

Improving the Future of Youth Smoking Cessation

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Objectives: To provide recommendations that will build a better foundation for research on youth smoking cessation. **Methods:** The Youth Tobacco Collaborative Cessation panel evaluated youth tobacco cessation literature and convened meetings to reach consensus. **Results:** Methodological issues include design, recruitment and retention, follow-up, measurement, and youth vernacular. Research gaps include youth characteristics, theoretical approaches,

delivery settings, and type of provider. Thirteen key research components for reporting are addressed. **Conclusions:** Given the dearth of studies on youth smoking cessation, scientifically rigorous studies need to be conducted with attention to methodological issues, research gaps, and reporting of key research components.

Key words: adolescent smoking cessation research

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Researchers have learned a great deal about why children and adolescents start to smoke, and we are beginning to understand more about why some go on to become regular smokers. We also have rich and informative literature about how to help adult smokers to

quit; indeed, 6000 studies have been published on tobacco-use cessation.¹ Fewer than 70, however, have addressed cessation among youth.² For adults, the Public Health Service (PHS) guidelines provide sound scientific evidence based on a detailed development process, including

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meta-analyses conducted by panel staff. For youth and adolescents, however, the PHS guidelines include several recommendations based either on less than optimal scientific support or on “expert” consensus unsupported by randomized controlled trials.

Given the dearth of research addressing youth tobacco cessation, there is a need to strategically move forward to lay the groundwork for improved studies in the future. Researchers, policy makers, and program providers as well as individual tobacco users will all benefit from such efforts. Clearly, a demand exists for effective tobacco cessation programs specifically for youth. Among youth who smoke, 75% have reported unsuccessful attempts to quit smoking,³ and 40% of youth who smoke have indicated they would like help to quit smoking.⁴ In addition, health professionals who work with youth have a great interest in such programs, because assisting youth in quitting can help reduce the toll of tobacco-related death and disease. In the absence of interventions, adolescent smokers are more likely to continue to smoke into adulthood.⁵

Based on a systematic review of the published literature, the Youth Tobacco Cessation Collaborative (YTCC) evidence review panel determined that, overall, the smoking cessation interventions for youth are promising. The panel, however, was unable to identify specific attributes that distinguished promising from ineffective interventions.⁶ These disappointing results stem primarily from the inadequate number of scientifically rigorous trials evaluating interventions for youth. To determine the most efficacious methods of helping youth to quit smoking, a number of methodological shortcomings in the current literature need to be addressed, rigorous studies need to be conducted to address research gaps, and key components of study methods and results need to be uniformly reported in the published literature. This paper will provide an overview of these methodological issues, current research gaps, and recommendations for scientific reporting. This paper will focus on cigarette smoking, as opposed to all forms of tobacco use, because the majority of research in the area of youth tobacco cessation has specifically addressed cigarette smoking.

Research Methodology

In the process of reviewing the scientific literature to determine best practices in smoking cessation for youth, the YTCC panel found several methodological and analytical shortcomings that jeopardized the validity and reliability of individual studies.⁶ Methodology for reviewing studies, including criteria and scoring for assessing validity, and criteria used to draw conclusions are described by McDonald and colleagues.⁶ Because the YTCC panel focused on those studies with the strongest methodology, more than half of the available literature identified in Sussman’s 2002 review was excluded from the review, resulting in 20 studies from which to draw conclusions.^{7-26,a} This was regrettable given the paucity of existing literature. Even so, many of these issues could have been readily addressed with relatively minor changes to the study, data analysis, and reporting. In order to develop an informative research literature on youth tobacco cessation, evaluators and researchers must carefully address these basic concerns. The following section highlights critical methodological issues identified by the panel.

Design. Many of the studies that were reviewed employed single-group designs. These designs assess smoking status and other smoking-related measures among single groups, usually before and after an intervention is delivered. The lack of a control group makes it impossible to determine if intervention recipients changed as a consequence of the specific intervention of interest or some other co-occurring factor. For example, recipients tend to be highly motivated to quit and thus may have quit regardless of the intervention. In addition, participation may produce a placebo effect merely by creating an expectation that the intervention will be effective. Students may also have quit smoking at follow-up due to an event other than the intervention, such as a cigarette price increase, countermarketing campaign, change in school tobacco policies, or other unre-

a The following unpublished report was included in the evidence review. For more information contact the corresponding author, Dr Backinger, Burton D, Chakravorty B, et al. Outcome of the TNT tobacco-cessation randomized trial with high-school students. Under review.

lated reasons such as participation in sports or change in social situation. These potential confounds need to be measured and considered when interpreting results. In general, single-group designs with a before-and-after comparison should be limited to situations where it is impossible to construct a control group, for example, when every youth in a jurisdiction of interest is required to receive the intervention. Whenever possible, researchers and program evaluators should employ a randomized controlled trial, which involves randomly assigning individuals to a control condition (eg, a placebo treatment, no treatment, delayed treatment, or usual care) or the active treatment of interest. When there is a danger that individuals assigned to different conditions may interact with one another in a way that affects one or more of the treatment conditions, a cluster-randomized design should be used. Here, clusters of youth (eg, from schools, medical clinics, or workplaces) are randomly assigned, with all youth within a given cluster receiving the same treatment. Randomization helps ensure that individuals receiving different treatments are generally similar on other characteristics that may affect the outcome, although it is not a guarantee. Consequently, it is important to check that individuals in each treatment condition are similar to one another at baseline and at the time of follow-up (see "Recruitment and retention," below). Special statistical adjustments need to be made when cluster randomized designs are employed because the unit of analysis becomes the cluster, (eg, school) rather than the individual (eg, adolescent smoker).²⁷

Although the randomized controlled design remains the gold standard for intervention research, where it is not feasible (eg, policy studies), an alternative is to construct a quasi-experimental design. Here, smoking histories and quit rates in a similar comparison group are measured over the same time period as the intervention group. The comparison group becomes the control, even though randomization does not occur. The challenge is to find a group of youth as similar as possible to the intervention group. Special care needs to be taken in interpreting findings; as with any nonrandomized design, differences between groups may be influenced by variables other than the

intervention.

Recruitment and retention. Most studies have not had sufficient numbers of participants in each treatment condition; small sample sizes limit the power of statistical analyses to detect differences between groups.²⁷ Furthermore, with small samples the odds increase of incorrectly concluding that there were no differences between the treatment and control group because of a lack of statistical power. The YTCC review panel found that, overall, quit rates varied considerably but generally ranged from 0% to 30%. Detecting a true difference between treatment and control groups of 5 percentage points (eg, concluding that 2 groups with quit rates of 10% and 15% are statistically different) would require more than 350 subjects in each condition at follow-up. Such large numbers of study participants can be difficult to obtain given challenges in recruiting and retaining youth in smoking cessation trials. A recent meta-analysis of recruitment of youth smokers into cessation programs found that participation rates of 2% to 10% are typical (McDonald P, personal communication, 2003). Thus, if a high school with 1800 students has a smoking rate of 20%, it will have 360 smokers. A researcher might expect between 7 and 36 smokers to volunteer and be eligible for a study. Moreover, it is not uncommon for up to 50% of students to be lost to follow-up. Researchers may lose contact with participants during the study, or participants may withdraw from the study before completion. With low initial recruitment rates and low retention rates over time, a study with 2 treatments (intervention and control) could require the cooperation of between 40 and 200 high schools in order to produce a sample size large enough to detect a modest intervention effect. Clearly, large-scale studies are needed and a significant effort is necessary to determine how to improve recruitment and retention rates.

Informal discussions with researchers who have conducted youth smoking cessation trials reveal that difficulties recruiting and retaining adolescent smokers are routinely underestimated, whether the study is conducted through schools, health clinics, workplaces, homes, or other sites. One must also consider that adolescents may prefer to quit smoking on their own rather than enroll in a cessation program, or they

may feel there is a stigma associated with formal programs. Recruitment rates for youth are similar to those found with adult smokers in group programs conducted in workplaces and health care settings.^{28,29} Recruitment rates for other types of youth-centered programs compare favorably to the 1 to 2% recruitment rates from the general population of adult smokers.³⁰ Many challenges must be faced, particularly the limitations associated with informed consent. For example, a researcher might have to obtain consent from a school board or workplace, a principal of a school or a clinic director, the parents of participants under age 18, as well as assent from the youth themselves. Because many youth smoke without the knowledge of their parents, teachers or other adults, they are often reluctant to volunteer if the study will require them to reveal themselves as smokers. The net result is that the sample is often quite different from the general population of youth smokers. Researchers are learning to employ creative research designs to minimize concerns by youth about parents and significant others learning about their smoking status. Ossip-Klein and colleagues in their study, for example, assigned health care practices to receive training in delivering brief interventions or maintain "usual care" – a control condition that did not receive the training until after the end of the comparison period, (Ossip-Klein D, personal communication 2003). Providing brief smoking interventions is considered standard of care because it follows PHS guidelines and could have been provided in the absence of the study, therefore, no special consent was needed for the intervention. Parents consented to their child's participation in the adolescent health behavior survey, and smoking status was not an enrollment criterion. The surveys assessed multiple health behaviors including tobacco use.

Smokers recruited into cessation studies tend not to be representative of the population of all smokers. The YTCC panel found that studies it reviewed disproportionately involved older, heavier smokers from urban settings. Participants are also more likely to be female and less likely to be a member of a racial or ethnic minority group.⁶ In general, both youth and adult study samples are overrepresented by those motivated to quit, fe-

males, and individuals with higher level of nicotine dependency.^{30,31}

Much more research is required to determine how best to recruit and retain adolescents, with or without changes to human subject ethics review practices. For example, does offering an incentive improve recruitment and/or retention? If yes, under what conditions do incentives become coercive? What steps can be taken to improve confidentiality? What is the best way to word assent statements to ensure they are comprehensible to youth while still meeting legal requirements? What are the relative advantages and disadvantages of proactive versus reactive recruitment strategies? How does the intensity of the intervention affect recruitment and retention? How do individual subject characteristics (eg, perception of self as a smoker or not) influence recruitment and retention? Because optimal recruitment and retention methods have not been determined for youth smoking cessation programs, it is important to document any methods that are used and to develop an evidence base of effective recruitment and retention methods.

Follow-up periods. The YTCC review panel found that many studies failed to follow up with study participants for a sufficient length of time. Like adults, adolescent quitters appear to be subject to significant relapse over time.³ The Centers for Disease Control and Prevention/Society for Research on Nicotine and Tobacco Expert Panel of Methodology and Outcome Measures for Adolescent Tobacco-Use Cessation (CDC/SRNT expert panel) examined measures of adult smoking cessation and concluded that a follow-up of at least 6 months provided the most reliable estimates of long-term abstinence and was recommended for youth tobacco cessation studies.³² The longer the follow-up period, however, the more retention may be a factor. Interim follow-up assessments are often warranted as well; these serve to maintain more regular contact with participants that can facilitate retention over time. In addition, they enable researchers to compare short- and long-term efficacy. Where retention rates may be jeopardized by a longer study period (eg, when collecting data across 2 school years, which increases the odds students will move to new schools or communities), interim follow-ups provide as-

assurance of obtaining at least short-term outcomes with a higher degree of confidence.

The timing of the follow-up period presents an additional challenge. Unfortunately, many published studies have not explicitly noted when their follow-up period began (or ended). Usually, the follow-up period should begin immediately after the intervention ends, but this principle is sometimes not appropriate. For example, interventions that involve multiple sessions with a planned quit date occurring prior to the last session should begin follow-up at the planned quit date or session closest to that date. If a program involves 8 sessions, 3 prior to and 5 after a quit date, follow-up should commence right after session 3. Occasionally, however, follow-up may need to begin at the point of registration, for example, when comparing treatments whose endpoints are at different times. Using the initial session becomes the only way to make a fair comparison across treatment conditions. In any study reporting, there is a need to clearly define how the follow-up intervals were calculated to allow for accurate comparisons across studies.

Assessment of smoking status/inclusion criteria. The majority of the published studies establish participant eligibility by using a screening process, which is typically determined by smoking status, quantity, frequency, or duration. Researchers generally ask potential participants how many cigarettes they smoke in an *average* day, week, or month or, alternatively, how many cigarettes they have smoked in the *past* day, week, or month. Results are used to determine whether an individual is eligible to participate in a study. Many studies are restricted to current smokers (perhaps defined as those who smoked one or more cigarettes in the past month) or who smoked an average of one or more cigarettes per day. There are several reasons that researchers and evaluators must exercise caution when determining smoking status or tobacco consumption. Sharing a single cigarette among a group of 2 or more youth is common, making it difficult to estimate individual consumption. Youth who do not purchase their own cigarettes (ie, they only smoke cigarettes purchased and shared by others) may indicate that they do not smoke. Similarly, youth who are occasional smok-

ers may classify themselves as nonsmokers. Many youth have highly irregular smoking patterns; it is not uncommon for someone to smoke heavily for several days and then go without smoking for several days.³² These irregular patterns of smoking, as well as the consumption of partial cigarettes, can make it challenging for youth to provide an accurate estimate of their smoking status or “usual” consumption levels. Consequently, it is important to develop a more accurate measure of smoking in youth. Through their formative research with adolescents, Nichter and colleagues have highlighted the importance of ascertaining the variability among adolescent smoking patterns including weekday and weekend smoking and sharing cigarettes.^{33,34} The CDC/SRNT expert panel suggests additional methods to measure adolescent tobacco use, including handwritten daily diaries, and “ecological momentary assessments” in which youth are reminded electronically to enter smoking information into an assigned handheld computer.³² Handheld wireless e-mail devices have been used successfully to conduct daily surveys on smoking and quitting behavior among high school students over a 3-month period (McDonald P, personal communication, 2003). Finally, there may be value in distinguishing among participants at various stages of smoking in that their responses to interventions may differ; for example, experimenters as compared to daily smokers.³⁵

Quit rates. The YTCC evidence review revealed that a number of studies assessed quit rates by simply inquiring of the youth as to whether he/she had quit smoking with a yes/no question. One recent study found that responses from the same sample of students produced quit rates ranging from 2.5% to 17% depending on how “quitting smoking” is assessed (McDonald P, personal communication, 2003). For example, students who tried only 1 or 2 cigarettes several months before may respond they have quit smoking, but were never actually established smokers. Moreover, youth engage in smoking patterns that are highly variable on a day-to-day basis. For example, due to supply problems or the need to conceal smoking from certain adults or peers, a young smoker may go several days between cigarettes, then smoke intensely for the next several days.

Standard adult measures such as 7-day point prevalence abstinence may not distinguish true quitters from temporary abstainers, inflating the true abstinence rate. Clearly, a more precise measure is needed. The CDC/SRNT expert panel recommended using 30-day point prevalence abstinence as the primary outcome measure (ie, the percent of youth in a given condition who have been completely abstinent for the 30 consecutive days prior to assessment). The CDC/SRNT expert panel also recommended reporting 7-day point prevalence measures, although it should be interpreted with caution. A CDC/SRNT expert panel on adult smoking measures also suggested using prolonged abstinence, the percent of participants who have remained completely abstinent from smoking for some period (usually 6 or 12 months), with the exception of predefined "slips."³⁶ For example, participants would be considered smoke free during the specified interval as long as they had not smoked on 3 consecutive days or on at least one day in a week for 3 consecutive weeks. Such definitions may have merit for youth smokers.

Tobacco consumption is frequently used as a secondary outcome measure. A treatment is considered to be partially successful if average daily consumption goes down among continuing smokers after they received an intervention. No data are available, however, on the long-term smoking behavior of youth who cut down after an intervention, and thus, consumption should not be used as a primary outcome measure.

Calculation of quit rates. Many studies reviewed by the YTCC panel failed to adequately describe how quit rates were calculated. Moreover, many studies performed these calculations in a manner that could inflate the success rate. For example, many divided the total number of quitters at follow-up by the number of smokers reached at follow-up, but this assumes that those who dropped out of the study or those not providing follow-up data had quit rates equivalent to those who were reached for follow-up. Previous research suggests that this may be an invalid assumption. For example, those who relapse may be more reluctant to continue participating in a study and drop out. Certain groups with higher relapse rates may also be the ones who are more difficult to track down for follow-up data

collection. In smoking cessation research, a more commonly accepted method of calculation (sometimes referred to as "intent-to-treat" analysis) is to divide the number of quitters in each treatment condition by the total number of participants assigned to receive that treatment at the beginning of the study.

Biochemical validation. Youth smoking is both underreported and overreported,³⁷ and self-reports vary by the social context in which they were collected. Accordingly, the CDC/SRNT expert panel suggested that self-reports of quitting should be validated where possible.³² The most common methods to confirm smoking status are to administer one or more biochemical tests or to obtain peer confirmation. Biochemical measures pose difficulties because of the variability of youth smoking patterns; as discussed, youth may go for several days without smoking. Measures such as expired carbon monoxide (CO) are accurate only for the detection of smoking in the last 24 hours, and the various forms of cotinine detection (in saliva, serum, or urine) measure use for less than a 7-day period. In addition, cotinine may inappropriately label users of nicotine replacement products, or those exposed to heavy concentrations of secondhand smoke, as smokers. Assessment of these variables is important for clarifying findings, particularly because of the inconsistent patterns of tobacco use among youth. Because of these limitations, biochemical data in adolescents should be interpreted with caution until a more solid evidence base emerges on the validity and criteria for use of biochemical verification with adolescent smokers. Nevertheless, the CDC/SRNT expert panel recommends the use of cotinine to validate measures of 7-day point prevalence abstinence. The panel also identified the need to report the sensitivity and specificity of the test, as well as the cutoff points used to determine smoking and nonsmoking status. Recently, Caraballo and colleagues analyzed cotinine levels using National Health and Nutrition Examination Survey data and determined the best cotinine cut-off level for defining adolescent smokers is 11.4.³⁸

One challenge to using biochemical verification is that it may be a barrier to participation. For example, if the intervention is delivered by telephone, mail, or

Internet, the need to provide a breath or saliva sample may deter participation, or lead to high refusal or dropout rates. Research is needed to determine whether there are settings or study types, or means of obtaining self-report, that minimize the likelihood of deception of smoking status by participants.

An alternative to biochemical validation is the “bogus pipeline” technique in which participants are told they may be subject to biochemical validation, but no such measures are ever taken. A variation is to take a breath or saliva sample and tell participants that it may be used to confirm smoking status even though it will not. This method increases the validity of self-reporting because youth are more likely to report their true smoking status if they think it will be verified. Some researchers are philosophically opposed to the use of the bogus pipeline methods because they involve deception of participants.³⁹ Human subject protections, as well as both youth assent and parental consent, need to be taken into account when considering biochemical validation or bogus pipeline.

Youth vernacular. The language researchers and practitioners use when talking with youth about tobacco cessation may be different from that used with adults. For example, to an adolescent, the term *quitting* may not mean quitting for good but instead stopping for some period of time, such as during baseball or track season or when dating a nonsmoker. It is important to use the same vocabulary as youth do when exploring key concepts such as quitting, dependency, addiction, peer pressure, and even smoking. For example, some youth may not identify themselves as smokers, even though they would be considered smokers by the adult definition. It is also important to pay attention to the developmental stage of adolescents so that the words used match the adolescents’ stage of cognition.³⁴ Finally, qualitative research is needed to identify technologies that will be appropriate for the age of adolescent smokers.

Research Gaps

The YTCC evidence review revealed a number of areas that warrant further research. The predominant setting for the studies reviewed was schools, and the predominant theoretical approach used was cognitive-behavioral. With this rec-

ognized dearth of studies in the area of youth tobacco cessation, it is important to study a variety of settings, using a variety of theoretical methods, and delivered by a variety of providers if we are to better understand how to best help youth quit smoking. The following section summarizes a number of research areas that warrant further study.

Youth characteristics. It remains unclear whether different approaches are needed based on youth characteristics. Youth characteristics might include sociodemographic factors, psychosocial, or developmental characteristics that identify particular phenotypes of youth smokers. Identifying these factors may help researchers tailor interventions, frame messages for diverse audiences of smokers, and apply the most appropriate theoretical principles. For example, are there physical and/or social differences in the way that different youth – girls versus boys, or those at different ages or developmental stages – respond to cessation? Based on focus groups with adolescents, Balch reported that girls were more interested than boys in group sessions.⁴⁰ Nichter and colleagues identified the need to address the association of smoking with relaxation when working with adolescent girls.³³ Are there differences in addiction level or level of smoking that would influence how youth respond to cessation and when cessation should be offered? Colby et al found in their review of the literature that 20% to 60% of adolescents who smoke report symptoms of dependence.⁴¹ DiFranza and colleagues, in a study of 12- to 13-year-olds, found that 63% of monthly smokers reported one or more symptoms of withdrawal or nicotine dependence.⁴² Do differences among youth affect the type of intervention offered (eg, group versus individual intervention) and the ideal type of facilitator or person to deliver the intervention? Finally, do other risk behaviors, such as drinking alcohol or using other drugs, family and social support, and co-occurring mental health problems affect the success of youth tobacco cessation? Such research is vitally important to inform the future development of interventions.

Theoretical approaches. Cognitive-behavioral approaches had enough studies of high or moderate quality with consistent results to be rated as “promising” by the YTCC evidence review panel, even

though this approach and other theoretical approaches such as motivational enhancement, stage of change, response contingency, and social influences have not been studied sufficiently.⁶ The same is true with respect to pharmacological treatment approaches to adolescent cessation. Only 3 studies have been published to date assessing the nicotine patch for youth.^{21,22,43} Additional pharmacological studies should investigate the use of nicotine replacement therapies and/or bupropion.

Delivery settings and type of provider. Neither the optimal delivery setting nor the best method of delivering an intervention for helping youth quit smoking is known. Although the majority of the studies evaluated by the YTCC evidence review group were conducted in schools, additional settings have potential utility, including clinic-based settings, such as physician and dental offices, and home-based interventions. Interventions delivered to populations such as economic, policy and media interventions, and telephone quit-lines also need further study. Settings that have not been studied include youth detention centers, homeless shelters, community centers, and churches. It is also important to determine the type of provider that will have the greatest success in helping youth quit tobacco. Can peers or family members, including parents and siblings, be effective interventionists? Are health care providers, such as physicians, nurses, dentists, dental hygienists and physician assistants, useful for adolescent cessation? For school settings, are school staff more effective than facilitators from the outside? Also, given technological advances and access by youth, would they prefer programs delivered via the Internet and/or interactive CD-ROMs? Finally, what is the minimum amount of contact needed to increase the odds of quitting, how many sessions are required, how long should they last, and how frequently should they be held for various settings and types of providers? Pilot studies are needed to experimentally test materials prior to conducting randomized trials in order to assess effect on intended constructs and processes.

Research Reporting

For many of the studies reviewed by the YTCC evidence review panel, omissions

in reporting or documentation of key components made it difficult to evaluate their quality. Consequently, a number of studies were not rated as highly as they could have been. The YTCC evidence review panel emphasizes the importance of reporting the following components in any published youth tobacco cessation study:

1.Theoretical framework. Briefly describe the theoretical approach used and how closely the intervention adhered to the theory.

2.Content and components. Briefly describe the activities or structure. Were self-help materials, facilitated group work, peer support, and reactive telephone support included?

3.Intensity and duration. On average, how much total contact time did program providers and participants have? Report the number sessions provided, the length of each session, and the number of weeks in which the sessions were conducted (eg, 8 sessions, of one hour each over a 4-week period).

4.Site(s). Describe the location(s) where the intervention was delivered, such as schools or physician offices.

5.Timing. Describe when the intervention was delivered (eg, before school, during lunch breaks, weekends) including the time of year the intervention was offered.

6.Implementation. Indicate the quality of implementation, including whether measures were taken to assure the intervention was implemented as planned, the extent to which the participants made use of the intervention components, and the extent to which the intervention influenced the main intended constructs (eg, whether self-efficacy was changed by an intervention designed to do so).

7.Provider characteristics. Describe the type of person who delivered the intervention, such as teacher, peer, nurse, health educator, or physician. Include whether the person was internal (eg, teacher in school) or external (eg, health educator not on school staff). Also report the type and length of training required, if applicable.

8.Design. Briefly describe the study design (eg, experimental, quasi-experimental, nonexperimental) including other relevant descriptors, such as whether study participants were matched.

9.Inclusion/exclusion criteria. Describe in detail the study participants,

including their level of smoking (eg, daily, weekly, monthly, and average number of cigarettes per day), if applicable; age, grade level, race/ethnicity, and whether participants' enrollment was voluntary or mandatory (eg, students were enrolled because they were caught smoking).

10. Sample size. Include the number of participants in all arms of the study at the beginning and end of the intervention, and at follow-up.

11. Follow-up. Include the percent retained in the study at follow-up in each arm, differences between completers and dropouts, percent completing all sessions, quit rates for each study arm, whether intent-to-treat analysis was used to calculate quit rates, and time of follow-up when quit rates were assessed. Be specific: For example, do quit rates assessed at 3 months mean 3 months since the start of the intervention, from the end, after the quit date, or after the last booster session? Intent-to-treat analysis assumes that those who dropped out are still smoking and should be included in the quit rates as having not quit.

12. Outcome measures. Be specific about what measure was used to calculate the quit rate, (eg, 7- or 30-day abstinence, point prevalence or continuous abstinence from all tobacco products). Include other relevant secondary outcome measures such as longest time of abstinence, number of quit attempts, or reduction in amount and frequency of smoking.

13. Confirmation of self-report. Indicate whether a method of validation was used to confirm self-report, and if so, what cutoff point was used to determine use versus abstinence and the outcome.

Additional study components may be necessary to report, depending on the type of study conducted, but this list represents the most salient from the YTCC evidence review panel. Word and page limitations are certainly a reality in publishing any scientific research project. Consequently, if key components are reported in published literature other than the outcomes paper, the outcomes paper should be clear in stating this and referencing the relevant articles.

Summary

Research is needed to address the methodological issues detailed in this review. Concurrently, we need to increase our knowledge base about interventions

that work. To facilitate literature reviews and meta-analysis, methodological details and intervention outcomes need to be reported as comprehensively as possible.

Numerous research projects and other activities are currently underway and funded by YTCC member organizations that address methodology and research gaps. Giovino et al are conducting the Assessing Youth Smoking Cessation Needs and Practices study, a 2-year longitudinal study of 16- to 20-year-old smokers. Results will provide much needed information regarding youth and young adults' natural quitting processes and methods used to quit tobacco. This study, funded by the Robert Wood Johnson Foundation (RWJF) and National Cancer Institute (NCI), will begin in mid-2003. The Helping Young Smokers Quit project, directed by Curry et al, is an evaluation of youth cessation programs from a representative sample of over 400 communities in the United States. Best and worst practices within these youth tobacco cessation programs will be identified in this evaluation, which began September 2002 and is funded by RWJF, NCI, and CDC. In addition, a "Measures Guide for Adolescent Tobacco," currently under development by Colby and colleagues and funded by NCI, will provide a web-based guide of standardized and psychometrically sound tobacco measures for use in tobacco interventions with youth. Additional research activities are outlined by Orleans and colleagues.⁴⁴

Recent papers have detailed the current landscape of funding for youth tobacco research and examined the science of youth tobacco cessation.^{45,46} Searches of the National Institutes of Health (NIH) research projects database (Computer Retrieval of Information on Scientific Projects – CRISP) and the California Tobacco-Related Disease Research Program Web site found 54 studies addressing youth smoking cessation funded by 10 organizations in fiscal years 2000, 2001, and 2002.^{47,48} Table 1 provides a summary of these studies, including funding organization, principal investigator, institution, and title.

These studies will undoubtedly help build the research foundation for finding effective ways to help youth quit smoking. The member organizations of the YTCC are committed to finding answers to the

Table 1
Youth Smoking Cessation Research Funded in Fiscal Years
2000, 2001, or 2002

Funding Organization	PI	Institution	Title of Project
Agency for Healthcare Research and Quality	Horn, Kimberly	West Virginia U.	Rural Emergency Department as Access Point for Teen Smoking Intervention
California Tobacco-Related Disease Research Program	Berman, Barbara	U. of California, Los Angeles	School-Based Anti-Tobacco Programs for Deaf/HH Youth
California Tobacco-Related Disease Research Program	Berman, Barbara	U. of California, Los Angeles	Anti-Tobacco Programming: Reaching the Deaf and Hard of Hearing
California Tobacco-Related Disease Research Program	Dent, Clyde	U. of Southern California	Nicotine Replacement in School-Based Cessation
California Tobacco-Related Disease Research Program	Hoika, Lillian	U. of California, San Francisco	Tobacco Cessation: Lake County Adolescents
California Tobacco-Related Disease Research Program	Johnson, C. Anderson	U. of Southern California	Lowering Smoking & ETS Risks in Immigrant Pacific Rim Youth
California Tobacco-Related Disease Research Program	Myers, Mark	U. of California, San Diego	Smoking Treatment for Substance Abusing Adolescents
California Tobacco-Related Disease Research Program	Pentz, Mary Ann	U. of Southern California	School Tobacco Program and Policy Trial
California Tobacco-Related Disease Research Program	Sussman, Steve	U. of Southern California	Motivation-Enhanced Teenage Tobacco Use Cessation
California Tobacco-Related Disease Research Program	Woodruff, Susan	San Diego Foundation	Virtual World Internet Chat Room for Teen Smoking Cessation
California Tobacco-Related Disease Research Program	Woodruff, Susan	San Diego Foundation	Pilot Test of a 3-D Chat Room for Rural Teen Smokers
Fogerty International Center	Perry, Cheryl	U. of Minnesota, Twin Cities	Mobilizing Youth for Action Against Tobacco in India
National Cancer Institute	Biener, Lois	U. of Massachusetts	Denormalizing Smoking via Policy and Media Interventions
National Cancer Institute	Brown, Richard	Butler Hospital, Providence, RI	Smoking Cessation in Teens with Comorbid Psychopathology
National Cancer Institute	Buller, David	AMC Cancer Research Center, Denver, CO	Arresting Smoking Uptake Using Interactive Multimedia
National Cancer Institute	Chiauszi, Emil	Inflexxion, Inc., Newton, MA	Computerized Nicotine Cessation for Adolescents
National Cancer Institute	Churchill, Russell	American Research Corporation of Virginia	Teen Smoking Prevention and Cessation Through Multimedia

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**Table 1 (continued)
Youth Smoking Cessation Research Funded in Fiscal Years
2000, 2001, or 2002**

Funding Organization	PI	Institution	Title of Project
National Cancer Institute	Engelberg, Moshe	Researchworks, Inc., San Diego, CA	Teen Lifestyle Computer Game to Reduce Cancer Risk
National Cancer Institute	Hollis, Jack	Kaiser Permanente Foundation Research Institute	Patient Focused Cancer Control in an HMO Population
National Cancer Institute & National Institute on Drug Abuse	Johnson, C. A.	U. of Southern California	Transdisciplinary Tobacco Use Research Center
National Cancer Institute	Kaplan, Celia	U. of California, San Francisco	Among Latino Youth – Longitudinal Health Behaviors Study
National Cancer Institute	Killen, Joel	Stanford U.	NRT & Zyban for Smoking Cessation Among High-Risk Teens
National Cancer Institute	Klecan, Debra	U. of New Mexico	Tobacco Cessation Project for Native American Youth
National Cancer Institute	Lazovich, Deann	U. of Minnesota, Twin Cities	Smoking Prevention and Cessation Among Older Adolescents
National Cancer Institute	Lipkus, Isaac	Duke U.	Message Framing Effects on Youth's Smoking Behavior
National Cancer Institute	Lipkus, Issac	Duke U.	Recruiting Teens into a Self-Help Quit Program
National Cancer Institute	McAlister, Alfred	U. of Texas Health Science Center, Houston	Texas Multi-Cultural Regional Community Tobacco Studies
National Cancer Institute	Muromoto, Myra	U. of Arizona	Bupropion Treatment for Youth Smoking Cessation
National Cancer Institute	Murray, Nancy	U. of Texas Health Science Center, Houston	Parent Assisted Smoking Cessation
National Cancer Institute	Ossip-Klein, Deborah	U. of Rochester	Primary Care and Self Help Intervention for Teen Smokers
National Cancer Institute	Patten, Christi	Mayo Clinic	Internet Home-Based Treatment for Adolescent Smokers
National Cancer Institute	Pbert, Lori	U. of Massachusetts	Provider and Peer Delivered Youth Smoking Intervention
National Cancer Institute	Peterson, Arthur	Fred Hutchinson Cancer Research Center	Proactive Smoking Cessation for Adolescents
National Cancer Institute	Pierce, John	U. of California, San Diego	Behavioral Research in Cancer Prevention

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Table 1 (continued)
Youth Smoking Cessation Research Funded in Fiscal Years
2000, 2001, or 2002

Funding Organization	PI	Institution	Title of Project
National Cancer Institute	Prokhorov, Alex	U. of Texas, MD Anderson Cancer Center	Teen Smoking Prevention and Cessation Via CD ROM Program
National Cancer Institute	Prochaska, James	U. of Rhode Island	School Computer Programs for Teens for Six Cancer Risks
National Cancer Institute	Riley, William	Personal Improvement Computer Systems, Reston, VA	Tobacco Free High Schools: A Student Marketing Approach
National Cancer Institute	Tercyak, Kenneth	Georgetown U.	Pediatric Cancer Prevention and Control
National Cancer Institute	Toborg, Mary	Toborg Associates, Inc., Washington, DC	Resource Kit for Adolescent Smoking Cessation
National Cancer Institute	Wakefield, Melanie	U. of Illinois, Chicago	Youth Smoking and Media
National Cancer Institute	Worden, John	U. of Vermont	Mass Media Interventions to Reduce Youth Smoking
National Heart, Lung, and Blood Institute	Joseph, Christine	Henry Ford Health Sciences Center	A Tailored Asthma Education Program for Urban Teens
National Heart, Lung, and Blood Institute	Robinson, Leslie	U. of Memphis	Smoking Onset in a Biethnic Population
National Heart, Lung, and Blood Institute	Robinson, Leslie	U. of Memphis	Developing a Smoking Cessation Program for Adolescents
National Institute for Nursing Research & National Cancer Institute	Sorensen, Glorian	Dana-Farber Cancer Institute	Tobacco Use Prevention and Cessation for Employed Youth
National Institute of Child Health and Human Development	Hurt, Richard	Mayo Clinic	Bupropion and Behavioral Treatment for Younger Smokers
National Institute of Child Health and Human Development	Rice, Virginia	Wayne State U.	Arab American Youth: Tobacco Use and Intervention
National Institute of Dental and Craniofacial Research	Lando, Harry	U. of Minnesota, Twin Cities	Adolescent Smoking Cessation in Dental Practices
National Institute on Drug Abuse	Hoffman, Jeffrey	Danya International, Inc., Silver Spring, MD	Smoking Cessation Intervention for Youth
National Institute on Drug Abuse	Klesges, Robert	U. of Memphis	School-Based Smoking Cessation Program for Adolescents

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**Table 1 (continued)
Youth Smoking Cessation Research Funded in Fiscal Years
2000, 2001, or 2002**

Funding Organization	PI	Institution	Title of Project
National Institute on Drug Abuse	Monti, Peter	Brown U.	Motivational Interviewing for Teen Smokers in the ER
National Institute on Drug Abuse	Roll, John	Friends Research Institute, Los Angeles, CA	Adolescent Smoking Cessation
National Institute on Drug Abuse	Weden, Margaret	Johns Hopkins U.	Gender, Race, Ethnicity & Smoking Initiation & Cessation
National Institute on Drug Abuse	Winkleby, Marilyn	Stanford U.	High-Risk Teen Tobacco Use Prevention Through Advocacy

most salient research questions, but this type of effort takes coordination and collaboration. The YTCC provides a way for members of funding organizations to work together to improve the future of youth tobacco cessation.

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