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Review of reviews on the effectiveness of digital interventions for reducing behavioural risks of cardiovascular disease in non-patient adult populations

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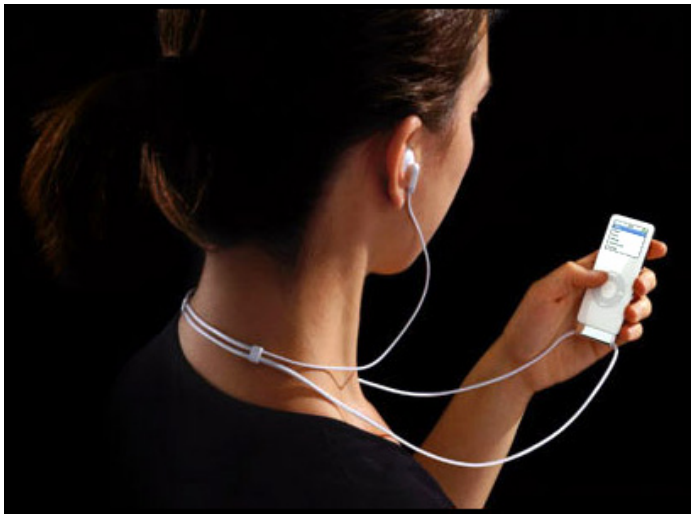
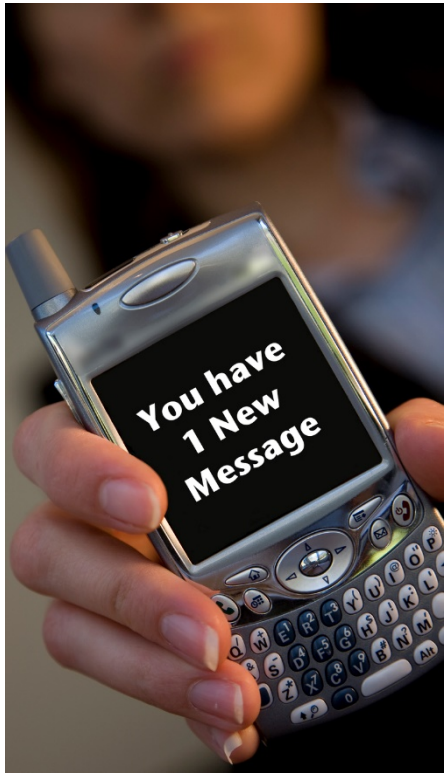
Background





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40-74

NHS HEALTH CHECK

Objectives

- To summarise the effectiveness of digital interventions at improving behavioural outcomes related to physical activity, smoking, alcohol or diet.

- To identify differences in effectiveness between modes of delivery of digital interventions.

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Inclusion criteria

English-language narrative reviews or meta-analyses of studies, published between 1 January 2009 and 25 February 2019

Population: Non-clinical, reflecting NHS Health Check patient characteristics (age 40-74, in high income countries)

Intervention: 'Digital', comprising:

- internet (e.g. websites, email)
- mobile (e.g. SMS, apps)
- social media
- wearable technology
- interventions that incorporated both digital and face-to-face components

Comparators: No restrictions

Outcomes: Behavioural or health outcomes related to the NHS Health Check

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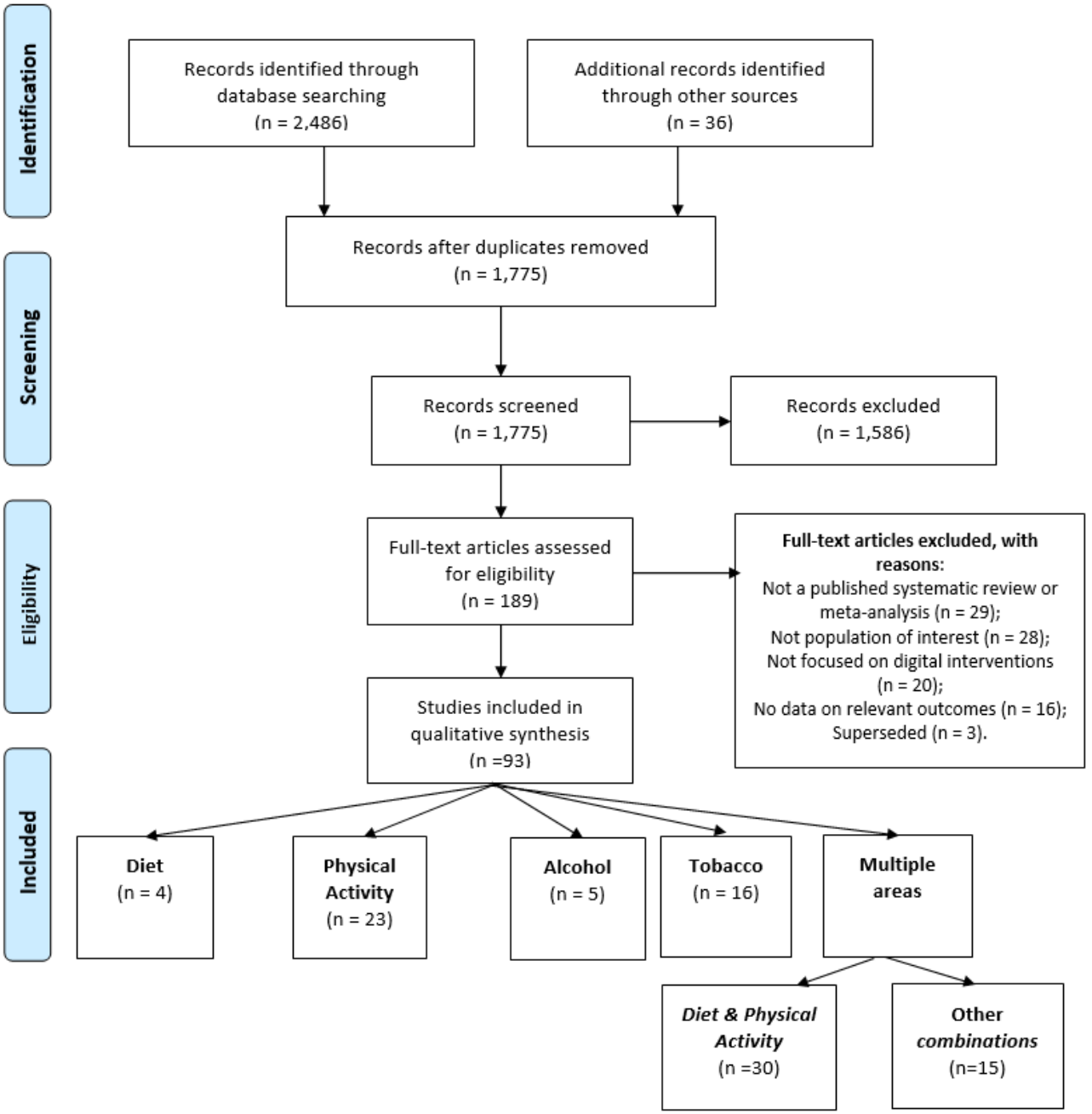
Procedure

PRISMA 2009



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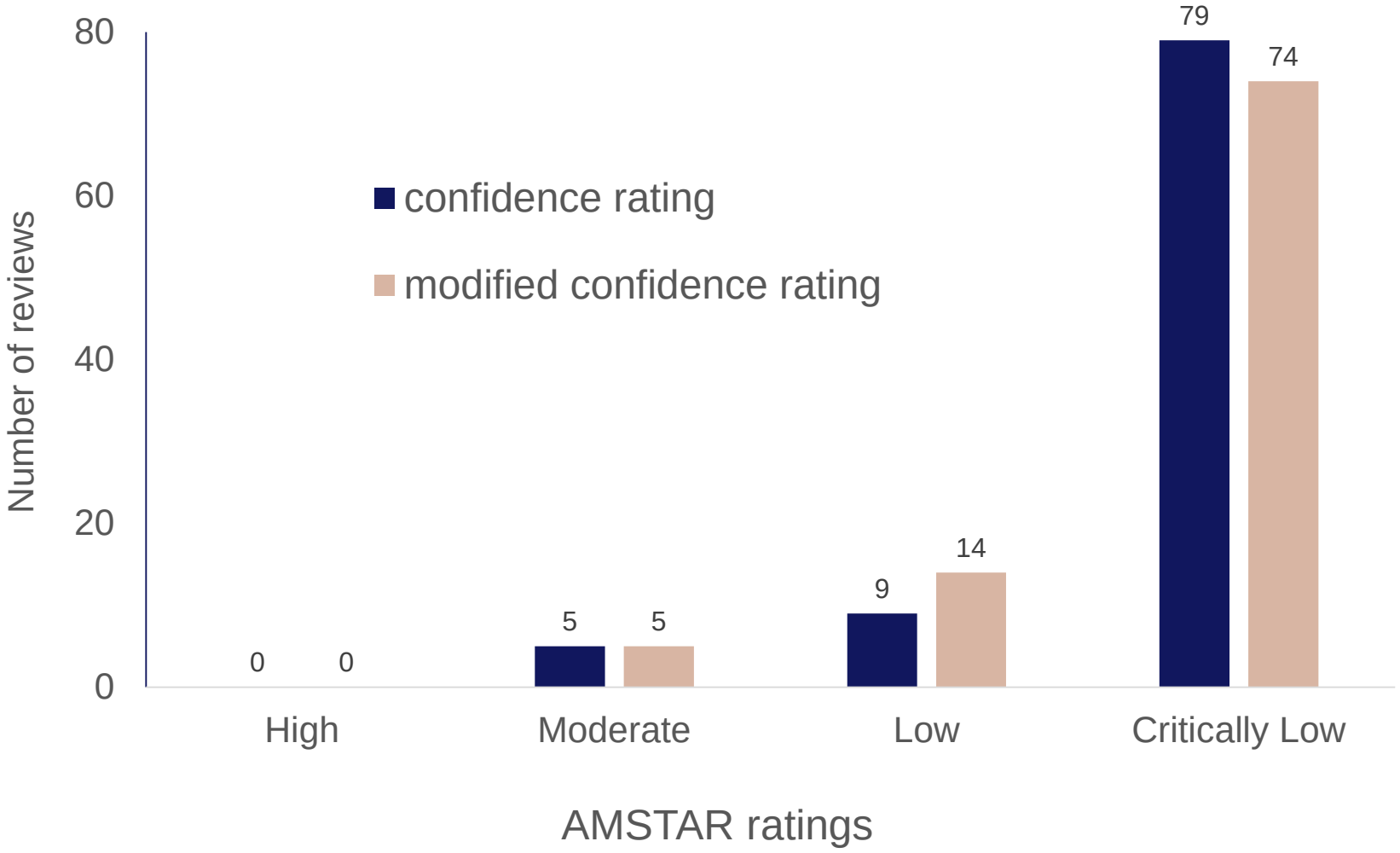
Confidence ratings of quality



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Results: Diet only (4 reviews; 54 studies)

Effectiveness compared to mixed (active and non-active controls)	• Small effect of **internet** interventions on pooled behaviours but none on fruit and vegetable consumption • Mixed effects of **social media** • Non-sig or small effects of **mobile** phone interventions • No evidence of effects of **computer-delivered** interventions • Mixed results for other modes of interventions
Compared to no / minimal controls	Little evidence available (one meta-analysis **of voice-response interventions** found no effect)
Compared to active controls	Mixed, limited data.
Sustainability	More effective over 3-6 month period.

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Results: Physical Activity only (5 reviews; 58 studies)

Effectiveness compared to mixed (active and non-active controls)	Mixed evidence for the effect of **internet**, **mobile**, **wearables**, **computer-delivered** interventions on physical activity; where there were effects they were small
Compared to no / minimal controls	Mixed results
Compared to active controls	Mixed results for mobile interventions (including apps) compared to active controls; no studies reporting on the other modes
Sustainability	Most effective in short-medium term (up to 6 months)

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Results: Diet & Physical Activity (30 reviews; 482 studies)

Effectiveness compared to mixed (active and non-active controls)	• small positive effects of **internet** interventions for weight loss and BMI • no effects of **social media** interventions • medium effects of **mobile** interventions on weight loss
Compared to no / minimal controls	More effective than minimal controls, but effect sizes were small
Compared to active controls	Not more effective than active controls, esp not face-to-face controls
Sustainability	Poor, limited data; but effectiveness declined over time.

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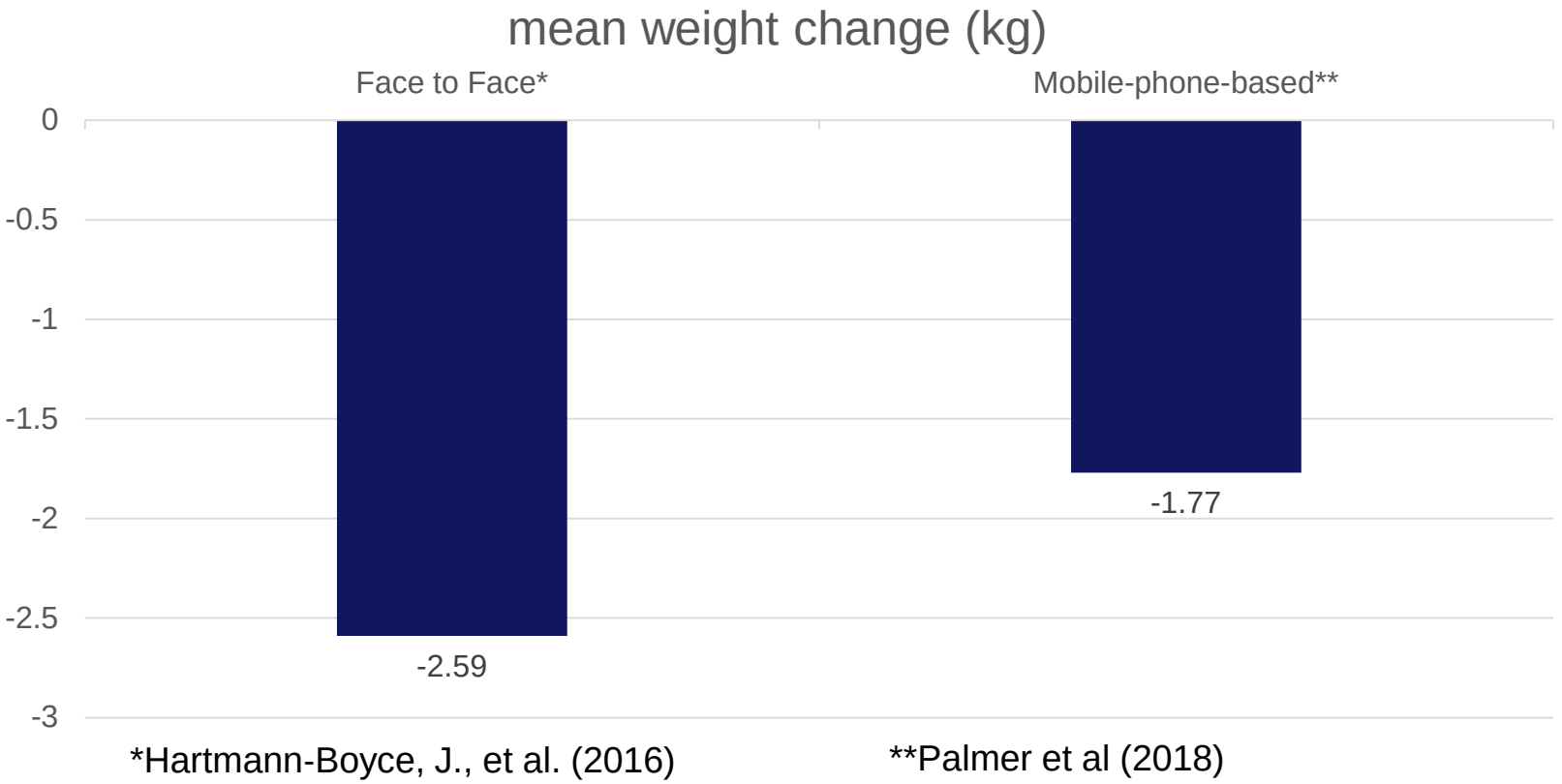
Results: weight loss through Diet interventions



*Hartmann-Boyce, J., et al. (2016)

**Palmer et al (2018)

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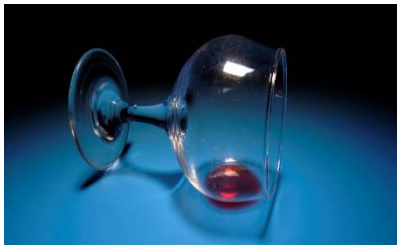
Results: Alcohol (5 reviews; 61 studies)



Effectiveness compared to mixed (active and non-active controls)	Small to medium positive effects for reducing alcohol intake, particularly for **internet**, **mobile**, **computer-delivered,** but not for **apps**
Compared to no / minimal controls	Small to medium positive effects
Compared to active controls	No evidence that digital interventions are any more effective than active controls; mixed evidence on whether active controls are more effective than digital
Sustainability	Mixed, no follow-ups beyond 12 months

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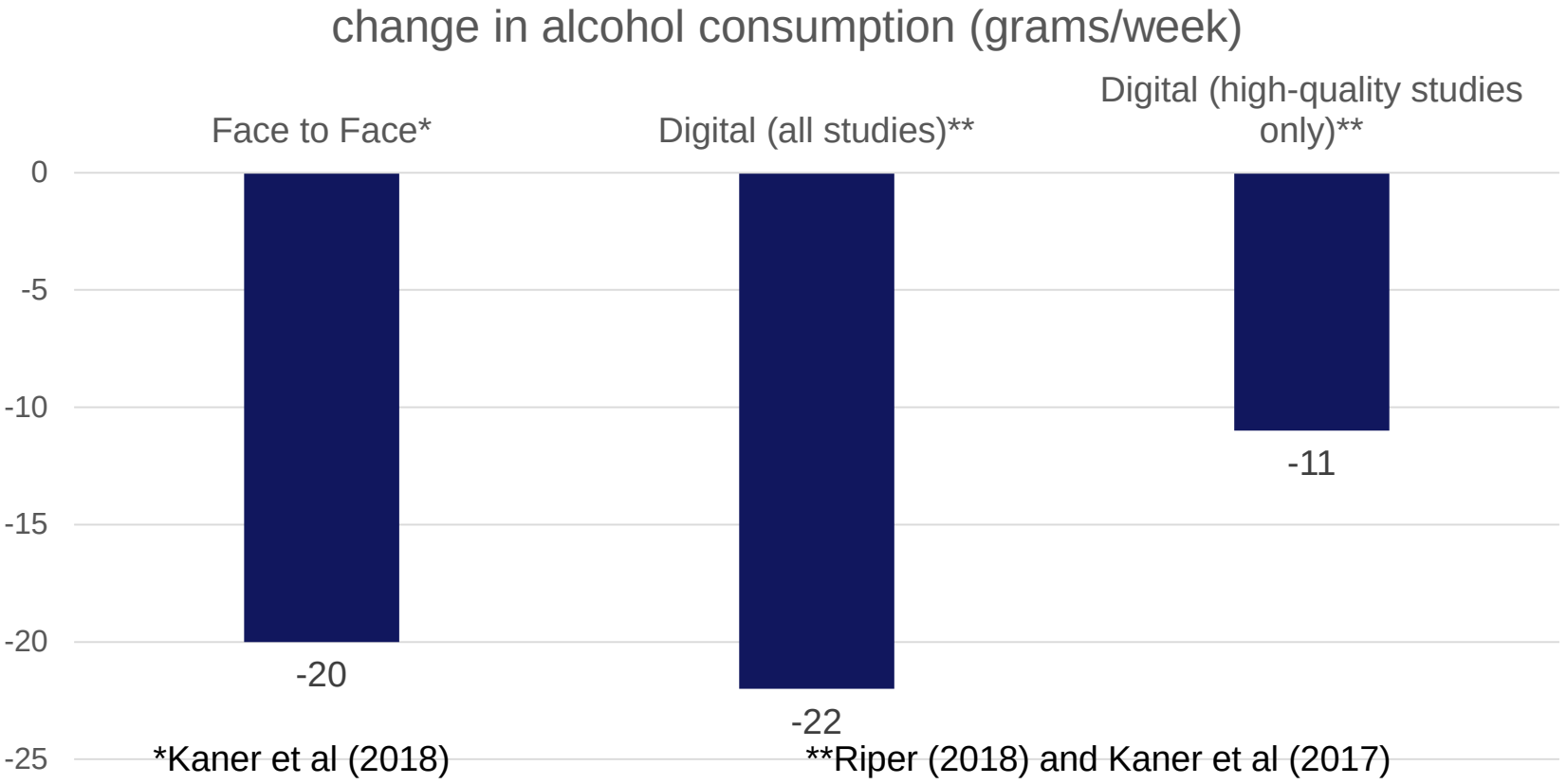
Results: Alcohol



*Kaner et al (2018)

**Riper (2018) and Kaner et al (2017)

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Results: Smoking (16 reviews; 383 studies)

Effectiveness compared to mixed (active and non-active controls)	Small positive effects (**internet**, **mobile/SMS, computer-delivered**); mixed evidence for using combined approaches
Compared to no / minimal controls	Small positive effects (**internet** and **combined** interventions), smaller effect for **mobile** interventions.
Compared to active controls	No evidence that digital (internet) interventions were any more effective than active controls
Sustainability	Up to 6 months (**internet**) and 18 months (**combined**) but mixed evidence for sustainability of mobile/computer-delivered interventions

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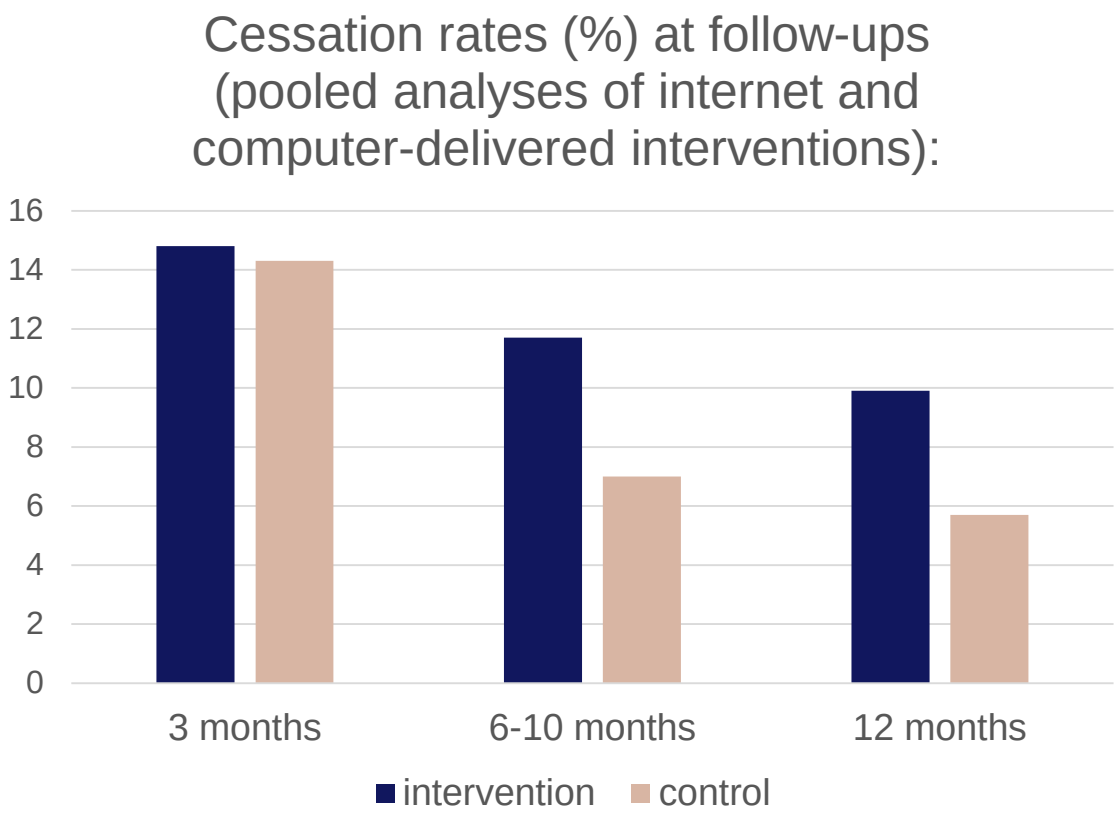
Results: Smoking



Myung (2009)

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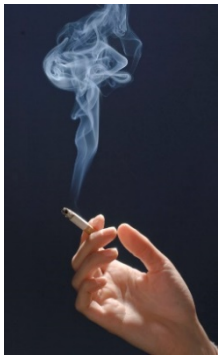

Results: Other combinations (15 reviews; 742 studies)

Effectiveness compared to mixed (active and non-active controls)	Small positive effects for both behaviour and health outcomes
Compared to no / minimal controls	Small positive effects
Compared to active controls	Small effects, but smaller than minimal controls.
Sustainability	Some effect beyond 12 months; mixed evidence on when the effect size peaks

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Conclusions (by area)

- Small, positive impact of digital interventions on:
  (most reviews used a mix of active and non-active controls)
    - smoking cessation
    - alcohol reduction
    - weight loss (through combined diet and exercise)
- No significant impact on diet or physical exercise when targeted separately (compared to mixed controls)

- Small effects compared to minimal interventions/ non-active controls
- Little or no evidence that digital is more effective than active controls including face-to-face, which may be more effective than digital

- Sustainability often limited (except for some smoking interventions), but limited evidence available

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Conclusions (by mode of intervention)

While effect sizes were small to medium:

- **internet** interventions consistently featured in the more effective interventions for each area studied.
- **Mobile** interventions were particularly effective for diet and PA combined (medium effective), also effective for alcohol and smoking (small effects)
- **Social media** not effective for Diet/PA weight loss interventions, mixed effects for diet; limited evidence for other areas
- **Computer-delivered** technologies have mixed effects for diet and for PA, but small effects for smoking and alcohol

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Limitations

- Varied interventions, high heterogeneity across reviews
- Limited follow-up
- High or unreported attrition rates
- Varied quality of existing research
- Varied use of controls

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Comparison to NICE guidelines

- Where comparable, effects of digital interventions were below the NICE guidelines for effectiveness, or at best ambiguous when different measures are used
- Often hard to compare results to NHS guidelines on effectiveness:
  - Smoking intervention outcomes often expressed as odds ratios for smoking cessation, while NICE guidelines focus on cessation rates.
  - Diet/exercise outcomes focus on kg lost, while NICE guidelines require 3% average weight loss (PHE 5%), so hard to compare without data on starting weights.
  - Programme completion rates low or absent.

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Suggestions for Further Research

Further research on digital interventions could address:

- Effectiveness when used as adjuncts and effectiveness when used as replacements for face-to-face interventions
- Longer-term follow-up, using active controls
- Comparisons between different modes of digital intervention
- Comparisons between different groups of patients by sex and socioeconomic status

Contact details

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