Internet-based interventions for young people with problematic substance use: a systematic review

Robert J Tait and Helen Christensen

ABSTRACT

Objective: To conduct a systematic review of randomised trials of web-based interventions for problematic substance use by adolescents and young adults.

Data sources: An extensive search conducted in February 2009 of computer databases (MEDLINE, PsycINFO, Current Contents) and manual searches of key references.

Study selection: Randomised comparisons of fully automated web-based interventions specifically targeting adolescents and young adults (ie, typically school or tertiary students, ⩽ 25 years old) versus other interventions.

Data synthesis: 16 relevant studies were identified, and data were extracted from 13 of the 14 reporting on alcohol use by young adults. The alcohol interventions had a small effect overall ($d = -0.22$) and for specific outcomes (level of alcohol consumption, $d = -0.12$; binge or heavy drinking frequency, $d = -0.35$; alcohol-related social problems, $d = -0.57$). The interventions were not effective ($d = -0.001$) in preventing subsequent development of alcohol-related problems among people who were non-drinkers at baseline. Due to methodological differences, data from the two studies reporting on tobacco interventions among adolescents were not combined.

Conclusions: Based on findings largely from tertiary students, web interventions targeting alcohol-related problems have an effect about equivalent to brief in-person interventions, but with the advantage that they can be delivered to a far larger proportion of the target population. Web-based interventions to prevent the development of alcohol-related problems in those who do not currently drink appear to have minimal impact. There are currently insufficient data to assess the effectiveness of web-based interventions for tobacco use by adolescents.

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The prevalence of mental health disorders is greatest in those aged under 25 years, with 26% having a disorder, including 13% with a substance use disorder.[1] In addition, a substantial proportion of young adults use substances in a risky manner without reaching the formal diagnostic criteria for a disorder — more than 40% of 18–19-year-olds use alcohol in a risky or high-risk fashion every month.[2] Despite the prevalence of these problems, the use of treatment services is limited, with only 35% of those with a diagnosis in the previous 12 months having accessed mental health services for that disorder.[1]

Between 1998 and 2006–07, the proportion of Australians with access to the internet at home rose from 16% to 64%,[2] and a further 25% reported having used the internet at other locations.[2] The 15–24-years age group has the highest proportion of internet users. Across all ages, most users (58%–80%) report that they search the web for health information.[3,4] Many adolescents think that the internet is a useful source of information on topics that are hard to discuss,[5] and online health information is regarded as trustworthy and relevant by both sexes and across socioeconomic groups.[6] Therefore, the internet provides an alternative vehicle for delivering health interventions. It may also provide a means of delivering services to those who are unable or unwilling to access conventional health services.

There is extensive evidence that brief interventions are an effective means of treating some substance use problems, especially for those who do not reach the criteria for dependence.[7-10] Techniques from brief interventions, traditionally delivered face-to-face, can also be delivered electronically.[11] However, the quality of electronic interventions remains in doubt. An assessment of 294 health behaviour change websites found that only 8.1% fulfilled the basic "5 A's" (advise, assess, assist, anticipatory guidance, arrange follow-up) thought to be required to initiate change in behaviour.[12,13] None of the alcohol-related websites met all five guidelines.[13] In addition, many of the early publications on web-based interventions were descriptive or reported on feasibility or on studies that were methodologically weak.[14,15] A recent review by Bewick and colleagues on web-based interventions for alcohol consumption[16] found that only one intervention had used a randomised design that included a control of the highest standard according to their criteria.[17]

Further studies have been published since May 2006 (the cut-off date for Bewick et al's review[16]), and there have been developments in web delivery across a range of common mental health problems. In addition, interventions and content designed for adults may not be appropriate or equally effective in younger groups. Given the importance of this age group in the initiation of substance use, their high level of use of internet resources, and willingness to access online health information, we aimed to review the current literature on interventions designed to target adolescents and young adults.

METHODS

Search strategy

We searched MEDLINE, PsycINFO and Current Contents in February 2009 using the search strategy: "Substance abuse or alcohol or drug or tobacco and ([internet or web] and [intervention or RCT])". The search was limited to English-language results and yielded 391 reports. Titles and abstracts were checked, and potentially eligible papers accessed for final assessment by one of us (RJT). References in eligible articles and reviews, as well as key journal sites (eg, *Journal of Medical Internet Research*), were used to identify further potentially relevant reports.

Inclusion criteria

The inclusion criteria for the review were that studies had to use a randomised design to compare a web-based intervention with at least a no-treatment control. The eligible age groups were adolescents (typically targeted via interventions delivered through schools) or young adults (ie, specifically targeting tertiary students or other people aged 25 years or less). Outcomes had to include a measure of consumption of the target substance, not just change in attitude.

1 Interventions for problematic substance use in young adults

Study, target substance	Sample, location	Intervention(s) v control	Outcome measures	Results/end point
Bersamin et al,[21] alcohol	622 tertiary students aged 18–20 years, United States	Online 3-hour College Alc course (interactive assignments, video clips, feedback, information) v no-treatment control	Heavy drinking (⩾ 5 drinks in a session), felt drunk, negative consequences	Among drinkers, College Alc significantly reduced all alcohol outcome measures; among baseline non-drinkers, no significant differences in outcomes at 3 months
Bewick et al,[22] alcohol	506 tertiary students with mean age 21.3 (SD, 3.7) years, United Kingdom	Web-based assessment + personalised feedback, social norms v assessment only (planned contacts at baseline, 6 and 12 weeks)	Alcohol units per occasion and per week, CAGE score	Units per occasion was the only significant time by group difference at Week 12
Chiauzzi et al,[23] alcohol	265 binge-drinking tertiary students with mean age 19.9 (SD, 1.6) years, US	MyStudentBody website (information, BI, skill-building feedback, college-specific information) v education-only web content (20 min × 4 weeks)	Typical alcohol quantity, frequency and peak drinking; composite score; special occasion drinking	No significant time by group interactions for typical drinking or binge episodes or composite score at 3 months
Croom et al,[24] alcohol	3216 tertiary students with modal age 18 years, US	AlcoholEdu for College (interactive online alcohol education course) + printed material v printed material only	Alcohol use, high-risk behaviour, protective behaviour, harm experienced	No statistically significant time by group interactions for alcohol use; two of 20 high-risk practices showed significant between-group differences at 4–6 weeks (one favouring the intervention and one the control)
Doumas et al,[25] alcohol	76 mandated tertiary students (violation of college alcohol/drug policies) with mean age 19.2 (SD, 1.3) years, US	Web-based personalised normative feedback (15 min) v web-based education (45 min)	Alcohol quantity, frequency and drinking to intoxication; alcohol-related problems	Significant time by group interactions showed greater improvements for intervention group for quantity, peak and drinking to intoxication at 30 days
Doumas et al,[26] alcohol	196 employed youths aged 18–24 years, US	Personalised normative feedback (15 min) v web-based intervention + 15 min MI v control	Alcohol quantity, frequency and drinking to intoxication; binge drinking and weekend drinking	Both interventions were effective in reducing alcohol use measures of weekend, peak and drinking to intoxication at 30 days; the addition of MI did not increase the effect of the web intervention
Kypri et al,[27] alcohol	576 tertiary students aged 17–29 years (only those scoring ⩾ 8 on the AUDIT), New Zealand	Multidose web intervention + feedback (baseline, 1 and 6 months) v single-dose web intervention + feedback v control (pamphlet only)	Frequency, typical quantity, total volume, heavy drinking events, alcohol-related problems, academic problems, AUDIT score	At 12 months, single-dose group had lower total consumption and fewer academic problems than controls, and multidose group had fewer academic problems and lower AUDIT scores than controls

CAGE = Cutting down, Annoyance by criticism, Guilty feeling, and Eye-openers. BI = brief intervention. MI = motivational interview. AUDIT = Alcohol Use Disorders Identification Test.[28] ◆

From a population perspective, for prevention programs to be useful in reducing health problems, they must not only have demonstrated efficacy and effectiveness but also the potential to be scalable, as well as having available resources to allow the program to be widely replicated while maintaining treatment fidelity.[18] We therefore restricted our focus to include only interventions that used fully automated treatment programs and excluded those that required additional elements, such as in-person motivational interviews, due to the difficulty of delivering these at a population level. Interventions delivered via a stand-alone computer or CD-ROM were similarly excluded.

Data analysis

To avoid overestimating the magnitude of effects in studies with repeated measures, effect sizes (*d*) were calculated as between-group differences at follow-up divided by the pooled standard deviation from the baseline data.[19] Where baseline data were unavailable, pooled standard deviations from the outcome results were used. In studies reporting medians and ranges, we estimated means and standard deviations using the method of Hozo and colleagues.[20]

Data were combined using Meta-Analysis software, version 5.3 (Ralf Schwarzer, Berlin, Germany), employing a random effects model. Where outcomes were significantly heterogeneous, the cluster analysis software incorporated in the same program was used to identify potential outliers.

RESULTS

Young adults

The search strategy yielded 13 studies involving tertiary students and one with young employed adults (Box 1, *pages S16–S17*). All 14 studies targeted alcohol consumption, with one study also addressing other types of health behaviour (physical inactivity, low fruit and vegetable intake[17]). One study provided outcome data as change scores subdivided by sex;[32] we did not include these in the meta-analysis phase.

1 Interventions for problematic substance use in young adults (continued)

Study, target substance	Sample, location	Intervention(s) v control	Outcome measures	Results/end point
Kypri and McAnally,[17] health behaviour including alcohol	218 tertiary students aged 17–24 years (all levels of alcohol use), New Zealand	Demographics + alcohol assessment + feedback v demographics + alcohol assessment v demographics	Peak consumption, peak estimated BAC, binge drinking	No significant differences reported for any alcohol measures at 6 weeks
Kypri et al,[29] alcohol	104 tertiary students aged 17–24 years (only those scoring ⩾ 8 on the AUDIT), New Zealand	Web-based assessment + feedback v assessment + leaflet	Frequency, typical quantity, total volume, heavy drinking events, alcohol-related problems, academic problems	At 6 months, no alcohol measures were significantly different; alcohol-related and academic problems favoured intervention group
Moore et al,[30] alcohol	116 tertiary students aged 18–25 years (only binge drinkers), US	Four "newsletters" delivered by internet v newsletters delivered by post	Frequency, quantity, binge drinking, drinking to get drunk	No significant time by group interactions at 30 days
Neighbors et al,[31] alcohol	295 tertiary students (intending to consume ⩾ 2 drinks on 21st birthday), US	Assessment + web-based feedback + e-mail + online card v assessment only	Number of drinks on 21st birthday, estimated BAC	Effect size: $d = 0.33$ for reduced BAC in intervention group; not reported for number of drinks
Saitz et al,[32] alcohol	650 tertiary students aged ⩾ 18 years (scoring ⩾ 8 on the AUDIT), US (Recruitment also tested two methods)	Extended BI (6 web-screens) v BI (3 web-screens)	Process assessment, prevalence of unhealthy alcohol use, changes in alcohol use	At 1 month follow-up, no significant difference in prevalence or alcohol use measures by intervention group
Walters et al,[33] alcohol	136 tertiary students with mean age 19.6 years (⩾ 1 heavy drinking event in past 2 weeks), US	Assessment + feedback v assessment only (study included two further arms [$n = 143$] involving in-person MI; not eligible for inclusion)	Drinks per week, peak BAC, alcohol-related problems, composite alcohol variable	At 6 months, no significant differences between groups
Walters et al,[34] alcohol	106 first-year tertiary students (⩾ 1 heavy drinking event in past 2 weeks), US	Assessment + feedback v assessment only	Drinks per week, peak BAC, alcohol-related problems	At 16 weeks, all alcohol consumption measures declined but no significant between-group interactions

BAC = blood alcohol content. AUDIT = Alcohol Use Disorders Identification Test.[28] BI = brief intervention. MI = motivational interview. ◆

The overall effect size for the outcomes (summarised in Box 2, *pages S18–S19*) was $d = -0.22$ (SE, 0.06; 95% CI, –0.34 to –0.10), but with significant heterogeneity ($Q = 249.03$, $df = 55$; $P < 0.00001$). In light of the range of different types of outcome measures used and the different levels of baseline alcohol exposure, potential sources of heterogeneity were sought by separately analysing the results for three key outcome measures (average quantity of alcohol, frequency of heavy or binge-drinking events, and alcohol-related social problems) and for those studies that separately reported outcomes for people who were non-drinkers at baseline.

Ten studies reported on the quantity of alcohol consumed (Box 2; variables 8, 12, 18, 23, 28, 36, 42, 48, 50, 53). Overall, those who received the interventions had a lower level of alcohol consumption at follow-up than those in the control groups, with a mean difference of $d = -0.12$ (SE, 0.05; 95% CI, –0.22 to –0.02), with the effect being homogeneous ($Q = 7.36$, $df = 9$; $P = 0.600$).

Seven studies reported on the frequency of heavy or binge drinking (Box 2; variables 1, 10, 20, 24, 29, 37, 44; variable 43 was an early outcome in the same study as 44 and was not included in our analysis). Young adults receiving the interventions had a lower frequency of heavy or binge drinking than controls ($d = -0.35$; SE, 0.15; 95% CI, –0.64 to –0.06), although this measure still showed significant heterogeneity ($Q = 29.74$, $df = 6$; $P = 0.00004$). An inspection of a cluster plot showed the effects for the studies by Bersamin et al[21] ($d = -0.99$) and Kypri et al[27] ($d = -0.80$) to be outliers.

Six studies reported on alcohol-related social consequences, as assessed by measures such as the Rutgers Alcohol Problem Index[36] or Alcohol Problems Scale[37] (Box 2; variables 3, 21, 30, 38, 52, 55), with the overall effect size being $d = -0.57$ (SE, 0.21; 95% CI, –0.98 to –0.15). These data showed significant heterogeneity ($Q = 24.20$, $df = 5$; $P = 0.0002$). A cluster analysis identified three clusters, with the smallest (variable 21) and largest (variable 38) effect sizes separate from the remaining variables.

Two studies reported outcomes separately for those who were non-drinkers at baseline.[21,24] The overall effect for this subpopulation was $d = -0.001$ (SE, 0.06; 95% CI, –0.12 to 0.12), an effect not significantly different from zero ($Z = -0.016$; $P = 0.499$). Our analysis did not include 751 people in Croom et al's study who were non-drinkers at baseline and follow-up, as disaggregated data were not available for these people. The overall effect size for all participants in the study, regardless of baseline alcohol status, was $d = -0.02$.[24]

Adolescents

Our systematic search yielded two eligible studies targeting adolescents (Box 3). Both studies targeted adolescent smoking: one randomly assigned schools to intervention or control groups,[38] and the second used

2 Outcome measures and effect sizes of interventions for problematic substance use in young adults

Study	Outcome samples n_e, n_c	Variable	Outcome measure	Mean$_e$, mean$_c$ / baseline SD$_e$, SD$_c$ (*or outcome SD$_e$, SD$_c$*)	Effect size *d*
Bersamin et al[21]	60, 79 (baseline drinkers in past 30 days)	1	Heavy drinking (≥ 5 drinks)/month	1.20, 2.60 / 1.39, 1.42	−0.99
		2	Felt drunk	1.43, 2.47 / 2.24, 2.30	−0.46
		3	Negative consequences[35]	5.72, 10.81 / 12.38, 9.37	−0.47
	118, 113 (baseline non-drinkers)	4	Heavy drinking	0.13, 0.11 / (*1.73, 1.58*)	0.01
		5	Felt drunk	0.13, 0.25 / (*2.28, 2.23*)	−0.05
		6	Negative consequences	8.28, 4.87/ (*32.47, 24.49*)	0.12
Bewick et al[22]	179, 138	7	Units of alcohol/episode	8.46, 9.80 / 8.17, 7.59	−0.17
		8	Units of alcohol/week	12.02, 14.85 / 13.67, 15.34	−0.20
		9	CAGE score	1.57, 1.55 / 1.14, 1.26	0.02
Chiauzzi et al[23]	105, 110	10	Binge-drinking days/week	1.2, 1.5 / 1.05, 1.61	−0.22
		11	Peak (maximum number of drinks)	1.4, 1.3 / 0.05, 0.54	0.26
		12	Average drinks/week	12.4, 13.7 / 16.21, 15.52	−0.08
		13	Drinking days/week	2.4, 2.6/ 1.57, 1.61	−0.13
		14	Average drinks/drinking day	1.2, 1.1 / 0.05, 0.54	0.26
		15	Special events quantity (past 3 months)	53.5, 67.1 / 84.17, 84.55	−0.16
Croom et al[24]	374, 375 (baseline drinkers)	16	Mean drinks past 2 weeks	16.8, 15.8 / 13.4, 11.6	0.08
	180, 211 (baseline non-drinkers)*	17	Mean drinks past 2 weeks	9.5, 10.1 / (*14.3, 10.3*)	−0.05
Doumas et al[25]	37, 24	18	Average drinks/week	4.89, 5.77 / 6.59, 5.30	−0.14
		19	Peak (maximum number of drinks)	6.95, 5.88 / 4.53, 2.77	0.27
		20	Drink to intoxication (days/month)	0.68, 0.71 / 0.37, 0.41	−0.08
		21	Alcohol-related problems (RAPI)	1.38, 1.54 / 3.62, 2.97	−0.05
		22	Estimated average peer-drinking	12.63, 11.31 / 0.20, 6.26	0.34
Doumas et al[26]	33, 47†	23	Average drinks (weekend drinking)	1.49, 1.31 / 3.04, 1.69	0.08
		24	Drink to intoxication (days/month)	0.85, 1.02 / 2.06, 1.70	−0.09
		25	Peak (maximum number of drinks)	3.55, 3.98 / 5.36, 4.80	−0.09
Kypri et al[27]	121, 126‡ (12 months)	26	Drinking days past 2 weeks	4, 4 / (*1.7, 2.3*)	0.00
		27	Drinks per drinking occasion	7, 8.5 / (*3.5, 3.8*)	−0.41
		28	Total drinks past 2 weeks	21, 30 / (*22.6, 29.2*)	−0.34
		29	Heavy drinking (female > 80 g; male > 120 g) past 2 weeks	0, 1 / (*1.2, 1.3*)	−0.80
		30	APS (social)	2, 3 / (*1.3, 1.8*)	−0.63
		31	Alcohol problems (academic)	1, 1 / (*1.5, 1.7*)	0.00
		32	AUDIT score	12, 14 / (*4.3, 4.7*)	−0.44

e = experimental group. c = control group. CAGE = Cutting down, Annoyance by criticism, Guilty feeling, and Eye-openers. RAPI = Rutgers Alcohol Problem Index.[36] APS = Alcohol Problems Scale.[37] AUDIT = Alcohol Use Disorders Identification Test.[28] * A further 751 people who were non-drinkers at baseline and follow-up were excluded from analysis. † A third group (n = 41) received in-person motivational interviews and was excluded. ‡ Comparison of multidose web intervention versus control; a third group (n = 113) received a single-dose web intervention. ◆

individual randomisation.[39] Due to these methodological differences and differences in the target populations (all students v only smokers), these data were not combined for meta-analysis.

DISCUSSION

Our search strategy revealed two categories of web-based intervention for problematic substance use in young people. Web-based interventions targeting alcohol use by young adults, predominantly tertiary students, appear to be effective for alcohol problems in current drinkers, but there is insufficient evidence to support their use in preventing the development of alcohol-related problems among those who do not drink alcohol. The second category was web-based interventions addressing smoking cessation in adolescents and school children; however, there are currently insufficient data to assess the utility of such interventions in this group.

Brief in-person interventions for non-treatment-seeking individuals are an effective means of reducing alcohol consumption, with effect sizes in the range of 0.14 to 0.67 (with positive values showing better outcomes).[8] Brief interventions have also been found to be effective among adolescents, with an overall effect size of 0.275.[40] Thus, the effects reported here for web-

2 Outcome measures and effect sizes of interventions for problematic substance use in young adults (continued)

Study	Outcome samples n_e, n_c	Variable	Outcome measure	$Mean_e$, $mean_c$ / baseline SD_e, SD_c (*or outcome* SD_e, SD_c)	Effect size *d*
Kypri and McAnally[17]	65, 61§	33	Peak estimated BAC	0.12, 0.13 / (*0.12, 0.08*)	−0.10
Kypri et al[29]	47, 47	34	Drinking days past 2 weeks	3, 4 / (*2, 3.5*)	−0.35
		35	Drinks per drinking occasion	8, 8 / (*5, 6.25*)	0.00
		36	Total drinks past 2 weeks	26, 23 / (*18.75, 31.25*)	0.12
		37	Heavy drinking (female > 80 g; male > 120 g) past 2 weeks	1, 1 / (*1, 3*)	0.00
		38	APS (social)	2, 3 / (*0.5, 0.75*)	−1.57
		39	Alcohol problems (academic)	2, 4 / (*3.0, 4.25*)	−0.54
Moore et al[30]	53, 47	40	Frequency/year	3.36, 3.60 / 2.04, 1.99	−0.12
		41	Frequency/month	3.68, 5.02 / 5.82, 5.83	−0.24
		42	Quantity/month	2.53, 2.51 / 2.55, 2.61	0.01
		43	Binge (female ⩾ 4; male ⩾ 6)/2 weeks	0.83, 1.34 / 1.60, 1.58	−0.32
		44	Binge (female ⩾ 4; male ⩾ 6)/month	1.64, 2.21 / 3.69, 3.76	−0.15
		45	"Get drunk" quantity	1.38, 1.98 / 2.84, 2.81	−0.21
		46	"Get drunk" frequency	2.94, 2.96 / 4.51, 4.52	0.00
		47	Peak quantity/month	4.25, 4.57 / 5.31, 5.28	−0.06
Neighbors et al[31]	138, 144	48	Quantity on 21st birthday	6.40, 7.00 / 5.29, 5.12	−0.12
		49	Estimated BAC	0.099, 0.129 / 0.107, 0.107	−0.28
Walters et al[33]	54, 61	50	Drinks/week	12.07, 12.92 / 11.59, 12.89	−0.07
		51	Estimated peak BAC	0.116, 0.135 / 0.088, 0.102	−0.20
		52	Alcohol-related problems (RAPI)	3.72, 5.77 / 6.01, 6.35	−0.33
Walters et al[34]	39, 43 (Week 16)	53	Drinks/week	3.17, 2.98 / 1.52, 1.35	0.13
		54	Peak BAC	0.052, 0.059 / 0.02, 0.01	−0.49
		55	Alcohol-related problems (RAPI)	1.51, 1.72 / 0.49, 0.61	−0.38
		56	Perceived drinking norms	10.3, 18.7 / 2.65, 3.42	−2.73

e = experimental group. c = control group. APS = Alcohol Problems Scale.[37] BAC = blood alcohol content. RAPI = Rutgers Alcohol Problem Index.[36] § A third group received additional in-person feedback and is excluded. ◆

based interventions are consistent with the magnitude of effects obtained from in-person interventions. There is preliminary evidence that computer-based interventions are cost-effective (eg, compared with cognitive behaviour therapy for depression).[41] There is also evidence to support the scalability of web-based interventions,[42] a potential benefit compared with in-person interventions. Nevertheless, it should be noted that some of the interventions reviewed here[21,24] are more time-consuming than typical brief in-person interventions, which are designed to be delivered in less than four sessions.[8] Cost–benefit analyses comparing web-based with in-person interventions are required.

An important caveat must be noted. In general, the web-based interventions in this review reported short-term outcomes, usually 3 months or less, and these may not represent a meaningful change in behaviour. Only four studies reported outcomes for 4 months or longer.[27,29,33,34] The outcomes for these studies (Box 2) show effect sizes ranging from 0.12 to −2.73, suggesting that persistent change in behaviour is possible with web-based interventions. Nevertheless, confirmation of long-term impacts is needed.

Considerable heterogeneity was noted in many of the measures and across the studies. Inspection of the interventions and measures did not reveal any clear explanation for this. For example, the measure of heavy drinking in Kypri et al's 2008 study[27] that was identified as an outlier in our subanalysis was the same measure used in their 2004 study,[29] with both studies using similar interventions and similar target populations (tertiary students recruited in a health care setting). Additionally, although the target populations across all but one of the alcohol interventions[26] were tertiary students, the study samples included subgroups of this population ranging from non-drinkers at baseline[21] to students who had been referred for counselling after breaches of university alcohol or drug policies.[25] Furthermore, both Bersamin et al[21] and Croom et al[24] noted that the web interventions were ineffective with young people who were non-drinkers at baseline — findings confirmed by the combined data reported here. Although all the studies used randomised designs, there was considerable diversity in the intensity of the interventions delivered, ranging from an online course[24] to a 15-minute assessment and feedback session.[25] Finally, not all studies provided a control group with an intervention of similar intensity as the experimental intervention. Therefore, it is unsurprising that there were overall differences in the effectiveness of interventions or the effect sizes.

A previous review of brief interventions to reduce smoking in adolescents noted an effect size of 0.037.[40] This included inter-

3 Interventions for problematic substance use in adolescents

Study, target substance	Sample, location	Intervention v control	Outcome measures	Results/endpoint
Buller et al,[38] cigarette smoking	2077 children in grades 7–9 (25 schools), Australia 1234 children in grades 6–7 (21 schools), United States	Consider This website (six modules, 45–60 min per module) v assessment only	Number of days of past 30 smoked a whole cigarette or smoked any cigarettes, even a single puff	Australia: significant difference for whole cigarettes but not for single puff US: no significant difference for either whole cigarette or single puff Duration of follow-up was unclear: several months or less, with variability between schools in both countries
Patten et al,[39] cigarette smoking	139 adolescents aged 11–18 years, US	Stomp Out Smokes (SOS) website v clinic-based brief office intervention (BOI)	30-day point prevalence of abstinence from smoking	SOS, 6% v BOI, 13% (non-significant difference) at 36 weeks ◆

ventions delivered at the population level[43] and for existing smokers.[44] Our review also identified one population-level approach and one targeting existing smokers. The population-level intervention recruited participants in both Australia and the United States. The Australian arm of the study reported a lower prevalence of smoking in the intervention group compared with the control group and a lower level of initiation of smoking by non-smokers.[38] However, these findings were not replicated in the US sample, and the authors concluded that web-based interventions are likely to have little practical impact on the level of smoking by adolescents.[38]

Another review[45] estimated that the overall quit rate for stand-alone computer-based smoking-cessation interventions for adolescents was 13%.[46-48] Patten et al[39] reported that none of the adolescents in their study attained complete abstinence, but the 30-day abstinence level at 36 weeks was 13% for brief office-based intervention, compared with 6% for the web-based intervention. A potential reason for the poor performance of the web-based approach is that participants accessed the website from home (on a mean of 6.8 days over 24 weeks), with 86% visiting the site at least once, but less than a third visiting the site weekly after the third week. In contrast, delivery in a school setting may encourage greater compliance (eg, 77% completing all sessions,[46] 90% completing two of three sessions[47]). Therefore, motivation of adolescents and compliance may be key factors in the effectiveness of this form of intervention.

Our review has some potential limitations. The techniques and process of meta-analysis have received detailed and at times trenchant critiques,[49,50] with key concerns being the quality of the studies included ("garbage in, garbage out"), combining different measures or interventions ("apples and oranges"), including multiple measures from studies ("inflated *N*s") and publication bias ("file drawer problem").[51,52] Nevertheless, the systematic assembly of data fulfilling clear criteria has come to the forefront in summarising scientific evidence.

Further, we did not identify any studies on the effectiveness of web-based interventions with adolescent drinkers. Given that 70% of 17-year-old students report having used alcohol in the past month and more than 40% report using it in a risky fashion,[53] this would appear to be an important target for future research, even though it is difficult to obtain the necessary ethics approval to conduct research in this age group, especially when investigating interventions to convert behaviour.

Adolescence and young adulthood are the key period for initiation of substance use and the development of substance use disorders. Although the lifetime prevalence of licit drug use has remained stable, the age of initiation has fallen in more recent birth cohorts,[54] with a concomitant increase in the risk of developing disorders in later life.[55] Thus, there is an imperative to design and deliver interventions that address substance use by adolescents and young adults. Web-based interventions have the potential to provide interventions at a population level, with initial findings supporting their effectiveness in reducing problematic alcohol use in tertiary students and young adults.

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COMPETING INTERESTS

None identified.

AUTHOR DETAILS

Robert J Tait, BSc(Hons), PhD, Research Fellow
Helen Christensen, PhD, FASSA, Director
Centre for Mental Health Research, Australian National University, Canberra, ACT.
Correspondence: Robert.tait@anu.edu.au

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