



Review

Interventions for prevention and treatment of tobacco smoking in school-aged children and adolescents: A systematic review and meta-analysis



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ABSTRACT

Objectives. To determine the effectiveness of primary health care relevant interventions to prevent and treat tobacco smoking in school-aged children and adolescents.

Methods. This systematic review considered studies included in a prior review. We adapted and updated the search to April 2015. Titles, abstracts and full-text articles were reviewed in duplicate; data extraction and quality assessments were performed by one reviewer and verified by another. Meta-analyses and pre-specified subgroup analyses were performed when possible. PROSPERO #CRD42015019051.

Results. After screening 2118 records, we included nine randomized controlled trials. The mostly moderate quality evidence suggested targeted behavioral interventions can prevent smoking and assist with cessation. Meta-analysis showed intervention participants were 18% less likely to report having initiated smoking at the end of intervention relative to controls (Risk Ratio 0.82; 95% confidence interval 0.72, 0.94); the absolute effect is 1.92% for smoking initiation, Number Needed to Treat is 52 (95% confidence interval 33, 161). For cessation, meta-analysis showed intervention participants were 34% more likely to report having quit smoking at the end of intervention relative to controls (Risk Ratio 1.34; 95% confidence interval 1.05, 1.69); the absolute effect is 7.98% for cessation, Number Needed to Treat is 13 (95% confidence interval 6, 77). Treatment harms were not mentioned in the literature and no data were available to assess long-term effectiveness.

Conclusion. Primary care relevant behavioral interventions improve smoking outcomes for children and youth. The evidence on key components is limited by heterogeneity in methodology and intervention strategy. Future trials should target tailored prevention or treatment approaches, establish uniform definition and measurement of smoking, isolate optimal intervention components, and include long-term follow-up.

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Abbreviations: CTFPHC, Canadian Task Force on Preventive Health Care; USPSTF, United States Preventive Services Task Force; GRADE, Grading of Recommendations Assessment Development and Evaluation.

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Introduction

Childhood and adolescence are developmental periods characterized by risk taking and experimentation in many areas, including using tobacco. In 2014, almost 25% of American high school students and 8% of middle school students reported using tobacco; 9.2% and 2.5% respectively, reported smoking cigarettes (Arrazola et al., 2015). In 2012–2013, 24% of Canadian youth reported that they had tried a cigarette at least once, with the prevalence ranging from 3% among 6th graders to 43% among 12th graders (Health Canada, 2014). While some young people will never try smoking and some will never take more than a puff or two of a cigarette, there are others who will become regular and perhaps lifelong smokers. In many countries, including Canada and the US, the majority of adult smokers began smoking in their teenage years (Janz, 2012; Substance Abuse and Mental Health Services Administration, 2014; U.S. Department of Health and Human Services, 2012).

In the short-term, children and youth who smoke can experience a variety of negative respiratory effects (U.S. Department of Health and Human Services, 2012) and there is some evidence that nicotine exposure may interfere with healthy brain development (Dwyer, McQuown, & Leslie, 2009; Galván, Poldrack, Baker, McGlennen, & London, 2011). In the long-term, those who continue to use tobacco will have greater risk for developing serious and sometimes fatal smoking related health problems such as lung and other cancers, cardiovascular diseases, oral diseases, and respiratory disorders (U.S. Department of Health and Human Services, 2014).

Estimates from both Canadian and US sources show downward trends in the prevalence of tobacco use and specifically cigarette smoking among children and adolescents over the past two decades (Arrazola et al., 2015; Health Canada, 2013; Janz, 2012; U.S. Department of Health and Human Services, 2012). These reductions are a good sign, however, there is some indication that the deceleration in prevalence has slowed or halted (U.S. Department of Health and Human Services, 2012) and even at these lower rates, across North America there are still millions of children and youth each year who experiment with cigarettes or become regular smokers. This reality reinforces the need for prevention and early treatment that will promote healthy behaviors in children and adolescents and reduce the risk of poor health outcomes later in life.

In 2003 the U.S. Preventive Services Task Force (USPSTF) determined that there was insufficient evidence to recommend for or against interventions to prevent and treat tobacco use in children and youth (U.S. Preventive Services Task Force, 2003). In 2013 the USPSTF released an updated B-grade recommendation encouraging primary care clinicians to provide interventions, such as education or brief counseling, to prevent tobacco use (U.S. Preventive Services Task Force, 2013); recommendations were not made for or against treatment. In the absence of national or provincial/territorial guidelines, current practice for prevention and treatment of child and adolescent tobacco smoking in Canada is left to the discretion of individual practitioners. Recently however, the Canadian Task Force on Preventive Health Care (CTFPHC) decided to produce clinical practice guidelines on this topic, and the present study was conducted to inform these recommendations.

Our aim was to conduct an up-to-date systematic review and meta-analysis of trials to answer the following questions:

- Are behaviorally-based interventions relevant to the Canadian primary care setting that are designed to prevent tobacco smoking effective in preventing school-aged children and youth from trying or taking up tobacco smoking and reducing future tobacco smoking during adulthood? What are the elements of efficacious prevention interventions?
- Are behaviorally-based and non-pharmacological alternative and complementary interventions relevant to the Canadian primary care setting that are designed to help school-aged children and youth stop ongoing tobacco smoking effective in achieving smoking cessation and reducing future tobacco smoking during adulthood? What, if any, adverse effects are associated with these interventions? What are the elements of efficacious treatment interventions?

Methods

Protocol and registration

The protocol was registered with the International Prospective Registry of Systematic Reviews (PROSPERO #CRD42015019051). The review was prepared in accordance with CTFPHC methods (<http://canadiantaskforce.ca/methods/methods-manual/>) and PRISMA-P guidelines for systematic reviews about

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