3**<br>**Description:** Reactive telephone counselling: participants received free telephone counselling at the Danish national quit line. | | | |
| **Data sources** | | | | |
| **Health outcomes:** Within trial analysis. **Quality-of-life weights:** Not applicable **Cost sources:** Sources of costs were not clearly reported. | | | | |
| **Comments** | | | | |
| **Source of funding:** The study was funded by the Danish Cancer Society. **Limitations:** The authors observed a significant drop-out rate, which might have affected the estimation of outcomes. Some assumptions were required for missing data. The analyses were prone to bias from motivation to quit. Some bias in the allocation procedure was also noted, although it should not have affected the conclusions of the analysis. A risk of contamination among interventions was also noted. **Other:** None | | | | |
| **Overall applicability:** Partially applicable **Overall quality:** Very serious limitations | | | | |
| *Abbreviations: CEA: cost-effective analysis; IQR: interquartile range* | | | | |

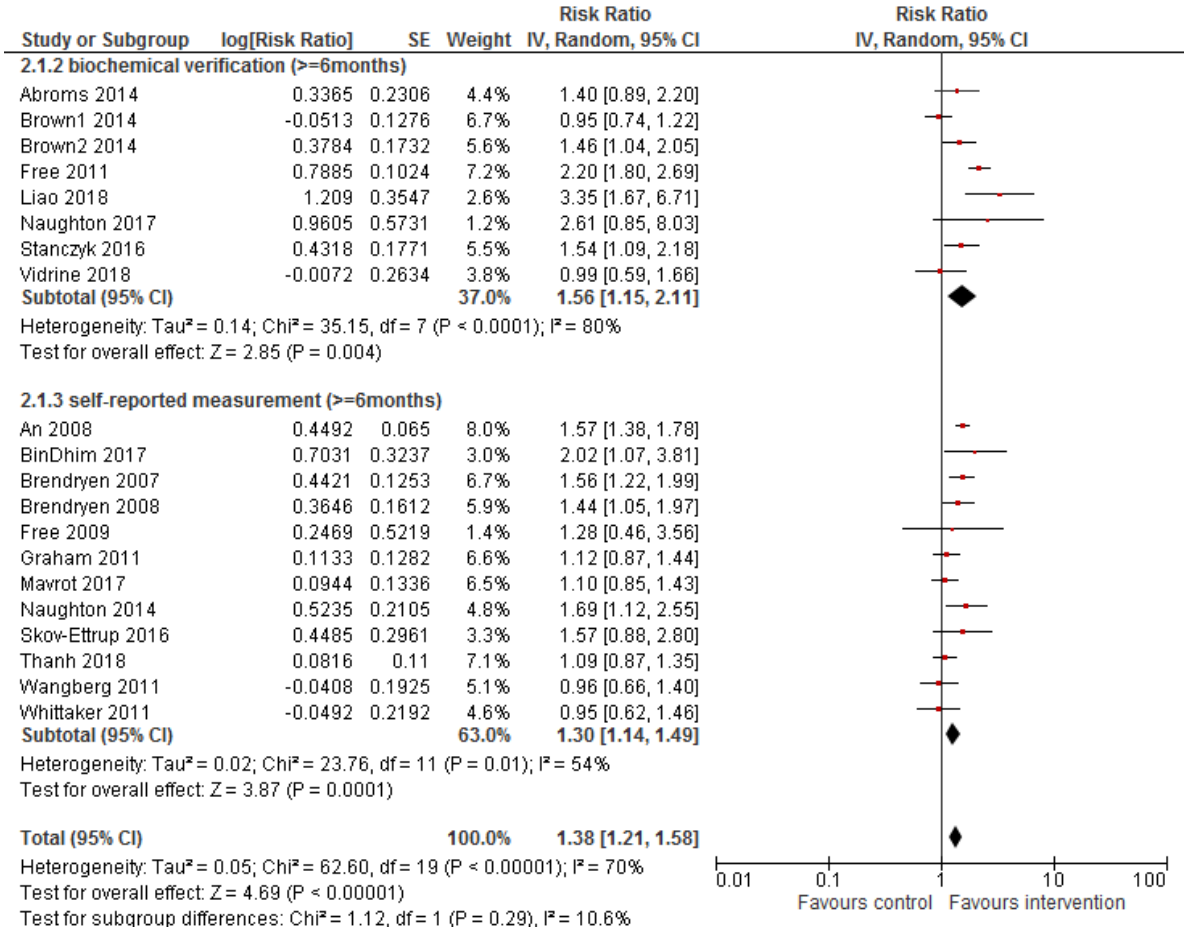
| Study | Stanczyk 2014 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| **Stanczyk 2014 (Netherlands)**<br><br>**Economic analysis:** CEA and CUA conducted alongside an RCT in which the main outcomes were prolonged abstinence rate and QALYs.<br>**Perspective:** Societal<br>**Time horizon:** 1 year<br>**Discounting:** Not applicable | **Population:**<br>Adult smokers<br><br>**Population – sociodemographic factors/cohort settings:**<br>Mean age in years (SD)<br>Video group: 45.54 (13.0)<br>Text group: 45.42 (12.8)<br>Control group: 46.2 (12.5)<br><br>Gender (% female)<br>Video group: 62.2%<br>Text group: 60.9%<br>Control group: 59.6%<br><br>**INTERVENTION Description:** Text-based computer tailored messages (without any graphics or animations).<br><br>**Mode:** Internet<br><br>**Intensity and duration:** 6 sessions | **Mean total costs (SD)**<br>Control group: €4,879<br>Text group: €4,939<br>Video group: €5,383<br><br>**Currency & cost year:**<br>EUR €; 2013<br><br>**Cost components incorporated:**<br>Intervention costs (hosting costs for the web-based CT smoking cessation intervention), health-care-related costs (general practitioners' or practice nurses' consultations or home visits, inpatient and outpatient specialist care, mental health care, alternative medicine, hospital admissions, smoking cessation aids, prescribed and over the counter medication, and other care such as professional home care, paramedic consultations), productivity costs (related to absenteeism), and respondent costs (related to the time respondents spent on the CT | **Percentage of individuals on prolonged abstinence**<br>Control group: 6.4%<br>Text group: 7.3%<br>Video group: 9.9%<br><br>**Mean QALYs (SD)**<br>All 3 interventions: 0.83 (0.2) QALYs | **Full incremental analysis - Incremental cost per prolonged abstinence**<br>Video vs Control: €1,500 (£1,372)<br>Text is dominated by video<br><br>**Full incremental analysis - Incremental cost per QALY**<br>Video vs Control: €60,000 (£54,870)<br>Text is dominated by video<br><br>**Analysis of uncertainty**<br>Nonparametric bootstrap resampling technique was used. At a threshold of €18,000/QALY, the video intervention had a 39% probability of being cost effective; at a threshold of €80,000/QALY, the video intervention had a 41% probability of being cost effective. |

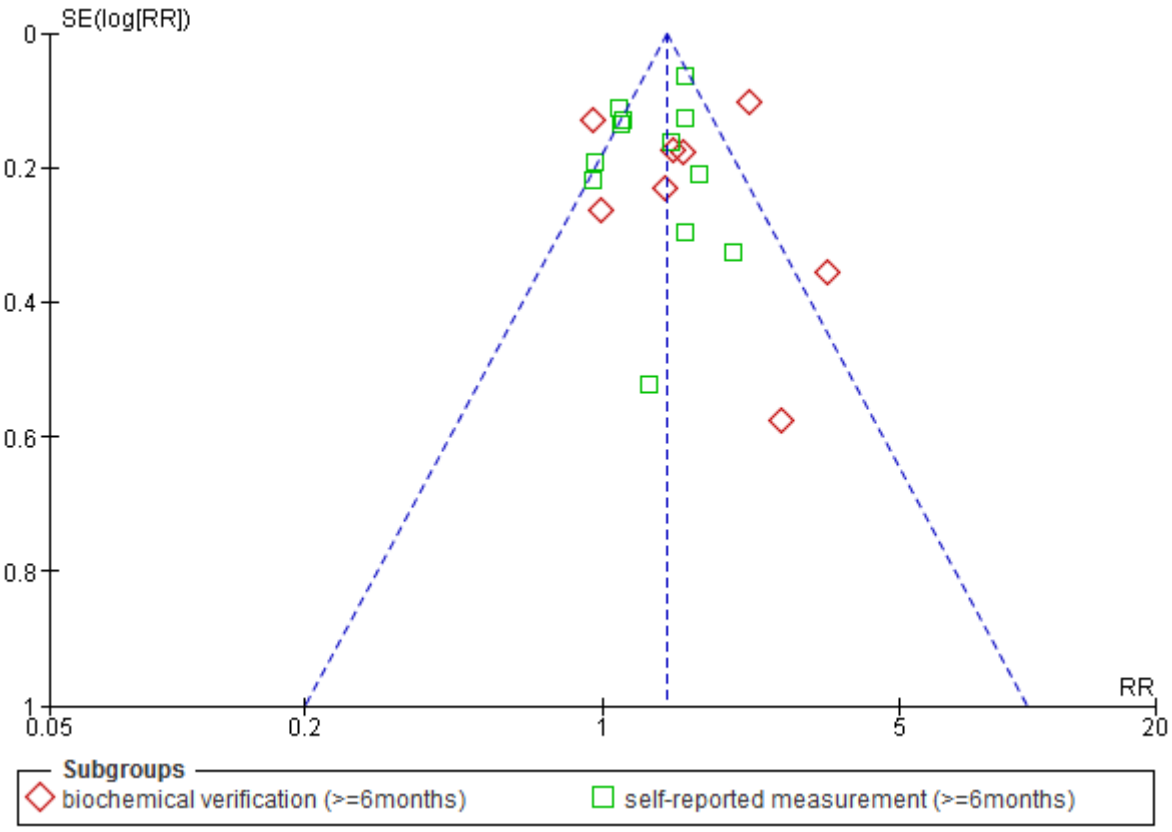
| Study | Stanczyk 2014 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | over 8 weeks from quit date (longer if relapse occurs).<br><br>**Tailoring**: Yes<br><br>**Healthcare professional involvement:** None<br><br>**Behaviour change techniques used:** Feedback and monitoring, goals and planning, self-belief<br><br>**INTERVENTION 2**<br>**Description:** Video-based computer-tailored intervention. Messages were presented by five different adults in a TV 'news programme' format.<br><br>**Mode:** Internet<br><br>**Intensity and duration:** 6 sessions over 8 weeks from quit date (longer if relapse occurs). | intervention and travel costs). | | |

| Study | Stanczyk 2014 | | | |
|---|---|---|---|---|
| **Study details** | **Population & interventions** | **Costs** | **Health outcomes** | **Cost-effectiveness** |
| | **Tailoring**: Yes<br><br>**Healthcare professional involvement:** None<br><br>**COMPARATOR**<br>**Description:** Brief general text advice about quitting. | | | |
| **Data sources** | | | | |
| **Health outcomes:** Within trial analysis (Smit 2012 and Te Poel 2009) **Quality-of-life weights:** Within trial analysis. Health states were assessed by the Dutch version of the Euro-Qol (EQ-5D-3L) **Cost sources:** Costs were taken from the RCT sample of individuals and valued using the Dutch manual for cost analysis in health-care research. | | | | |
| **Comments** | | | | |
| **Source of funding:** The study was supported by ZonMw, the Netherlands Organisation for Health Research and Development **Limitations:** Short-term time horizon. Health-care utilization was based on self-reported data, which might have introduced recall bias and included productivity costs. Substantial missing data were replaced using imputation techniques that might not be the most appropriate. **Other:** None | | | | |
| **Overall applicability:** Partially applicable | **Overall quality:** Potentially serious limitations | | | |
| *Abbreviations: CT: computer technology; EQ-5D: EuroQol-5 Dimension; QALY: quality-adjusted life year; SD: standard deviation* | | | | |

# Appendix J – Forest plots

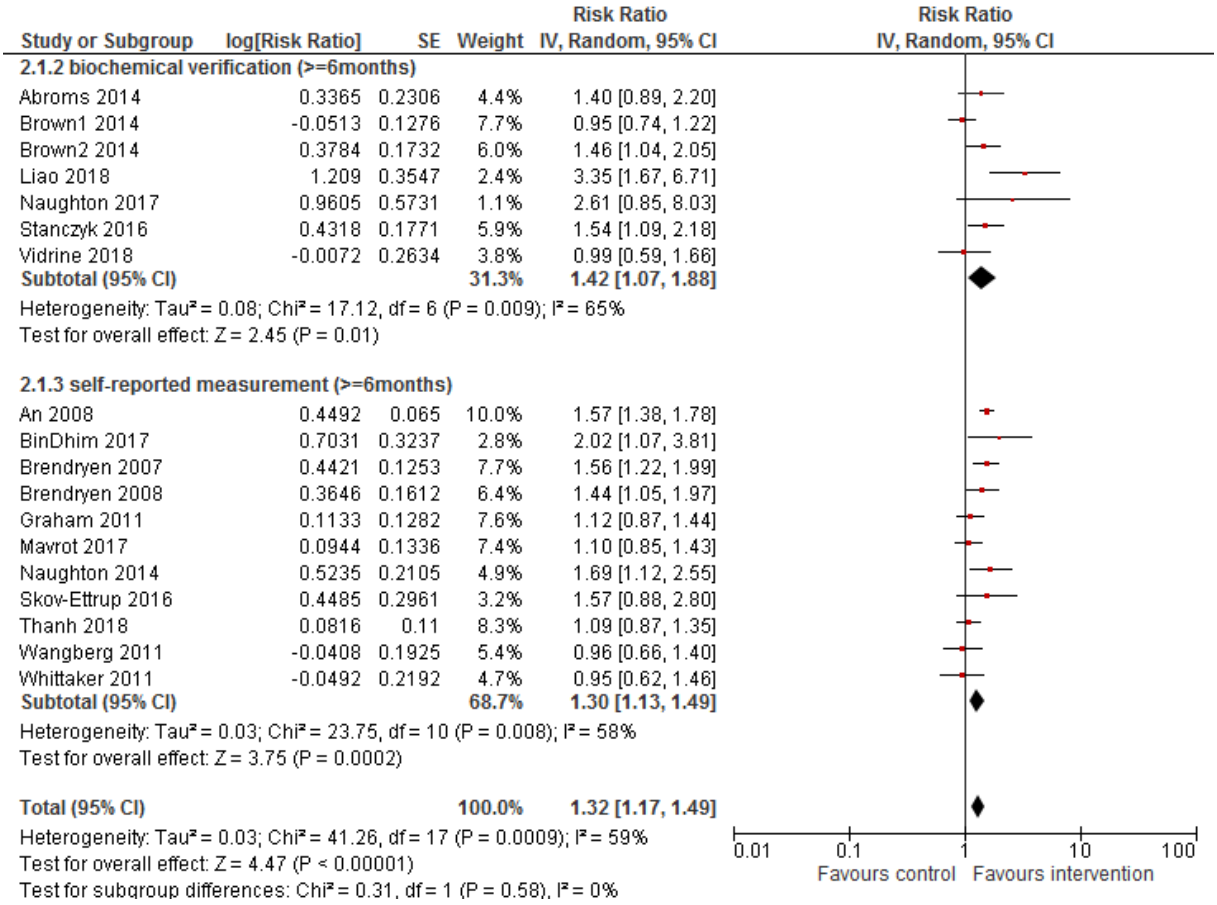
## Long term smoking abstinence (≥ 6months): subgroup analysis by smoking ascertainment (biochemical, self-reporting verification)



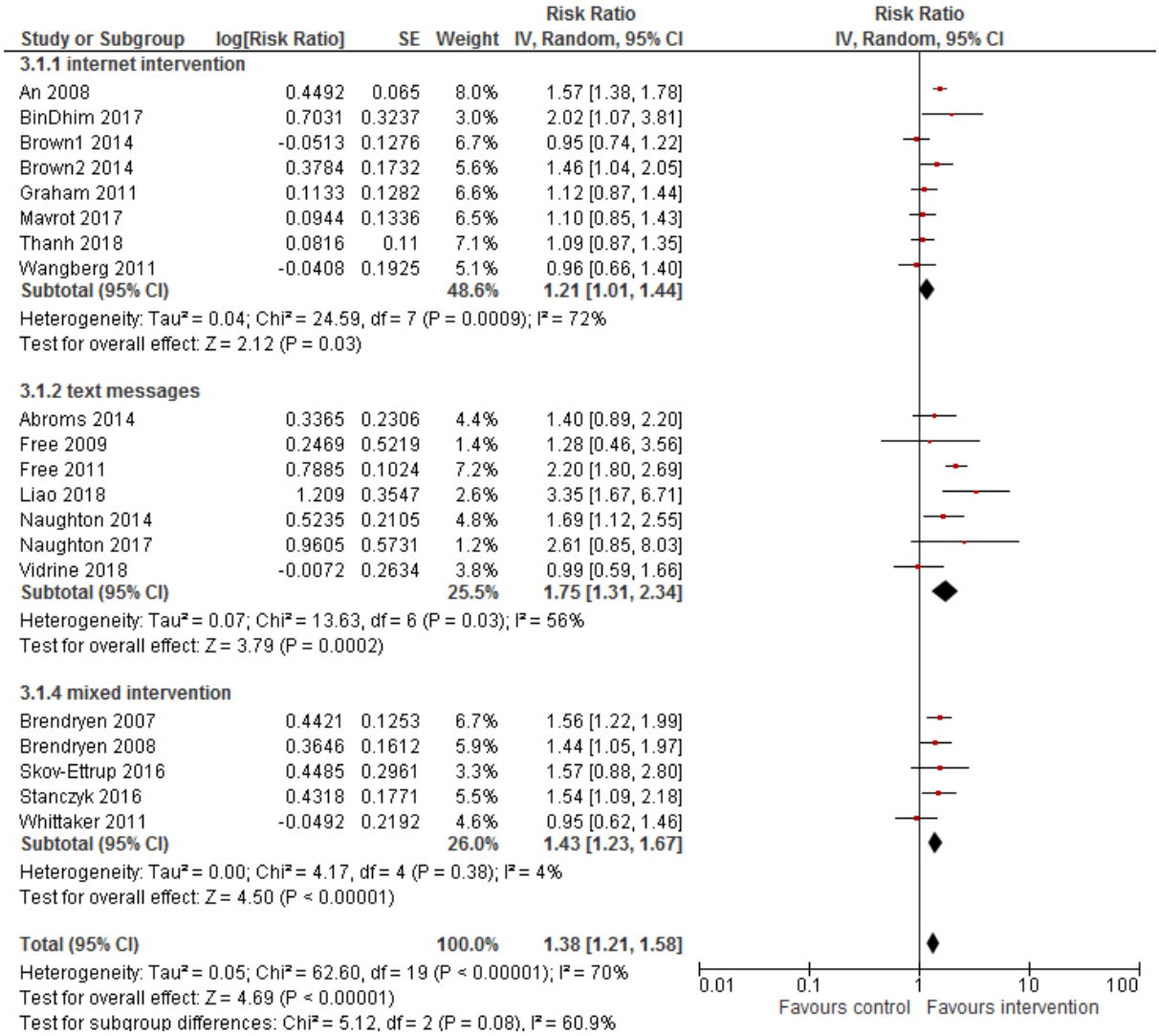



The visual assessment of the funnel plot suggests the absence of any influence from any small- study effects, suggesting no evidence of publication bias

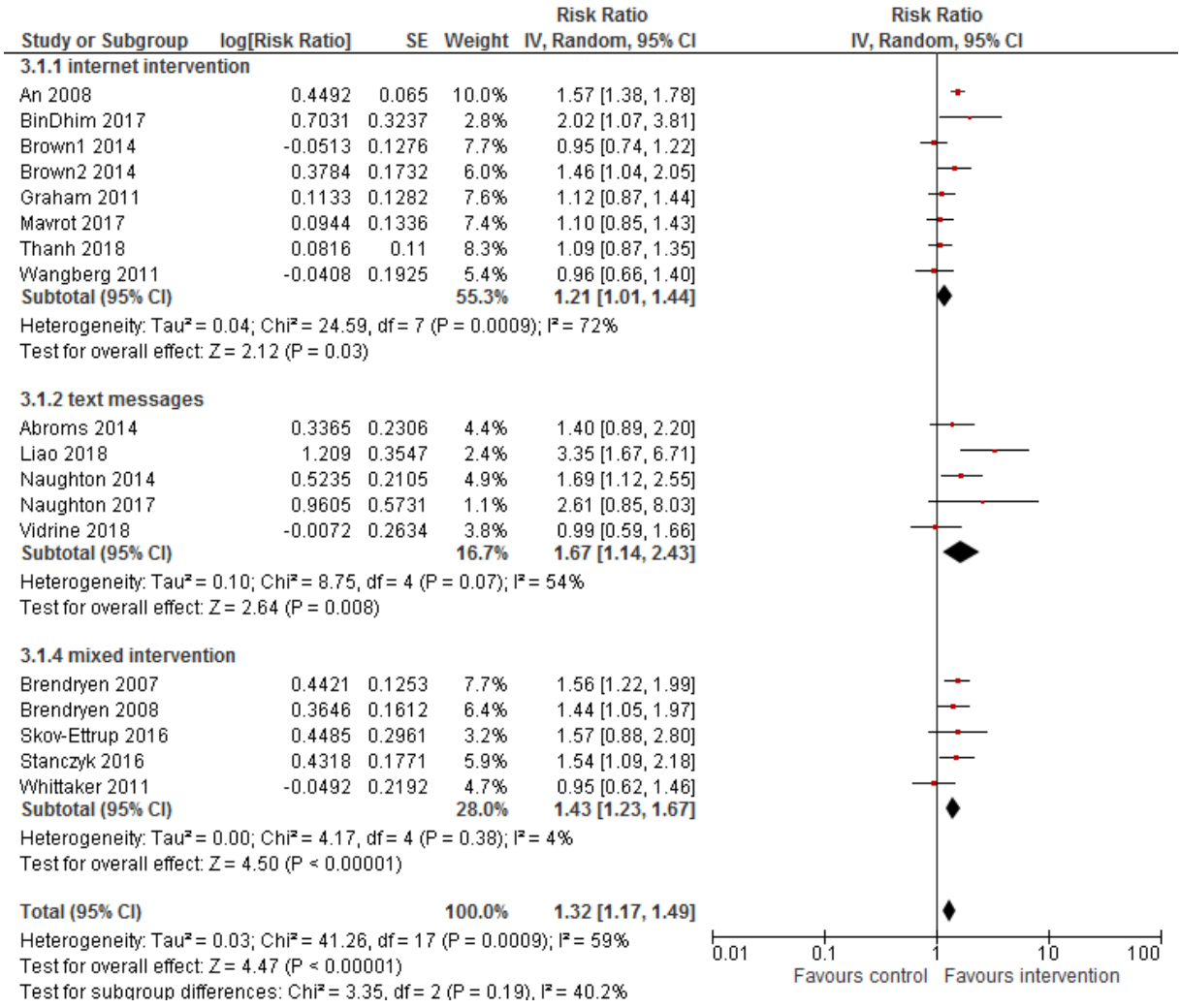
## Intervention vs other intervention- Long term smoking abstinence (≥ 6months): subgroup analysis by smoking ascertainment (biochemical, self-reporting verification)



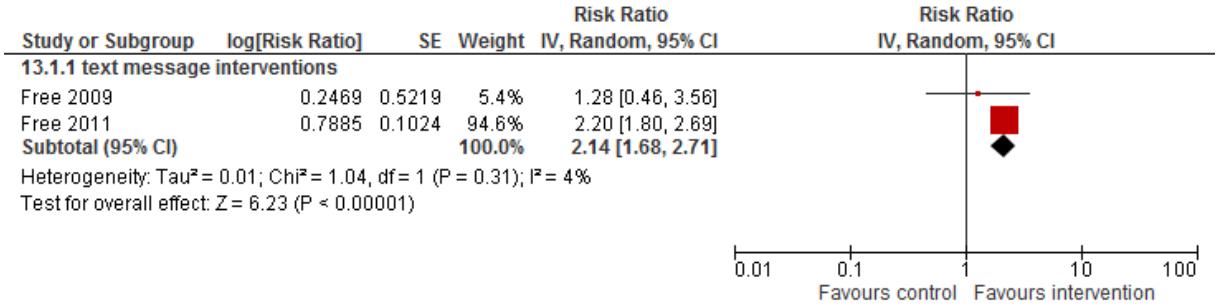
## Long term smoking abstinence (≥6months): subgroup analysis by digital platform



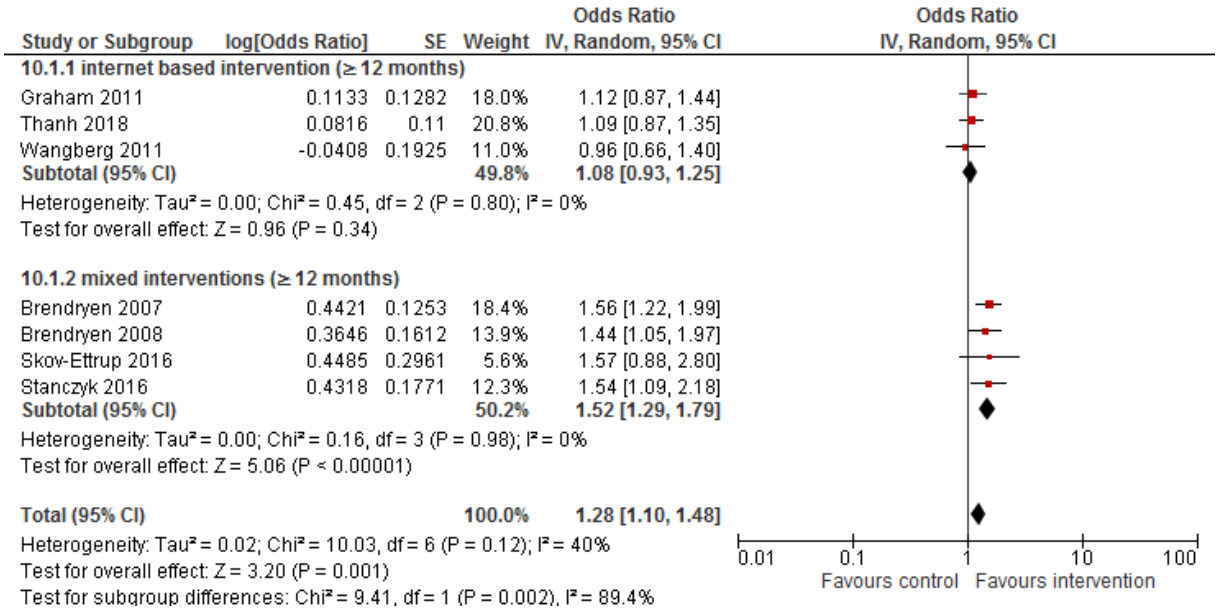
## Intervention vs other intervention- Long term smoking abstinence (≥6months): subgroup analysis by digital platform



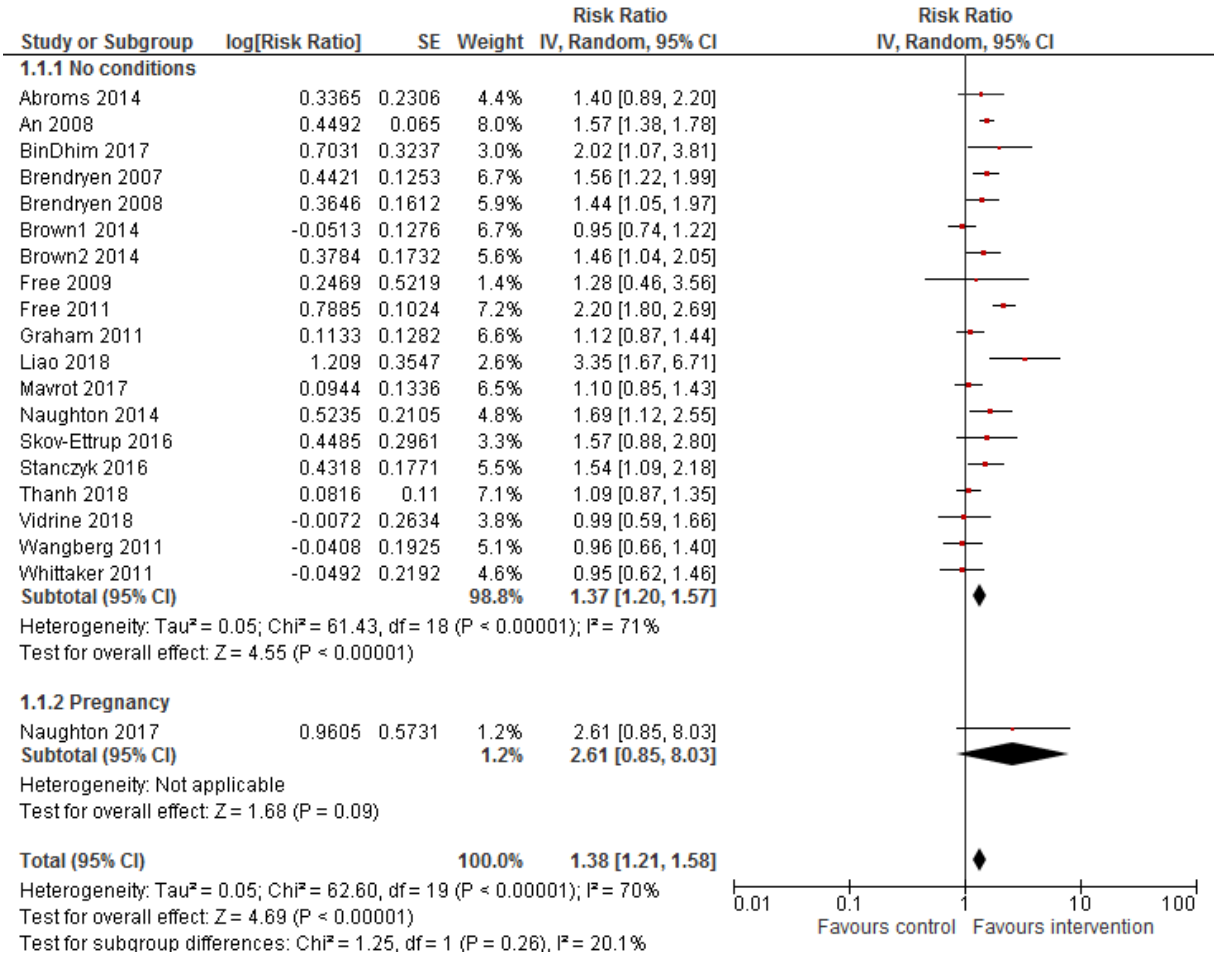

## Intervention vs no intervention- Long term smoking abstinence (≥6months): subgroup analysis by digital platform



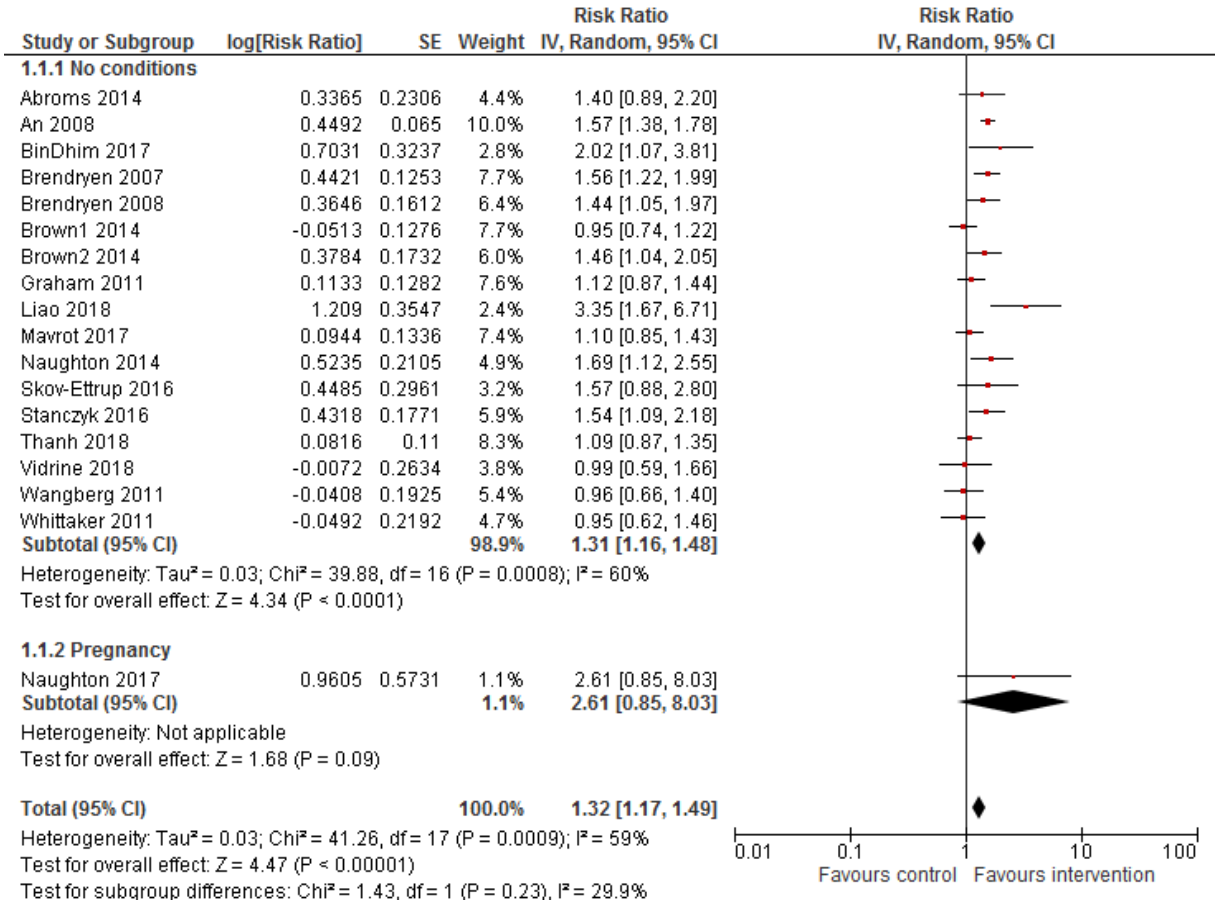
## Long term smoking abstinence: subgroup analysis by digital platform on follow up period (≥12 months)



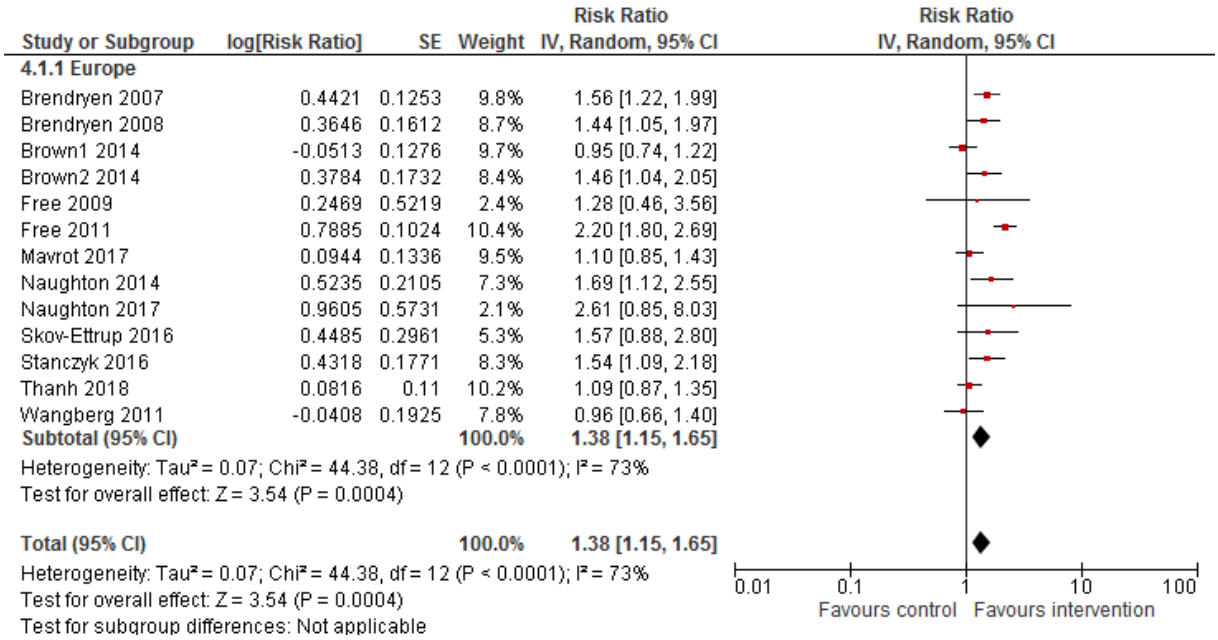
## Long term smoking abstinence: sensitivity analysis by condition



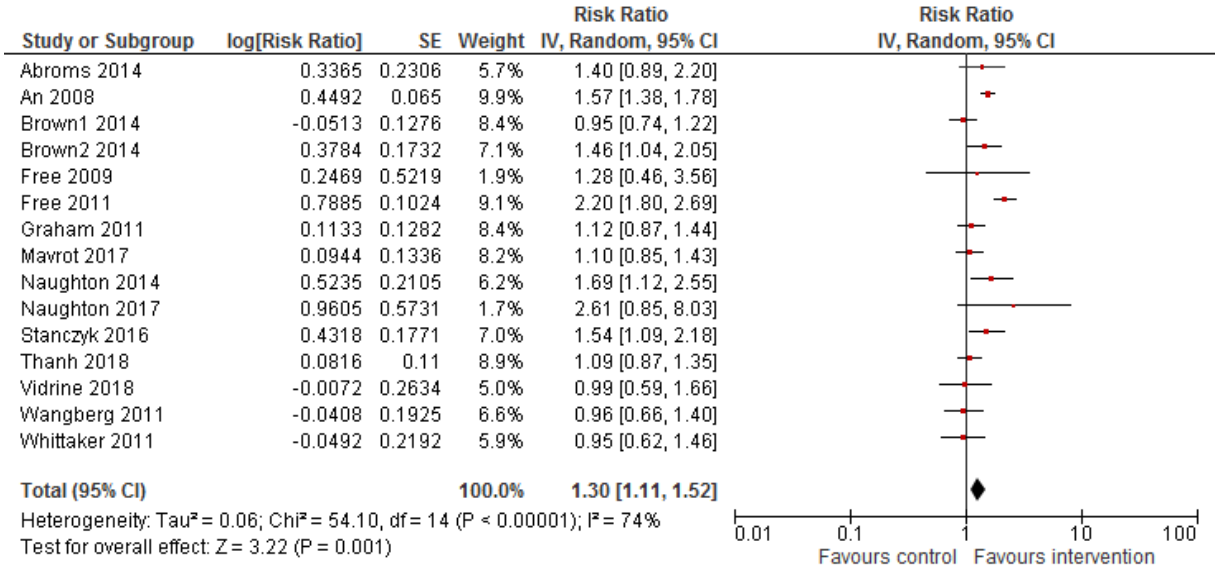
## Intervention vs other intervention- Long term smoking abstinence: sensitivity analysis by condition



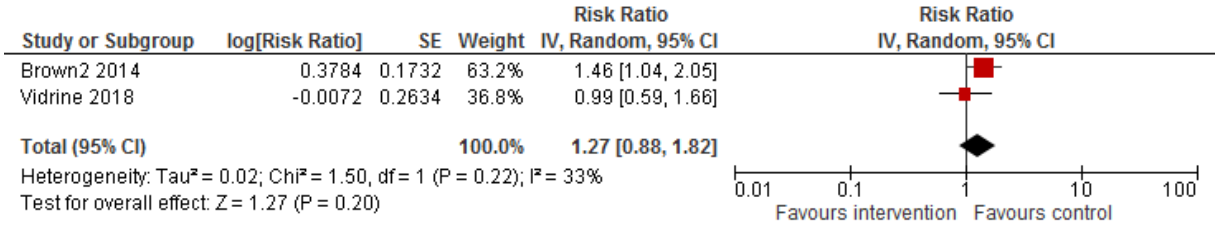
## Long term smoking abstinence in European countries




## Long term smoking abstinence for tailored interventions



## Long term smoking abstinence in people with low socioeconomic status



# Appendix K – Expert testimony

### Harms and negative consequences of digital and mobile health interventions

| Section A: | |
|---|---|
| **Name:** | Dr Beth Bell |
| **Role:** | Senior Lecturer in Psychology, School of Psychological and Social Sciences |
| **Institution/Organisation** | York St John University<br>Lord Mayor's Walk<br>York<br>YO31 7EX |
| **Guideline title:** | Behaviour change: digital and mobile health interventions |
| **Guideline Committee:** | PHAC A |
| **Subject of expert testimony:** | Components and characteristics of digital and mobile interventions to change unhealthy behaviours in alcohol consumption, smoking, unsafe sex, and diet and exercise |
| **Evidence gaps or uncertainties:** | • What are the harms and negative consequences of digital health technologies, if any? Are there different harms for different populations?<br>• What is the impact of disengagement from digital intervention on health outcomes?<br>• Which components and characteristics are more associated with harms and negative consequences, if any? |
| | |

**Section B:**

**Summary testimony:**

This expert testimony focuses on digital and mobile health interventions pertaining to diet and exercise behaviours only.

1. What are the harms and negative consequences of digital health technologies, if any? Are there different harms for different populations?

Research examining the harms and negative consequences of digital health technologies (diet and exercise) is in its infancy, and should be considered within the broader context of research demonstrating the numerous benefits of such technologies when facilitating behaviour change.

Research has examined the harms associated with commercially available digital eating and exercise interventions (e.g. FitBit, MyFitnessPal; Honary et al., 2019). In particular, young male and female adult users reported experiencing the following negative outcomes as a consequence of app use: development of obsessive behaviours, low mood, feelings of guilt, maladaptive eating/exercise behaviour and negative social consequences (Honary et al., 2019). A more detailed breakdown of the specific features of interventions that are associated with harm are outlined in section 3.

Individuals at-risk of/experiencing/ in recovery from eating disorders (ED) may be particularly vulnerable to harms associated with using commercially available digital interventions. In particular, research has shown:

- Women in ED recovery describe how the weight-loss focus of many digital diet interventions exacerbated the obsessive behaviours associated with their eating disorder (Eikey & Reddy, 2017). They further described how apps facilitated the development of diet/exercise regimes aimed at achieving underweight goals and how the gamification features of apps made this process more enjoyable. Some report the triggering effect of apps and potential for relapse (Eikey & Reddy, 2017; Eikey et al., 2019).
- 75% of survey respondents with ED report using apps to log eating behaviour and 73% believe this contributes to their ED (Levinson et al., 2017).
- Clinicians and other ED professionals report concerns about the weight-loss goal-setting and self-tracking features of digital diet interventions since they can be misappropriated by patients to facilitate extreme weight-loss, especially when accompanied with feedback, and may exacerbate eating disorder symptoms (Eikey, 2016; Honary et al., 2019).
- College women with non-clinical disordered eating report self-tracking of diet and exercise exacerbates behaviour (Eikey et al., 2018).

- Importantly, while no research exists examining risk of harm among men with ED or other groups at risk of ED (e.g. young people with body image concerns), it is likely they would also be vulnerable to harm.

Harms may be less likely to occur in individuals living with obesity; Jospe et al. (2018) found individuals living with obesity did not report increased disordered eating or exercise after 12 months of diet-related self-tracking. However, this study did not address whether there were any negative emotional harms of using digital interventions among individuals living with obesity, and more research is needed.

2. What is the impact of disengagement from digital intervention on health outcomes?

Engagement with digital diet and exercise interventions has been extensively studied (Perski et al., 2016). However, research specifically focusing on disengagement is limited, largely due to problems accessing those who have disengaged in research settings. Nevertheless, some studies have examined the link between low levels of intervention engagement (e.g., few long-ins to intervention, less time engaged with technology) and health outcomes, yielding mixed results (e.g. Donkin et al., 2011; Vandelanotte, 2014).

Mixed findings in this field likely reflect how lack of engagement/ disengagement occur for a variety of reasons (Cordeiro et al., 2015), thus reason underpinning disengagement will likely moderate the link between disengagement and health outcomes. In circumstances where individuals disengage from a digital intervention because habit formation has occurred and the technology is no longer required, it is unlikely that disengagement will be associated with negative health outcomes.

However, research has shown that disengagement may be due to a multitude of factors unrelated to behaviour change. Young adult respondents to a qualitative survey reported that they had stopped using digital diet and exercise technologies for reasons, including app deemed too demanding, diminished motivation, and goals being met (Honary et al., 2019). Some participants attributed negative consequences of app use (e.g. impact on social life, feelings of guilt and obsession) to their disengagement. The link between disengagement for such reasons and health behaviour has not been studied, and is an important avenue for future research.

3. Which components and characteristics are more associated with harms and negative consequences, if any?

Some features of digital interventions appear to be more associated with harm and negative consequences than others. These features may be more common in commercially available digital interventions, and may serve more of a commercial purpose than a behaviour change function.

- Goal setting based on body weight (i.e. weight-loss goals). There is substantial debate within health sciences with regards to the utility of focusing on weight-related goals when trying to improve diet and exercise outcomes (e.g., Gaeser

& Blair, 2019). Nevertheless, weight-related goals are a key feature of many digital diet and exercise –related behaviour change interventions. In commercially available digital interventions, weight-loss goals are often unregulated: 21% of the top 100 diet and exercise apps do not regulate body-weight goals, allowing users to set underweight (BMI < 17.5) goals (Honary et al., 2019). Furthermore, an analysis of almost 19,000 weight-loss app user profiles indicated approx. 7% set target body-weight goals classified as underweight (Eikey et al., 2017). These features may be particularly problematic for individuals at risk of, experiencing or in recovery from, eating disorders (Eikey, 2016; Eikey & Reddy, 2017; Eikey et al., 2019).

- Self-tracking of diet and exercise behaviour. Of the top 100 diet and exercise apps, 23% facilitate self-tracking of dietary behaviour and 84% facilitate tracking of exercise behaviour. While research has highlighted how self-tracking can lead to successful behaviour change (e.g. De Cock et al. 2017, Ryan et al., 2019, Sarcona et al., 2017), there is also potential for harm. Use of commercially available diet and exercise tracking technologies is associated disordered eating and compulsive exercise in young adults (Linardon et al., 2019; Plateau et al., 2018; Simspon & Mazzeo, 2017). Furthermore, qualitative research shows that users report obsessive behaviours (e.g. compulsive checking, rumination) and guilt following perceived failure to meet goals (Cordeiro et al., 2015; Honary et al., 2019). Some users also report tracking has led to consumption of unhealthy food options such as pre-packaged ready-meals or fast food options since these are easier to log (Cordeiro et al., 2015; Honary et al., 2019). This “cheating the digital system” is also found in users of exercise self-tracking technologies. For example, decreases in *vigorous* intensity physical activity following use of exercise self-tracking technologies over time have been documented (Kerner et al., 2019)
- Social media content designed to foster/motivate diet and exercise behaviour change that is clustered around specific hashtags (e.g. #fitspiration, content ostensibly designed to promote fitness) may include content problematic representations of diet and exercise (e.g., Deighton-Smith and Bell, 2019). This is difficult to regulate and is often used alongside commercially available diet and exercise apps (Depper & Howe, 2017). Evidence has shown exposure to such content can have negative consequences for mood, body image and eating/exercise behaviour (e.g. Dumas & Desroches, 2019; Fatt et al., 2018).
- Intervention functions designed to promote continuous engagement/ use of app for commercial purposes (such as notifications and reminders to use apps) may prompt feelings of guilt as expressed by some participants in qualitative studies (e.g., Eikey et al., 2017; Honary et al., 2019), but more research is needed. Importantly, these features may have little relevance to behaviour change goals (Honary et al., 2019).
- Appearance focused nature of commercially available digital diet and exercise behaviour change interventions (62% of top 100) may be problematic for those

with body image concerns and prevent intrinsic motivations developing, according to clinicians/expert opinion (for discussion see Honary et al., 2019).

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Sarcona, A., Kovacs, L., Wright, J., & Williams, C. (2017). Differences in eating behavior, physical activity, and health-related lifestyle choices between users and nonusers of mobile health apps. *American Journal of Health Education*, *48*(5), 298-305.

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### Harms in specific populations and scaling up in digital interventions

| **Section A:** | |
|---|---|
| **Name:** | Professor Colin Espie |
| **Role:** | Professor of Sleep Medicine, Nuffield Department of Clinical Neurosciences<br>Senior Clinical Research Fellow, Department of Psychiatry |
| **Institution/Organisation (where applicable):**<br><br>**Contact information:** | University of Oxford<br>OMPI Building<br>South Parks Road<br>Oxford, OX1 3RE, UK |

| | |
|---|---|
| **Guideline title:** | Behaviour change: digital and mobile health interventions |
| **Guideline Committee:** | PHAC A |
| **Subject of expert testimony:** | Components and characteristics of digital and mobile interventions to change unhealthy behaviours in alcohol consumption, smoking, unsafe sex, and diet and exercise |
| **Evidence gaps or uncertainties:** | • What harms, if any, are associated with digital health interventions with no evidence of efficacy?<br>• Are there any components and characteristics associated with greater harm than others? If so, are some groups more affected than others?<br>• What issues arise when scaling up a digital intervention? |

| Section B: |
| --- |
| **Summary testimony:** |

**What harms, if any, are associated with digital health interventions with no evidence of efficacy?**

I think it is important to read and to re-read this question very carefully. An intervention … with no evidence of efficacy? Under what circumstances should we accept that it is OK for an intervention to have no known benefit? I have several concerns that the Committee should take into account.

First, there are challenges in using the word “intervention” in guideline development. Although it may be intended as a generic term, I worry that the lay public will struggle to differentiate an “intervention” from a “therapeutic” or even from a “treatment”. After all, people go for surgical intervention. We would say that therapeutics, treatments (and surgical procedures) require an evidence base. I realise that the Committee may wish to shy away from substituting the word “product” for intervention, but I think that this would be more parsimonious. Most scalable digital and mobile interventions are in fact products and the biggest movers in this space are health technology companies.

Second, the digital health world is beset by the problem of ‘stealth research’. This is where innovation happens outside the peer-reviewed literature in what has been described as a confusing mix of “possibly brilliant ideas, aggressive corporate announcements, and mass media hype.”[1] In the five years since JAMA published this paper a great deal of data has emerged demonstrating that the highest-valued healthcare start-ups contribute minimally to relevant, high-impact published research; and that a company's (often very substantial) market valuation is completely unrelated to its publication record.[2] The problem often is that it is not in a company’s interests, or even on their agenda, to demonstrate efficacy. They can rely on market claims and publicity, sometimes backed up by key opinion leaders or celebrities who may appear to the lay person to endorse the product being helpful and effective. This compounds my point above if people think that this intervention is going to help them solve a health problem.

Third, I would refer the Committee to the crucially important work of the Digital Therapeutics Alliance (https://www.dtxalliance.org/) who are working to address the challenges of confusion and misperception in the diffuse field of digital health by clarifying unequivocally that anything claiming to be a ‘digital therapeutic’ requires an evidence base; just like any other therapeutic making a medical claim. The DTA is a not-for-profit industry body where 30 companies with an interest in digital therapeutics are collaborating to publish, promote and uphold evidence-based standards of practice. The DTA’s first report surveys the digital health landscape and discusses how wellbeing and therapeutics claims and the regulatory implications of each differ markedly.[3] At this point in time the required standard for any digital intervention that purports to deliver a clinically meaningful benefit is an adequately powered randomised controlled trial, the primary outcomes of which are pre-registered on a trials registry.[4]

In summary, therefore, there are major issues around semantics; and around observing the letter rather than spirit of the ‘law’. A NICE guideline is likely to be hugely influential, so it is important that the terminology used in the guideline is crisp, clear and sufficiently differentiated. The Committee should be aware that a guideline that is permissive of slack or non-existent scientific evidence, and that over-indexes on of a doing no harm philosophy, may be used as an endorsement for poor practice

and for elegant product wordsmithing, and may lead the public unduly to trust market claims.

**Are there any components and characteristics associated with greater harm than others? If so, are some groups more affected than others?**

I think a good discipline here would be to ask the question, if this intervention (product) were to be delivered face to face by health services staff, would potential harms be mitigated that are problematic to mitigate digitally?

I have two suggestions for consideration here.

First, is the sensitivity-specificity ratio. For whom is this intervention (product) designed? We generally think of low risk/ non-medical products as being suitable for anyone and everyone. There is often no specificity of intended audience, and few if any exclusion criteria. We might consider it generally to be a good thing to lose weight, stop smoking, to exercise more and to take some measure of responsibility for one's health. I have some concerns, however, that there are likely to be many people who require more, perhaps much more, intervention. The 'dose' delivered by the digital or mobile intervention may be trivial in relation to a person's needs, and the relationship between this as self-care, and what in truth is needed may be tenuous. This potential harm of under-treatment would be mitigated by the professional being involved. Those that required more help would likely be triaged. Moreover, this sensitivity-specificity challenge interacts with the (likely) lack of evidence for efficacy of the digital product. Were the same intervention delivered by a health professional it most likely would have been previously subject to clinical trials, consistent with my points earlier.

Second, digital health products may be little more than an engaging distraction. Vulnerable populations may include those who do not generally attend for health care, and those who place undue trust in digital applications. I realise, in relation to the former, that one attraction of digital products is that they 'reach' people who do not typically make use of health services. That is a good thing; but there also is an unintended consequence if the digital product in effect reinforces non-participation in conventional care, or replaces it. I have a concern that some people may think of digital as their alternate care; and indeed, some companies appear to see themselves as developing this new vertical - a vision as yet unproven. Then there are those who implicitly trust the digital data and their progress against goals set. Without evidence that the applications measure things with validity and reliability, I worry that people are vulnerable to potentially false or sub-optimal feedback. App based information can assist the clinical conversations around health, but it can also hinder. This is especially the case when people become wedded to their data, to the personal challenges based on those data and to the social comparisons that are often intrinsic to the data, or when they develop an unhealthy obsession with self-analysis.

**What issues arise when scaling up a digital intervention?**

My main points here are about quality and capability, and the related matter of who is best placed to develop and to deliver digital product(s) at scale?

First, let us consider quality. We recognise that the authentic standard for evidence-based practice is an adequately controlled RCT and/ or meta-analysis of RCT data.

On that basis we can trust that an intervention is effective. It "works". Leaving aside the question of if and how we determine efficacy in the digital domain, my point is that we can agree upon an authentic standard. What though is the authentic peer review standard for the quality of a digital intervention product? Reference can be made to GDPR and data security, and to ISO standards of course, but I am thinking of how do you make a great product, differentiated by the highest level of peer review? In these circumstances it may be industry peer review that matters - this is a digital innovation that makes Apple or Google 'jealous',[4] or that attracts Techcrunch awards. Another, and likely related measure, may be user engagement metrics and user satisfaction and volume and spread of use.

Second, there is capability to scale. A successful digital application is likely to be used by millions of people, perhaps simultaneously. Who has the necessary expertise to a) develop and deliver a complex digital intervention, that is b) highly engaging, c) can sustain service continuity and capability, whilst d) maintaining user satisfaction over time, and e) iterating a product offering to new and improved technical standards, f) on diverse operating systems, g) at ever increasing speed, h) to entire populations?

The main issue that arises for me in considering scale is that product quality and capability will likely rely on a mature industry that takes its responsibilities to the public seriously. The public services role in my view will be around standard setting, regulation and developing productive partnerships that make economic sense. After all, only a good quality product is worth scaling, and there is an increasingly high bar to meet the expectations and needs of the public about usability. It seems unlikely to me, for example, that the NHS will be in a position to develop and maintain a suite of digital interventions that are at the cutting edge of software technology or AI. It seems to me even less likely that they should. Our health services do not make anything else (e.g. medical equipment, drugs, furniture, vehicles). Is this an exceptional case or a strong suit?

On the other hand, NICE is in an ideal position to guide and to recommend what is required, to what standards, and for whom [consistent with the eight criteria (a. to f.) above]

**References to other work or publications to support your testimony' (if applicable):**


1. Ioannidis JPA. Stealth research: is biomedical innovation happening outside the peer-reviewed literature? *Journal of the American Medical Association*. 2015;313:663-664.
2. Cristea IA, Cahan EM, Ioannidis JPA. Stealth research: Lack of peer-reviewed evidence from healthcare unicorns. *European Journal of Clinical Investigation*. 2019;49:e13072.
3. Digital Therapeutics Alliance. *Digital Therapeutics: Combining Technology and Evidence-based Medicine to Transform Personalized Patient Care.* DTA, 2018
4. Espie CA, Carl JR. Stott R, Henry AL, Miller CB. Digital medicine needs to work. *The Lancet*. 2018;392:2694

## Uptake, engagement and people with mental health conditions

| Section A: | |
|---|---|
| **Name:** | Dr Gavin Doherty |
| **Role:** | Associate Professor & Fellow |
| **Institution/Organisation** | School of Computer Science and Statistics<br>Trinity College Dublin<br>Dublin 2<br>Ireland |
| **Guideline title:** | Behaviour change: digital and mobile health interventions |
| **Guideline Committee:** | PHAC A |
| **Subject of expert testimony:** | Components and characteristics of digital and mobile interventions to change unhealthy behaviours in alcohol consumption, smoking, unsafe sex, and diet and exercise |
| **Evidence gaps or uncertainties:** | • Which components and characteristics are associated with greater interaction, uptake and engagement with digital health interventions?<br>• Which components and characteristics lead to higher (or lower) interaction, uptake and engagement in people with mental health conditions?<br>• Are there particular components and characteristics that may be important for those with mental health conditions?<br>• Which harms and negative consequences as a result of using digital interventions, if any, are specific to people with mental health conditions? |

| Section B: |
| --- |
| **Summary testimony:** |

**Engagement with digital health interventions**

For digital health interventions to have the opportunity to work, users must engage with them. However, engagement is a multifaceted construct. How engagement is viewed and defined influences the choice of design strategies used to encourage engagement, and the approaches taken to measure it. Even when taking the most common approach of using simple behavioural measures of engagement, we must consider what aspects of the intervention are engaged with, and whether these comprise the most active or useful components of an intervention for that particular user.

Within the recent literature on digital health, there is greater recognition of the importance of engagement, and the role of engagement as a mediator of outcomes, and as a phased process in which there may be periods of disengagement and re-engagement (Yardley et al.). The importance of iterative human-centred design processes in the development of usable and engaging interventions has likewise come to be more widely recognised.

**Engagement strategies and components**

A recent systematic review of computing literature (n=351) examines the definitions, theories and design features which have been used to understand and promote user engagement (Doherty & Doherty 2019). The strategies identified include:

- Usability, feedback, aesthetics
- Challenge, cognitive load, workload
- Immersion, presence, involvement
- Exploration, richness, narrative, novelty
- Fun, humour, gamification.
- Social connectedness, social presence.

There are thus a wide set of features which might be incorporated into intervention components. A further complication is that it is difficult to isolate the effect of individual components. The set of features provided need to be brought together into a coherent design, and may complement or rely upon each other.

**Case study – SilverCloud Health**

An example of a digital health intervention incorporating a variety of components to improve engagement is SilverCloud. SilverCloud is an online platform for the delivery of human-supported mental and behavioural health interventions (see for example Richards et al., 2015). The SilverCloud platform is used in the majority of NHS IAPT services, and has been used to deliver evidence-based interventions to over 300,000 clients. The platform embodies four design strategies to increase engagement, that are aligned with the therapeutic goals of the platform:

- Interactive: to make the experience of online therapy more active and interactive, encouraging engagement with the therapeutic content.

- Social: to include anonymous and moderated content from other users to assure users that they are not alone in experiencing difficulties and that many other people have experienced similar problems and overcome them.
- Personal: to provide the client with more control over the experience, in terms of how they use the program, and their journey through it.
- Supportive: each client has a human supporter to encourage, guide, and motivate them as they go through the intervention.

As an example of the interdependence of components the interactive exercises carried out by a client allow the supporter to provide more personal and meaningful feedback, and thus one component of the design allows the other component to operate more effectively.

A recent analysis of engagement on the SilverCloud platform shows a positive relationship between engagement and outcomes (Enrique et al. 2019). However, current work applying machine learning techniques to a large cohort shows that it is possible to distinguish client subtypes based on engagement that exhibit a more complex relationship between engagement and outcomes (under review). While such stratification is a first step towards personalisation, how such understanding of client subtypes can best be integrated into intervention design and delivery is a question requiring sustained interdisciplinary collaboration.

**Implementation context**

The NHS IAPT setting itself comprises a valuable example, with the development of new clinical pathways and a new workforce, standardised and mandatory reporting, and improvement of outcomes as digital interventions become more embedded. The success of the IAPT model motivates us to look not only at intervention delivery, but to examine the referral pathway (including self-signup), at how technology is introduced and at how expectations are set. For example, recent analysis of secondary outcomes of a naturalistic RCT carried out within the NHS showed expectations of change among the vast majority of participants in the sample (under review).

In the overall context of implementation of an intervention, some technology involving novel and potentially invasive components such as sensor-based tracking or automated recommendations based on machine learning may have acceptability issues. Technology acceptance models (Davis 1989, Kim & Park 2012) may be helpful in considering the balance between health threat, perceived usefulness and perceived usability. This may differ among groups. For example, recent interdisciplinary research on engagement with antenatal mental health screening on mobile phones suggests that characteristics such as ethnicity can affect willingness to install an m-Health application (Doherty et al., 2019). A related issue concerns what happens after the more intensive (and perhaps human-supported) component of an intervention ends, and particularly whether there can be a more graduated disengagement, for example through the provision of self-management tools.

**Risks**

Many of the design challenges mentioned above also constitute risks – the primary risk being a lack of user engagement and consequent failure to support a positive outcome for the patient. Engagement issues may also emerge from personal factors such as lack of time, and so features to enable flexibility, such as being able to "pause" a supported intervention may be useful. Studies of digital health interventions in which engagement has been low can also be problematic to interpret.

Within the patient pathway, there are questions such as how patients are assessed for suitability, and what options are available if a digital solution is not appropriate for them, or for transition to more intensive intervention. The topics of fairness, privacy, and autonomy have received much attention with regard to machine learning technologies recently, and while there are many different technical definitions of fairness, the fundamental concern is whether use of a digital intervention will disadvantage some proportion of the population, and what actions can be taken to mitigate this, for example through provision of tailored content to particular client groups.

**References to other work or publications to support your testimony' (if applicable):**

A. Blandford, J. Gibbs, N. Newhouse, O. Perski, A. Singh, and E. Murray. 2018. Seven lessons for interdisciplinary research on interactive digital health interventions. Digit. Heal. 4, (2018), 1–13.
Yardley, L., Spring, B. J., Riper, H., Morrison, L. G., Crane, D. H., Curtis, K., Merchant, GC, Naughton, F., Blandford, A. (2016). Understanding and promoting effective engagement with digital behavior change interventions. American Journal of Preventive Medicine, 51(5), 833-842.
K. Doherty and G. Doherty, Engagement in HCI: Conception, Theory and Measurement**,** ACM Computing Surveys, 51(5), 2019.
K. Doherty, J. Marcano-Belisario, M. Cohn, N. Mastellos, C. Morrison, J. Car, and G. Doherty. Engagement with Mental Health Screening on Mobile Devices: Results from an Antenatal Feasibility Study. Proc. ACM Conference on Human Factors in Computing Systems (CHI 2019), 2019.
D. Richards, L. Timulak, E. O'Brien, C. Hayes, N. Vigano, J. Sharry & G. Doherty. A Randomized Controlled Trial of an internet-delivered treatment: its potential as a low-intensity community intervention for adults with symptoms of depression**.** Behaviour Research and Therapy 75:20-31 2015.
Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. Manag Inf Syst Q. 1989 Sep;13(3):319–39.
Kim J, Park HA, Development of a Health Information Technology Acceptance Model Using Consumers' Health Behavior Intention, J Med Internet Res 2012;14(5).
Enrique A, Palacios JE, Ryan H, Richards D. Exploring the Relationship Between Usage and Outcomes of an Internet-Based Intervention for Individuals With Depressive Symptoms: Secondary Analysis of Data From a Randomized Controlled Trial. J Med Internet Res 2019;21(8).

## Equality of access and suitability in population groups

| Section A: | |
|---|---|
| **Name:** Katherine Brown | |
| **Role:** | **Professor of Health Psychology Applied to Public Health** |
| **Institution/Organisation** | Coventry University (from 14th October 2019: University of Hertfordshire) |
| **Guideline title:** | Behaviour change: digital and mobile health interventions |
| **Guideline Committee:** | PHAC A |
| **Subject of expert testimony:** | Components and characteristics of digital and mobile interventions to change unhealthy behaviours in alcohol consumption, smoking, unsafe sex, and diet and exercise |
| **Evidence gaps or uncertainties:** | • Which components and characteristics lead to higher uptake and engagement in different population groups?<br>• Which components and characteristics are associated with attrition from the intervention?<br>• Are there interactions between components and characteristics that can increase or decrease engagement when both/neither are present?<br>• Which are the components and characteristics that can support underserved populations and those with health inequalities to engage with digital interventions?<br>• Are there populations where digital interventions are not suitable? Or where access to interventions may be difficult? |
| | |

## Section B:

**Summary testimony:**

- Which components and characteristics lead to higher uptake and engagement in different population groups?

We've found that having interesting content that is co-produced, desired, liked and appealing in a 'consumer/marketing' type way can be critical to uptake and engagement. e.g. in our Respect Yourself[1,2] sexual health work with young people, having 'the pleasure zones' and 'word of the day' made the content appealing and we could see evidence of website users tracking from those 'draws' to 'health behaviour' content intended to drive services access. Another example, on 'Wrapped'[3], a condom promotion intervention that sits around online STI screening services, we deliberately designed one of the intervention components, the condom selection packaging (adding an object to the environment that users order through the intervention site) to be luxurious/classy looking and users can choose packaging to reflect their tastes.

Based on our experiences we would suggest going for the 'lowest' form of 'digital' required to deliver needed content and preferred in a target population group – sometimes text messaging is enough – don't over-digitalise/over complicate.

We think you may be more likely to get engagement from groups with a vested interest in the target behaviour and where digital engagement already happening – e.g. digital condom promotion intervention more appealing to those accessing online/digital self-screening for STI infections[3] (so making use of key digital infrastructure that already reaches target populations to apply behavioural science-based content)

Our work on stopapp[4, 5, 6] and feasibility trial findings suggest that participants may be more likely to 'book a stop smoking appointment' (target behaviour) and thus engage to the end when the digital invitation comes from a 'credible source' such as invitation to attend smoking cessation more relevant if generated by a 'healthcare' source e.g. GP (tentative though – not full RCT)

Similarly recent work on smoking in pregnancy shows importance to women of getting message about importance of stopping smoking from their midwife or GP rather than 'just' from the stop smoking in pregnancy advisor[7]

In a recent Systematic review and meta-analysis[8] looking at digital interventions to support stop smoking in pregnancy we found very limited information about SES of population – only reported in a couple of the included papers so assessing engagement and effectiveness in different SE demographic groups was not possible.

- Which components and characteristics are associated with attrition from the intervention?

A 'Substance of the intervention' type issue is that 'social support', an important BCT for much behaviour change can be limited on some digital platforms/contexts and may thus limit engagement when that is what is needed. In addition, Some BCTs are by their nature difficult to administer on digital platforms e.g. ones that involve 'Discuss……'. Tailoring content relies on algorithms rather than human intuition in the digital sphere.

On the Wrapped intervention we found that people don't typically like content to be released over time – like to be in control of what they can access and when – will affect attrition if hold things back 'til later[3].

Running out of 'data' and pay as you go models of text and web access on phones more problematic for those on lower incomes and at greater risk of health inequality. We found in our stopapp feasibility trial[6] that the only factor significantly associated with loss to follow up was whether or not people had access to the internet via data on their mobile phone.

Other data from the stopapp feasibility trial[6] showed that engagement with stopapp, measured in a range of ways (e.g. total amount of time spent using it, number of pages visited) was not significantly associated with any of the socio-demographic data including socio-economic status measured in two ways – IMD (quintiles and deciles) and professional status. We had a good range of ethnicities and SES status in the study including a good proportion of people who were long-term unemployed or had never worked.

RE: BCT goal setting - Need to help people to set appropriate goals – some evidence that if goals too ambitious they are not achieved and this leads to lower self-efficacy and lower motivation levels and attrition from intervention use. Tentative finding in a systematic review[9] we've conducted that goal-setting as a component of digital interventions across a range of health behaviours reduces self-efficacy, however when we updated the review and added more papers this finding did not stand.

- Are there interactions between components and characteristics that can increase or decrease engagement when both/neither are present?

No specific data to offer here – feel that very specific factorial experiments are needed to address questions here which we have yet to secure funding for.

- Which are the components and characteristics that can support underserved populations and those with health inequalities to engage with digital interventions?

Co-production with people who represent as full a range of the target population groups as possible maximises likely success.

Digital content can be used in a supported way – e.g. on the LIFT project[10] although digital was not a preference of the target population of Bangladeshi and Pakistani women the voluntary sector organisation that runs maternal and child health programmes for that community were keen to have a digital animation to encapsulate the key infant feeding promotion messages that were co-produced with the community. This retains the benefit of the fidelity to message content whilst providing an opportunity for face-2-face context setting and assessment if whether now is the right time to provide those messages etc

- Are there populations where digital interventions are not suitable? Or where access to interventions may be difficult?

Sexual health/condom use promotion: Vulnerable populations such as people being trafficked, young people at risk of sexual exploitation – using digital alone (e.g. moving all condom promotion activity and STI screening to an on-line model) may mean missed opportunities to identify those 'at risk' and instigate safeguarding processes – opportunity for 'mis-use' to avoid coming into contact with. Concern for us with 'Wrapped'[3]. In addition, we can't provide components of the intervention deemed as 'sexually explicit' to those under 18 years of age. Linking automatic/affective responses between condoms and having sex is imperative for improving condom use. Erotic content that includes condom use can help to improve the association between the two but cannot be shown to under 18s for legal reasons.

Bangladeshi and Pakistani women we were working with on infant feeding/breastfeeding promotion intervention development[10] did not want digital content for them to use independently – they wanted to have something they could easily share with a family member – particularly parents/grandparents who may hold strong cultural beliefs around infant feeding that they want support to tactfully challenge (relevant to weight management since breastfeeding protects from obesity)

EU wide project focussed on communities affected by FGM[11] – enjoy community events and socialising, talking to one another – they wanted face-to-face events and group based interventions.

**References to other work or publications to support your testimony' (if applicable):**

1. **Brown, K.E.**, Newby, K., Caley, M., Danahay, A. & Kehal, I. (2016). Pilot evaluation of a web-based intervention targeting sexual health service access. *Health Education Research* 31 (2):273-282. doi: 10.1093/her/cyw003

2. Newby, K. V., **Brown, K. E.**, Bayley, J., Kehal, I., Caley, M., Danahay, A., ... & Critchley, G. (2017). Development of an Intervention to Increase Sexual Health Service Uptake by Young People. *Health Promotion Practice*, *18*(3), 391-399.
3. Newby, K., Crutzen, R., **Brown, K. E.**, Bailey, J., Saunders, J., Szczepura, A., Hurt, J., Alston, T., Sadiq, T. & Satyajit, D. (2019). Wrapped: Development of an intervention to increase condom use amongst users of chlamydia self-sampling websites. *Journal of Medical Internet Research: Formative Research.* 3(2):e11242 DOI: 10.2196/11242
4. Fulton, E., **Brown, K. E.,** Kwah, K., & Wild, S. (2016). StopApp™: Using the Behaviour Change Wheel to develop an app to increase uptake and attendance at NHS Stop Smoking Services. *Healthcare*, *4*(2), 31; doi: 10.3390/healthcare4020031
5. Fulton, E., Kwah, K., Wild, S., **& Brown, K E.** (2018). Lost in Translation: Transforming Behaviour Change Techniques into Engaging Digital Content and Design for the StopApp™. *Healthcare, 6*(3), 75 doi:10.3390/healthcare6030000 (PDF Version)
6. Fulton, E., Newby, K., Gokal, K., Kwah, K., Jackson, L., Naughton, F., Coleman, T. & **Brown, K. E.** (2019). A tailored digital behaviour change intervention with e-referral system to increase attendance at NHS Stop Smoking Services (The MyWay Project): study protocol for a randomised controlled feasibility trial. *BMJ Open,* http://dx.doi.org/10.1136/bmjopen-2018-028721
7. Griffiths, S., Fulton, E., & **Brown, K. E.** (in prep). Factors influencing smoking cessation and engagement with stop smoking services in pregnant smokers. (work from the doctoral thesis of Sarah Griffiths).
8. Griffiths, S. E., Parsons, J., Fulton, E., Naughton, F., Tombor, I. & **Brown, K. E.** (2018). Are digital interventions for smoking cessation in pregnancy effective? A systematic review and meta-analysis. *Health Psychology Review* https://doi.org/10.1080/17437199.2018.1488602
9. Newby, K., Teah, G., Cooke, R., Li, X., **Brown, K. E.,** Salisbury-Finch, B., Kwah, K., Bartle, N., Curtis, K., Fulton, E., Parsons, J., Dusseldorp, E., & Williams, S. (under review). What is the best way to promote self-efficacy through digital behaviour change interventions? A systematic review and meta-analysis.
10. Bartle, N., **Brown, K.,** & Blissett, J. (2017- 2019). A community-centered intervention to improve infant feeding practices among Pakistani and Bangladeshi families living in the UK. Medical Research Council (PHIND) (£151 573.95)
11. **Brown, K.E.,** Beecham, D., & Barrett, H. (2012). Researching FGM Intervention Programmes Linked to African Communities in the EU II (REPLACE II). European Commission funding from specific programme "DAPHNE III". (Euro 600 000).

## Developing and implementing digital and mobile health interventions

| Section A: | |
|---|---|
| **Name:** | Professor Michael Trenell |
| **Role:** | Director, NIHR Innovation Observatory |
| **Institution/Organisation** | Newcastle University<br>4th Floor, Time Central<br>32 Gallowgate<br>Newcastle upon Tyne<br>NE1 4BF |
| **Guideline title:** | Behaviour change: digital and mobile health interventions |
| **Guideline Committee:** | PHAC A |
| **Subject of expert testimony:** | Components and characteristics of digital and mobile interventions to change unhealthy behaviours in alcohol consumption, smoking, unsafe sex, and diet and exercise |
| **Evidence gaps or uncertainties:** | • What factors should be considered when developing a digital health intervention?<br>• Are there groups that require specific consideration during implementation, for example underserved and hard-to-reach groups and the less digitally literate?<br>• What are the barriers to implementing a digital intervention at local or national level in the NHS? |

| Section B: |
| --- |
| **Summary testimony:** |

- **What factors should be considered when developing a digital health intervention?**

  There are three chasms for digital health:

  1) Good / great idea to minimally viable product (proof of concept)
  2) Minimally viable product to clinically validated product (efficacy)
  3) Clinically validated product to use at scale (effectiveness)

  Each of these requires knowledge, investment, a multi-disciplinary team. Typically, the first step is essentially a proof of concept. This should be co-designed with end users, detailing where the digital service fits in with the existing clinical journey. It should take into account best practice and clinical guidelines, but also incorporate guidance on user experience and use interface. The second step is to take a minimally viable product when it is shown to have promise and support it for use in a clinical setting. This involves building to the right digital standards and having the right level of accreditation for the service. The final stage is supporting the service at scale. This is the stage to date that is least achieved by digital services. Providing a service to 1,000 to 10,000 people is fundamentally different to providing to 100,000 – 500,000 people. The way the digital architecture is developed is different, the way it is supported is different and the way it is regulated is different. Data should be continually collected, and the services evolved in response to this, with a documented pathway for continual improvement.

- **Are there groups that require specific consideration during implementation, for example underserved and hard-to-reach groups and the less digitally literate?**

  When considering access, it is important to benchmark this against existing services. On the field we mainly work in, type 2 diabetes, access to self-management services is poor in groups who are easily overlooked. Our data and data from other suggest that digital services broaden access. This is by no means a panacea, but it holds promise. When designing services, considering access with older generation technologies and without implied knowledge of how to use the technology. Work hard on the content as this is often overlooked. Make sure readability aligns to national reading average, the content is engaging, and accessible.

  It is valuable to consider that digital services are regarded as complex interventions. They require multiple layers of support, incorporating behaviour change of not only the patient, but the healthcare team and support infrastructure. These should be proactively reviewed and addressed during the design.

**What are the barriers to implementing a digital intervention at local or national level in the NHS?**

We have much to learn about optimising digital implementation of health services. There are three main layers which should be planned; the patient, the healthcare team, and the system (regulation, policy, funding). An effective implementation plan should be coordinated, deliberate, assessed and continuingly improving. This requires central and local support and needs to be coordinated. There is an inherent complexity in localised commissioning of digital health services, with each geography having ecocentrism's in how they manage data protection, procurement, and assessment. This makes scale difficult or costs higher as the service essentially becomes more bespoke to that region. In contrast, central procurement removes many of the barriers, but requires central budget allocation at support at a scale appropriate to the need being addressed. This is best documented in the national Healthy Living with Type 2 diabetes programme which is the first to target a digital service at scale in the NHS. The programme levers off existing infrastructure for implementation, but standardises GDPR and standards working to existing government digital standards. This provides scale and confidence, but also requires a central push and budget allocation.

**References to other work or publications to support your testimony' (if applicable):**

# Appendix L – Excluded studies

## Public Health studies

| Study | Reason for exclusion |
|---|---|
| Abroms, Lorien C., Chiang, Shawn, Macherelli, Laura et al. (2017) Assessing the National Cancer Institute's SmokefreeMOM text-messaging program for pregnant smokers: Pilot randomized trial. Journal of Medical Internet Research 19(10) | - Comparator in study does not match that specified in protocol |
| Abroms, Lorien C., Johnson, Pamela R., Leavitt, Leah E. et al. (2017) A Randomized Trial of Text Messaging for Smoking Cessation in Pregnant Women. American journal of preventive medicine 53(6): 781-790 | - Comparator in study does not match that specified in protocol |
| Abroms, Lorien, Hershcovitz, Ronit, Boal, Ashley et al. (2015) Feasibility and acceptability of a text messaging program for smoking cessation in Israel. Journal of Health Communication 20(8): 903-909 | - Not a relevant study design |
| Afshin, Ashkan, Babalola, Damilola, McLean, Mireille et al. (2016) Information Technology and Lifestyle: A Systematic Evaluation of Internet and Mobile Interventions for Improving Diet, Physical Activity, Obesity, Tobacco, and Alcohol Use. Journal of the American Heart Association 5(9) | - Study does not contain a relevant intervention |
| Ajay, V. S., Praveen, P. A., Millett, C. et al. (2012) Role of mobile phone technology in tobacco cessation interventions. Global Heart 7(2): 167-174 | - Not a relevant study design |
| Akhu-Zaheya, Laila M. and Shiyab, Wa'ed Y. (2017) The effect of short message system (SMS) reminder on adherence to a healthy diet, medication, and cessation of smoking among adult patients with cardiovascular diseases. International Journal of Medical Informatics 98: 65-75 | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
|---|---|
| Alghamdi, Manal; Gashgari, Horeya; Househ, Mowafa (2015) A Systematic Review of Mobile Health Technology Use in Developing Countries. Studies in health technology and informatics 213: 223-6 | - old systematic review (before 2017) |
| An, L. C., Zhu, S. H., Nelson, D. B. et al. (2006) Benefits of telephone care over primary care for smoking cessation: A randomized trial. Archives of Internal Medicine 166(5): 536-542 | - Study does not contain a relevant intervention |
| An, Lawrence C., Demers, Michele R. S., Kirch, Matthias A. et al. (2013) A randomized trial of an avatar-hosted multiple behavior change intervention for young adult smokers. Journal of the National Cancer Institute. Monographs 2013(47): 209-15 | - Not adequate follow up |
| Aneni, Ehimen C., Roberson, Lara L., Maziak, Wasim et al. (2014) A systematic review of internet-based worksite wellness approaches for cardiovascular disease risk management: outcomes, challenges & opportunities. PloS one 9(1): e83594 | - old systematic review (before 2017) |
| Augustson, Erik, Engelgau, Michael M., Zhang, Shu et al. (2017) Text to Quit China: An mHealth Smoking Cessation Trial. American journal of health promotion : AJHP 31(3): 217-225 | - Comparator in study does not match that specified in protocol |
| Badawy, Sherif M. and Kuhns, Lisa M. (2017) Texting and Mobile Phone App Interventions for Improving Adherence to Preventive Behavior in Adolescents: A Systematic Review. JMIR mHealth and uHealth 5(4): e50 | - old systematic review (before 2017) |
| Balk-Moller, Nina Charlotte; Poulsen, Sanne Kellebjerg; Larsen, Thomas Meinert (2017) Effect of a Nine-Month Web- and App-Based Workplace Intervention to Promote Healthy Lifestyle and Weight Loss for Employees in the Social Welfare and Health Care Sector: A Randomized Controlled Trial. Journal of medical Internet research 19(4): e108 | - Study does not focus on behavour change |

| Study | Reason for exclusion |
|---|---|
| Balmford, James and Borland, Ron (2014) How do smokers use a smoking cessation text messaging intervention?. Nicotine & Tobacco Research 16(12): 1586-1592 | - Comparator in study does not match that specified in protocol |
| Bannink, Rienke, Broeren, Suzanne, Joosten-van Zwanenburg, Evelien et al. (2014) Effectiveness of a Web-based tailored intervention (E-health4Uth) and consultation to promote adolescents' health: randomized controlled trial. Journal of medical Internet research 16(5): e143 | - Not adequate follow up |
| Barak, A., Hen, L., Boniel-Nissim, M. et al. (2008) A comprehensive review and a meta-analysis of the effectiveness of Internet-based psychotherapeutic interventions. Journal of Technology in Human Services 26(24): 109-160 | - Study does not contain a relevant intervention |
| Barth, J.; Critchley, J.; Bengel, J. (2006) Efficacy of psychosocial interventions for smoking cessation in patients with coronary heart disease: a systematic review and meta-analysis. Annals of Behavioral Medicine 32(1): 10-20 | - old systematic review (before 2017) |
| Baskerville, Neill Bruce, Struik, Laura Louise, Guindon, Godefroy Emmanuel et al. (2018) Effect of a Mobile Phone Intervention on Quitting Smoking in a Young Adult Population of Smokers: Randomized Controlled Trial. JMIR mHealth and uHealth 6(10): e10893 | - Not adequate follow up |
| Bennett, Melanie E., Toffey, Kristin, Dickerson, Faith et al. (2015) A review of android apps for smoking cessation. Journal of Smoking Cessation 10(2): 106-115 | - Review article but not a systematic review |
| Bernstein, Steven L.; Rosner, June; Toll, Benjamin (2016) A Multicomponent Intervention Including Texting to Promote Tobacco Abstinence in Emergency Department Smokers: A Pilot Study. Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 23(7): 803-8 | - Not adequate follow up |

| Study | Reason for exclusion |
|---|---|
| Bitton, A. (2009) Web- and computer-based smoking cessation programs are effective for adult smokers. Journal of Clinical Outcomes Management 16(7): 301-303 | - Study does not focus on behavour change |
| Boland, V. C., Stockings, E. A., Mattick, R. P. et al. (2018) The Methodological Quality and Effectiveness of Technology-Based Smoking Cessation Interventions for Disadvantaged Groups: A Systematic Review and Meta-analysis. Nicotine and Tobacco Research 20(3): 276-285 | - Study does not focus on behavour change |
| Bommele, Jeroen, Schoenmakers, Tim M., Kleinjan, Marloes et al. (2017) Targeting hardcore smokers: The effects of an online tailored intervention, based on motivational interviewing techniques. British Journal of Health Psychology 22(3): 644-660 | - No eligible outcome |
| Borland, R.; Balmford, J.; Hunt, D. (2004) The effectiveness of personally tailored computer-generated advice letters for smoking cessation. Addiction 99(3): 369-377 | - Study does not contain a relevant intervention |
| Borland, Ron, Balmford, James, Segan, Catherine et al. (2003) The effectiveness of personalized smoking cessation strategies for callers to a Quitline service. Addiction (Abingdon, England) 98(6): 837-46 | - Not a relevant study design |
| Bos, Jason, Staiger, Petra K., Hayden, Melissa J. et al. (2019) A randomized controlled trial of inhibitory control training for smoking cessation and reduction. Journal of consulting and clinical psychology | - Not adequate follow up |
| Bottorff, Joan L., Oliffe, John L., Sarbit, Gayl et al. (2016) Evaluation of QuitNow Men: An online, men-centered smoking cessation intervention. Journal of Medical Internet Research 18(4): 73-82 | - Not a relevant study design |
| Bricker, J. B., Mull, K. E., McClure, J. B. et al. (2018) Improving quit rates of web-delivered interventions for smoking cessation: full-scale | - Comparator in study does not match that specified in protocol |

| Study | Reason for exclusion |
|---|---|
| randomized trial of WebQuit.org versus Smokefree.gov. Addiction (Abingdon, England) 113(5): 914-923 | |
| Bricker, J. B., Sridharan, V., Zhu, Y. et al. (2018) Trajectories of 12-Month Usage Patterns for Two Smoking Cessation Websites: Exploring How Users Engage Over Time. Journal of medical Internet research 20(4): e10143 | - Comparator in study does not match that specified in protocol |
| Bricker, Jonathan B., Sridharan, Vasundhara, Zhu, Yifan et al. (2018) Trajectories of 12-Month Usage Patterns for Two Smoking Cessation Websites: Exploring How Users Engage Over Time. Journal of medical Internet research 20(4): e10143 | - Comparator in study does not match that specified in protocol |
| Brose, L. S.; Simonavicius, E.; McNeill, A. (2018) Maintaining abstinence from smoking after a period of enforced abstinence - systematic review, meta-analysis and analysis of behaviour change techniques with a focus on mental health. Psychological medicine 48(4): 669-678 | - No eligible outcome |
| Brown, Joanne (2013) A review of the evidence on technology-based interventions for the treatment of tobacco dependence in college health. Worldviews on Evidence-Based Nursing 10(3): 150-162 | - Review article but not a systematic review |
| Brunette, Mary F., Ferron, Joelle C., McHugo, Gregory J. et al. (2011) An electronic decision support system to motivate people with severe mental illnesses to quit smoking. Psychiatric Services 62(4): 360-366 | - Not a relevant study design |
| Brusse, Carl, Gardner, Karen, McAullay, Daniel et al. (2014) Social media and mobile apps for health promotion in Australian Indigenous populations: scoping review. Journal of medical Internet research 16(12): e280 | - Review article but not a systematic review |
| Buhi, E. R., Trudnak, T. E., Martinasek, M. P. et al. (2013) Mobile phone-based behavioural | - old systematic review (before 2017) |

| Study | Reason for exclusion |
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| interventions for health: A systematic review. Health Education Journal 72(5): 564-583 | |
| Burford, O., Jiwa, M., Carter, O. et al. (2013) Internet-based photoaging within Australian pharmacies to promote smoking cessation: randomized controlled trial. Journal of medical Internet research 15(3): e64 | - Study does not contain a relevant intervention |
| Busch, Vincent and De Leeuw, Johannes Robertus Josephus (2014) Unhealthy behaviors in adolescents: Multibehavioral associations with psychosocial problems. International Journal of Behavioral Medicine 21(3): 439-446 | - Not a relevant study design |
| Cameron, David, Epton, Tracy, Norman, Paul et al. (2015) A theory-based online health behaviour intervention for new university students (U@Uni:LifeGuide): results from a repeat randomized controlled trial. Trials 16: 555 | - Study does not contain a relevant intervention |
| Castro, Raquel Paz, Haug, Severin, Filler, Andreas et al. (2017) Engagement within a mobile phone-based smoking cessation intervention for adolescents and its association with participant characteristics and outcomes. Journal of Medical Internet Research 19(11) | - Not a relevant study design |
| Catley, D., Goggin, K., Harris, K. J. et al. (2016) A Randomized Trial of Motivational Interviewing: cessation Induction Among Smokers With Low Desire to Quit. American journal of preventive medicine 50(5): 573-583 | - Comparator in study does not match that specified in protocol |
| Centre, Horizon Scanning Research & Intelligence (2015) New and emerging mobile health interventions that promote behavioural change.. | - Review article but not a systematic review |
| Chan, Sophia S. C., Wong, David C. N., Cheung, Yee Tak Derek et al. (2015) A block randomized controlled trial of a brief smoking cessation counselling and advice through short message service on participants who joined the Quit to Win Contest in Hong Kong. Health education research 30(4): 609-21 | - Study does not focus on behavour change |

| Study | Reason for exclusion |
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| Chebli, Jaymee-Lee; Blaszczynski, Alexander; Gainsbury, Sally M. (2016) Internet-Based Interventions for Addictive Behaviours: A Systematic Review. Journal of gambling studies 32(4): 1279-1304 | - old systematic review (before 2017) |
| Chen, Y. F., Madan, J., Welton, N. et al. (2012) Effectiveness and cost-effectiveness of computer and other electronic aids for smoking cessation: a systematic review and network meta-analysis. Health technology assessment (Winchester, England) 16(38): 1-v | - old systematic review (before 2017) |
| Cheung, Ka Wai, Wong, Ian Wh, Fingrut, Warren et al. (2018) Randomized controlled trial of emergency department initiated smoking cessation counselling and referral to a community counselling service. CJEM 20(4): 556-564 | - Study does not contain a relevant intervention |
| Cheung, Kei Long; Wijnen, Ben; de Vries, Hein (2017) A Review of the Theoretical Basis, Effects, and Cost Effectiveness of Online Smoking Cessation Interventions in the Netherlands: A Mixed-Methods Approach. Journal of medical Internet research 19(6): e230 | - Review article but not a systematic review |
| Chow, Clara K., Redfern, Julie, Hillis, Graham S. et al. (2015) Effect of Lifestyle-Focused Text Messaging on Risk Factor Modification in Patients With Coronary Heart Disease: A Randomized Clinical Trial. JAMA 314(12): 1255-63 | - No eligible outcome |
| Christoff, A. D. O. and Boerngen-Lacerda, R. (2015) Reducing substance involvement in college students: A three-arm parallel-group randomized controlled trial of a computer-based intervention. Addictive Behaviors 45: 164-171 | - Not adequate follow up |
| Clark, Matthew M., Cox, Lisa Sanderson, Jett, James R. et al. (2004) Effectiveness of smoking cessation self-help materials in a lung cancer screening population. Lung cancer (Amsterdam, Netherlands) 44(1): 13-21 | - Comparator in study does not match that specified in protocol |

| Study | Reason for exclusion |
|---|---|
| Cobb, C. O. and Graham, A. L. (2014) Use of non-assigned interventions in a randomized trial of internet and telephone treatment for smoking cessation. Nicotine and Tobacco Research 16(10): 1289-1297 | - Study does not contain a relevant intervention |
| Cobos-Campos, Raquel, Apinaniz Fernandez de Larrinoa, Antxon, Saez de Lafuente Morinigo, Arantza et al. (2017) Effectiveness of Text Messaging as an Adjuvant to Health Advice in Smoking Cessation Programs in Primary Care. A Randomized Clinical Trial. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 19(8): 901-907 | - Study does not contain a relevant intervention |
| Coleman, T., Agboola, S., Leonardi-Bee, J. et al. (2010) Relapse prevention in UK stop smoking services: current practice, systematic reviews of effectiveness and cost-effectiveness analysis. Health Technology Assessment 14(49): 1-152 | - Study does not contain a relevant intervention |
| Collins, Bradley N., Lepore, Stephen J., Winickoff, Jonathan P. et al. (2018) "An office-initiated multilevel intervention for tobacco smoke exposure: A randomized trial"" Errata. Pediatrics 141(6): 1 | - Study does not contain a relevant intervention |
| Cook, Royer F., Hersch, Rebekah K., Schlossberg, Dana et al. (2015) A Web-based health promotion program for older workers: randomized controlled trial. Journal of medical Internet research 17(3): e82 | - Not adequate follow up |
| Coorey, Genevieve M., Neubeck, Lis, Mulley, John et al. (2018) Effectiveness, acceptability and usefulness of mobile applications for cardiovascular disease self-management: Systematic review with meta-synthesis of quantitative and qualitative data. European journal of preventive cardiology 25(5): 505-521 | - Systematic review does not exactly fit our protocol |
| Covolo, L., Ceretti, E., Moneda, M. et al. (2017) Does evidence support the use of mobile phone apps as a driver for promoting healthy lifestyles | - Systematic review does not exactly fit our protocol |

| Study | Reason for exclusion |
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| from a public health perspective? A systematic review of Randomized Control Trials. Patient education and counseling 100(12): 2231-2243 | |
| Cremers, Henricus-Paul, Mercken, Liesbeth, Candel, Math et al. (2015) A Web-based, computer-tailored smoking prevention program to prevent children from starting to smoke after transferring to secondary school: randomized controlled trial. Journal of medical Internet research 17(3): e59 | - Study does not contain a relevant intervention |
| Cremers, Henricus-Paul, Mercken, Liesbeth, Crutzen, Rik et al. (2014) Do email and mobile phone prompts stimulate primary school children to reuse an Internet-delivered smoking prevention intervention?. Journal of medical Internet research 16(3): e86 | - Comparator in study does not match that specified in protocol |
| Cutrona, Sarah L., Sadasivam, Rajani S., DeLaughter, Kathryn et al. (2016) Online tobacco websites and online communities-who uses them and do users quit smoking? The quit-primo and national dental practice-based research network Hi-Quit studies. Translational Behavioral Medicine 6(4): 546-557 | - Not a relevant study design |
| Danaher, Brian G., Tyler, Milagra S., Crowley, Ryann C. et al. (2019) Outcomes and Device Usage for Fully Automated Internet Interventions Designed for a Smartphone or Personal Computer: The MobileQuit Smoking Cessation Randomized Controlled Trial. Journal of medical Internet research 21(6): e13290 | - Comparator in study does not match that specified in protocol |
| Danielsson, Anna-Karin; Eriksson, Anna-Karin; Allebeck, Peter (2014) Technology-based support via telephone or web: a systematic review of the effects on smoking, alcohol use and gambling. Addictive behaviors 39(12): 1846-68 | - old systematic review (before 2017) |
| Davidson, S. M.; Boldt, R. G.; Louie, A. V. (2018) How can we better help cancer patients quit smoking? The London Regional Cancer Program experience with smoking cessation. Current oncology (Toronto, Ont.) 25(3): 226-230 | - Not a relevant study design |

| Study | Reason for exclusion |
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| de Josselin de Jong, Sanne, Candel, Math, Segaar, Dewi et al. (2014) Efficacy of a Web-based computer-tailored smoking prevention intervention for Dutch adolescents: randomized controlled trial. Journal of medical Internet research 16(3): e82 | - No eligible outcome |
| De Leon, Elaine; Fuentes, Laura W.; Cohen, Joanna E. (2014) Characterizing periodic messaging interventions across health behaviors and media: systematic review. Journal of medical Internet research 16(3): e93 | - old systematic review (before 2017) |
| de Ruijter, Dennis, Candel, Math, Smit, Eline Suzanne et al. (2018) The Effectiveness of a Computer-Tailored E-Learning Program for Practice Nurses to Improve Their Adherence to Smoking Cessation Counseling Guidelines: Randomized Controlled Trial. Journal of medical Internet research 20(5): e193 | - Study does not contain a relevant intervention |
| DeStasio, Krista L.; Hill, Anne P.; Berkman, Elliot T. (2018) Efficacy of an SMS-Based Smoking Intervention Using Message Self-Authorship: A Pilot Study. Journal of smoking cessation 13(1): 55-58 | - Data not reported in an extractable format |
| Dickinson, W. Perry, Glasgow, Russell E., Fisher, Lawrence et al. (2013) Use of a website to accomplish health behavior change: if you build it, will they come? And will it work if they do?. Journal of the American Board of Family Medicine : JABFM 26(2): 168-76 | - Comparator in study does not match that specified in protocol |
| Do, Huyen Phuc, Tran, Bach Xuan, Le Pham, Quyen et al. (2018) Which eHealth interventions are most effective for smoking cessation? A systematic review. Patient preference and adherence 12: 2065-2084 | - Systematic review does not exactly fit our protocol |
| Dornelas, Ellen A. and Thompson, Paul D. (2007) Smoking cessation for cardiac patients. Preventive cardiology 10(2suppl1): 31-3 | - Not a relevant study design |
| Dunn, C.; Deroo, L.; Rivara, F. P. (2001) The use of brief interventions adapted from | - old systematic review (before 2017) |

| Study | Reason for exclusion |
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| motivational interviewing across behavioral domains: a systematic review. Addiction 96(12): 1725-1742 | |
| Durmaz, Seyfi, Ergin, Isil, Durusoy, Raika et al. (2019) WhatsApp embedded in routine service delivery for smoking cessation: effects on abstinence rates in a randomized controlled study. BMC public health 19(1): 387 | - Study does not contain a relevant intervention |
| Emmons, Karen M., Puleo, Elaine, Sprunck-Harrild, Kim et al. (2013) Partnership for Health-2, a web-based versus print smoking cessation intervention for childhood and young adult cancer survivors: Randomized comparative effectiveness study. Journal of Medical Internet Research 15(11): 3-19 | - No eligible outcome |
| Epton, Tracy, Norman, Paul, Dadzie, Aba-Sah et al. (2014) A theory-based online health behaviour intervention for new university students (U@Uni): results from a randomised controlled trial. BMC public health 14: 563 | - Comparator in study does not match that specified in protocol |
| Eysenbach, G., Powell, J., Englesakis, M. et al. (2004) Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions. Bmj 328: 1166-1170 | - old systematic review (before 2017) |
| Fanshawe, T. R., Halliwell, W., Lindson, N. et al. (2017) Tobacco cessation interventions for young people. Cochrane Database of Systematic Reviews 2017(11): cd003289 | - Study does not contain a relevant intervention |
| Fellows, J. L., Mularski, R. A., Leo, M. C. et al. (2016) Referring Hospitalized Smokers to Outpatient Quit Services: A Randomized Trial. American Journal of Preventive Medicine 51(4): 609-619 | - Study does not contain a relevant intervention |
| Fingrut, W.; Stewart, L.; Cheung, K. W. (2016) Choice of smoking cessation counselling via phone, text, or email in emergency department patients. Preventive Medicine Reports 4: 597-600 | - Not a relevant study design |

| Study | Reason for exclusion |
|---|---|
| Fjeldsoe, Brianna S.; Marshall, Alison L.; Miller, Yvette D. (2009) Behavior change interventions delivered by mobile telephone short-message service. American journal of preventive medicine 36(2): 165-73 | - old systematic review (before 2017) |
| Forsyth, S. R. and Malone, R. E. (2016) Smoking in video games: A systematic review. Nicotine and Tobacco Research 18(6): 1390-1398 | - old systematic review (before 2017) |
| Free, Caroline, Phillips, Gemma, Galli, Leandro et al. (2013) The effectiveness of mobile-health technology-based health behaviour change or disease management interventions for health care consumers: a systematic review. PLoS medicine 10(1): e1001362 | - old systematic review (before 2017) |
| Friedberg, J. P., Rodriguez, M. A., Watsula, M. E. et al. (2015) Effectiveness of a tailored behavioral intervention to improve hypertension control: primary outcomes of a randomized controlled trial. Hypertension (dallas, tex. : 1979) 65(2): 440-446 | - No eligible outcome |
| Gandhi, S., Chen, S., Hong, L. et al. (2017) Effect of Mobile Health Interventions on the Secondary Prevention of Cardiovascular Disease: Systematic Review and Meta-analysis. Canadian Journal of Cardiology 33(2): 219-231 | - Study does not contain a population of interest |
| Gardner, Karen, Kearns, Rachael, Woodland, Lisa et al. (2018) A Scoping Review of the Evidence on Health Promotion Interventions for Reducing Waterpipe Smoking: Implications for Practice. Frontiers in public health 6: 308 | - Review article but not a systematic review |
| Garrison, Kathleen A., Pal, Prasanta, O'Malley, Stephanie S. et al. (2018) Craving to Quit: A Randomized Controlled Trial of Smartphone app-based Mindfulness Training for Smoking Cessation. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco | - Study does not focus on behavour change |

| Study | Reason for exclusion |
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| Garrison, Kathleen A., Pal, Prasanta, O'Malley, Stephanie S. et al. (2018) Craving to Quit: A Randomized Controlled Trial of Smartphone app-based Mindfulness Training for Smoking Cessation. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco | - Study does not focus on behavour change<br>- Duplication of an excluded study |
| Gerbert, B., Berg-Smith, S., Mancuso, M. et al. (2003) Using innovative video doctor technology in primary care to deliver brief smoking and alcohol intervention. Health promotion practice 4(3): 249-261 | - Data not reported in an extractable format |
| Ghorai, K., Akter, S., Khatun, F. et al. (2014) mHealth for smoking cessation programs: A systematic review. Journal of Personalized Medicine 4(3): 412-423 | - old systematic review (before 2017) |
| Gianos, Eugenia, Schoenthaler, Antoinette, Mushailov, Michael et al. (2015) Rationale and design of the Investigation of Motivational Interviewing and Prevention Consults to Achieve Cardiovascular Targets (IMPACT) trial. American heart journal 170(3): 430-7.e9 | - Not a relevant study design |
| Gilbert, Hazel, Sutton, Stephen, Morris, Richard et al. (2017) Start2quit: a randomised clinical controlled trial to evaluate the effectiveness and cost-effectiveness of using personal tailored risk information and taster sessions to increase the uptake of the NHS Stop Smoking Services. Health technology assessment (Winchester, England) 21(3): 1-206 | - Not a relevant study design<br>- Study does not contain a relevant intervention |
| Gillaspy, Stephen R., Leffingwell, Thad, Mignogna, Melissa et al. (2013) Testing of a web-based program to facilitate parental smoking cessation readiness in primary care. Journal of primary care & community health 4(1): 2-7 | - No eligible outcome |
| Goldade, Kate, Whembolua, Guy-Lucien, Thomas, Janet et al. (2011) Designing a smoking cessation intervention for the unique needs of homeless persons: a community- | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
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| based randomized clinical trial. Clinical trials (London, England) 8(6): 744-54 | |
| Gordon, Judith S., Armin, Julie, Hingle, Melanie D. et al. (2017) Development and evaluation of the See Me Smoke-Free multi-behavioral mHealth app for women smokers. Translational Behavioral Medicine 7(2): 172-184 | - Not a relevant study design |
| Gore, Maria Odette, Krantz, Mori J., Albright, Karen et al. (2019) A controlled trial of mobile short message service among participants in a rural cardiovascular disease prevention program. Preventive medicine reports 13: 126-131 | - No eligible outcome |
| Graham, A. L., Papandonatos, G. D., Cha, S. et al. (2017) Improving adherence to smoking cessation treatment: Intervention effects in a web-based randomized trial. Nicotine and Tobacco Research 19(3): 324-332 | - No eligible outcome |
| Graham, A. L., Papandonatos, G. D., Cobb, C. O. et al. (2015) Internet and telephone treatment for smoking cessation: Mediators and moderators of short-term abstinence. Nicotine and Tobacco Research 17(3): 299-308 | - Not adequate follow up |
| Graham, Amanda L., Cobb, Nathan K., Raymond, Linda et al. (2007) Effectiveness of an Internet-based worksite smoking cessation intervention at 12 months. Journal of Occupational and Environmental Medicine 49(8): 821-828 | - Not adequate follow up |
| Graham, Amanda L., Papandonatos, George D., Cha, Sarah et al. (2018) Improving Adherence to Smoking Cessation Treatment: Smoking Outcomes in a Web-based Randomized Trial. Annals of behavioral medicine : a publication of the Society of Behavioral Medicine 52(4): 331-341 | - No eligible outcome |
| Griffiths, S. E., Parsons, J., Naughton, F. et al. (2018) Are digital interventions for smoking cessation in pregnancy effective? A systematic | - Systematic review does not exactly fit our protocol |

| Study | Reason for exclusion |
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| review and meta-analysis. Health psychology review 12(4): 333-356 | |
| Gryczynski, Jan, Mitchell, Shannon Gwin, Gonzales, Arturo et al. (2015) A randomized trial of computerized vs. in-person brief intervention for illicit drug use in primary care: Outcomes through 12 months. Journal of Substance Abuse Treatment 50: 3-10 | - Study does not contain a population of interest |
| Guidry, Jeanine, Jin, Yan, Haddad, Linda et al. (2016) How health risks are pinpointed (or not) on social media: The portrayal of waterpipe smoking on pinterest. Health Communication 31(6): 659-667 | - Not a relevant study design |
| Hall, Amanda K.; Cole-Lewis, Heather; Bernhardt, Jay M. (2015) Mobile text messaging for health: a systematic review of reviews. Annual review of public health 36: 393-415 | - Not a relevant study design |
| Hamm, M. P., Shulhan, J., Williams, G. et al. (2014) A systematic review of the use and effectiveness of social media in child health. BMC Pediatrics 14(1): 138 | - old systematic review (before 2017) |
| Hammett, Erin, Veldheer, Susan, Hrabovsky, Shari et al. (2018) TXT2STAYQUIT: Pilot Randomized Trial of Brief Automated Smoking Cessation Texting Intervention for Inpatient Smokers Discharged from the Hospital. Journal of hospital medicine 13(7): 488-489 | - Not adequate follow up |
| Hartmann-Boyce, Jamie, Stead, Lindsay F., Cahill, Kate et al. (2013) Efficacy of interventions to combat tobacco addiction: Cochrane update of 2012 reviews. Addiction (Abingdon, England) 108(10): 1711-21 | - old systematic review (before 2017) |
| Harvanko, Arit, Slone, Stacey, Shelton, Brent et al. (2018) Web-Based Contingency Management for Adolescent Tobacco Smokers: A Clinical Trial. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
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| Hassandra, Mary, Lintunen, Taru, Hagger, Martin S. et al. (2017) An mHealth App for Supporting Quitters to Manage Cigarette Cravings With Short Bouts of Physical Activity: A Randomized Pilot Feasibility and Acceptability Study. JMIR mHealth and uHealth 5(5): e74 | - Study does not contain a relevant intervention |
| Haug, S., Meyer, C., Schorr, G. et al. (2009) Continuous individual support of smoking cessation using text messaging: A pilot experimental study. Nicotine and Tobacco Research 11(8): 915-923 | - Not adequate follow up |
| Haug, S., Schaub, M. P., Venzin, V. et al. (2013) Moderators of outcome in a text messaging (SMS)--based smoking cessation intervention for young people. Psychiatrische praxis 40(6): 339-346 | - Study not reported in English |
| Haug, Severin; Schaub, Michael P.; Schmid, Holger (2014) Predictors of adolescent smoking cessation and smoking reduction. Patient Education and Counseling 95(3): 378-383 | - Not a relevant study design |
| Head, Katharine J., Noar, Seth M., Iannarino, Nicholas T. et al. (2013) Efficacy of text messaging-based interventions for health promotion: a meta-analysis. Social science & medicine (1982) 97: 41-8 | - old systematic review (before 2017) |
| Heffner, J. L., Mull, K. E., Watson, N. L. et al. (2018) Smokers with bipolar disorder, other affective disorders, and no mental health conditions: Comparison of baseline characteristics and success at quitting in a large 12-month behavioral intervention randomized trial. Drug and Alcohol Dependence 193: 35-41 | - Comparator in study does not match that specified in protocol |
| Heffner, Jaimee L., Mull, Kristin E., Watson, Noreen L. et al. (2018) Smokers with bipolar disorder, other affective disorders, and no mental health conditions: Comparison of baseline characteristics and success at quitting in a large 12-month behavioral intervention randomized trial. Drug and alcohol dependence 193: 35-41 | - Comparator in study does not match that specified in protocol<br><br>- Study does not contain a population of interest |

| Study | Reason for exclusion |
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| Heffner, Jaimee L., Mull, Kristin E., Watson, Noreen L. et al. (2019) Long-term smoking cessation outcomes for sexual minority vs. non-minority smokers in a large randomized, controlled trial of two web-based interventions. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco | - Comparator in study does not match that specified in protocol |
| Heminger, Christina L., Boal, Ashley L., Zumer, Maria et al. (2016) Text2Quit: an analysis of participant engagement in the mobile smoking cessation program. The American journal of drug and alcohol abuse 42(4): 450-8 | - Not a relevant study design |
| Herbec, Aleksandra, Brown, Jamie, Tombor, Ildiko et al. (2014) Pilot randomized controlled trial of an internet-based smoking cessation intervention for pregnant smokers ('MumsQuit'). Drug and alcohol dependence 140: 130-6 | - Not adequate follow up |
| Hettema, J.; Steele, J.; Miller, W. R. (2005) Motivational interviewing. Annual Review of Clinical Psychology 1: 91-111 | - old systematic review (before 2017) |
| Hoeppner, Bettina B.; Hoeppner, Susanne S.; Abroms, Lorien C. (2017) How do text-messaging smoking cessation interventions confer benefit? A multiple mediation analysis of Text2Quit. Addiction (Abingdon, England) 112(4): 673-682 | - Not a relevant study design |
| Hou, Su- I.; Charlery, Su-Anne Robyn; Roberson, Kiersten (2014) Systematic literature review of Internet interventions across health behaviors. Health psychology and behavioral medicine 2(1): 455-481 | - old systematic review (before 2017) |
| Houston, Thomas K., Sadasivam, Rajani S., Allison, Jeroan J. et al. (2015) Evaluating the QUIT-PRIMO clinical practice ePortal to increase smoker engagement with online cessation interventions: a national hybrid type 2 implementation study. Implementation science : IS 10: 154 | - Comparator in study does not match that specified in protocol |

| Study | Reason for exclusion |
|---|---|
| Houston, Tom K. and Ford, Daniel E. (2008) A tailored Internet-delivered intervention for smoking cessation designed to encourage social support and treatment seeking: Usability testing and user tracing. Informatics for Health & Social Care 33(1): 5-19 | - Comparator in study does not match that specified in protocol |
| Huang, Kaisen, Liu, Wei, He, Dingxiu et al. (2015) Telehealth interventions versus center-based cardiac rehabilitation of coronary artery disease: A systematic review and meta-analysis. European journal of preventive cardiology 22(8): 959-71 | - old systematic review (before 2017) |
| Hutton, Heidi E., Wilson, Lisa M., Apelberg, Benjamin J. et al. (2011) A systematic review of randomized controlled trials: Web-based interventions for smoking cessation among adolescents, college students, and adults. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 13(4): 227-38 | - old systematic review (before 2017) |
| Jacobs, Megan A., Cobb, Caroline O., Abroms, Lorien et al. (2014) Facebook apps for smoking cessation: a review of content and adherence to evidence-based guidelines. Journal of medical Internet research 16(9): e205 | - Review article but not a systematic review |
| Jacobs, N., Clays, E., De Bacquer, D. et al. (2011) Effect of a tailored behavior change program on a composite lifestyle change score: a randomized controlled trial. Health education research 26(5): 886-95 | - Study does not contain a relevant intervention |
| Jacobs, Nele, Drost, Ruben, Ament, Andre et al. (2011) Willingness to pay for a cardiovascular prevention program in highly educated adults: a randomized controlled trial. International journal of technology assessment in health care 27(4): 283-9 | - Study does not contain a relevant intervention |
| Jawad, Mohammed, Jawad, Sena, Waziry, Reem K. et al. (2016) Interventions for waterpipe tobacco smoking prevention and | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
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| cessation: a systematic review. Scientific reports 6: 25872 | |
| Jayakrishnan, Radhakrishnan, Mathew, Aleyamma, Uutela, Antti et al. (2013) Multiple approaches and participation rate for a community based smoking cessation intervention trial in rural Kerala, India. Asian Pacific journal of cancer prevention : APJCP 14(5): 2891-6 | - Study does not contain a relevant intervention |
| Jensen, C. D., Cushing, C. C., Aylward, B. S. et al. (2011) Effectiveness of motivational interviewing interventions for adolescent substance use behavior change: a meta-analytic review. Journal of Consulting and Clinical Psychology 79(4): 433-440 | - old systematic review (before 2017) |
| Jiang, Shan; Wu, Lingli; Gao, Xiaoli (2017) Beyond face-to-face individual counseling: A systematic review on alternative modes of motivational interviewing in substance abuse treatment and prevention. Addictive behaviors 73: 216-235 | - Study does not contain a relevant intervention |
| Johnson, Sara S. and Evers, Kerry E. (2015) Using individually tailored and mobile behavior change solutions to promote multiple behavior change. American Journal of Health Promotion 29(4): 8-10 | - Not a relevant study design |
| Jones, H. A., Heffner, J. L., Mercer, L. et al. (2015) Web-based acceptance and commitment therapy smoking cessation treatment for smokers with depressive symptoms. Journal of Dual Diagnosis 11(1): 56-62 | - Not adequate follow up |
| K, Myung S, McDonnell, D. D., Kazinets, G et al. (2009) Effects of Web- and computer-based smoking cessation programs. Archives of internal medicine 169(13): 929-937 | - old systematic review (before 2017) |
| Kanera, Iris M., Bolman, Catherine A. W., Willems, Roy A. et al. (2016) Lifestyle-related effects of the web-based Kanker Nazorg Wijzer (Cancer Aftercare Guide) intervention for cancer | - No eligible outcome |

| Study | Reason for exclusion |
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| survivors: a randomized controlled trial. Journal of cancer survivorship : research and practice 10(5): 883-97 | |
| Kathleen, F. H., Young-il, K., Meifang, C. et al. (2016) Web-Based Intervention for Transitioning Smokers From Inpatient to Outpatient Care: An RCT. American Journal of Preventive Medicine 51(4): 620-629 | - Study does not contain a relevant intervention |
| Kim, Ju Young; Wineinger, Nathan E.; Steinhubl, Steven R. (2016) The Influence of Wireless Self-Monitoring Program on the Relationship Between Patient Activation and Health Behaviors, Medication Adherence, and Blood Pressure Levels in Hypertensive Patients: A Substudy of a Randomized Controlled Trial. Journal of medical Internet research 18(6): e116 | - No eligible outcome |
| Kohl, Leonie F. M.; Crutzen, Rik; de Vries, Nanne K. (2013) Online prevention aimed at lifestyle behaviors: a systematic review of reviews. Journal of medical Internet research 15(7): e146 | - Not a relevant study design |
| Kouwenhoven-Pasmooij, Tessa A., Djikanovic, Bosiljka, Robroek, Suzan J. W. et al. (2015) Design and baseline characteristics of the PerfectFit study: a multicenter cluster-randomized trial of a lifestyle intervention in employees with increased cardiovascular risk. BMC public health 15: 715 | - Not a relevant study design |
| Krebs, P.; Prochaska, J. O.; Rossi, J. S. (2010) A meta-analysis of computer-tailored interventions for health behavior change. Preventive Medicine 51(34): 214-221 | - old systematic review (before 2017) |
| Krishna, Santosh; Boren, Suzanne Austin; Balas, E. Andrew (2009) Healthcare via cell phones: a systematic review. Telemedicine journal and e-health : the official journal of the American Telemedicine Association 15(3): 231-40 | - old systematic review (before 2017) |

| Study | Reason for exclusion |
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| Krishnan, Nandita, Elf, Jessica L., Chon, Sandy et al. (2018) COach2Quit: a pilot randomized controlled trial of a personal carbon monoxide monitor for smoking cessation. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco | - Not adequate follow up |
| Lana, Alberto; Faya-Ornia, Goretti; Lopez, Maria Luisa (2014) Impact of a web-based intervention supplemented with text messages to improve cancer prevention behaviors among adolescents: results from a randomized controlled trial. Preventive medicine 59: 54-9 | - No eligible outcome |
| Lehto, Tuomas and Oinas-Kukkonen, Harri (2011) Persuasive features in web-based alcohol and smoking interventions: a systematic review of the literature. Journal of medical Internet research 13(3): e46 | - old systematic review (before 2017) |
| Leykin, Y., Aguilera, A., Torres, L. D. et al. (2012) Interpreting the outcomes of automated internet-based randomized trials: example of an International Smoking Cessation Study. Journal of medical Internet research 14(1): e5 | - Study does not contain a relevant intervention |
| Liao, Yanhui, Wu, Qiuxia, Tang, Jinsong et al. (2016) The efficacy of mobile phone-based text message interventions ('Happy Quit') for smoking cessation in China. BMC public health 16(1): 833 | - Not a relevant study design |
| Lindsay, Sally, Smith, Simon, Bellaby, Paul et al. (2009) The health impact of an online heart disease support group: a comparison of moderated versus unmoderated support. Health education research 24(4): 646-54 | - Study does not contain a relevant intervention<br>- No eligible outcome |
| Lindson-Hawley, Nicola; Thompson Tom, P.; Begh, Rachna (2015) Motivational interviewing for smoking cessation. Cochrane Database of Systematic Reviews: Reviews issue3 | - old systematic review (before 2017) |
| Linke, Sarah E.; Rutledge, Thomas; Myers, Mark G. (2012) Intermittent exercise in response to cigarette cravings in the context of an | - Comparator in study does not match that specified in protocol |

| Study | Reason for exclusion |
|---|---|
| Internet-based smoking cessation program. Mental health and physical activity 5(1): 85-92 | |
| Lustria, M. L., Noar, S. M., Cortese, J. et al. (2013) A meta-analysis of web-delivered tailored health behavior change interventions. Journal of Health Communication 18(9): 1039-1069 | - old systematic review (before 2017) |
| Maher, Carol A., Lewis, Lucy K., Ferrar, Katia et al. (2014) Are health behavior change interventions that use online social networks effective? A systematic review. Journal of medical Internet research 16(2): e40 | - No eligible outcome |
| Mantler, Tara; Irwin, Jennifer D.; Morrow, Don (2012) Motivational interviewing and smoking behaviors: a critical appraisal and literature review of selected cessation initiatives. Psychological reports 110(2): 445-60 | - Review article but not a systematic review |
| Mauriello, Leanne, Dyment, Sharon, Prochaska, Janice et al. (2011) Acceptability and feasibility of a multiple-behavior, computer-tailored intervention for underserved pregnant women. Journal of Midwifery & Women's Health 56(1): 75-80 | - Not a relevant study design |
| Mays, Darren, Hawkins, Kirsten B., Bredfeldt, Christine et al. (2017) The effects of framed messages for engaging adolescents with online smoking prevention interventions. Translational behavioral medicine 7(2): 196-203 | - Not adequate follow up |
| McCrabb, S., Baker, A. L., Attia, J. et al. (2019) 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 : a publication of the Society of Behavioral Medicine 53(2): 180-195 | - Systematic review does not exactly fit our protocol |
| McDonnell, Diana D., Kazinets, Gene, Lee, Hyun-Ju et al. (2011) An internet-based smoking cessation program for Korean Americans: results from a randomized controlled | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
|---|---|
| trial. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 13(5): 336-43 | |
| Meyer, Christian, Ulbricht, Sabina, Baumeister, Sebastian E. et al. (2008) Proactive interventions for smoking cessation in general medical practice: A quasi-randomized controlled trial to examine the efficacy of computer-tailored letters and physician-delivered brief advice. Addiction 103(2): 294-304 | - Study does not contain a relevant intervention |
| Meyer, Christian, Ulbricht, Sabina, Gross, Beatrice et al. (2012) Adoption, reach and effectiveness of computer-based, practitioner delivered and combined smoking interventions in general medical practices: a three-arm cluster randomized trial. Drug and alcohol dependence 121(12): 124-32 | - Study does not contain a relevant intervention |
| Meyer, Christian, Ulbricht, Sabina, Haug, Severin et al. (2016) Motivating smokers to quit using computer-generated letters that target either reduction or cessation: A population-based randomized controlled trial among smokers who do not intend to quit. Drug and alcohol dependence 166: 177-86 | - Study does not contain a relevant intervention |
| Minami, Haruka, Brinkman, Hannah R., Nahvi, Shadi et al. (2018) Rationale, design and pilot feasibility results of a smartphone-assisted, mindfulness-based intervention for smokers with mood disorders: Project mSMART MIND. Contemporary clinical trials 66: 36-44 | - Data not reported in an extractable format |
| Munoz, Ricardo F., Aguilera, Adrian, Schueller, Stephen M. et al. (2012) From online randomized controlled trials to participant preference studies: Morphing the San Francisco Stop Smoking site into a worldwide smoking cessation resource. Journal of Medical Internet Research 14(3): 74-85 | - Data not reported in an extractable format |
| Munoz, Ricardo F., Barrera, Alinne Z., Delucchi, Kevin et al. (2009) International Spanish/English Internet smoking cessation trial yields 20% abstinence rates at 1 year. Nicotine & tobacco | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
|---|---|
| research : official journal of the Society for Research on Nicotine and Tobacco 11(9): 1025-34 | |
| Muramoto, Myra L., Hall, John R., Nichter, Mark et al. (2014) Activating lay health influencers to promote tobacco cessation. American journal of health behavior 38(3): 392-403 | - No eligible outcome |
| Mussener, Ulrika, Bendtsen, Marcus, Karlsson, Nadine et al. (2016) Effectiveness of Short Message Service Text-Based Smoking Cessation Intervention Among University Students: A Randomized Clinical Trial. JAMA internal medicine 176(3): 321-8 | - Not adequate follow up |
| Naslund, J. A., Kim, S. J., Aschbrenner, K. A. et al. (2017) Systematic review of social media interventions for smoking cessation. Addictive Behaviors 73: 81-93 | - old systematic review (before 2017) |
| Naughton, Felix, Prevost, A. Toby, Gilbert, Hazel et al. (2012) Randomized controlled trial evaluation of a tailored leaflet and SMS text message self-help intervention for pregnant smokers (MiQuit). Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 14(5): 569-77 | - Not adequate follow up |
| Naughton, Felix; Riaz, Muhammad; Sutton, Stephen (2016) Response Parameters for SMS Text Message Assessments Among Pregnant and General Smokers Participating in SMS Cessation Trials. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 18(5): 1210-4 | - Not a relevant study design |
| Newton, N. C., Teesson, M., Vogl, L. E. et al. (2010) Internet-based prevention for alcohol and cannabis use: final results of the Climate Schools course. Addiction (abingdon, england) 105(4): 749-759 | - No eligible outcome |
| Norman, C. D., Maley, O., Li, X. et al. (2008) Using the Internet to Assist Smoking Prevention and Cessation in Schools: A Randomized, | - Data not reported in an extractable format |

| Study | Reason for exclusion |
|---|---|
| Controlled Trial. Health Psychology 27(6): 799-810 | |
| Oenema, Anke, Brug, Johannes, Dijkstra, Arie et al. (2008) Efficacy and use of an internet-delivered computer-tailored lifestyle intervention, targeting saturated fat intake, physical activity and smoking cessation: a randomized controlled trial. Annals of behavioral medicine : a publication of the Society of Behavioral Medicine 35(2): 125-35 | - Not adequate follow up |
| Oosterveen, Emilie, Tzelepis, Flora, Ashton, Lee et al. (2017) A systematic review of eHealth behavioral interventions targeting smoking, nutrition, alcohol, physical activity and/or obesity for young adults. Preventive medicine 99: 197-206 | - Systematic review does not exactly fit our protocol |
| Orr, Jayne A. and King, Robert J. (2015) Mobile phone SMS messages can enhance healthy behaviour: a meta-analysis of randomised controlled trials. Health psychology review 9(4): 397-416 | - Systematic review does not exactly fit our protocol |
| Overdijkink, Sanne B., Velu, Adeline V., Rosman, Ageeth N. et al. (2018) The Usability and Effectiveness of Mobile Health Technology-Based Lifestyle and Medical Intervention Apps Supporting Health Care During Pregnancy: Systematic Review. JMIR mHealth and uHealth 6(4): e109 | - Systematic review does not exactly fit our protocol |
| Palmer, M., Sutherland, J., Barnard, S. et al. (2018) The effectiveness of smoking cessation, physical activity/diet and alcohol reduction interventions delivered by mobile phones for the prevention of non-communicable diseases: A systematic review of randomised controlled trials. PLoS ONE 13(1): e0189801 | - Systematic review does not exactly fit our protocol |
| Parekh, S., King, D., Boyle, F. M. et al. (2014) Randomized controlled trial of a computer-tailored multiple health behaviour intervention in general practice: 12-month follow-up results. International Journal of Behavioral Nutrition and Physical Activity 11(1): 41 | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
|---|---|
| Parekh, Sanjoti, Vandelanotte, Corneel, King, David et al. (2012) Improving diet, physical activity and other lifestyle behaviours using computer-tailored advice in general practice: A randomised controlled trial. The International Journal of Behavioral Nutrition and Physical Activity 9 | - No eligible outcome |
| Parisod, H., Pakarinen, A., Axelin, A. et al. (2018) Feasibility of mobile health game "Fume" in supporting tobacco-related health literacy among early adolescents: A three-armed cluster randomized design. International Journal of Medical Informatics 113: 26-37 | - No eligible outcome |
| Park, Ai Hee; Lee, Suk Jeong; Oh, Seung Jin (2015) The effects of a smoking cessation programme on health-promoting lifestyles and smoking cessation in smokers who had undergone percutaneous coronary intervention. International journal of nursing practice 21(2): 107-17 | - Study does not contain a relevant intervention |
| Patten, Christi A., Croghan, Ivana T., Meis, Tracy M. et al. (2006) Randomized clinical trial of an Internet-based versus brief office intervention for adolescent smoking cessation. Patient education and counseling 64(13): 249-58 | - Study does not contain a relevant intervention |
| Peng, Wu-der Brian and Schoech, Dick (2013) Evaluation of a web-phone intervention system in changing smoking behavior-A randomized controlled trial. Journal of Technology in Human Services 31(3): 248-268 | - Not adequate follow up |
| Pfaeffli Dale, Leila, Dobson, Rosie, Whittaker, Robyn et al. (2016) The effectiveness of mobile-health behaviour change interventions for cardiovascular disease self-management: A systematic review. European journal of preventive cardiology 23(8): 801-17 | - No eligible outcome |
| Pfaeffli Dale, Leila, Whittaker, Robyn, Jiang, Yannan et al. (2015) Text Message and Internet Support for Coronary Heart Disease Self- | - No eligible outcome |

| Study | Reason for exclusion |
|---|---|
| Management: Results From the Text4Heart Randomized Controlled Trial. Journal of medical Internet research 17(10): e237 | |
| Piette, John D., List, Justin, Rana, Gurpreet K. et al. (2015) Mobile Health Devices as Tools for Worldwide Cardiovascular Risk Reduction and Disease Management. Circulation 132(21): 2012-27 | - Review article but not a systematic review |
| Pinder, Charlie, Vermeulen, Jo, Cowan, Benjamin R. et al. (2018) Digital Behaviour Change Interventions to Break and Form Habits. ACM Trans. Comput.-Hum. Interact. 25(3): 1-66 | - Review article but not a systematic review |
| Pisinger, Charlotta, Jorgensen, Michael Milo, Moller, Niels Erik et al. (2010) A cluster randomized trial in general practice with referral to a group-based or an Internet-based smoking cessation programme. Journal of public health (Oxford, England) 32(1): 62-70 | - Study does not focus on behavour change |
| Pollak, K. I., Lyna, P., Bilheimer, A. et al. (2013) A pilot study testing SMS text delivered scheduled gradual reduction to pregnant smokers. Nicotine and Tobacco Research 15(10): 1773-1776 | - Not adequate follow up |
| Portnoy, David B., Scott-Sheldon, Lori A. J., Johnson, Blair T. et al. (2008) Computer-delivered interventions for health promotion and behavioral risk reduction: a meta-analysis of 75 randomized controlled trials, 1988-2007. Preventive medicine 47(1): 3-16 | - old systematic review (before 2017) |
| Posadzki, P., Mastellos, N., Ryan, R. et al. (2016) Automated telephone communication systems for preventive healthcare and management of long-term conditions. Cochrane Database of Systematic Reviews 2016(12): cd009921 | - old systematic review (before 2017) |
| Powell, John, Newhouse, Nikki, Martin, Angela et al. (2016) A novel experience-based internet intervention for smoking cessation: feasibility | - Not adequate follow up |

| Study | Reason for exclusion |
|---|---|
| randomised controlled trial. BMC public health 16(1): 1156 | |
| Prabhakaran, Dorairaj, Jha, Dilip, Prieto-Merino, David et al. (2018) Effectiveness of an mHealth-Based Electronic Decision Support System for Integrated Management of Chronic Conditions in Primary Care: The mWellcare Cluster-Randomized Controlled Trial. Circulation | - No eligible outcome |
| Prado, Maria G., Iversen, Maura D., Yu, Zhi et al. (2018) Effectiveness of a Web-Based Personalized Rheumatoid Arthritis Risk Tool With or Without a Health Educator for Knowledge of Rheumatoid Arthritis Risk Factors. Arthritis care & research 70(10): 1421-1430 | - Study does not contain a population of interest |
| Price, Matthew, Yuen, Erica K., Davidson, Tatiana M. et al. (2015) Access and completion of a Web-based treatment in a population-based sample of tornado-affected adolescents. Psychological services 12(3): 283-90 | - No eligible outcome |
| Prochaska, James O., Butterworth, Susan, Redding, Colleen A. et al. (2008) Initial efficacy of MI, TTM tailoring and HRI's with multiple behaviors for employee health promotion. Preventive medicine 46(3): 226-31 | - Does not contain a population of people who smoke |
| Prochaska, James O., Velicer, Wayne F., Redding, Colleen et al. (2005) Stage-based expert systems to guide a population of primary care patients to quit smoking, eat healthier, prevent skin cancer, and receive regular mammograms. Preventive medicine 41(2): 406-16 | - Study does not contain a relevant intervention |
| Prokhorov, Alexander V., Kelder, Steven H., Shegog, Ross et al. (2010) Project ASPIRE: an Interactive, Multimedia Smoking Prevention and Cessation curriculum for culturally diverse high school students. Substance use & misuse 45(6): 983-1006 | - Does not contain a population of people who smoke |
| Prokhorov, Alexander V., Kelder, Steven H., Shegog, Ross et al. (2008) Impact of A Smoking | - No eligible outcome |

| Study | Reason for exclusion |
|---|---|
| Prevention Interactive Experience (ASPIRE), an interactive, multimedia smoking prevention and cessation curriculum for culturally diverse high-school students. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 10(9): 1477-85 | |
| Prybutok, Gayle (2015) An analysis of randomised controlled trials that utilise internet based smoking reduction/cessation programs. International Journal of Electronic Healthcare 8(24): 202-219 | - old systematic review (before 2017) |
| Ramo, Danielle E., Thrul, Johannes, Delucchi, Kevin L. et al. (2018) A randomized controlled evaluation of the tobacco status project, a Facebook intervention for young adults. Addiction (Abingdon, England) | - Study does not contain a relevant intervention |
| Reid, Robert D., Pipe, Andrew L., Quinlan, Bonnie et al. (2007) Interactive voice response telephony to promote smoking cessation in patients with heart disease: a pilot study. Patient education and counseling 66(3): 319-26 | - Study does not contain a relevant intervention |
| Reinwand, Dominique A., Schulz, Daniela N., Crutzen, Rik et al. (2015) Who Follows eHealth Interventions as Recommended? A Study of Participants' Personal Characteristics From the Experimental Arm of a Randomized Controlled Trial. Journal of medical Internet research 17(5): e115 | - Data not reported in an extractable format |
| Riaz, S. and Sykes, C. (2015) Are smartphone health applications effective in modifying obesity and smoking behaviours? A systematic review. Health and Technology 5(2): 73-81 | - old systematic review (before 2017) |
| Riemsma, R., Pattenden, J., Bridle, C. et al. (2003) Limited evidence for the effectiveness of stage-based intervention strategies in influencing smoking behaviour. Evidence-Based Healthcare 7(4): 174-176 | - Not a relevant study design |
| Riemsma, Robert Paul, Pattenden, Jill, Bridle, Christopher et al. (2003) Systematic review of | - old systematic review (before 2017) |

| Study | Reason for exclusion |
|---|---|
| the effectiveness of stage based interventions to promote smoking cessation. BMJ (Clinical research ed.) 326(7400): 1175-7 | |
| Riley, William; Obermayer, Jami; Jean-Mary, Jersino (2008) Internet and mobile phone text messaging intervention for college smokers. Journal of American College Health 57(2): 245-248 | - Not adequate follow up |
| Romer, Daniel, Jamieson, Patrick E., Jamieson, Kathleen Hall et al. (2017) Counteracting the Influence of Peer Smoking on YouTube. Journal of health communication 22(4): 337-345 | - Study does not contain a relevant intervention |
| Rooke, Sally, Thorsteinsson, Einar, Karpin, Anne et al. (2010) Computer-delivered interventions for alcohol and tobacco use: a meta-analysis. Addiction (Abingdon, England) 105(8): 1381-90 | - old systematic review (before 2017) |
| Salisbury, Chris, O'Cathain, Alicia, Thomas, Clare et al. (2017) An evidence-based approach to the use of telehealth in long-term health conditions: development of an intervention and evaluation through pragmatic randomised controlled trials in patients with depression or raised cardiovascular risk. | - Study does not contain a population of interest |
| Schumann, Anja, John, Ulrich, Baumeister, Sebastian E. et al. (2008) Computer-tailored smoking cessation intervention in a general population setting in Germany: outcome of a randomized controlled trial. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 10(2): 371-9 | - Study does not contain a relevant intervention |
| Shahab, Lion and McEwen, Andy (2009) Online support for smoking cessation: a systematic review of the literature. Addiction (Abingdon, England) 104(11): 1792-804 | - old systematic review (before 2017) |
| Shaw, R. J., Pollak, K., Zullig, L. L. et al. (2016) Feasibility and smokers' evaluation of self-generated text messages to promote quitting. | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
|---|---|
| Nicotine and Tobacco Research 18(5): 1206-1209 | |
| Shi, Hui-Jing, Jiang, Xiao-Xiao, Yu, Chun-Yan et al. (2013) Use of mobile phone text messaging to deliver an individualized smoking behaviour intervention in Chinese adolescents. Journal of telemedicine and telecare 19(5): 282-7 | - Not adequate follow up |
| Shuter, Jonathan, Kim, Ryung S., An, Lawrence C. et al. (2018) Feasibility of a smartphone-based tobacco treatment for HIV-infected smokers. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco | - Study does not contain a population of interest<br>- Not adequate follow up |
| Simmons, Vani Nath, Heckman, Bryan W., Fink, Angelina C. et al. (2013) Efficacy of an experiential, dissonance-based smoking intervention for college students delivered via the internet. Journal of consulting and clinical psychology 81(5): 810-20 | - Comparator in study does not match that specified in protocol |
| Skov-Ettrup, L. S., Dalum, P., Ekholm, O. et al. (2014) Reach and uptake of Internet- and phone-based smoking cessation interventions: Results from a randomized controlled trial. Preventive Medicine 62: 38-43 | - Data not reported in an extractable format |
| Smeets, T., Kremers, S. P. J., Brug, J. et al. (2007) Effects of tailored feedback on multiple health behaviors. Annals of behavioral medicine : a publication of the Society of Behavioral Medicine 33(2): 117-23 | - Not adequate follow up |
| Smit, E. S., Candel, M. J. J. M., Hoving, C. et al. (2016) Results of the PAS Study: A Randomized Controlled Trial Evaluating the Effectiveness of a Web-Based Multiple Tailored Smoking Cessation Program Combined With Tailored Counseling by Practice Nurses. Health communication 31(9): 1165-73 | - Study does not contain a relevant intervention |
| Smit, Eline S.; de Vries, Hein; Hoving, Ciska (2010) The PAS study: a randomized controlled trial evaluating the effectiveness of a web-based | - Study does not contain a relevant intervention |

| Study | Reason for exclusion |
|---|---|
| multiple tailored smoking cessation programme and tailored counselling by practice nurses. Contemporary clinical trials 31(3): 251-8 | |
| Smit, Eline Suzanne; de Vries, Hein; Hoving, Ciska (2012) Effectiveness of a Web-based multiple tailored smoking cessation program: A randomized controlled trial among Dutch adult smokers. Journal of Medical Internet Research 14(3): 158-169 | - Study does not contain a relevant intervention |
| Smith, Meredith Y., Cromwell, Jerry, DePue, Judith et al. (2007) Determining the cost-effectiveness of a computer-based smoking cessation intervention in primary care. Managed care (Langhorne, Pa.) 16(7): 48-55 | - Not a relevant study design |
| Spohr, S. A., Nandy, R., Gandhiraj, D. et al. (2015) Efficacy of SMS Text Message Interventions for Smoking Cessation: A Meta-Analysis. Journal of Substance Abuse Treatment 56: 1-10 | - old systematic review (before 2017) |
| Spollen, John J., Thrush, Carol R., Mui, Dan-Vy et al. (2010) A randomized controlled trial of behavior change counseling education for medical students. Medical teacher 32(4): e170-7 | - Study does not contain a relevant intervention |
| Stanczyk, Nicola Esther, Crutzen, Rik, Bolman, Catherine et al. (2013) Influence of delivery strategy on message-processing mechanisms and future adherence to a Dutch computer-tailored smoking cessation intervention. Journal of medical Internet research 15(2): e28 | - No eligible outcome |
| Stanczyk, Nicola, Bolman, Catherine, van Adrichem, Mathieu et al. (2014) Comparison of text and video computer-tailored interventions for smoking cessation: randomized controlled trial. Journal of medical Internet research 16(3): e69 | - Secondary publication of an included study that does not provide any additional relevant information |
| Stein-Seroussi, Al, Stockton, Laurie, Brodish, Paul et al. (2009) Randomized controlled trial of the ACTION smoking cessation curriculum in | - Not adequate follow up |

| Study | Reason for exclusion |
|---|---|
| tobacco-growing communities. Addictive behaviors 34(9): 737-43 | |
| Strecher, Victor J., McClure, Jennifer, Alexander, Gwen et al. (2008) The role of engagement in a tailored web-based smoking cessation program: randomized controlled trial. Journal of medical Internet research 10(5): e36 | - Comparator in study does not match that specified in protocol |
| Strecher, Victor J.; Shiffman, Saul; West, Robert (2005) Randomized controlled trial of a web-based computer-tailored smoking cessation program as a supplement to nicotine patch therapy. Addiction (Abingdon, England) 100(5): 682-8 | - Not adequate follow up |
| Strecher, Victor J.; Shiffman, Saul; West, Robert (2006) Moderators and mediators of a web-based computer-tailored smoking cessation program among nicotine patch users. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 8suppl1: S95-101 | - Not adequate follow up |
| Strecher, Victor, Wang, Catherine, Derry, Holly et al. (2002) Tailored interventions for multiple risk behaviors. Health Education Research 17(5): 619-626 | - Not a relevant study design |
| Sutton, Stephen and Gilbert, Hazel (2007) Effectiveness of individually tailored smoking cessation advice letters as an adjunct to telephone counselling and generic self-help materials: randomized controlled trial. Addiction (Abingdon, England) 102(6): 994-1000 | - Study does not contain a relevant intervention |
| Swartz, L. H. G., Noell, J. W., Schroeder, S. W. et al. (2006) A randomised control study of a fully automated internet based smoking cessation programme. Tobacco control 15(1): 7-12 | - Not adequate follow up |
| Taber, J. M., McQueen, A., Simonovic, N. et al. (2019) Adapting a self-affirmation intervention for use in a mobile application for smokers. Journal of behavioral medicine | - No eligible outcome<br><br>- Study does not contain a relevant intervention |

| Study | Reason for exclusion |
|---|---|
| Taggart, Jane, Williams, Anna, Dennis, Sarah et al. (2012) A systematic review of interventions in primary care to improve health literacy for chronic disease behavioral risk factors. BMC family practice 13: 49 | - old systematic review (before 2017) |
| Tanaka, Hideo, Yamato, Hiroshi, Tanaka, Taichiro et al. (2006) Effectiveness of a low-intensity intra-worksite intervention on smoking cessation in Japanese employees: a three-year intervention trial. Journal of occupational health 48(3): 175-82 | - Study does not contain a relevant intervention |
| Tapper, Katy, Jiga-Boy, Gabriela, Maio, Gregory R. et al. (2014) Development and preliminary evaluation of an internet-based healthy eating program: randomized controlled trial. Journal of medical Internet research 16(10): e231 | - No eligible outcome |
| Taylor, Gemma M. J., Dalili, Michael N., Semwal, Monika et al. (2017) Internet-based interventions for smoking cessation. The Cochrane database of systematic reviews 9: cd007078 | - Systematic review does not exactly fit our protocol |
| Thakkar, Jay, Redfern, Julie, Thiagalingam, Aravinda et al. (2016) Patterns, predictors and effects of texting intervention on physical activity in CHD - insights from the TEXT ME randomized clinical trial. European journal of preventive cardiology 23(17): 1894-1902 | - No eligible outcome |
| Tombor, Ildiko, Beard, Emma, Brown, Jamie et al. (2018) Randomized factorial experiment of components of the SmokeFree Baby smartphone application to aid smoking cessation in pregnancy. Translational behavioral medicine | - Not a relevant study design |
| Tsoh, Janice Y.; Kohn, Michael A.; Gerbert, Barbara (2010) Promoting smoking cessation in pregnancy with Video Doctor plus provider cueing: a randomized trial. Acta obstetricia et gynecologica Scandinavica 89(4): 515-23 | - Not adequate follow up |

| Study | Reason for exclusion |
|---|---|
| Tsoli, S.; Sutton, S.; Kassavou, A. (2018) Interactive voice response interventions targeting behaviour change: A systematic literature review with meta-analysis and meta-regression. BMJ Open 8(2): e018974 | - No eligible outcome |
| Unal, Eda, Giakoumidakis, Konstantinos, Khan, Ehsan et al. (2018) Mobile phone text messaging for improving secondary prevention in cardiovascular diseases: A systematic review. Heart & lung : the journal of critical care 47(4): 351-359 | - Study does not contain a relevant intervention |
| Unrod, M., Smith, M., Spring, B. et al. (2007) Randomized controlled trial of a computer-based, tailored intervention to increase smoking cessation counseling by primary care physicians. Journal of General Internal Medicine 22(4): 478-484 | - Study does not focus on behavour change |
| Urrea, B., Plante, T. B., Kelli, H. M. et al. (2015) Mobile Health Initiatives to Improve Outcomes in Primary Prevention of Cardiovascular Disease. Current Treatment Options in Cardiovascular Medicine 17(12): 59 | - Review article but not a systematic review |
| van den Heuvel, Josephus Fm, Groenhof, T. Katrien, Veerbeek, Jan Hw et al. (2018) eHealth as the Next-Generation Perinatal Care: An Overview of the Literature. Journal of medical Internet research 20(6): e202 | - Review article but not a systematic review |
| van Lieshout, Jan, Huntink, Elke, Koetsenruijter, Jan et al. (2016) Tailored implementation of cardiovascular risk management in general practice: a cluster randomized trial. Implementation science : IS 11: 115 | - No eligible outcome |
| Vidrine, Damon J., Fletcher, Faith E., Danysh, Heather E. et al. (2012) A randomized controlled trial to assess the efficacy of an interactive mobile messaging intervention for underserved smokers: Project ACTION. BMC public health 12: 696 | - Not a relevant intervention |

| Study | Reason for exclusion |
|---|---|
| Vodopivec-Jamsek, Vlasta, de Jongh, Thyra, Gurol-Urganci, Ipek et al. (2012) Mobile phone messaging for preventive health care. The Cochrane database of systematic reviews 12: cd007457 | - old systematic review (before 2017) |
| Vogel, E. A., Thrul, J., Humfleet, G. L. et al. (2019) Smoking cessation intervention trial outcomes for sexual and gender minority young adults. Health psychology 38(1): 12-20 | - There is no comparison group |
| Voncken-Brewster, Viola, Tange, Huibert, de Vries, Hein et al. (2015) A randomized controlled trial evaluating the effectiveness of a web-based, computer-tailored self-management intervention for people with or at risk for COPD. International journal of chronic obstructive pulmonary disease 10: 1061-73 | - Does not contain a population of people who smoke |
| Westmaas, J Lee, Bontemps-Jones, Jeuneviette, Hendricks, Peter S et al. (2018) Randomised controlled trial of stand-alone tailored emails for smoking cessation. Tobacco control 27(2): 136-146 | - Data not reported in an extractable format<br><br>- Study does not contain a relevant intervention |
| Whelan, Maxine E., Morgan, Paul S., Sherar, Lauren B. et al. (2017) Can functional magnetic resonance imaging studies help with the optimization of health messaging for lifestyle behavior change? A systematic review. Preventive medicine 99: 185-196 | - Not a relevant study design |
| Whittaker, R., McRobbie, H., Bullen, C. et al. (2016) Mobile phone-based interventions for smoking cessation. Cochrane Database of Systematic Reviews 2016(4): cd006611 | - old systematic review (before 2017) |
| Wilson, Sarah M., Hair, Lauren P., Hertzberg, Jeffrey S. et al. (2016) Abstinence Reinforcement Therapy (ART) for rural veterans: Methodology for an mHealth smoking cessation intervention. Contemporary clinical trials 50: 157-65 | - Study does not contain a population of interest |
| Wittekind, Charlotte E.; Ludecke, Daniel; Cludius, Barbara (2019) Web-based Approach | - No eligible outcome |

| Study | Reason for exclusion |
|---|---|
| Bias Modification in smokers: A randomized-controlled study. Behaviour research and therapy 116: 52-60 | |
| Woodruff, S. I., Conway, T. L., Edwards, C. C. et al. (2007) Evaluation of an Internet virtual world chat room for adolescent smoking cessation. Addictive Behaviors 32(9): 1769-1786 | - Not a relevant study design |
| Ybarra, M. L., Holtrop, J. S., Prescott, T. L. et al. (2013) Pilot RCT results of stop my smoking USA: A text messaging-based smoking cessation program for young adults. Nicotine and Tobacco Research 15(8): 1388-1399 | - Not adequate follow up |
| Young, C. L., Trapani, K., Dawson, S. et al. (2018) Efficacy of online lifestyle interventions targeting lifestyle behaviour change in depressed populations: A systematic review. Australian and New Zealand Journal of Psychiatry 52(9): 834-846 | - Systematic review does not exactly fit our protocol |
| Yu, Shaohua, Duan, Zongshuan, Redmon, Pamela B. et al. (2017) mHealth Intervention is Effective in Creating Smoke-Free Homes for Newborns: A Randomized Controlled Trial Study in China. Scientific reports 7(1): 9276 | - No eligible outcome |
| Zbikowski, S. M., Jack, L. M., McClure, J. B. et al. (2011) Utilization of services in a randomized trial testing phone- and web-based interventions for smoking cessation. Nicotine and Tobacco Research 13(5): 319-327 | - Data not reported in an extractable format |
| Zeng, Emily Y., Heffner, Jaimee L., Copeland, Wade K. et al. (2016) Get with the program: Adherence to a smartphone app for smoking cessation. Addictive Behaviors 63: 120-124 | - Study does not contain a relevant intervention |
| Zhang, Hui, Jiang, Ying, Nguyen, Hoang D. et al. (2017) The effect of a smartphone-based coronary heart disease prevention (SBCHDP) programme on awareness and knowledge of CHD, stress, and cardiac-related lifestyle behaviours among the working population in | - Not a relevant study design |

| Study | Reason for exclusion |
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| Singapore: a pilot randomised controlled trial. Health and quality of life outcomes 15(1): 49 | |
| Zullig, Leah L., Sanders, Linda L., Shaw, Ryan J. et al. (2014) A randomised controlled trial of providing personalised cardiovascular risk information to modify health behaviour. Journal of telemedicine and telecare 20(3): 147-52 | - Not adequate follow up |

## Economic studies

| Reference | Reason for exclusion |
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| Aalbers T, Baars MAE, Rikkert MGMO. Characteristics of effective Internet-mediated interventions to change lifestyle in people aged 50 and older: a systematic review. Ageing Res Rev. 2011;10(4):487-97. | Ineligible outcomes |
| Abrantes AM, Blevins CE, Battle CL, Read JP, Gordon AL, Stein MD. Developing a Fitbit-supported lifestyle physical activity intervention for depressed alcohol dependent women. J Subst Abuse Treat. 2017;80:88-97. | Ineligible outcomes |
| Adams J. Worth doing badly? Sexual health promotion in primary care. Br J Gen Pract. 2003;53(497):981 | Ineligible study design |
| Aittasalo M, Rinne M, Pasanen M, Kukkonen-Harjula K, Vasankari T. Promoting walking among office employees - evaluation of a randomized controlled intervention with pedometers and e-mail messages. BMC Public Health. 2012;12(403):1-11. | Ineligible population |
| Alfonso J, Hall TV, Dunn ME. Feedback-based alcohol interventions for mandated students: an effectiveness study of three modalities. Clin Psychol Psychother. 2013;20(5):411-23. | Ineligible outcomes |
| Alouki K, Delisle H, Bermudez-Tamayo C, Johri M. Lifestyle interventions to prevent type 2 diabetes: a systematic review of economic evaluation studies. J Diabetes Res. 2016;2016:E2159890. | Systematic review |
| Aminde LN, Takah NF, Zapata-Diomedi B, Veerman JL. Primary and secondary prevention interventions for cardiovascular disease in low-income and middle-income countries: a systematic review of economic evaluations. Cost Eff Resour Alloc. 2018;16(22):1-34. | Systematic review |

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| Angus C, Latimer N, Preston L, Li J, Purshouse R. What are the implications for policy makers? A systematic review of the cost-effectiveness of screening and brief interventions for alcohol misuse in primary care. Frontiers in Psychiatry. 2014;5(Sep):Article 114. | Ineligible intervention |
| Angus C, Li J, Romero-Rodriguez E, Anderson P, Parrott S, Brennan A. Cost-effectiveness of strategies to improve delivery of brief interventions for heavy drinking in primary care: results from the ODHIN trial. Eur J Public Health. 2018;29(2):219-25. | Ineligible intervention |
| Archer E, Groessl EJ, Sui X, McClain AC, Wilcox S, Hand GA, et al. An economic analysis of traditional and technology-based approaches to weight loss. Am J Prev Med. 2012;43(2):176-82. | Ineligible population |
| Bailey J, Mann S, Wayal S, Hunter R, Free C, Abraham C, et al. Sexual health promotion for young people delivered via digital media: a scoping review. NIHR Journals Library 2015 | Ineligible study design |
| Bailey JV, Webster R, Hunter R, Griffin M, Freemantle N, Rait G, et al. The men's safer sex project: intervention development and feasibility randomized controlled trial of an interactive digital intervention to increase condom use in men. Health Technol Assess. 2016;20(91):1-152. | Ineligible population |
| Bhardwaj NN, Wodajo B, Gochipathala K, Paul DP, Coustasse A. Can mHealth revolutionize the way we manage adult obesity? Perspect Health Inf Manag. 2017;14:1A. | Systematic review |
| Blake H. Text messaging interventions increase adherence to antiretroviral therapy and smoking cessation. Evid Based Med. 2014;19(1):35-36. | Ineligible outcomes |
| Blankers M, Nabitz U, Smit F, Koeter MW, Schippers GM. Economic evaluation of internet-based interventions for harmful alcohol use alongside a pragmatic randomized controlled trial. J Med Internet Res. 2012;14(5):E134. | Ineligible population |
| Block G, Sternfeld B, Block CH, Block TJ, Norris J, Hopkins D, et al. Development of alive! (A lifestyle intervention via email), and its effect on health-related quality of life, presenteeism, and other behavioral outcomes: randomized controlled trial. J Med Internet Res. 2008;10(4):e43. | Ineligible outcomes |
| Brown J. Internet-based intervention for smoking cessation (StopAdvisor) in people with low and high socioeconomic status: a randomised controlled trial. Lancet Respir Med. 2014;2(12):997-1006. | Ineligible study design |
| Bull S, Devine S, Schmiege SJ, Pickard L, Campbell J, Shlay JC. Text messaging, teen outreach program, and sexual health behavior: a cluster randomized trial. Am J Public Health. 2016;106(S1):S117-24. | Ineligible intervention |
| Burgos JL, Patterson TL, Graff-Zivin JS, Kahn JG, Rangel MG, Lozada MR, et al. Cost-effectiveness of combined sexual and injection risk reduction interventions among female sex workers who inject drugs in two very distinct Mexican border cities. PLoS ONE. 2016;11(2):E0147719. | Ineligible intervention |
| Burford O, Jiwa M, Carter O, Parsons R, Hendrie D. Internet-based photoaging within Australian pharmacies to promote smoking cessation: randomized controlled trial. J Med Internet Res. 2013;15(3):e64. | Ineligible intervention |
| Burn E, Marshall AL, Miller YD, Barnett AG, Fjeldsoe BS, Graves N. The cost-effectiveness of the MobileMums intervention to increase physical | Ineligible population |

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| activity among mothers with young children: a Markov model informed by a randomised controlled trial. BMJ Open. 2015;5(4):E007226. | |
| Burn E, Nghiem S, Jan S, Redfern J, Rodgers A, Thiagalingam A, et al. Cost-effectiveness of a text message programme for the prevention of recurrent cardiovascular events. Heart. 2017;103(12):923-30. | Ineligible outcomes |
| Calhoun PS, Datta S, Olsen M, Smith VA, Moore SD, Hair LP, et al. Comparative effectiveness of an internet-based smoking cessation intervention versus clinic-based specialty care for veterans. J Subst Abuse Treat. 2016;69:19-27. | Ineligible intervention |
| Carr SM, Lhussier M, Forster N, Geddes L, Deane K, Pennington M, et al. An evidence synthesis of qualitative and quantitative research on component intervention techniques, effectiveness, cost-effectiveness, equity and acceptability of different versions of health-related lifestyle advisor role in improving health. Health Technol Assess. 2011;15(9) | Ineligible outcomes |
| Cecchini M, Sassi F, Lauer JA, Lee YY, Guajardo-Barron V, Chisholm D. Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness. Lancet. 2010;376(9754):1775-84. | Ineligible intervention |
| Chen F, Su W, Becker SH, Payne M, Sweet CMC, Peters AL, et al. Clinical and economic impact of a digital, remotely-delivered intensive behavioral counselling program on medicare beneficiaries at risk for diabetes and cardiovascular disease. PLoS ONE. 2016;11(10):E0163627. | Ineligible intervention |
| Chen YF, Madan J, Welton N, Yahaya I, Aveyard P, Bauld L, et al. Effectiveness and cost-effectiveness of computer and other electronic aids for smoking cessation: a systematic review and network meta-analysis. Health Technol Assess. 2012;16(38):1-205. | Limited ability to inform the committee about the factors of interest |
| Cheng Q, Church J, Haas M, Goodall S, Sangster J, Furber S. Cost-effectiveness of a population-based lifestyle intervention to promote healthy weight and physical activity in non-attenders of cardiac rehabilitation. Heart Lung Circ. 2016;25(3):265-74. | Ineligible intervention |
| Cheung KL, Wijnen B, de Vries H. A review of the theoretical basis, effects, and cost effectiveness of online smoking cessation interventions in the netherlands: a mixed-methods approach. J Med Internet Res. 2017;19(6):E230. | Ineligible population |
| Cheung K-L, Wijnen BFM, Hiligsmann M, Coyle K, Coyle D, Pokhrel S, et al. Is it cost-effective to provide internet-based interventions to complement the current provision of smoking cessation services in the Netherlands? An analysis based on the EQUIPTMOD. Addiction (Abingdon, England). 2018;113 Suppl 1:87-95 | Ineligible study design |
| Clayforth C, Pettigrew S, Mooney K, Lansdorp-Vogelaar I, Rosenberg M, Slevin T. A cost-effectiveness analysis of online, radio and print tobacco control advertisements targeting 25-39 year-old males. Aust N Z J Public Health. 2014;38(3):270-74. | Ineligible intervention |
| Cleghorn C, Wilson N, Nair N, Kvizhinadze G, Nghiem N, McLeod M, et al. Health Benefits and Cost-Effectiveness From Promoting Smartphone Apps for Weight Loss: Multistate Life Table Modeling. JMIR mHealth and uHealth 2019;7(1): e11118 | Ineligible intervention |

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| Cobiac LJ, Vos T, Barendregt JJ. Cost-effectiveness of interventions to promote physical activity: a modelling study. PLos Med. 2009;6(7):1-11. | Ineligible population |
| Cohen DA, Wu SY, Farley TA. Comparing the cost-effectiveness of HIV prevention interventions. J Acquir Immune Defic Syndr. 2004;37(3):1404-14. | Ineligible intervention |
| Comello, Maria Leonora G and Porter, Jeannette H. Concept Test of a Smoking Cessation Smart Case. Telemed J E Health 2018:4 | Ineligible intervention |
| Cooper K, Shepherd J, Picot J, Jones J, Kavanagh J, Harden A, et al. An economic model of school-based behavioral interventions to prevent sexually transmitted infections. Int J Technol Assess Health Care. 2012;28(4):407-14. | Ineligible intervention |
| Crombie IK, Falconer DW, Irvine L, Williams B, Ricketts IW, Humphris G, et al. Reducing alcohol-related harm in disadvantaged men: development and feasibility assessment of a brief intervention delivered by mobile telephone. NIHR Journals Library 2013 | Ineligible study design |
| Crombie IK, Irvine L, Williams B, Sniehotta FF, Petrie DJ, Jones C, et al. Text message intervention to reduce frequency of binge drinking among disadvantaged men: the TRAM RCT. Public Health Research. 2018; 6(6): Available from: https://dx.doi.org/10.3310/phr06060 | Ineligible population |
| Daley A, Jolly K, Madigan C, Griffin R, Roalfe A, Lewis A, et al. A brief behavioural intervention to promote regular self-weighing to prevent weight regain after weight loss: a RCT. NIHR Journals Library 2019 | Ineligible intervention |
| Dandona L, Kumar SG, Kumar GA, Dandona R. Cost-effectiveness of HIV prevention interventions in Andhra Pradesh state of India. BMC Health Serv Res. 2010;10(117):1-8. | Ineligible intervention |
| Devi R, Singh SJ, Powell J, Fulton EA, Igbinedion E, Rees K. Internet-based interventions for the secondary prevention of coronary heart disease. Cochrane Database Syst Rev. 2015;12:CD009386. | Ineligible outcomes |
| Dobbie F, Hiscock R, Leonardi-Bee J, Murray S, Shahab L, Aveyard P, et al. Evaluating long-term outcomes of NHS stop smoking services (ELONS): a prospective cohort study. Health Technol Assess. 2014;18(35):1-424. | Ineligible intervention |
| Donker T, Blankers M, Hedman E, Ljotsson B, Petrie K, Christensen H. Economic evaluations of internet interventions for mental health: a systematic review. Psychol Med. 2015;45(16):3357-76. | Ineligible outcomes |
| Drost RM, Paulus AT, Jander AF, Mercken L, de Vries H, Ruwaard D, et al. A web-based computer-tailored alcohol prevention program for adolescents: cost-effectiveness and intersectoral costs and benefits. J Med Internet Res. 2016;18(4):E93. | Ineligible population |
| Ekpu VU, Brown AK. The economic impact of smoking and of reducing smoking prevalence: review of evidence. Tobacco Use Insights. 2015;8:1-35. | Systematic review |
| Emery JL, Coleman T, Sutton S, Cooper S, Leonardi-Bee J, Jones M, et al. Uptake of tailored text message smoking cessation support in pregnancy when advertised on the internet (MiQuit): observational study. J Med Internet Res. 2018;20(4):E146. | Ineligible study design |

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| Emmons KM, Puleo E, Greaney ML, Gillman MW, Bennett GG, Haines J, et al. A randomized comparative effectiveness study of Healthy Directions 2: a multiple risk behavior intervention for primary care. Prev Med. 2014;64:96-102. | Ineligible intervention |
| Estabrooks PA, Wilson KE, McGuire TJ, Harden SM, Ramalingam NP, Schoepke L, et al. A quasi-experiment to assess the impact of a scalable, community-based weight loss program: combining reach, effectiveness, and cost. J Gen Intern Med. 2017;32(Suppl 1):24-31. | Limited ability to inform the committee about the factors of interest |
| Fischer HH, Durfee MJ, Raghunath SG, Ritchie ND. Short Message Service Text Message Support for Weight Loss in Patients With Prediabetes: Pragmatic Trial. JMIR Diabetes. 2019;4(2):e12985. | Ineligible study design |
| Fletcher A, Willmott M, Langford R, White J, Poole R, Brown R, et al. Pilot trial and process evaluation of a multilevel smoking prevention intervention in further education settings. NIHR Journals Library 2017 | Ineligible study design |
| Folse SB, Falzon L, Trudeau KJ, Sciamanna CN, Schwartz JE, Davidson KW. Computer-based interventions for weight loss or weight maintenance in overweight or obese people. Cochrane Database Syst Rev. 2009(1):CD007675. | Ineligible study design |
| Forrest JI, Wiens M, Kanters S, Nsanzimana S, Lester RT, Mills EJ. Mobile health applications for HIV prevention and care in Africa. Curr Opin HIV AIDS. 2015;10(6):464-71. | Ineligible study design |
| Galarraga O, Colchero MA, Wamai RG, Bertozzi SM. HIV prevention cost-effectiveness: a systematic review. BMC Public Health. 2009;9(suppl 1):S5. | Ineligible intervention |
| Gallagher R, Neubeck L. How health technology helps promote cardiovascular health outcomes. Med J Aust. 2016;205(3):107-08. | Ineligible study design |
| GC V, Wilson EC, Suhrcke M, Hardeman W, Sutton S. Are brief interventions to increase physical activity cost-effective? A systematic review. Br J Sports Med. 2016;50(7):408-17. | Systematic review |
| Gillett M, Royle P, Snaith A, Scotland G, Poobalan A, Imamura M, et al. Non-pharmacological interventions to reduce the risk of diabetes in people with impaired glucose regulation: a systematic review and economic evaluation. Health Technol Assess. 2012;16(33):1-236. | Ineligible intervention |
| Godfrey C. Cost effectiveness of treatment for alcohol problems: findings of the randomised UK alcohol treatment trial (UKATT). BMJ. 2005;331(7516):544-48. | Ineligible intervention |
| Golsteijn RH, Peels DA, Evers SM, Bolman C, Mudde AN, de Vries H, et al. Cost-effectiveness and cost-utility of a web-based or print-delivered tailored intervention to promote physical activity among adults aged over fifty: an economic evaluation of the Active Plus intervention. Int J Behav Nutr Phys Act. 2014;11:122. | Ineligible population |
| Goode AD, Lawler SP, Brakenridge CL, Reeves MM, Eakin EG. Telephone, print, and web-based interventions for physical activity, diet, and weight control among cancer survivors: a systematic review. J Cancer Surviv. 2015;9(4):660-82. | Ineligible outcomes |

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| Gozzoli V, Palmer AJ, Brandt A, Spinas GA. Economic and clinical impact of alternative disease management strategies for secondary prevention in type 2 diabetes in the Swiss setting. Swiss Med Wkly. 2001;131(21-22):303-10. | Ineligible intervention |
| Harris J, Felix L, Miners A, Murray E, Michie S, Fergusn E, et al. Adaptive e-learning to improve dietary behaviour: a systematic review and cost-effectiveness analysis. Health Technol Assess. 2011;15(37):1-160. | Limited ability to inform the committee about the factors of interest |
| Harris T, Kerry S, Victor C, Iliffe S, Ussher M, Fox-Rushby J, et al. A pedometer-based walking intervention in 45- to 75-year-olds, with and without practice nurse support: the PACE-UP three-arm cluster RCT. Health Technol Assess. 2018;22(37):1-274 | Ineligible intervention |
| Hawkins J, Charles JM, Edwards M, Hallingberg B, McConnon L, Edwards RT, et al. Acceptability and Feasibility of Implementing Accelorometry-Based Activity Monitors and a Linked Web Portal in an Exercise Referral Scheme: Feasibility Randomized Controlled Trial. J Med Internet Res 2019;21(3):e12374 | Ineligible intervention |
| Henderson JA, Chubak J, O'Connell J, Ramos MC, Jensen J, Jobe JB, et al. Design of a randomized controlled trial of a web-based intervention to reduce cardiovascular disease risk factors among remote reservation-dwelling American Indian adults with type 2 diabetes. J Prim Prev. 2012;33(4):209-22. | Ineligible study design |
| Hersey JC, Khavjou O, Strange LB, Atkinson RL, Blair SN, Campbell S, et al. The efficacy and cost-effectiveness of a community weight management intervention: a randomized controlled trial of the health weight management demonstration. Prev Med. 2012;54(1):42-49. | Ineligible population |
| Hollingworth W, Hawkins J, Lawlor DA, Brown M, Marsh T, Kipping RR. Economic evaluation of lifestyle interventions to treat overweight or obesity in children. Int J Obes. 2012;36(4):559-66. | Ineligible intervention |
| Holmen H, Torbjornsen A, Wahl AK, Jenum AK, Smastuen MC, Arsand E, et al. A mobile health intervention for self-management and lifestyle change for persons with type 2 diabetes, part 2: one-year results from the Norwegian randomized controlled trial renewing health. Diabetes Technol Ther. 2016;18(Suppl 1):S58-59. | Ineligible study design |
| Holtz B, Krein SL, Bentley DR, Hughes ME, Giardino ND, Richardson CR. Comparison of veteran experiences of low-cost, home-based diet and exercise interventions. J Rehabil Res Dev. 2014;51(1):149-60. | Ineligible outcomes |
| Hunter R, Wallace P, Struzzo P, Vedova RD, Scafuri F, Tersar C, et al. Randomised controlled non-inferiority trial of primary care-based facilitated access to an alcohol reduction website: cost-effectiveness analysis. BMJ Open. 2017;7(11):E014577. | Ineligible population |
| Iribarren SJ, Cato K, Falzon L, Stone PW. What is the economic evidence for mHealth? A systematic review of economic evaluations of mHealth solutions. PLoS ONE. 2017;12(2):E0170581. | Systematic review |
| Jacobs-van der Bruggen MA, Bos G, Bemelmans WJ, Hoogenveen RT, Vijgen SM, Baan CA. Lifestyle interventions are cost-effective in people with | Ineligible intervention |

| Reference | Reason for exclusion |
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| different levels of diabetes risk: results from a modeling study. Diabetes Care. 2007;30(1):128-34. | |
| Jacobs-van der Bruggen MA, van Baal PH, Hoogenveen RT, Feenstra TL, Briggs AH, Lawson K, et al. Cost-effectiveness of lifestyle modification in diabetic patients. Diabetes Care. 2009;32(8):1453-58. | Ineligible intervention |
| Joo N-S, Park Y-W, Park K-H, Kim C-W, Kim B-T. Cost-effectiveness of a community-based obesity control programme. J Telemed Telecare. 2010;16(2):63-7. | Limited ability to inform the committee about the factors of interest |
| Kachur R, Hall W, Coor A, Kinsey J, Collins D, Strona FV. The use of technology for sexually transmitted disease partner services in the united states: a structured review. Sex Transm Dis. 2018;45(11):707-12. | Ineligible outcomes |
| Kaner EF, Beyer FR, Garnett C, Crane D, Brown J, Muirhead C, et al. Personalised digital interventions for reducing hazardous and harmful alcohol consumption in community-dwelling populations. Cochrane Database Syst Rev. 2017;9:CD011479. | Ineligible outcomes |
| Keyserling TC, Sheridan SL, Draeger LB, Finkelstein EA, Gizlice Z, Kruger E, et al. A Comparison of live counseling with a web-based lifestyle and medication intervention to reduce coronary heart disease risk: a randomized clinical trial. JAMA Intern Med. 2014;174(7):1144-57. | Ineligible population |
| Khan N, Marvel FA, Wang J, Martin SS. Digital health technologies to promote lifestyle change and adherence. Curr Treat Options Cardiovasc Med. 2017;19(8):60. | Ineligible outcomes |
| King C, Llewellyn C, Shahmanesh M, Abraham C, Bailey J, Burns F, et al. Sexual risk reduction interventions for patients attending sexual health clinics: a mixed-methods feasibility study. Health Technol Assess. 2019;23(12):1-122 | Ineligible study design |
| Korber K. Quality assessment of economic evaluations of health promotion programs for children and adolescents-a systematic review using the example of physical activity. Health Econ Rev. 2015;5(1):1-14. | Ineligible intervention |
| Krishna S, Boren SA, Balas EA. Healthcare via cell phones: a systematic review. Telemed J E Health. 2009;15(3):231-40. | Ineligible study design |
| Krishnan A, Finkelstein EA, Levine E, Foley P, Askew S, Steinberg D, et al. A Digital Behavioral Weight Gain Prevention Intervention in Primary Care Practice: Cost and Cost-Effectiveness Analysis. J Med Internet Res. 2019;21(5):e12201 | Ineligible intervention |
| Kruger J, Brennan A, Strong M, Thomas C, Norman P, Epton T. The cost-effectiveness of a theory-based online health behaviour intervention for new university students: an economic evaluation. BMC Public Health. 2014;14(1011):1-16. | Limited ability to inform the committee about the factors of interest |
| Krukowski RA, Tilford JM, Harvey-Berino J, West DS. Comparing behavioral weight loss modalities: incremental cost-effectiveness of an internet-based versus an in-person condition. Obesity (Silver Spring). 2011;19(8):1629-35. | Ineligible population |

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| Larsen B, Marcus B, Pekmezi D, Hartman S, Gilmer T. A web-based physical activity intervention for Spanish-speaking Latinas: a costs and cost-effectiveness analysis. J Med Internet Res. 2017;19(2):E43. | Ineligible population |
| Larsen-Cooper E, Bancroft E, Rajagopal S, O'Toole M, Levin A. Scale matters: a cost-outcome analysis of an m-health intervention in Malawi. Telemed J E Health. 2016;22(4):317-24. | Ineligible population |
| Lawlor DA, Kipping RR, Anderson EL, Howe LD, Chittleborough CR, Moure-Fernandez A, et al. Active for Life Year 5: a cluster randomised controlled trial of a primary school-based intervention to increase levels of physical activity, decrease sedentary behaviour and improve diet. NIHR Journals Library 2016 | Ineligible intervention |
| Leahey TM, Fava JL, Seiden A, Fernandes D, Doyle C, Kent K, et al. A randomized controlled trial testing an Internet delivered cost-benefit approach to weight loss maintenance. Prev Med. 2016;92:51-57. | Ineligible population |
| Leahey TM, Thomas G, Fava JL, Subak LL, Schembri M, Krupel K, et al. Adding evidence-based behavioral weight loss strategies to a statewide wellness campaign: a randomized clinical trial. Am J Public Health. 2014;104(7):1300-06. | Ineligible population |
| Levy DE, Klinger EV, Linder JA, Fleegler EW, Rigotti NA, Park ER, et al. Cost-effectiveness of a health system-based smoking cessation program. Nicotine Tob Res 2017;19(12):1508-15. | Ineligible intervention |
| Lewis BA, Williams DM, Neighbors CJ, Jakicic JM, Marcus BH. Cost Analysis of Internet vs. Print Interventions for Physical Activity Promotion. Psychol Sport Exerc. 2010: 11(3):246-249 | Ineligible study design |
| Li R, Qu S, Zhang P, Chattopadhyay S, Gregg EW, Albright A, et al. Economic evaluation of combined diet and physical activity promotion programs to prevent type 2 diabetes among persons at increased risk: a systematic review for the community preventive services task force. Ann Intern Med. 2015;163(6):452-60. | Ineligible outcomes |
| Little P, Stuart B, Hobbs FR, Kelly J, Smith ER, Bradbury KJ, et al. An internet-based intervention with brief nurse support to manage obesity in primary care (POWeR+): a pragmatic, parallel-group, randomised controlled trial. Lancet Diabetes Endocrinol. 2016;4(10):821-8. | Ineligible population |
| Little P, Stuart B, Richard Hobbs FD, Kelly J, Smith ER, Bradbury KJ, et al. Randomised controlled trial and economic analysis of an internet-based weight management programme: POWeR+ (positive online weight reduction). Health Technol Assess. 2017;21(4):1-61. | Ineligible population |
| Lohan M, Aventin A, Maguire L, Curran R, McDowell C, Agus A, et al. Increasing boys' and girls' intentions to avoid teenage pregnancy: a cluster randomised controlled feasibility trial of an interactive video drama-based intervention in post-primary schools in Northern Ireland. Public Health Research. 2017; 5(1): Available from: https://dx.doi.org/10.3310/phr05010 | Ineligible study design |
| Lohse N, Marseille E, Kahn JG. Development of a model to assess the cost-effectiveness of gestational diabetes mellitus screening and lifestyle change for the prevention of type 2 diabetes mellitus. Int J Gynaecol Obstet. 2011;115(Suppl 1):S20-25. | Ineligible intervention |

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| Lorig KR, Ritter PL, Dost A, Plant K, Laurent DD, McNeil I. The expert patients programme online, a 1-year study of an Internet-based self-management programme for people with long-term conditions. Chronic Illness. 2008;4(4):247-56. | Limited ability to inform the committee about the factors of interest |
| Loveman E, Frampton GK, Shepherd J, Picot J, Cooper K, Bryant J, et al. The clinical effectiveness and cost-effectiveness of long-term weight management schemes for adults: a systematic review. Health Technol Assess. 2008;15(2):1-182. | Ineligible outcomes |
| Lu C, Schultz AB, Sill S, Petersen R, Young JM, Edington DW. Effects of an incentive-based online physical activity intervention on health care costs. J Occup Environ Med. 2008;50(11):1209-15. | Limited ability to inform the committee about the factors of interest |
| Luxton DD, Hansen RN, Stanfill K. Mobile app self-care versus in-office care for stress reduction: a cost minimization analysis. J Telemed Telecare. 2014;20(8):431-35. | Ineligible population |
| Maddison R, Pfaeffli L, Whittaker R, Stewart R, Kerr A, Jiang Y, et al. A mobile phone intervention increases physical activity in people with cardiovascular disease: results from the HEART randomized controlled trial. Eur J Prev Cardiol. 2015;22(6):701-9. | Limited ability to inform the committee about the factors of interest |
| Marcolino MS, Oliveira JAQ, D'Agostino M, Ribeiro AL, Alkmim MBM, Novillo-Ortiz D. The impact of mHealth interventions: systematic review of systematic reviews. JMIR Mhealth Uhealth. 2018;6(1):E23. | Ineligible outcomes |
| Mateo KF, Jay M. Access to a behavioral weight loss website with or without group sessions increased weight loss in statewide campaign. J Clin Outcomes Manag. 2014;21(8):345-48. | Ineligible outcomes |
| Mauriello LM, Gkbayrak NS, Van Marter DF, Paiva AL, Prochaska JM. An internet-based computer-tailored intervention to promote responsible drinking: findings from a pilot test with employed adults. Alcohol Treat Q. 2011;30(1):91-108. | Ineligible outcomes |
| McConnon A, Kirk SFL, Cockroft JE, Harvey EL, Greenwood DC, Thomas JD, et al. The Internet for weight control in an obese sample: results of a randomised controlled trial. BMC Health Serv Res. 2007;7:206. | Limited ability to inform the committee about the factors of interest |
| Medical Advisory S. Behavioural interventions for type 2 diabetes: an evidence-based analysis. Ont Health Technol Assess Ser. 2009;9(21):1-45. | Ineligible outcomes |
| Miners A, Harris J, Felix L, Murray E, Michie S, Edwards P. An economic evaluation of adaptive e-learning devices to promote weight loss via dietary change for people with obesity. BMC Health Serv Res. 2012;12(190):1-9. | Limited ability to inform the committee about the factors of interest |
| Moreau M, Gagnon M-P, Boudreau F. Development of a fully automated, web-based, tailored intervention promoting regular physical activity among insufficiently active adults with type 2 diabetes: integrating the I-change | Ineligible study design |

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| model, self-determination theory, and motivational interviewing components. JMIR research protocols. 2015;4(1):E25. | |
| Murphy SM, Campbell ANC, Ghitza UE, Kyle TL, Bailey GL, Nunes EV, et al. Cost-effectiveness of an internet-delivered treatment for substance abuse: data from a multisite randomized controlled trial. Drug Alcohol Depend. 2016;161:119-26. | Ineligible population |
| Naughton F, Cooper S, Bowker K, Campbell K, Sutton S, Leonardi-Bee J, et al. Adaptation and uptake evaluation of an SMS text message smoking cessation programme (MiQuit) for use in antenatal care. BMJ Open. 2015;5(10):E008871. | Ineligible outcomes |
| Neumann A, Schwarz P, Lindholm L. Estimating the cost-effectiveness of lifestyle intervention programmes to prevent diabetes based on an example from Germany: Markov modelling. Cost Eff Resour Alloc. 2011;9(17):1-13. | Ineligible intervention |
| Ohinmaa A, Chatterley P, Nguyen T, Jacobs P. Telehealth in substance abuse and addiction: review of the literature on smoking, alcohol, drug abuse and gambling. Alberta: Institute of Health Economics; 2010. Available from: https://www.ihe.ca/advanced-search/telehealth-in-substance-abuse-and-addiction-review-of-the-literature-on-smoking-alcohol-drug-abuse-and-gambling. | Systematic review |
| Olmstead TA, Ostrow CD, Carroll KM. Cost-effectiveness of computer-assisted training in cognitive-behavioral therapy as an adjunct to standard care for addiction. Drug Alcohol Depend. 2010;110(3):200-07. | Ineligible population |
| Oosterhoff M, Bosma H, van Schayck OCP, Evers SMAA, Dirksen CD, Joore MA. A systematic review on economic evaluations of school-based lifestyle interventions targeting weight-related behaviours among 4-12year olds: issues and ways forward. Prev Med. 2018;114:115-22. | Ineligible intervention |
| Osilla KC, Van Busum K, Schnyer C, Larkin JW, Eibner C, Mattke S. Systematic review of the impact of worksite wellness programs. Am J Manag Care. 2012;18(2):E68-81. | Ineligible outcomes |
| Padwal RS, Klarenbach S, Sharma AM, Fradette M, Jelinski SE, Edwards A, et al. The evaluating self-management and educational support in severely obese patients awaiting multidisciplinary bariatric care (EVOLUTION) trial: principal results. BMC Med. 2017;15(1):46. | Ineligible population |
| Park AL, McDaid D, Weiser P, Von Gottberg C, Becker T, Kilian R, et al. Examining the cost effectiveness of interventions to promote the physical health of people with mental health problems: a systematic review. BMC Public Health. 2013;13(787):1-17. | Ineligible outcomes |
| Peels DA, Hoogenveen RR, Feenstra TL, Golsteijn RH, Bolman C, Mudde AN, et al. Long-term health outcomes and cost-effectiveness of a computer-tailored physical activity intervention among people aged over fifty: modelling the results of a randomized controlled trial. BMC Public Health. 2014;14(1):1099. | Ineligible population |
| Perman G, Rossi E, Waisman GD, Aguero C, Gonzalez CD, Pallordet CL, et al. Cost-effectiveness of a hypertension management programme in an elderly population: a Markov model. Cost Eff Resour Alloc. 2011;9(4):1-11. | Ineligible intervention |

| Reference | Reason for exclusion |
|---|---|
| Pifarre M, Carrera A, Vilaplana J, Cuadrado J, Solsona S, Abella F, et al. TControl: a mobile app to follow up tobacco-quitting patients. Comput Methods Programs Biomed. 2017;142:81-89. | Ineligible population |
| Pringle A, Cooke C, Gilson N, Marsh K, McKenna J. Cost-effectiveness of interventions to improve moderate physical activity: a study in nine UK sites. Health Educ J. 2010;69(2):211-24. | Ineligible intervention |
| Prinja S, Bahuguna P, Rudra S, Gupta I, Kaur M, Mehendale SM, et al. Cost effectiveness of targeted HIV prevention interventions for female sex workers in India. Sex Transm Infect. 2011;87(4):354-61. | Ineligible intervention |
| Prybutok G. An analysis of randomised controlled trials that utilise internet based smoking reduction/cessation programs. IJEH. 2015;8(2-4):202-19. | Ineligible outcomes |
| Radcliff TA, Bobroff LB, Lutes LD, Durning PE, Daniels MJ, Limacher MC, et al. Comparing costs of telephone vs face-to-face extended-care programs for the management of obesity in rural settings. J Acad Nutr Diet. 2012;112(9):1363-73. | Ineligible intervention |
| Rasu RS, Hunter CM, Peterson AL, Maruska HM, Foreyt JP. Economic evaluation of an internet-based weight management program. Am J Manag Care. 2010;16(4):E98-104. | Limited ability to inform the committee about the factors of interest |
| Reback, C.J.; Fletcher, J.B.; Leibowitz, A.A. Cost effectiveness of text messages to reduce methamphetamine use and HIV sexual risk behaviors among men who have sex with men. Journal of Substance Abuse Treatment 2019;100: 59-63 | Ineligible outcome |
| Redman LM, Gilmore LA, Breaux J, Thomas DM, Elkind-Hirsch K, Stewart T, et al. Effectiveness of SmartMoms, a novel ehealth intervention for management of gestational weight gain: randomized controlled pilot trial. JMIR Mhealth Uhealth. 2017;5(9):E133. | Ineligible population |
| Riemsma R, Pattenden J, Bridle M, Sowden A, Mather L, Watt I, et al. A systematic review of the effectiveness of interventions based on a stages-of-change approach to promote individual behaviour change in health care settings. Health Technol Assess. 2002; 6(24): Available from: https://www.journalslibrary.nihr.ac.uk/hta/hta6240/#/abstract | Systematic review |
| Rinaldi G, Kiadaliri AA, Haghparast-Bidgoli H. Cost effectiveness of HIV and sexual reproductive health interventions targeting sex workers: a systematic review. Cost Eff Resour Alloc. 2018;16(63):1-13. | Ineligible intervention |
| Robertson C, Archibald D, Avenell A, Douglas F, Hoddinott P, van Teijlingen E, et al. Systematic reviews of and integrated report on the quantitative, qualitative and economic evidence base for the management of obesity in men. Health Technol Assess. 2014;18(35) | Systematic review |
| Robroek SJW, Polinder S, Bredt FJ, Burdorf A. Cost-effectiveness of a long-term internet-delivered worksite health promotion programme on physical activity and nutrition: a cluster randomized controlled trial. Health Educ Res. 2012;27(3):399-410. | Limited ability to inform the committee about the factors of interest |

| Reference | Reason for exclusion |
|---|---|
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| Rollo ME, Burrows T, Vincze LJ, Harvey J, Collins CE, Hutchesson MJ. Cost evaluation of providing evidence-based dietetic services for weight management in adults: in-person versus eHealth delivery. Nutr Diet. 2018;75(1):35-43. | Ineligible population |
| Rubinstein A, Garcia Marti S, Souto A, Ferrante D, Augustovski F. Generalized cost-effectiveness analysis of a package of interventions to reduce cardiovascular disease in Buenos Aires, Argentina. Cost Eff Resour Alloc. 2009;7(10):1-10. | Ineligible intervention |
| Sacks N, Cabral H, Kazis LE, Jarrett KM, Vetter D, Richmond R, et al. A web-based nutrition program reduces health care costs in employees with cardiac risk factors: before and after cost analysis. J Med Internet Res. 2009;11(4):E43. | Limited ability to inform the committee about the factors of interest |
| Sanyal C, Stolee P, Juzwishin D, Husereau D. Economic evaluations of eHealth technologies: a systematic review. PLoS ONE. 2018;13(6):E0198112. | Ineligible study design |
| Schulz DN, Smit ES, Stanczyk NE, Kremers SPJ, de Vries H, Evers SMAA. Economic evaluation of a web-based tailored lifestyle intervention for adults: findings regarding cost-effectiveness and cost-utility from a randomized controlled trial. J Med Internet Res. 2014;16(3):E91. | Ineligible population |
| Schulz DN, Smit ES, Stanczyk NE, Kremers SPJ, De Vries H, Evers SMAA. Economic evaluation of a web-based tailored lifestyle intervention for adults: findings regarding cost-effectiveness and cost-utility from a randomized controlled trial. Diabetes Technol Ther. 2015;17(Suppl 1):S54-S55. | Ineligible study design |
| Semwal M, Whiting P, Bajpai R, Bajpai S, Kyaw BM, Tudor Car L Digital Education for Health Professions on Smoking Cessation Management: Systematic Review by the Digital Health Education Collaboration. J Med Internet Res 2019;21(3):e13000 | Ineligible study design |
| Sevick MA, Napolitano MA, Papandonatos GD, Gordon AJ, Reiser LM, Marcus BH. Cost-effectiveness of alternative approaches for motivating activity in sedentary adults: results of project STRIDE. Prev Med. 2007;45(1):54-61. | Ineligible intervention |
| Sharifi M, Franz C, Horan CM, Giles CM, Long MW, Ward ZJ, et al. Cost-effectiveness of a clinical childhood obesity intervention. Pediatrics. 2017;140(5):1-11. | Ineligible intervention |
| Shaw R, Fenwick E, Baker G, McAdam C, Fitzsimons C, Mutrie N. 'Pedometers cost buttons': the feasibility of implementing a pedometer based walking programme within the community. BMC Public Health. 2011;11(200):1-9. | Ineligible population |
| Shepherd J, Kavanagh J, Picot J, Cooper K, Harden A, Barnett-Page E, et al. The effectiveness and cost-effectiveness of behavioural interventions for the prevention of sexually transmitted infections in young people aged 13– | Ineligible intervention |

| Reference | Reason for exclusion |
|---|---|
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| Smit ES, Evers SM, de Vries H, Hoving C. Cost-effectiveness and cost-utility of Internet-based computer tailoring for smoking cessation. J Med Internet Res. 2013;15(3):e57. | Ineligible intervention |
| Smith KJ, Hsu HE, Roberts MS, Kramer MK, Orchard TJ, Piatt GA, et al. Cost-effectiveness analysis of efforts to reduce risk of type 2 diabetes and cardiovascular disease in Southwestern Pennsylvania, 2005-2007. Prev Chronic Dis. 2010;7(5):A109. | Ineligible intervention |
| Smith KJ, Kuo S, Zgibor JC, McTigue KM, Hess R, Bhargava T, et al. Cost effectiveness of an internet-delivered lifestyle intervention in primary care patients with high cardiovascular risk. Prev Med. 2016;87:103-09. | Ineligible population |
| Smith MY, Cromwell J, DePue J, Spring B, Redd W, Unrod M. Determining the cost-effectiveness of a computer-based smoking cessation intervention in primary care. Manag Care. 2007;16(7):48-55. | Ineligible population |
| Sniehotta FF, Evans EH, Sainsbury K, Adamson A, Batterham A, Becker F, et al. Behavioural intervention for weight loss maintenance versus standard weight advice in adults with obesity: A randomised controlled trial in the UK (NULevel Trial). PLoS Med. 2019;16(5):e1002793 | Ineligible population |
| Sohn S, Helms TM, Pelleter JT, Muller A, Krottinger AI, Schoffski O. Costs and benefits of personalized healthcare for patients with chronic heart failure in the care and education program "Telemedicine for the Heart". Telemed J E Health. 2012;18(3):198-204. | Ineligible intervention |
| Southard BH, Southard DR, Nuckolls J. Clinical trial of an internet-based case management system for secondary prevention of heart disease. J Cardpulm Rehabil. 2003;23(5):341-34. | Ineligible population |
| Sukhanova A, Ritzwoller DP, Alexander G, Calvi JH, Carlier C, McClure JB, et al. Cost analyses of a web-based behavioral intervention to enhance fruit and vegetable consumption. Int J Behav Nutr Phys Act. 2009;6:92. | Limited ability to inform the committee about the factors of interest |
| Sun Y, You W, Almeida F, Estabrooks P, Davy B. The effectiveness and cost of lifestyle interventions including nutrition education for diabetes prevention: a systematic review and meta-analysis. J Acad Nutr Diet. 2017;117(3):E36(404-21). | Ineligible intervention |
| Thangaratinam S, Rogozinska E, Jolly K, Glinkowski S, Duda W, Borowiack E, et al. Interventions to reduce or prevent obesity in pregnant women: a systematic review. Health Technol Assess. 2007;16(31):1-191. | Ineligible intervention |
| The Swedish Council on Technology Assessment in Health Care. Methods of promoting physical activity. A systematic review. Stockholm: SBU; 2006. 1-14. Available from: | Systematic review |

| Reference | Reason for exclusion |
|---|---|
| https://www.ncbi.nlm.nih.gov/books/NBK447978/pdf/Bookshelf_NBK447978.pdf. | |
| Van den Bruel A, Cleemput I, Van Linden A, Schoefs D, Ramaekers D, Bonneux L. Effectiveness and cost-effectiveness of treatments for smoking cessation. KCE. 2004;1A | Systematic review |
| van Luenen S, Kraaij V, Garnefski N, Spinhoven P, van den Akker-van Marle ME. Cost-utility of a guided Internet-based intervention in comparison with attention only for people with HIV and depressive symptoms: A randomized controlled trial. J Psychosom Res. 2019;118:34-40 | Ineligible outcome |
| van Wier MF, Dekkers JC, Bosmans JE, Heymans MW, Hendriksen IJM, Pronk NP, et al. Economic evaluation of a weight control program with e-mail and telephone counseling among overweight employees: a randomized controlled trial. Int J Behav Nutr Phys Act. 2012;9:112. | Ineligible population |
| Vickerman KA, Keller PA, Deprey M, Lachter RB, Jenssen J, Dreher M. Never quit trying: reengaging tobacco users in statewide cessation services. J Public Health Manag Pract. 2018;24(3):E25-33. | Ineligible population |
| Vidmar AP, Pretlow R, Borzutzky C, Wee CP, Fox DS, Fink C, et al. An addiction model-based mobile health weight loss intervention in adolescents with obesity. Pediatr Obes. 2019;14(2):E12464. | Ineligible population |
| Wake M, Baur LA, Gerner B, Gibbons K, Gold L, Gunn J, et al. Outcomes and costs of primary care surveillance and intervention for overweight or obese children: the LEAP 2 randomised controlled trial. BMJ. 2009;339:(B3308) | Ineligible intervention |
| Wake M, Gold L, McCallum Z, Gerner B, Waters E. Economic evaluation of a primary care trial to reduce weight gain in overweight/obese children: the LEAP trial. Ambul Pediatr. 2008;8(5):336-41. | Ineligible intervention |
| Webb J, Hall J, Hall K, Fabunmi-Alade R. Increasing the frequency of physical activity very brief advice by nurses to cancer patients. A mixed methods feasibility study of a training intervention. Public Health. 2016;139:121-33. | Ineligible population |
| Webb J, Fife-Schaw C, Ogden J. A randomised control trial and cost-consequence analysis to examine the effects of a print-based intervention supported by internet tools on the physical activity of UK cancer survivors. Public Health. 2019;171:106-115 | Ineligible outcome |
| West R, Coyle K, Owen L, Coyle D, Pokhrel S, Group ES. Estimates of effectiveness and reach for 'return on investment' modelling of smoking cessation interventions using data from England. Addiction. 2018;113(Suppl 1):19-31. | Ineligible intervention |
| Whitaker R, Hendry M, Aslam R, Booth A, Carter B, Charles JM, et al. Intervention now to eliminate repeat unintended pregnancy in teenagers (INTERUPT): a systematic review of intervention effectiveness and cost-effectiveness, and qualitative and realist synthesis of implementation factors and user engagement. Health Technol Assess. 2016;20(16):1-214. | Ineligible intervention |
| Whittaker F, Wade V. The costs and benefits of technology-enabled, home-based cardiac rehabilitation measured in a randomised controlled trial. J Telemed Telecare. 2014;20(7):419-22. | Ineligible intervention |

| Reference | Reason for exclusion |
|---|---|
| Wong CK, Jiao F-F, Siu S-C, Fung CS, Fong DY, Wong K-W, et al. Cost-effectiveness of a short message service intervention to prevent type 2 diabetes from impaired glucose tolerance. J Diabetes Res. 2016;2016 | Ineligible intervention |
| Wu S, Cohen D, Shi Y, Pearson M, Sturm R. Economic analysis of physical activity interventions. Am J Prev Med. 2011;40(2):149-58. | Systematic review |
| Wyke S, Bunn C, Andersen E, Silva MN, van Nassau F, McSkimming P, et al. The effect of a programme to improve men's sedentary time and physical activity: The European Fans in Training (EuroFIT) randomised controlled trial. PLoS Med. 2019;16(2):e1002736 | Ineligible intervention |
| Wyke S, Hunt K, Gray CM, et al. Football Fans in Training (FFIT): a randomised controlled trial of a gender-sensitised weight loss and healthy living programme for men – end of study report. NIHR Journals Library 2015 | Ineligible intervention |
| Zanaboni P, Lien LA, Hjalmarsen A, Wootton R. Long-term telerehabilitation of COPD patients in their homes: interim results from a pilot study in Northern Norway. J Telemed Telecare. 2013;19(7):425-9. | Ineligible study design |
| Zivin K, Sen A, Plegue MA, Maciejewski ML, Segar ML, AuYoung M, et al. Comparative effectiveness of wellness programs: impact of incentives on healthcare costs for obese enrollees. Am J Prev Med. 2017;52(3):347-52. | Limited ability to inform the committee about the factors of interest |
| Zoellner JM, You W, Estabrooks PA, Chen Y, Davy BM, Porter KJ, et al. Supporting maintenance of sugar-sweetened beverage reduction using automated versus live telephone support: findings from a randomized control trial. Int J Behav Nutr Phys Act. 2018;15(1):97. | Ineligible outcomes |

## Appendix M – Intervention matrix

The intervention matrix was made to assess if any associations between intervention components and effectiveness could be deduced. This was then to be tested through subgroup analysis. However, this was not possible because the interventions contained many different components and combinations of components. Therefore, deducing which single components that were associated with effectiveness was not possible.

| **Key for "Outcomes" columns** | |
|---|---|
| Most effective (green boxes) | Significantly more effective than other arms; abstinence rate of 20% was considered effective |
| Equivalent (yellow boxes) | If the other arm is "most effective", then equivalent arm is also effective, but the other arm is significantly more effective |
| | If the other arm is "ineffective", then equivalent arm is also ineffective, but the other arm is significantly less effective |
| Ineffective (red boxes) | Significantly less effective than other arms; abstinence rate of below 20% was considered ineffective |

| Study | Intervention mode | Arm | Components of intervention | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Knowledge on smoking and cessation | | | | | | | | | | Monitoring | | | | | |
| | | | Personalised feedback | Decisional balance exercise | Financial impact | General interest | Education on harms of smoking and benefits to quit | Health and risks | Links to other cessation materials | Exercises/ quizzes | Videos/audio files | Diary | Quit date | Goal setting | Level of dependence | Stage of change | Making a public declaration |
| **No chronic condition** | | | | | | | | | | | | | | | | | | |
| Abroms 2014 | Text | Intervention | Yes | No | No | No | Yes | No | Yes | Yes | No | Yes | Yes | No | No | No | No |
| | | Control | No | No | No | No | Yes | No | No | No | No | No | No | No | No | No | No |
| An 2008 | Computer | Intervention | Yes | No | No | Yes | Yes | No | No | Yes | No | Yes | Yes | No | No | No | No |
| | | Control | No | No | No | No | Yes | No | No | No | No | No | Yes | No | No | No | No |
| BinDhim 2017 | App | Intervention | Yes | No | No | No | Yes | No | No | No | No | Yes | Yes | No | No | No | No |
| | | Control | No | No | No | No | Yes | No | No | No | No | No | Yes | No | No | No | No |
| Brendryen 2007 | Email, computer, IVR, text | Intervention | No | No | No | No | Yes | No | No | No | Yes | Yes | Yes | No | No | No | No |
| | | Control | No | No | No | No | Yes | No | Yes | No | No | Yes | Yes | No | No | No | No |
| Brendryen 2008 | Email, computer, IVR, text | Intervention | No | No | No | No | Yes | No | No | No | Yes | Yes | Yes | No | No | No | No |
| | | Control | No | No | No | No | Yes | No | Yes | No | No | Yes | Yes | No | No | No | No |
| Brown 2014 | Computer | Intervention | No | No | No | No | Yes | No | No | No | Yes | Yes | Yes | Yes | No | No | No |
| | | Control | No | No | No | No | Yes | No | No | No | No | No | No | No | No | No | No |
| Free 2009 | Text | Intervention | No | No | No | No | No | No | No | No | No | Yes | Yes | No | No | No | Yes |
| | | Control | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| Free 2011 | Text | Intervention | No | No | No | No | No | No | No | No | No | Yes | Yes | No | No | No | Yes |
| | | Control | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| Graham 2011 | Website | Intervention | No | No | No | No | Yes | No | No | No | No | No | Yes | No | No | No | No |
| | | Control | No | No | No | No | Yes | No | Yes | No | No | No | No | No | No | No | No |
| Liao 2018 | Text | Intervention | No | No | No | No | No | No | No | No | No | No | Yes | Yes | No | No | No |
| | | Control | No | No | No | No | No | No | No | No | No | No | Yes | No | No | No | No |
| Mavrot 2017 | Website | Intervention | Yes | No | No | No | Yes | No | No | No | Yes | Yes | Yes | No | Yes | No | No |
| | | Control | No | No | No | No | Yes | No | No | No | Yes | No | No | No | No | No | No |
| Naughton 2014 | Text | Intervention | No | No | No | No | Yes | Yes | No | No | No | No | Yes | No | No | No | No |
| | | Control | No | No | No | No | Yes | No | No | No | No | No | Yes | No | No | No | No |
| Skoy-Ettrup 2016 | Text & video | Intervention | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| | | Control | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| Thanh 2018 | Email | Intervention | Yes | No | No | No | Yes | Yes | Yes | No | No | No | Yes | No | No | Yes | No |
| | | Control | No | No | No | No | No | No | No | Yes | No | No | No | No | No | Yes | No |
| Vidrine 2018 | Text | Intervention | No | No | No | No | Yes | Yes | No | No | No | No | No | No | No | No | No |
| | | Control | No | No | No | No | No | No | Yes | No | No | No | No | No | No | No | No |
| Wangberg 2011 | Email | Intervention | Yes | No | Yes | No | Yes | Yes | No | No | No | No | Yes | No | Yes | No | No |
| | | Control | No | No | No | No | Yes | Yes | No | No | No | No | Yes | No | Yes | No | No |
| Whittaker 2011 | Text & video | Intervention | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| | | Control | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| **Pregnancy** | | | | | | | | | | | | | | | | | | |
| Naughton 2017 | Text | Intervention | No | No | No | No | Yes | Yes | No | Yes | No | No | No | No | No | No | No |
| | | Other intervention | No | No | No | No | Yes | No | No | No | No | No | No | No | No | No | No |

| Study | Components of intervention | | | | | | | | | | Outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coping strategies | Reminders to complete intervention | Entered into contest | Motivation and self-efficacy | Tips for quitting | Peer support | Forum/social media-type platform | Healthcare professional | Tailoring | Intensity | Abstinence | Engagement |
| **No chronic con** | | | | | | | | | | | | |
| Abroms 2014 | No | Yes | No | No | No | No | No | No | Yes | Range: 5/day - 1/week | | |
| | No | Yes | No | No | No | No | No | No | No | Reminder texts sent more frequently before follow-ups | | |
| An 2008 | No | Yes | No | No | No | Yes | No | No | Yes | 20 visits over 30 weeks | | |
| | No | No | Yes | No | No | No | No | No | No | Email containing links to health resources | | |
| BinDhim 2017 | No | Yes | No | Yes | Yes | No | No | No | No | Unknown | | |
| | No | No | No | No | No | No | No | No | No | Unknown | | |
| Brendryen 2007 | Yes | Yes | No | Yes | Yes | Yes | No | No | Yes | Multiple daily until quit date; lower after quit date | | |
| | No | No | No | No | Yes | No | No | No | No | 1 self-help booklet | | |
| Brendryen 2008 | Yes | Yes | No | Yes | Yes | Yes | No | No | Yes | Multiple daily until quit date; lower after quit date | | |
| | No | No | No | No | Yes | No | No | No | No | 1 self-help booklet | | |
| Brown 2014 | Yes | Yes | No | Yes | Yes | No | Yes | No | Yes | 20 sessions/7 months | | |
| | No | No | No | No | Yes | No | No | No | No | 1 session | | |
| Free 2009 | Yes | No | No | No | No | Yes | No | No | Yes | Daily before quite date; 5/day to 3/week after quit date | | |
| | No | No | No | No | No | No | No | No | No | Fortnightly simple generic SMS | | |
| Free 2011 | Yes | No | No | No | No | Yes | No | No | Yes | Daily before quite date; 5/day to 3/week after quit date | | |
| | No | No | No | No | No | No | No | No | No | Fortnightly simple generic SMS | | |
| Graham 2011 | No | No | No | Yes | Yes | Yes | Yes | No | Yes | Continuous access 6 months | | |
| | No | No | No | No | Yes | No | No | No | No | Continuous access 6 months | | |
| Liao 2018 | Yes | No | No | Yes | No | Yes | No | No | No | 3-5/day for 24 weeks | | |
| | No | No | No | No | No | No | No | No | No | 1/week for 24 weeks | | |
| Mavrot 2017 | No | Yes | No | Yes | Yes | No | Yes | Yes | Yes | Continuous access/6months | | |
| | No | No | No | No | Yes | No | Yes | No | No | Continuous access/6months | | |
| Naughton 2014 | Yes | No | No | Yes | Yes | No | No | No | Yes | 0-2/day (mean 1.2) for 90 days | | |
| | No | No | No | No | Yes | No | No | No | No | 1 CAU session | | |
| Skov-Ettrup 2016 | No | No | No | No | No | No | No | No | No | Unknown; optional 118 text messages during quitting | | |
| | No | No | No | No | No | No | No | No | No | Unknown | | |
| Thanh 2018 | Yes | Yes | No | Yes | Yes | No | No | No | No | Every 1/2/4 days for 3 months | | |
| | No | No | No | No | No | No | No | No | No | 1 booklet, 4 chapters | | |
| Vidrine 2018 | Yes | No | No | Yes | Yes | Yes | No | No | Yes | 35/week at weeks 1-4 reducing to 7/week at weeks 4-12 | | |
| | No | No | No | Yes | Yes | No | No | Yes | No | Unknown; 10 week supply of NRT | | |
| Wangberg 2011 | No | No | No | Yes | Yes | Yes | Yes | No | Yes | 150 messages/12 months | | |
| | No | No | No | Yes | Yes | Yes | Yes | No | No | Unknown | | |
| Whittaker 2011 | No | No | No | No | No | No | No | No | No | 1/day slowly reducing to 1/4days | | |
| | No | No | No | No | No | No | No | No | No | 1/2 weeks | | |
| **Pregnancy** | | | | | | | | | | | | |
| Naughton 2017 | Yes | No | No | Yes | Yes | No | No | No | Yes | 0-2/day (mean 1.2) for 12wks; frequency could be amend | | |
| | No | No | No | No | Yes | No | No | No | No | 1 CAU session | | |
| | | | | | | | | Key: | | | | |
| | | | | | | | | Most effective | | Equivalent | | Ineffective |