

Adolescent smoking cessation

Deepa R. Camenga and Jonathan D. Klein

Purpose of review

Approximately 25% of high school students report current cigarette use, 85% of adolescents think about quitting, and around 80% of current smokers made a quit attempt in the past year. This review analyzes recent additions to the adolescent smoking cessation literature from June 1, 2003 to May 1, 2003.

Recent findings

Adolescent attitudes toward smoking cessation are largely affected by their smoking history. Youth cessation interventions largely focus on behavioral interventions, and research concerning these interventions has yielded mixed results. Little data exist about the effectiveness of nicotine replacement therapy in adolescents, but there is growing evidence that youth use this pharmacotherapy. Recent research has explored the use of nicotine replacement therapy as an adjunct for enhanced smoking reduction in adults, and future research may focus on this tactic for youth as well. Internet cessation adjuncts and telephone quit lines also serve as future frontiers for adolescent smoking cessation research.

Summary

Information concerning adolescent smoking behaviors, effective interventions, and smoking cessation therapy continue to grow and provide data that improve our understanding of adolescent smoking cessation. Although we cannot directly extrapolate the adult findings to this population, adult cessation research continues to inform future adolescent cessation efforts.

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Division of Adolescent Medicine, Department of Pediatrics, and the American Academy of Pediatrics Center for Child Health Research, University of Rochester School of Medicine, Rochester, New York, USA

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Correspondence to Jonathan D. Klein, MD, 601 Elmwood Avenue, Box 690, Rochester NY 14642, USA
Tel: 585 275 7760; fax: 585 242 9733;
e-mail Jonathan_Klein@urmc.rochester.edu

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Abbreviation

NRT nicotine replacement therapy

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Introduction

Despite the recent decline in adolescent smoking, in 2002 10.1% of middle school students and 22.9% of high school students reported current (past 30 day) cigarette use [1•]. Approximately 51% of 11- to 18-year-old youths have tried smoking [2••], 2000 adolescents become daily smokers each day, and among 12- to 17-year-old youths, 31.8% (1 million) of those who smoked in the past month were daily smokers [3].

On the other hand, 85% of adolescents who smoke think about quitting [4] and 80% of current smokers made a quit attempt during the past year [5•,6]. A Department of Health and Human Service's Healthy People 2010 goal is to decrease the prevalence of adolescent smoking to 16% and to increase the tobacco cessation rate among adolescents to 84% [7]. Researchers, public health experts, and the medical community increasingly understand the importance of identifying smoking cessation strategies among this population. This update reviews current research concerning adolescent smoking cessation.

Adolescent attitudes toward smoking cessation

Youth may not grasp the long-term consequences of cigarette use. The traditional view has believed that adolescents tend to relate to the short-term effects of smoking, and this must be engaged when motivating them to quit. A series of focus groups with high school students reiterated these findings and found that motivation to quit stemmed from disliking the smell of cigarettes, cost, and a decline in artistic/athletic performance [8•]. However, other studies have found that certain populations of adolescents also report health concerns as their primary reason for quitting [9•]. In a telephone survey of 509 teenage smokers from Baltimore, Maryland, 49.9% of respondents reported health concerns as the primary reason for wanting to quit, whereas 19.6% reported athletic performance-related reasons. Similarly, a survey of 183 adolescent substance abusers found that 60% reported health as a reason for quitting [10]. In both these samples, subjects reported a high level of cigarette use, indicating that heavier smokers may be more likely to endorse health-related benefits of quitting.

Although heavier smoking seems to affect motivation for quitting, it also seems to affect self-efficacy toward quitting as well. The ability to avoid smoking is related to the

level of smoking among adolescents. A survey of 379 15- to 18-year-old employed adolescents found that as smoking frequency and nicotine dependence increased, self-efficacy about their ability to avoid smoking decreased [11•]. Teens who had never tried to quit were likely to state that quitting was difficult, and to believe that quitting would promote weight gain, increase stress, and force a change in their social groups [8•]. Understanding the relation between smoking behaviors and attitudes toward cessation may improve the ability of smoking cessation interventions to target adolescents effectively by their smoking status.

Behavioral interventions

Many smoking cessation programs that have targeted youth have focused on behavioral interventions. Most of these interventions have been tested in school or health care settings. Studies generally incorporate multiple modalities to engage teens in smoking cessation, an approach endorsed by adolescents [12]. A multifaceted school-based pilot study, incorporating the transtheoretic model of change, pharmacotherapy, concurrent parental intervention, and physician involvement found a 27% cessation rate on completion of the 8-week program. The study included 22 11th and 12th graders who were motivated to quit at baseline [12]. In contrast, a randomized control trial examining a school-based intervention targeting 269 adolescents who were caught smoking at school found no difference in the cessation outcome on completion of the 4-week program and at 12 months [13]. They found a 6% cessation rate at 1 year in both the control and intervention groups, and high rate of falsified self-report of smoking status when they biochemically verified the results using expired alveolar carbon monoxide.

Although many programs have evaluated school and health care-based smoking cessation strategies, current research has also focused on alternative ways to engage teens in smoking cessation. Recently, researchers have tried to target employed youth using workplace interventions. One tobacco control intervention in working youth concluded that it is challenging to undertake a smoking cessation intervention in the workplace because of high turnover rates of employed teens [14•]. Other programs have focused on youth advocacy. Winkleby *et al.* [15] randomized 10 high schools to a semester-long program in which 11th and 12th grade students either focused on advocacy level activities that targeted environmental influences in their communities, or learned about drug and alcohol abuse prevention. Self-reported regular smoking (smoking > 1 pack/week), verified at baseline with expired carbon monoxide levels, decreased by 3.8% in treatment schools and increased by 1.5% in control schools ($P < 0.001$). Regular smoking remained lower in the treatment schools at the 6-month follow-up assessment.

These findings highlight the general trend in adolescent smoking cessation research that interventions have shown mixed results. In their review of the literature, Moolchan *et al.* [16] reiterate that various types of treatment interventions have been tested in youth in regard to methodological design, length of intervention, follow-up of treatment, and entry criteria. They argue that poor methodological design, lack of biochemical validation, inadequate follow-up, and lack of appropriate control groups contribute to these mixed results. In addition, long-term data do not exist for this population [17••]. Although recent studies have started to improve on these shortcomings, in general the field still lacks a sizable body of well-designed research.

The 5A brief intervention

The United States Public Health Service's smoking cessation guideline is based on a mnemonic involving five As (Ask, Advise, Assess, Assist, Arrange). This counseling technique was developed and tested as a brief clinician intervention with adults, requiring less than 3 minutes of counseling. Numerous studies in adults have shown that brief physician intervention promotes cessation [18].

Even though there is little evidence regarding its effectiveness in adolescent populations, a survey of 429 California physicians found that more than 90% of pediatricians/family practitioners believed that they used the 5A model when counseling adolescent patients on smoking cessation [19••]. The rate of asking about smoking status increased with age, with 40.3% of pediatricians asking 11- to 12-year-olds, and 80.8% of pediatricians asking 17- to 18-year-olds. Although many physicians asked and advised, fewer assisted and arranged. Only 28% of physicians reported that they encouraged patients to set a quit date, and only 17.6% arranged for follow-up visits. Several current National Cancer Institute-funded trials are trying to evaluate systematically the effect of tobacco cessation interventions in youth [20•]. Findings from this research may help guide future recommendations and guidelines concerning the application of the 5A model to youth.

Pharmacotherapy

Few studies have examined the efficacy of nicotine replacement therapy (NRT) in adolescents [21•]. Hanson *et al.* [22••] conducted the first double-blind, randomized control trial examining the effectiveness of the nicotine patch in helping adolescents quit smoking. They examined 100 13- to 19-year-olds motivated to quit smoking with biochemical verification of abstinence by measured expired air carbon monoxide levels. In addition to being randomly assigned a nicotine replacement patch or placebo, both arms received 10 intensive one-on-one cognitive behavioral counseling sessions, and rewards for maintaining low carbon monoxide-validated

abstinence. Although their treatment group experienced significantly lower craving scores and fewer withdrawal symptoms, they did not find any differences in overall abstinence.

Although physicians may hesitate to prescribe NRT to their adolescent patients, there is evidence that adolescents use over-the-counter NRT. The Food and Drug Administration currently does not label NRT for use by individuals younger than 18 years. Despite this, a recent study found that a minor was able to purchase NRT in retail stores in 81% of attempts [23•]. In a cross-sectional survey of 4078 urban high school students, 5% of all students reported previous or current use of nicotine replacement gum or patches [24••]. Twenty seven percent of current smokers and 39% of former smokers reported NRT use. Past NRT use was most prevalent among current daily smokers, and regular current use of NRT was most prevalent among infrequent smokers, suggesting that the use of NRT among infrequent smokers may be related to a greater intention to quit. These findings also indicate that adolescents are accessing these products, suggesting that future investigations need to explore adolescent use patterns, as well as the effectiveness of NRT among youth.

The concurrent use of cigarettes and nicotine replacement therapy

The adult literature has increasingly explored the concurrent use of cigarettes and NRT and its effect on smoking reduction. Although there is concern that concurrent use could increase the risk of myocardial ischemia or other adverse events, evidence shows that combined use of NRT and cigarettes appears safe [25–27]. Adults who choose reduction rather than cessation have reported a higher smoking frequency, less motivation to quit, and a history of fewer quit attempts [28]. A phone survey of 2655 adult smokers who were motivated to quit found that 14% and 10% of the sample reported concurrent use of both NRT and cigarettes at 6 and 12 weeks after their quit date respectively [29]. At 12 weeks the concurrent users reported a reduction in their smoking levels, smoking an average of 8.7 cigarettes per day, down from a baseline level of 27.1 cigarettes per day.

Research has also shown that concurrent use of NRT and cigarettes also may promote reduction in smokers not motivated to quit. A recent 2-year, double-blind, placebo-controlled trial examined the effect of the nicotine gum versus placebo among 411 “healthy” adult smokers who were unable or unmotivated to quit [30]. At 12 and 24 months, they found a statistically significant difference in self-reported smoking and in expired carbon monoxide when comparing the NRT with the control group. However, these findings were biased by a dropout rate of 64% at 24 months and by significantly higher nicotine dependence score of those lost to follow-up.

Klesges *et al.* [24••] found evidence for concurrent use of cigarettes and NRT among adolescents. Interestingly, 18% of past or current NRT users had never smoked, and more than 40% of the adolescents smoking less than one cigarette per week also used NRT. Although this study did not discern whether the concurrent use among low-level smokers was for the purpose of smoking reduction or cessation, it raises some concerns. The recent review by Moolchan *et al.* [31•] of treatment options for adolescent tobacco users argues that there is little evidence for the health benefits of smoking reduction, although they posit that it may be useful in this population because motivation for total abstinence may be low. Thus, NRT for smoking reduction or cessation in adolescents merits further investigation.

Adjunct materials

Adjunct cessation strategies (Internet-based information, telephone quit lines, self-help pamphlets, videos, and so forth) may be effective in adults [18], but data concerning the use of adjunct materials for adolescent smoking cessation are sparse. As a result, practitioners may hesitate to use adjunct materials as support mechanisms when delivering smoking cessation counseling to youth. For example, in the pediatric population, less than a third of practitioners report that they have distributed smoking cessation pamphlets to their patients [19••].

Telephone quit lines may serve as an adjunct to youth smoking cessation interventions. Quit lines can provide direct service to help smokers quit, raise the community’s general awareness of the importance of quitting through promotional campaigns, and provide informational access to large populations [32•]. Quit lines also allow users to access a variety of supplemental services that may improve cessation rates [32•]. For example, adults smokers who called a quit line and received personally tailored computer-generated advice via telephone or letter have been shown to have higher abstinence rates compared with control groups [33,34]. An expert panel concluded that the strength of evidence concerning adult quit lines is so strong that they recently recommended that the federal government institute a national toll-free quit line to help increase cessation rates in the United States [35•]. Unfortunately, little evidence concerning adolescent use of quit lines exists. But, given rising national awareness, attention will probably increasingly focus on adolescent smoking cessation interventions using quit lines.

Interest will also likely continue in Internet cessation adjuncts as cessation modalities. Cheh *et al.* [36•] recently reviewed existing smoking cessation Web sites for their content quality and usability, finding that a majority of sites explained nicotine addiction and NRT, but few explained the side effects of or contraindications to NRT use. They also concluded that the current sites

could improve their accessibility, usability, and credibility. Future research is needed on the effectiveness of Web-based cessation modalities.

Health disparities in adolescent smoking cessation

Recent data on the prevalence of adolescent smoking by ethnic/racial populations found that 27.9% of American Indian/Alaskan native, 16.0% of white, 7.0% of black, and 5.2% of Japanese youth report cigarette use during the last month [37••]. Recently, investigators found that although African-American youth reported lower cigarette consumption, they reported a similar level of nicotine dependence and comparable motivation to quit [38••]. These findings only begin to highlight the need to explore further ethnic/racial differences in smoking to inform future interventions for minority populations.

Conclusion

Adolescent smoking rates continue to exceed public health goals. However, the area of adolescent smoking cessation research is still quite young. Child health and behavioral science researchers increasingly recognize the need for further data concerning effective smoking cessation strategies, as well as continued efforts to reduce nicotine exposure [20••]. Funders, researchers, and both public and clinical practice organizations can work collaboratively to expand the current research landscape and therefore improve the utility and availability of effective adolescent smoking cessation interventions in practice.

References and recommended reading

Papers of particular interest, published within the annual period of review, are highlighted as:

- Of special interest
- Of outstanding interest

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