SYNOPSIS

Review of “Interventions for Adolescent Substance Abuse: An Overview of Systematic Reviews”


Synopses are brief descriptions of original research articles and reviews such as those that appear in the scientific literature. Synopses summarize and critique single studies or reviews and cannot be assumed to represent the body of evidence on a specific topic.

**Key Messages**

- This synopsis summarizes a recent Das et al. (2016) overview of 46 systematic reviews on youth substance use prevention, and outlines strengths and limitations of the Das review.

- School-based interventions, particularly those with combined social competence and social norms curricula, may reduce tobacco use initiation, frequency and quantity of alcohol use, and prevalence of drug use, but may not improve long-term outcomes for these substances.

- Family- or community-based interventions may lower risk of smoking initiation, alcohol use, and drug use, but are not associated with reductions in prevalence of smoking, with improved outcomes for certain programs such as those that focused on parental involvement and social competence.

- Digital interventions, such as mass media or internet-based interventions, may be effective for reducing tobacco use prevalence and the frequency or quantity of alcohol use.

- Among policy areas and other interventions, tobacco advertising was associated with increased smoking prevalence and there was limited evidence that incentives, individual interventions, or interventions delivered in multiple settings further improve outcomes.

- Strengths of the article included having a clear research question and inclusion criteria, with a search strategy with an adequate number of years; limitations were that the search strategy was restricted to two databases, and that one reviewer performed quality assessment.
Background

- As part of a comprehensive approach to substance use, public health units are undertaking activities that include leading or partnering on interventions to prevent or delay the onset of substance use among youth.

- There is a great deal of literature available on youth substance use prevention, including multiple intervention strategies (e.g., school-based, family-based, digital, incentives, or policies) and outcomes related to various substances (e.g., tobacco, alcohol, and other drugs).

- For a general understanding of the literature on this topic, we provide an appraisal of a 2016 overview of systematic reviews related to youth substance use, which included 46 systematic reviews.

- We identified two other recent reviews of systematic reviews in the literature, but have selected the article by Das et al., as the others provided less information about the systematic reviews included (e.g., article quality or detail on the relevant data).

Appraisal

Study Design

Das et al., conducted an overview of systematic reviews focused on interventions for youth substance use prevention. The literature search used two databases (Cochrane Library and PubMed) searched up to December 2015, without limiting geographic setting and without language restrictions. Two reviewers screened articles for inclusion according to study objectives, and extracted data independently using a standardized form. The authors reported quality appraisal of all included systematic reviews using the AMSTAR quality assessment tool.

Main Findings

The authors included 46 systematic reviews; these reviews were largely based on randomized controlled trials (RCTs) conducted in high income countries among youth and young adults aged 11 to 24 years. Here we present the main findings by intervention category and by substance. As the interest of the public health unit request was primary prevention of substance use, the scope of this summary does not provide detail on systematic reviews that focused solely on substance use treatment or cessation only.

School-based Interventions

Overall, school-based interventions were associated with some prevention outcomes (uptake or prevalence of use) including lower risk of smoking uptake (at longest follow-up), cannabis use, and drug use (follow-up under 12 months). There was also an association with decreased frequency and quantity of alcohol use. Lifetime alcohol use and smoking prevalence at long-term follow-up (grade 12, or 18 years of age) were not significantly different. Interventions that combined social competence (e.g., self-
esteem, coping, problem solving) and social influence curricula (e.g., dealing with peer pressure, refusal) were associated with improved outcomes, and information-only interventions were ineffective.

TOBACCO USE
The review included three systematic reviews on school-based interventions for tobacco use. These three reviews rated between 6 and 9 on the AMSTAR quality criteria, and all three performed meta-analysis (all three were rated on AMSTAR as using appropriate methods use to combine finding) (Table 1 in the article states no meta-analysis was performed for citation 34 although a pooled estimate is presented in Table 2, and the original article describes meta-analysis). These reviews were based on a range of eight to 134 included RCTs. School-based interventions for tobacco included: information, social competence or social influence criteria, multimodal programs, and Smoke-Free Class (SFC) competition. Long-term follow-up was conducted to grade 12, or 18 years of age, for some smoking prevention trials. School-based interventions for tobacco use were associated with a lower risk of smoking uptake (relative risk, RR: 0.88, 95% confidence interval, CI: 0.82 to 0.96). Among specific interventions, there was evidence to support social competence curricula and combined social competence and social influence curricula, but not for information-only, social influence interventions or multimodal programs. There was a lower risk of smoking at follow-up after the SFC competition (RR: 0.86, 95% CI: 0.79 to 0.94). However, the risk difference for smoking prevalence among RCTs of school based interventions with long-term follow-up was not significantly different (risk difference, RD: 0.61; 95% CI: -4.22 to 3.00).

ALCOHOL USE
The review included four systematic reviews on school-based interventions for alcohol use. These four reviews rated between 7 and 9 on the AMSTAR quality criteria, with three of the four reviews performing meta-analysis. These reviews were based on a range of 17 to 53 included RCTs, although two included other study designs. School-based interventions for alcohol included programs such as brief alcohol interventions (BAIs), Project ALERT (Adolescent Learning Experiences in Resistance Training), TND-4 (Project Towards No Drugs Abuse), The Brave (Building Resiliency and Vocational Excellence), EU-Dap (European Drug Addiction Prevention), GBG (Good Behaviour Game), and others. Summary estimates for school-based interventions on alcohol use mainly focused on frequency or quantity of alcohol use, rather than uptake or prevalence of alcohol use. There was some benefit of these programs for decreasing both the quantity of alcohol consumed (effect size (d+random): 0.13, 95% CI 0.07 to 0.19) and the frequency of drinking days (effect size (d+random): 0.07, 95% CI: 0.02 to 0.3) among first-year college students. There was no association between school-based programs and heavy drinking or alcohol-related problems. One systematic review that included specific analyses of lifetime alcohol use (e.g., ever used alcohol) found no association between school-based programs and overall alcohol use at follow-up over 13 months or with lifetime alcohol use.

DRUG USE
The review included two systematic reviews on school-based interventions for drug use. These two reviews rated between 8 and 10 on the AMSTAR quality rating, and both performed meta-analysis. One of these reviews included 15 RCTs related to cannabis use, and the other included 51 RCTs on cannabis or other drug use. School-based programs focused on knowledge, social competence or affective...
education (e.g., enhance self-esteem), social norms (e.g., resistance training), or combined approaches. Among summary estimates related to cannabis use, school-based interventions were associated with a lower risk of cannabis use (effect size d=0.58, 95% CI 0.55 to 0.62), or cannabis use over 12 months of follow-up (combined approach) (RR 0.83, 95% CI 0.69 to 0.99), but lower cannabis use at less than 12 months of follow-up (combined approach) did not reach statistical significance (RR: 0.79, 95% CI: 0.59 to 1.05). For estimates related to other drug use (not cannabis), the effect of school-based programs using a combined approach at follow-up less than 12 months was mixed (no significant difference for dichotomous outcome, but significant difference for continuous outcome), and not significant at follow-up over 12 months. For any drugs, school-based programs were associated with lower risk of drug use at follow-up under 12 months (RR: 0.76; 95% CI: 0.64 to 0.89) Overall, programs based on a combination of social competence and social influence approaches had better results, and knowledge-based interventions showed no difference in outcomes.

ANY SUBSTANCE USE

The review included four systematic reviews on school-based interventions that included outcomes related to any substance use. These four reviews rated between 6 and 10 on the AMSTAR quality rating, including two that performed meta-analysis. Two of these reviews included six RCTS, and the other two included four and 18 studies respectively. The summary results presented are based on frequency of alcohol use or cannabis dependence, rather than initiation of substance use or prevalence of substance use. Among summary estimates presented, school-based brief interventions, compared with assessment only, were associated with decreased frequency of alcohol use (standard mean difference, SMD: -0.91, 95% CI: -1.21 to -0.61). There was no difference between brief interventions compared with information provision for alcohol frequency, or any comparisons with the outcome of cannabis dependence.

Family- or Community-based Interventions

Overall, family- or community-based interventions were associated with some prevention outcomes (initiation or prevalence of use) including lower risk of smoking initiation, alcohol use, and drug use. These interventions were not associated with smoking prevalence, weekly or monthly smoking, or smoking cessation. High-intensity family-based programs were associated with improved outcomes for smoking initiation, and programs that emphasized parental involvement, and development of social competence, self-regulation and parenting skills were strongest for preventing any substance use.

TOBACCO USE

The review included three systematic reviews that focused on family- or community-based interventions for prevention of tobacco use among youth. These three included reviews were rated 5 to 10 on AMSTAR quality assessment, and all included meta-analysis. The reviews included between 15 and 27 RCTs, and one included other controlled trials. Family-based interventions included a focus on family functioning, such as communication and interaction, parent or sibling smoking behaviour, and parenting (including interest and care for the adolescent, and rule setting). Community-based interventions included those with multiple components or outside of school settings, including media promotion, public policy, health provider initiatives, or initiatives in organizations, sports, or workplaces. Among summary estimates provided in Das et al., family-based interventions were effective for preventing new
smoking at follow up among individuals with no previous smoking at baseline (RR: 0.76, 95% CI: 0.68 to 0.84), but not for overall smoking prevalence at follow up. The evidence was strongest for high intensity family-based programs. Community-based interventions were not associated with a change in weekly or monthly smoking. Home- or community-based interventions were associated with reduced risk of smoking initiation (RR: 0.81, 95% CI: 0.70 to 0.93), but no change in smoking cessation.

ALCOHOL USE

One systematic review focused on family- or community-based interventions for prevention of alcohol use among youth. That review included 12 RCTs and rated 9 on AMSTAR quality assessment. The review did not perform meta-analysis. Interventions included family-based psychosocial or educational programs that worked with parental influence on behavioural norms, or on the risks of alcohol use. This review found that 9 of its 12 included trials demonstrated effectiveness of family-based interventions on alcohol use (e.g., initiation, use in the past month or year, frequency/quantity, intoxication), and concluded there was a small, but consistent effect for these interventions overall.

DRUG USE OR ANY SUBSTANCE USE

Das’ review did not include systematic reviews specific to family-based interventions for drug use, but did include one systematic review focused on the effect of family- or community-based interventions for any substance use. This review included 20 RCTs and rated 8 on the AMSTAR quality assessment. The review did not perform meta-analysis. The family-based interventions included focused on parenting skills, communication, or complemented classroom-based programs, and were provided by coaching, videos, or other interactive methods, by health, school, or other organizations. The authors of the systematic review concluded that parenting programs were effective in reducing or preventing substance use, and the most effective programs emphasized parental involvement, and development of social competence, self-regulation and parenting skills.

Digital Interventions

Overall, digital interventions were associated with some prevention outcomes (uptake or prevalence of use) including the potential for mass media campaigns to prevent smoking uptake and for internet-based programs to prevent substance use (e.g., smoking prevalence). However, there were methodological weaknesses noted regarding this literature. There may be some effect of digital interventions on reducing quantity or frequency of alcohol use, but these effects may not offer an advantage compared to alternate interventions. These results for tobacco and alcohol use were also consistent among reviews that focused on any substance use.

TOBACCO USE

The review included four systematic reviews related to digital interventions for tobacco use; two that focused on the prevention of tobacco use, and two that focused on smoking cessation using digital platforms. These reviews were rated 8 to 9 on AMSTAR quality assessment, and none performed meta-analysis. Among the reviews, there were a range of seven to 28 RCTs included, and one also included quasi-RCTs (e.g., assigned using alternate allocation). The digital interventions focused on prevention of tobacco use and included mass media in various formats (e.g., television, radio, billboards). These studies found that mass media campaigns may prevent smoking uptake, but the studies had
methodological flaws. There was insufficient evidence for effectiveness for internet-based programs for smoking cessation among college students in one review, and another indicated some effectiveness for cessation at 6 months or more, but there were not consistent effects and studies were at high risk of bias.

**ALCOHOL USE**
The review included one systematic review of digital interventions focused on alcohol use or problems. This review rated 8 on AMSTAR quality assessment, included 35 studies, and performed meta-analysis. Digital interventions were delivered on the internet or CD/DVD as a computerized task, lasting approximately 20 minutes. The results demonstrated that the interventions reduced quantity and frequency of alcohol use when compared with assessment-only controls, but not with active control groups (e.g., interventions that were not digital/computer-related but still included alcohol relevant content). Summary estimates were presented for studies with an active comparison group, including outcomes for frequency of heavy drinking and alcohol-related problems, but did not include data on initiation or prevalence of alcohol use. There was an association between digital interventions and reduced alcohol-related problems at greater than 6 weeks (effect size: 0.16, 95% CI: 0.03 to 0.30), but an effect was not demonstrated for the other outcomes. The authors concluded that digital interventions were comparable to alternative interventions for alcohol use.

**DRUG USE OR ANY SUBSTANCE USE**
The review did not include systematic reviews specific to digital interventions for drug use, but did include four systematic reviews that focused on the effect of digital interventions for any substance use. These reviews were rated from 7 to 8 on AMSTAR quality assessment and one performed meta-analysis (Tait 2010 was described by Das et al. as having no meta-analysis, but results for alcohol outcomes had meta-analysis in the original paper). Two included between 12 and 16 RCTs, and two included between eight and 31 studies with other designs. Interventions were delivered using the internet, a CD, or mobile phone. Among these studies, school-based programs that used interventions on the internet and those delivered on CD for tobacco, alcohol, and other drugs have the potential to reduce use based on some significant findings among the included studies (e.g., smoking prevalence, cigarette use among non-smokers, average alcohol consumption, onset of heavy alcohol use) or intentions to use (e.g., intention to refuse cannabis). Another review found a small significant effect of internet-based interventions on alcohol use among individuals under 25 years of age, including drinking frequency and problems related to alcohol, but insufficient evidence on the effect for tobacco use. Mobile phone interventions for alcohol use were not identified, and those for smoking cessation were too small to draw conclusions about the intervention. Internet-based interventions for alcohol consumption used a social norms approach and showed evidence to decrease alcohol consumption (no further detail on outcomes available, article in German language). Computerized educational games for adolescents on substance use had positive outcomes for knowledge and attitudes, but few examined outcomes.

**Policy Interventions**
Overall, exposure to tobacco advertising was associated with higher prevalence of tobacco use. Restrictions on youth access to tobacco sales were not associated with prevalence of tobacco use, while
summary outcomes on tobacco sales were not reported. Few studies addressed school tobacco policies or alcohol advertising. There were no included systematic reviews on policies related to drug use or to substance use overall.

**TOBACCO USE**
The review included four systematic reviews that focused on policy interventions for preventing tobacco use among youth. These four reviews were based on a range of one RCT to 35 studies, and rated 6 to 10 on the AMSTAR quality rating. One of the four reviews performed meta-analysis. Areas for policy interventions included policies on advertising or promotion, regulation of places for tobacco use, and youth access to tobacco sales. One review found that exposure to tobacco advertising was associated with higher likelihood of using tobacco at follow-up. A review of school tobacco policies found one RCT with high risk of bias that showed no difference between intervention and control schools. Among summary estimates, compliance with restrictions on the ability of teens to purchase cigarettes was not associated with lower 30-day smoking prevalence (estimate of effect: -1.5%, 95% CI: -6.0% to +2.9%; AMSTAR rating reported as 7, including appropriate methods used to combine the findings) (Note: This was reported in error in the table by Das et al. as -2.9 and presented in bold as a significant result. However, it reads +2.9 and non-significant result in the original review, and the narrative by Das. Also note that summary outcomes on tobacco sales were not reported). Similarly, another review of interventions to change retailer behaviour regarding illegal tobacco sales to youth found that strategies were not associated with sustained high compliance with policies or with youth smoking prevalence.

**ALCOHOL USE**
One systematic review focused on policy interventions for preventing alcohol use among youth. The review rated 10 on AMSTAR quality assessment. The review was based on four studies (1 RCT and 3 interrupted time series; incorrectly listed as a total of two studies in the tables in Das et al.), and meta-analysis was performed. Three summary estimates were provided in Das et al.: two from a very low quality, small RCT that found a statistically significant difference in alcohol consumption among men 18 to 29 years of age while watching a movie or commercials with high or low number of alcohol portrayals. The other estimate based on meta-analysis did not show a significant association between total or partial alcohol advertising bans and volume of alcohol sales. The systematic review found a lack of evidence for or against alcohol advertising restrictions, including radio, television, newspaper, billboards, and film.

**DRUG USE OR ANY SUBSTANCE USE**
The review did not include any systematic reviews on policy interventions for drug use or substance use overall.

**Individual Interventions**
Overall, the review found limited evidence that mentoring may reduce alcohol use in the past year.

**TOBACCO OR ALCOHOL USE**
The multi-database search strategy for this review did not locate any systematic reviews specifically addressing individual interventions for the prevention of tobacco or alcohol use among youth.
ANY SUBSTANCE USE
The review included three systematic reviews addressing the effectiveness of individual interventions to prevent youth substance use, which included a range of four to 20 studies. The methods for the three reviews rated between 7 and 9 on AMSTAR quality assessment, and one performed meta-analysis. Individual interventions included mentoring (e.g. Big Brothers/Sisters program), counselling, psychotherapy, or cognitive behavioural therapy. Mentoring combined with other interventions was not associated with changes in alcohol use and mentoring was not associated with cannabis use, although overall cannabis use prevalence was low and may have limited the ability to detect an effect. In the article that performed meta-analysis, mentoring as a single intervention was associated with fewer participants initiating alcohol use (RR: 0.71, 95% CI: 0.57 to 0.90). Two of the other systematic reviews focused on treatment for drug and alcohol problems and reported inconsistent findings for intervention outcomes.

Incentive Interventions
Overall, the review by Das et al. did not find benefit for incentives to prevent tobacco use, and did not find evidence addressing incentives to prevent other substance use.

TOBACCO USE
The review included one systematic review of incentives to prevent tobacco use (i.e., not starting), which was based on seven cluster RCT studies. The systematic review methods rated 9 on AMSTAR quality assessment, and it included a meta-analysis. Incentives consisted of rewards in the form of contests, competitions, lotteries, contingent payments, or rewards to third parties such as schools. The review found no association between incentives and smoking uptake at the longest reported follow-up.

ALCOHOL, DRUG AND ANY SUBSTANCE USE
The review did not identify other systematic reviews on incentives to prevent the use of other substances among youth.

Multi-component Interventions
Overall, the overview by Das found that multi-component interventions delivered in various settings were associated with reduced lifetime or regular tobacco use, but were not associated with 30-day tobacco use. For alcohol use, these interventions may reduce lifetime or 30-day use, but may not be superior to interventions in single settings. Similarly, studies conducted in various settings, and measuring outcomes for multiple substances at longer-term follow-up, found an association with reduced tobacco, alcohol, and cannabis use (e.g., used in the past 30 days).

TOBACCO USE
The Das review included five systematic reviews that examined multi-component interventions (school and out-of-school components) intended to prevent tobacco use. These reviews were rated between 6 and 9 on AMSTAR quality assessment, and three conducted meta-analysis. The five reviews were based on two to 35 RCTs. Three of the five reviews reported only on smoking cessation and found statistically significant results among summary estimates, but are not discussed further here as our scope was
primary prevention of substance use. The two reviews with outcomes related to the prevention of tobacco use, showed significant associations for multi-component interventions and reduced lifetime smoking (OR: 0.73, 95% CI: 0.64 to 0.82) and regular smoking (OR: 0.59; 95% CI: 0.42 to 9.83), but not for 30-day smoking. Another review summarized the effectiveness of strategies to prevent tobacco use among Indigenous youth, finding no association between the intervention and weekly smoking.

**ALCOHOL USE**

Das et al. included one systematic review of the effectiveness of multicomponent interventions (delivered in multiple settings, e.g., school and family) for the prevention of alcohol use among youth. The systematic review was rated 10 on AMSTAR quality rating, was based on 20 RCTs and did not conduct meta-analysis. Of the 20 trials, 12 showed evidence of effectiveness (e.g., weekly drinking, use in the last 30 days, lifetime use) with effects sustained for up to three years. However, there was little evidence that delivering interventions in multiple settings was superior to interventions delivered in single settings.

**DRUG USE OR ANY SUBSTANCE USE**

The review did not include systematic reviews specific to multicomponent interventions for drug use, but did include four systematic reviews on multicomponent interventions and the effectiveness on substance use overall. These four reviews were based on 9 RCTs to 52 studies, with their methods rated between 7 and 8 on AMSTAR quality assessment. Two performed meta-analysis. One focused on prevention and three focused on interventions among youth already using substances, including two related to substance use treatment and the other on early interventions. Among summary estimates presented, brief motivational interviewing in various settings, used as early intervention with adolescents already using substances, was associated with reduction in alcohol and other drug use measured as an aggregate (effect size, $g = 0.24$; 95% CI: 0.11 to 0.37), as well as lower specific measures of alcohol use (based on frequency, quantity, heavy/binge drinking). There was no reduction in cannabis use (e.g., frequency of use, frequency of cannabis use and driving, frequency of driving with a driver who used cannabis). One of the four reviews focused on long-term outcomes related to prevention. These interventions occurred in various settings and primarily included content on social influences, such as Assertiveness Training, Healthy Schools and Drugs Project, and the Waterloo Smoking Prevention Project. This review found that multicomponent interventions largely showed significant positive effects for preventing or reducing smoking outcomes (e.g., ever, monthly, or daily smoking among non-smokers at baseline), and outcomes related to alcohol and cannabis use (e.g., 30-day cannabis use).

**Strengths**

Overall, this article was rated as moderate (score 6/10) by Health Evidence, and link to the quality appraisal is available online. Strengths included having a clear research question and inclusion criteria, with a search strategy that covered an adequate number of years (database inception to December 2015). The authors performed quality assessment using the AMSTAR tool and presented an overall score, including whether appropriate methods were used to combine findings, but not ratings for each criterion. Authors appropriately combined the results across studies in a narrative summary, and their
interpretation of the effectiveness of interventions for youth substance use prevention was generally supported by the evidence.

Limitations

A limitation of the review by Das was that the search strategy was restricted to two databases: Cochrane Library and PubMed. Further, the review by Das did not describe whether more than one reviewer performed quality assessment of included articles and how consensus on the quality rating was achieved. This study was conducted prior to the release of AMSTAR II, which includes a question about whether the article discusses heterogeneity of results. The wider confidence intervals reported for some estimates above may reflect higher heterogeneity among the included studies. For some interventions, there may have been relevant studies, details regarding intervention characteristics, or relevant outcomes that were not captured in the review. For example, the review by Das found youth tobacco access interventions did not significantly lower smoking prevalence among youth; however, there are examples in the literature of non-included systematic reviews that found interventions with active enforcement result in reduced sales of tobacco to youth.

Reliability

The affiliation of the authors involved in the review by Das is with The Hospital for Sick Children in Toronto, Ontario, as well as the Aga Khan University in Karachi, Pakistan. The authors disclose that the research was supported by the Bill and Melinda Gates Foundation, and have declared that there are no financial or nonfinancial competing interests among the authors. The article is published in the Journal of Adolescent Health, published by Elsevier.
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Citation

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