The effectiveness of digital health technologies for reducing substance use among young people: a systematic review & meta-analysis

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Aims

We conducted a systematic review and **two meta-analyses** to assess the effectiveness of digital interventions for reducing substance use (alcohol, smoking, and other substances) among young people aged **10 to 24 years**.

Methods

Figure 1: PRISMA flow diagram

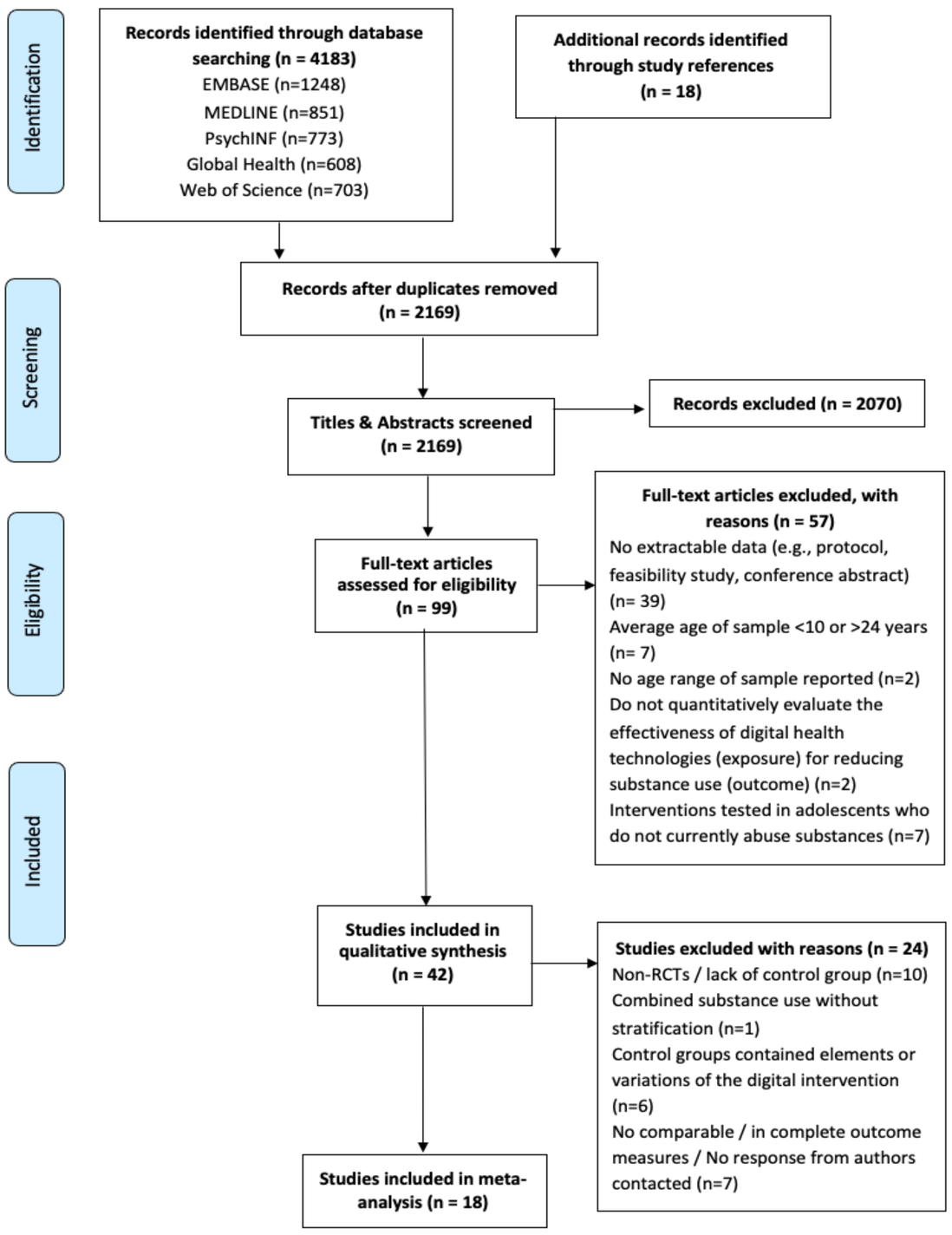

Table 1: Inclusion & Exclusion criteria

Inclusion criteria	Exclusion criteria
Published in English	The mean age of participants was <10 years or >24 years
Quantitatively evaluated the effectiveness of a digital health intervention (exposure) for substance use (outcome)	Assessed passive digital health technologies, such as those developed for the sole purpose of screening, assessment or lacked any user input
Participants who were between 10-24 years of age	<50% of the participant population was between 10-24 years old.
Participants with self-reported current problematic substance use at baseline or a formally diagnosed substance use disorder.	Participants with one-off consumption such as using a substance once a year or once in their lifetime.

Digital health interventions were defined as interventions delivered with the support of computers, mobile phones or portable devices with the primary aim of changing substance use-related behaviours. This systematic review was conducted following Cochrane methodology PRISMA guidelines and was registered with **PROSPERO in November 2020 (CRD42020218442).**

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Methods (cont.)

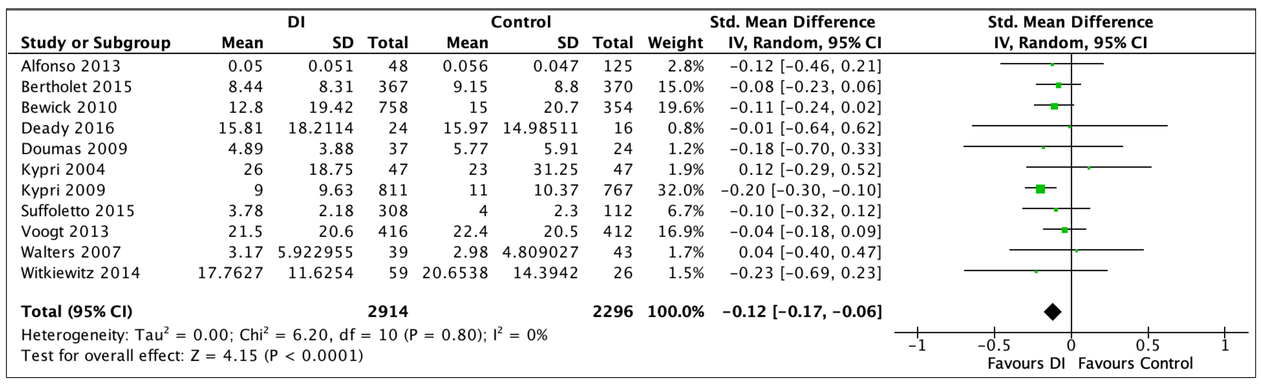
- *Alcohol use outcome measure = weekly alcohol consumption (continuous).*
- *Smoking outcome measure = 30-day continuous abstinence (dichotomous).*

Post hoc sensitivity analyses investigated whether pooled effect sizes varied by the type of control group under study: face-to-face intervention, assessment only/no intervention, and passive intervention (e.g., leaflets, helplines).

Results

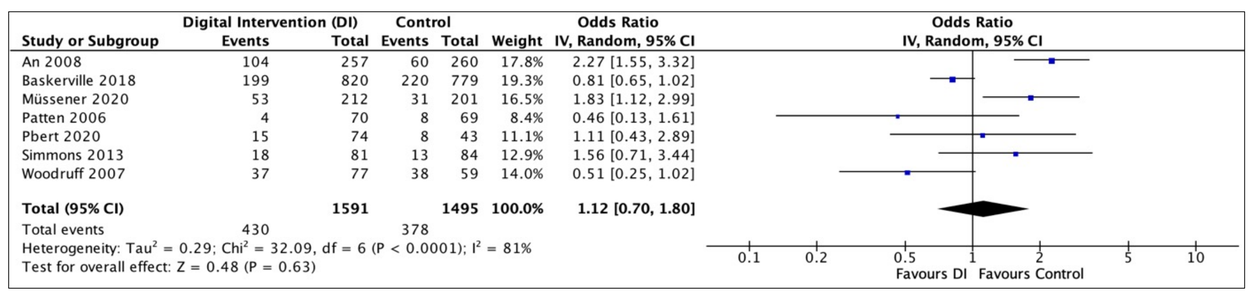
The pooled SMD (Figure 2) demonstrated a small but statistically significant effect of digital interventions on reducing weekly alcohol consumption at follow-up compared to control arms (SMD=-0.12, 95% CI=-0.17 to -0.06). There was evidence of low heterogeneity (I^2=0%; Q(10)=6.20, *P*=.80).

Figure 2: Forest plot of included alcohol studies



There was no statistically significant effect of digital interventions on 30-day smoking abstinence (OR=1.12, 95% CI=0.70 to 1.80) (Figure 3). There was evidence of considerable and statistically significant heterogeneity (I^2=81%; Q(6) =32.09, P<0.0001).

Figure 3: Forest plot of included smoking studies



Digital interventions led to more reductions in alcohol use than no intervention, and comparable reductions to passive interventions and face-to-face therapies (Table 2). For smoking, effect sizes were non-significant regardless of control arm.

Table 2: Sensitivity analysis stratified by control arms

Stratified analyses	Alcohol				Smoking			
Control group type	n	SMD (95% CI)	Cochran's Q	I^2	n	Odds Ratio (95% CI)	Cochran's Q	I^2
Face-to-face	2	-0.11 (-0.29, 0.07)	Q(1)=0.02 P=0.90	0%	2	0.94 (0.29, 3.05)	Q(1)=2.60 P=0.11	62%
Assessment only / no intervention	6	-0.13 (-0.19, -0.06)	Q(5)=4.66 P=0.46	0%	1	—	—	—
Passive (e.g., leaflets, standard government websites)	3	-0.00 (-0.28, 0.28)	Q(2)=0.79 P=0.67	0%	4	1.40 (0.76-2.59)	Q(3)=24.74 P<0.0001	88%

Conclusion

In young people, digital interventions produced a small but significant reduction in alcohol consumption compared to no intervention, but were not effective for smoking abstinence. Overall, improvements were short-lived and inconsistent.