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CADTH RAPID RESPONSE REPORT:
SUMMARY WITH CRITICAL APPRAISAL

Internet-based Brief Interventions for Substance Misuse in Youth and Young Adults: A Review of the Clinical Effectiveness, Cost-effectiveness, and Guidelines

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

Context and Policy Issues

According to the Canadian Community Health Survey – Mental Health 2012, 21.6% of Canadians have had substance use disorders during their lifetime.[1] These include alcohol abuse or dependence (18.1%), cannabis abuse or dependence (6.8%) and other drug abuse and dependence (4.0%).[1] The prevalence of substance use disorder in the past 12-months among Canadians aged 15 to 64 was 3.8%, of which youth and young adults aged 15 to 24 years had highest rate (9.1%) compared to older age groups (3.4% for adults aged 25 to 44 years, and 1.9% for adults aged 45 to 64 years).[2] Substance use disorders not only affect the individual but also cause significant burden to families, communities, and healthcare costs.[3,4] Many individuals who struggle with alcohol and substance misuse problems do not access specialized care due to factors including fear of stigma and embarrassment, lack of transportation, lack of availability of health services, and time conflicts.[5,6]

Computer and internet-based interventions (i.e., treatment programs based on digital technologies for behavioral change) that include a screening component have been developed to overcome many of the barriers to accessing care and can provide large scale individualized intervention with a reduced cost.[7,8] The structure and format of internet-based interventions vary greatly; generally, the internet-based interventions can be provided as unguided stand-alone internet interventions or internet interventions as add-on to treatment as usual with the guidance of therapists.[9] One method of providing internet-based interventions is to have participants log on to a pre-designed website and work through the intervention materials on it, which guide participants through the program and provide feedback.

There is growing evidence for the efficacy of computer and internet-based interventions for reducing alcohol and substance misuse among adolescents and adults.[9-14] However, the comparisons in those studies were mostly non-active comparators (e.g., no intervention, assessment only, or waitlist). The effectiveness of internet-based interventions for substance misuse compared with an active comparator (i.e., face-to-face intervention), particularly in youth and young adults, remains unclear.

The aim of this report is to review the clinical effectiveness, cost-effectiveness compared with face-to face interventions for substance misuse in youth and young adults. The current report also aims to review evidence-based guidelines on the use of internet-based brief interventions screening and reducing substance misuse in youth and young adults.

Research Questions

1. What is the clinical effectiveness of Internet-based screening, brief intervention for substance misuse in youth and young adults?
2. What is the cost-effectiveness of Internet-based screening, brief intervention for substance misuse in youth and young adults?
3. What are guidelines informing the use of Internet-based screening, brief intervention for substance misuse in youth and young adults?

Key Findings

No studies on the clinical effectiveness and cost-effectiveness could be identified that had a direct comparison between internet-based brief interventions and face-to-face interventions for adolescent and young adults with substance misuse disorders. One RCT comparing computer or therapist brief intervention with control for adolescents who were misusing cannabis provided insufficient evidence to draw any conclusion. No evidence-based guidelines were identified.

Methods

Literature Search Methods

A limited literature search was conducted on key resources including Ovid Medline, PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit retrieval by publication type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2013 and May 11, 2018.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Youth and young adults (i.e., ages 12 to 29 years) with substance misuse disorders
Intervention	Internet-based screening and/or brief intervention
Comparator	Face-to-face interventions
Outcomes	Clinical benefit (e.g., lower alcohol/drug consumption and blood alcohol/drug levels, reduced heavy episodic consumption, consumption frequency, volume, reduced risk behaviors, mitigation of school performance and other related problems); harms (e.g., insufficiency of non-face-to-face intervention) and/or safety; cost-effectiveness; guidelines
Study Designs	Health technology assessments (HTAs), systematic reviews (SRs), meta-analyses (MAs), randomized controlled trials (RCTs), non-randomized studies (only if few HTA/SR/MA found), economic evaluations, and evidence-based guidelines

Exclusion Criteria

Studies were excluded if they did not satisfy the selection criteria in Table 1 and if they were published prior to 2013.

Critical Appraisal of Individual Studies

The SIGN checklist was used to assess the quality of the included RCT.[15] Summary scores were not calculated for the included study; rather, a review of the strengths and limitations were described narratively.

Summary of Evidence

Quantity of Research Available

A total of 529 citations were identified in the literature search. Following screening of titles and abstracts, 473 citations were excluded and 56 potentially relevant reports from the electronic search were retrieved for full-text review. No potentially relevant publications were retrieved from the grey literature search. Of these potentially relevant articles, 55 publications were excluded for various reasons, while one publication of an RCT met the inclusion criteria and was included in this report. Appendix 1 presents the PRISMA flowchart of the study selection.

Summary of Study Characteristics

The characteristics of the identified RCT[16] are summarized below and are presented in Appendix 2.

Study Design

The study[16] was an open-label, three arm, parallel, 1:1:1 ratio, RCT, which recruited participants presenting to seven community health clinics in urban areas.

Country of Origin

The RCT[16] was conducted in the United States and was published in 2013.

Population

Participants were adolescents (mean age 16.3 years) reporting cannabis use in the past year. Most of the participants identified their ethnicity as African American (60.7%) or as Hispanic (11.0%), followed by others (28.3%).[16]

Interventions and Comparators

This study was designed to compare computer brief intervention (CBI) or therapist brief intervention (TBI) with the control. Comparison between CBI and TBI was considered exploratory only.[16]

The Brief Interventions incorporated motivational interview including contents such as:

(1) goals/values; (2) feedback for cannabis, alcohol and other drug use, including consequences and driving under the influence of cannabis; (3) decisional balance exercise about cannabis; (4) tricky situations (e.g., role plays) including refusal skills for cannabis and other drug use, safe ways to get home/prevent drinking high/drunk, dealing with peer pressure for delinquency (e.g., stealing a car/joy riding), coping with negative affect such as boredom, anger or sadness, and consequences (i.e., problem identification, getting help); and (5) control brochure. (p647)[16]

CBI was a stand-alone interactive animated program set up on a tablet with a touch screen and audio feedback. TBI was conducted by research therapists trained in motivational interviewing. The control group received a brochure only, containing warning sings, resources, and cannabis information websites.

Outcomes

The outcomes included frequency of cannabis use, number of cannabis related consequences, frequency of other drug use (other drugs included but were not limited to opioids for non-medical use, hallucinogens, stimulants, and sedatives), frequency of alcohol use, and frequency of driving under the influence of cannabis.

The cannabis related consequences included interpersonal problems (e.g., had a fight, argument or bad feeling with a friend), intrapersonal problems (e.g., missed out other things because of spending too much money on cannabis), and substance use disorder symptoms (e.g., could not stop smoking).

Follow-up Period

The outcomes were assessed after 3, 6, and 12 months of follow-up.

Analysis

Generalized estimating equations (GEE) were used to compare CBI versus control or TBI versus control on outcomes at 3, 6, and 12 months using intent to treat (ITT) approach. The study was powered (80% power, n = 95 per group) to detect a 15% difference between CBI and control or TBI and control. The study was not designed to have sufficient power to detect a difference between CBI and TBI. With the current sample size per group, comparison between CBI and TBI was underpowered and was considered exploratory only.

Summary of Critical Appraisal

The summary of the quality assessment for the RCT was described below and is presented in Appendix 3.

The study[16] was of moderate quality as most criteria were fulfilled, including an explicit question, a detailed description of methodology on randomization, ITT analysis, and multicenter trial. The study did not report on method of concealment and blinding. The nature of the study prohibited the blinding of staff to the intervention assignment during treatment. However, staff was blinded during the follow-up periods, and thus was less likely to be biased toward one intervention or another (either explicitly or implicitly) during the assessment of outcomes. No dropouts occurred during brief interventions. The percentages of dropouts at 3, 6, and 12 months follow-up were 14.9%, 15.2% and 16.2%, respectively.

Summary of Findings

The main findings and conclusions of the included RCT are presented in Appendix 4.

Question 1: What is the clinical effectiveness of Internet-based screening, brief intervention for substance misuse in youth and young adults?

One RCT[16] was identified that examined the efficacy of brief interventions (CBI or TBI) among cannabis-using adolescents presenting to primary care clinics.

Frequency of cannabis use

Compared with baseline, cannabis use at 3, 6, and 12 months follow-up significantly decreased in all conditions, i.e., CBI, TBI, and control. Results from GEE analyses

comparing CBI with control or TBI with control showed no significant effects at any follow-up.

Number of cannabis consequences

Compared with baseline, the number of cannabis consequences significantly decreased in the CBI at 3 and 6 months, significantly decreased in the TBI at 6 and 12 months, and showed no significant decrease in the control at any time point. Results from GEE analyses comparing CBI with control showed significant effect at 3 months, but not at 6 or 12 months. No significant effects were noted for TBI at any time point.

Frequency of other drug use

Compared with baseline, frequency of other drug use significantly decreased at 3 and 6 months for both CBI and TBI, while the control showed no significant difference. Results from GEE analyses comparing CBI with control showed significant effect at 3 and 6 months, but not at 12 months. No significant effects were noted for TBI at any time point.

Frequency of alcohol use

All conditions showed no significant change in frequency of alcohol use compared with baseline. Results from GEE analyses comparing CBI with control or TBI with control showed no significant effects at any time point.

Frequency of driving under the influence of cannabis

CBI and control conditions showed no significant change in frequency of driving under the influence of cannabis compared with baseline. TBI showed a significant decrease in frequency of driving under the influence of cannabis at 3 months, but not at 6 or 12 months. Results from GEE analyses comparing CBI with control showed no significant effects at any time point. There was significant effect for TBI at 3 months compared with control, but not at 6 or 12 months.

Comparison between CBI and TBI

No significant effects were observed at any time point of follow-up.

Question 2: What is the cost-effectiveness of Internet-based screening, brief intervention for substance misuse in youth and young adults?

No relevant literature was identified.

Question 3: What are guidelines informing the use of Internet-based screening, brief intervention for substance misuse in youth and young adults?

No relevant literature was identified.

Limitations

For clinical effectiveness, only one RCT that partially met the inclusion criteria was included. This study was designed to compare CBI or TBI with control, but not between CBI and TBI. The comparison between CBI and TBI was considered as exploratory only. The population was restricted to cannabis-using adolescents only, although the outcomes of the included study included cannabis, alcohol and other drug use. There is significant evidence in the literature on the efficacy of internet-based brief interventions for alcohol use and illicit

substance abuse in adolescents and young adults, however, those studies did not meet the inclusion criteria, as the internet-based brief interventions were not compared with face-to-face interventions. This review found no relevant literature for cost evaluations and guidelines on the use of Internet-based screening, brief intervention for substance misuse in youth and young adults.

Conclusions and Implications for Decision or Policy Making

No evidence could be identified for a direct comparison between internet-based brief intervention and face-to-face interventions for adolescent and young adult substance abuse. Additionally, no relevant economic studies or evidence-based guidelines were identified. Exploratory analysis of the included study (that was not powered to detect a difference between the interventions) showed no significant difference between CBI and TBI among cannabis-using adolescents in urban primary care clinics. When compared with control, both CBI and TBI showed no significant effects with respect to cannabis or alcohol use. CBI appeared to decrease cannabis related problems and other drug use, while TBI decreased the frequency of driving under the influence of cannabis in the short term of follow-up. These findings provided insufficient evidence to draw any conclusion regarding the effect of computer brief intervention for cannabis-using adolescents.

There exists extensive literature on the efficacy of internet-based interventions for alcohol and other substance misuse in youth and young adults.[9,11-14,17-32] The majority of those studies used non-active comparators and the evidence suggests that these interventions produced small effects for a short-term period only. Future research that focuses on the comparative effectiveness of internet-based brief interventions and face-to-face lifestyle interventions delivered by primary care professionals for substance abuse in adolescents and young adults would reduce the uncertainty regarding the effectiveness of the intervention.

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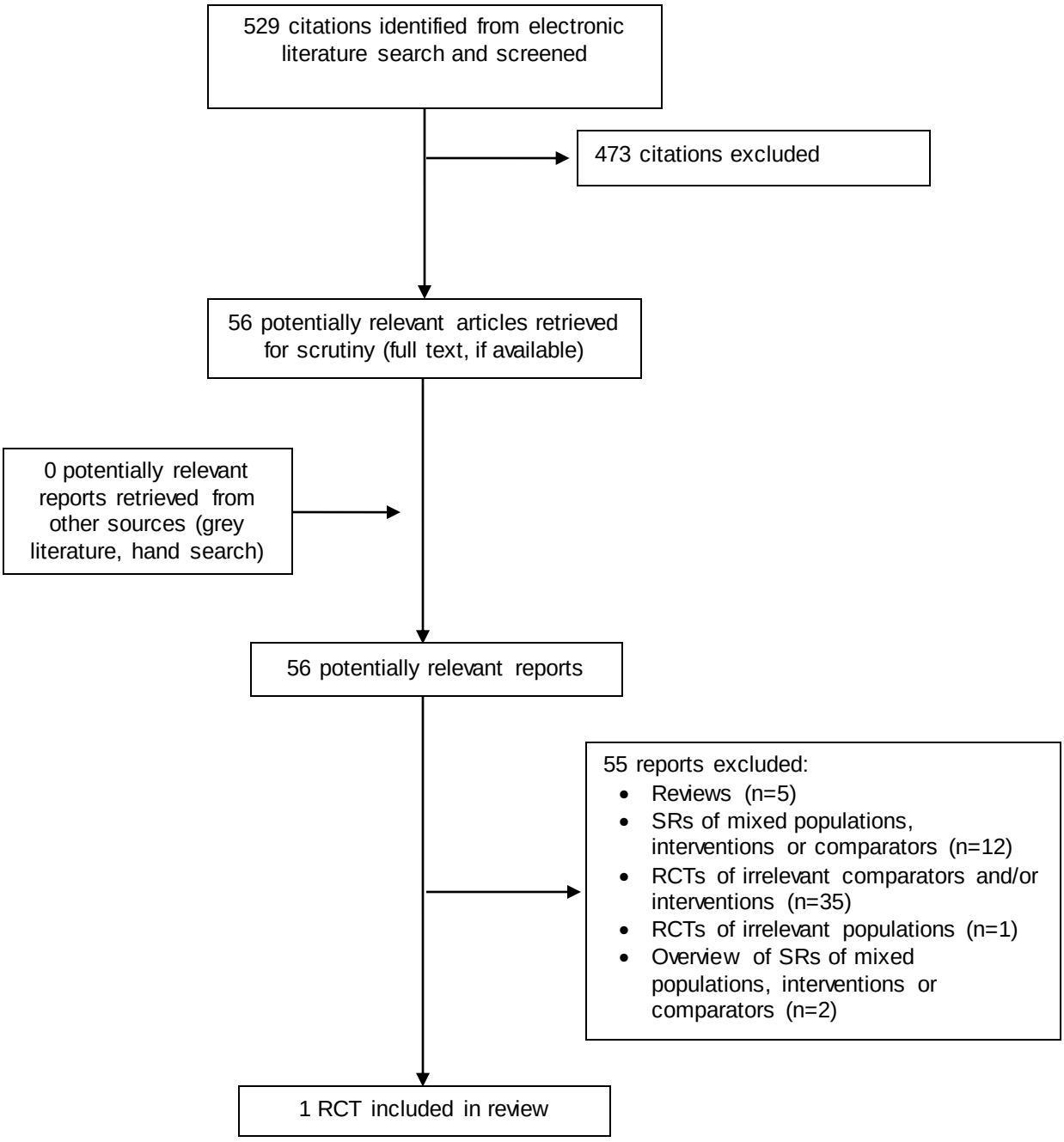
Appendix 1: Selection of Included Studies



Appendix 2: Characteristics of Included Studies

Table 2: Characteristics of Included Primary Studies

First Author, Publication Year, Country, Study Name (if reported), Funding	Study Design and Analysis	Patient Characteristics	Interventions	Comparators	Clinical Outcomes, Length of Follow-up
Walton et al., 2013[16] USA Funding: National Institute on Drug Abuse	RCT, open-label, multicenter, parallel, 1:1:1 ratio Analysis: ITT Sample size calculation: Yes, to detect differences between CBI or TBI with control (no intervention, brochure only)	328 adolescents reporting cannabis use in the past year Mean age (SD): 16.3 (1.6) years Race: African-American: 60.7% Hispanic: 11.0% Others: 28.3% Sex: 33.5% male	– CBI: a stand-alone interactive animated program, with touch screens and audio feedback. – TBI: conducted by therapists, using elicit-provide-elicit framework when reviewing tailored feedback, using summaries and open-ended questions.	Control: brochure containing warning signs, resources and information websites	– Frequency of cannabis use – Number of cannabis-related consequences – Frequency of other drug use – Frequency of alcohol use – Frequency of driving under the influence of cannabis Follow-up: 3, 6 and 12 months

CBI = computer brief intervention; ITT = intention-to-treat; RCT = randomized controlled trial; SD = standard deviation; TBI = therapist brief intervention

Appendix 3: Quality Assessment of Included Studies

Table 3: Quality Assessment of Primary Studies

SIGN Checklist for Randomized Controlled Trials: Internal Validity[15]	Walton et al., 2013[16]
1. The study addresses an appropriate and clearly focused question.	Yes
2. The assignment of subjects to treatment groups is randomized.	Yes
3. An adequate concealment method is used.	Can't tell
4. Subjects and investigators are kept 'blind' about treatment allocation.	No
5. The treatment and control groups are similar at the start of trial.	Yes
6. The only difference between groups is the treatment under investigation.	Yes
7. All relevant outcomes are measured in a standard, valid and reliable way.	Yes
8. What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?	0% Follow-up rates exceeded 80% on all groups
9. All the subjects are analyzed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).	Yes
10. Where the study is carried out more than one site, results are comparable for all sites.	Yes

Appendix 4: Main Study Findings and Author's Conclusions

Table 4: Summary of Findings of Included Primary Studies

Main Study Findings	Author's Conclusions
Walton et al., 2013[16]	

Frequency of cannabis use (% change from baseline)

Follow-up (months)	Control	CBI	TBI
3	-35.7**	-33.0**	-24.5**
6	-37.2**	-35.9**	-23.6**
12	-31.1**	-32.7**	-19.1*

* $P \leq 0.05$; ** $P \leq 0.01$

Number of cannabis consequences[a] (% change from baseline)

Follow-up (months)	Control	CBI	TBI
3	-2.6	-19.7**	-11.7
6	-20.9	-26.6**	-20.4*
12	-17.9	-6.7	-21.8*

* $P \leq 0.05$; ** $P \leq 0.01$
[a] including interpersonal, intrapersonal and substance use disorder symptoms

Frequency of other drug use (% change from baseline)

Follow-up (months)	Control	CBI	TBI
3	1.7	-81.4*	-44.7*
6	2.6	-87.2*	-44.7*
12	-39.7	-44.2	-19.1

* $P \leq 0.05$

Frequency of alcohol use (% change from baseline)

Follow-up (months)	Control	CBI	TBI
3	-15.3	-30.8	-4.0
6	0.0	-25.3	-5.3
12	-19.4	-36.2	17.3

CBI = computer brief intervention; TBI = therapist brief intervention

Frequency of driving under the influence of cannabis (% change from baseline)

Follow-up (months)	Control	CBI	TBI
3	23.1	-22.9	-50.0*
6	42.3	-4.2	-35.0
12	-3.8	-6.2	-17.5

Comparing of CBI with control or TBI with control at 3-, 6-, and 12-month follow-up using group x time interaction from the generalized estimating equation analyses

- **Frequency of cannabis use:**
  - CBI: not significant at any time point
  - TBI: not significant at any time point
- **Number of cannabis consequences**
  - CBI: significant at 3 months (estimate [SE] = -0.24 [0.12]; $P < 0.05$), not significant at 6 and 12 months
  - TBI: not significant at any time point
- **Frequency of other drug use**
  - CBI: significant at 3 months (estimate [SE] = 1.82 [0.68]; $P < 0.01$); significant at 6 months (estimate [SE] = -1.41 [0.52]; $P < 0.01$), not significant at 12 months

"Among adolescent cannabis users presenting to primary care, a CBI decreased cannabis related problems and other drug use and a TBI decreased cannabis DUI in the short term." (p578)[16]

Cannabis DUI = driving under the influence of cannabis

Main Study Findings	Author's Conclusions

• TBI: not significant at any time point
 	
• **Frequency of alcohol use:**
  • CBI: not significant at any time point
  • TBI: not significant at any time point
 	
• **Frequency of driving under the influence of cannabis:**
  • CBI: not significant at any time point
  • TBI: significant at 3 months (estimate [SE] = 0.87 [0.33]; $P < 0.01$); not significant at 6 and 12 months
 	
Comparing of CBI with TBI (exploratory analysis):
No significant effects at any time point of follow-up	

CBI = computer brief intervention; TBI = therapist brief intervention; SE = standard error