



# **Tobacco Prevention and Cessation for Youth with Mental Illnesses and Substance Abuse Disorders:**

## **Current Knowledge & Suggested Directions**

**Prepared for the  
State Tobacco Education &  
Prevention Partnership**

**Colorado Department of  
Public Health and Environment**

**October 2008**

**Prepared By:**

**The Behavioral Health & Wellness Program  
Department of Psychiatry  
University of Colorado Denver**

**Jeanette Waxmonsky, Chad Morris, Mandy Graves,  
Karen Devine, Scott LeBeau, Tamara DeHay**

**October 2008**



For additional Information please contact:

Chad D. Morris, Ph.D.  
Associate Professor  
Director, Behavioral Health & Wellness Program  
University of Colorado Denver, Anschutz Medical Campus  
Department of Psychiatry  
Campus Box F478  
1784 Racine Street  
Aurora, Colorado 80045  
(p) 303.724.3709  
(f) 303.724.3717  
chad.morris@ucdenver.edu

**Funding for this project was provided with proceeds from the Colorado tobacco tax, which is administered by the Prevention Services Division at the Colorado Department of Public Health and Environment (CDPHE). CDPHE disclaims responsibility for any analyses, interpretations, or conclusions**

# **Tobacco Prevention and Cessation for Youth with Mental Illnesses and Substance Abuse Disorders: Current Knowledge & Suggested Directions**

## **EXECUTIVE SUMMARY**

This report focuses on the tobacco cessation needs of youth with mental illnesses and substance abuse disorders, including adolescents (13-17 years old) and transitional age youth (ages 18-25 years old). The Behavioral Health and Wellness Program team at the University of Colorado Denver prepared this report to inform the development of effective tobacco control interventions for youth served by the public mental health and substance abuse systems.

To accomplish this goal we completed a multi-method environmental scan and needs assessment to identify recommendations and actionable steps for a pilot intervention(s) for this population. Based on extensive literature review of behavioral and pharmacotherapy interventions and results from focus groups and key informant interviews, we provide recommendations for future tobacco control efforts for this population, including options for adapting, piloting and diffusing cessation strategies to youth with mental illnesses.

Findings support the need for the development of targeted tobacco control interventions for the priority population, and reveal that this need is largely unmet. In summary, we recommend the following next steps in regard to future tobacco control efforts for this population. We recommend that:

- **Tobacco prevention and cessation interventions should be integrated into existing mental health and substance abuse treatment programs.**
- **Although the research is limited, tools exist and should be utilized to serve the cessation needs of youth with mental illnesses and substance abuse disorders.**
- **Providers should be encouraged to use low-burden interventions with all youth and their family members.**

The above recommendations are expanded upon in the report. Although attention to tobacco cessation is currently quite limited in the public health system (e.g., mental health and substance abuse), there is widespread community interest in tobacco cessation strategies and a great need for education and resources regarding evidence-based prevention and treatment options. Community health centers' ability to treat and monitor symptoms through pharmacotherapy and psychosocial interventions makes these settings a logical place to address the high prevalence of tobacco use among youth clientele.

**Tobacco Prevention and Cessation for Youth with Mental  
Illnesses and Substance Abuse Disorders:  
Current Knowledge & Suggested Directions**

**TABLE OF CONTENTS**

<b>I. Introduction</b>	<b>2</b>
<b>II. Methodology</b>	<b>3</b>
<b>III. Literature Review</b>	<b>3</b>
<b>IV. Qualitative Data Findings</b>	<b>16</b>
<b>V. Recommendations</b>	<b>19</b>
<b>VI. References</b>	<b>21</b>
<b>Appendix I. Literature Review</b>	<b>27</b>
<b>Appendix II. Key Informants &amp; Focus Groups</b>	<b>50</b>
<b>Appendix III. Recommendations for Toolkit Changes</b>	<b>51</b>

# **Tobacco Prevention and Cessation for Youth with Mental Illnesses and Substance Abuse Disorders:**

## **Current Knowledge & Suggested Directions**

---

### **I. INTRODUCTION**

This report focuses on the tobacco cessation needs of youth with mental illnesses and substance abuse disorders, including adolescents (13-17 years old) and transitional age youth (ages 18-25 years old). The Behavioral Health and Wellness Program team at the University of Colorado Denver prepared this report to inform the development of effective tobacco control interventions for youth served by the public mental health and substance abuse systems. To accomplish this goal we completed a multi-method environmental scan and needs assessment to identify recommendations and actionable steps for a pilot intervention(s) for this population.

#### **Report Structure**

After briefly discussing our methodology, this report provides:

- ✓ An updated literature review of behavioral and pharmacotherapy interventions for smoking cessation in youth with mental illnesses and substance abuse. Effective cessation strategies and current best practices for tobacco control are identified.
- ✓ Preliminary qualitative data from youth focus groups and key informants on the barriers and opportunities for recruiting and retaining these youth in cessation programs.
- ✓ Analysis of strengths and limitations of the current mental health provider toolkit and other STEPP resources for youth with mental illnesses and substance abuse disorders.
- ✓ Potential directions for youth with mental illnesses and substance abuse disorders based on combined data from the literature review, key informants, and focus groups. Options for adapting, piloting and diffusing cessation strategies to this population are included.

## **II. METHODOLOGY**

### **Literature Review**

A literature review was conducted to: (1) Identify the factors associated with tobacco use for adolescents with mental illnesses; and (2) Summarize the existing evidence base for tobacco cessation intervention with this population. The review included the 2008 Tobacco Cessation Guidelines as well as literature published from January 1975 through August 2008. The search was conducted using Medline, PsychInfo, and the U.S. National Library of Medicine PubMed databases. A total of 27 intervention studies, 10 review articles, and 13 correlational studies were identified and reviewed.

### **Qualitative Data from Key Informants and Focus Groups**

Use of both key informant interviews and youth focus groups allowed us to collect information from individuals with diverse perspectives on the tobacco control needs of youth with mental illnesses and substance abuse disorders. Key informants were identified using existing community contacts and “snowball” sampling, whereby initial key informants suggested further relevant contacts. Interviews were conducted by telephone or in person and lasted between 30 and 60 minutes. Twenty interviews were completed and included mental health providers, primary care providers, STEPP tobacco cessation staff, families, and youth tobacco researchers.

Six focus groups augmented the key informant interviews. Twenty-four (24) youth ages 13-22 years old participated in focus groups. Participants were youth receiving services at community mental health settings. Three community mental health centers (i.e., Larimer, San Luis Valley, Aurora) identified interested youth who were then consented into focus groups by University of Colorado Denver staff. Focus groups were digitally recorded and then transcribed. Content analysis was utilized in order to extract themes.

## **III. LITERATURE REVIEW**

This literature review is organized into several sections. We begin by providing tobacco use prevalence data for youth with mental illnesses and substance abuse disorders. Risk factors and correlates of smoking follow. We then present what is known regarding intervening with youth generally, and then we explore special considerations for youth with psychiatric and substance abuse disorders including anxiety, attention deficit / hyperactivity disorder, depression, bipolar disorder, disruptive behavior disorders, psychotic disorders, and co-occurring substance abuse. We conclude the literature review by discussing measurement issues when working with youth. The literature referenced is also presented in detailed tables found in Appendix I.

## **Prevalence**

In the U.S., 28.4% of high school students report using some sort of tobacco product (23% report cigarette use, 8% report smokeless tobacco use, and 14% report cigar use; ("Use of cessation methods among smokers aged 16-24 years--United States, 2003," 2006). Unfortunately, research indicates that the earlier in life one begins to smoke, the more addicted they are likely to become (Redmond, 2002). The CDC (1994) reports that 43% of people between the ages of 10 and 22 years who smoke as few as three cigarettes a day become habitual smokers. Also the largest proportion of smokers is among people between the ages of 18 and 24 years ("Smoking Cessation Resources Fact Sheet", 2004). Among adult daily smokers, 89% reported that they tried their first cigarette and were daily smokers at or before age 18 ("Preventing tobacco use among young people. A report of the Surgeon General. Executive summary," 1994).

Adolescents vastly underestimate nicotine's addictiveness, believing that they will not become regular smokers. Of the 70.2% of adolescents who have tried smoking, 35.8% will become daily smokers during high school ("Selected cigarette smoking initiation and quitting behaviors among high school students--United States, 1997," 1998). Adolescents who smoke often fail to consider their future health and thus continue to be unaware of the harmful effects of smoking and the addictive nature of tobacco (Fritz, Wider, Hardin, & Horrocks, 2008). Nearly three out of four adolescent smokers have made at least one serious quit attempt and have failed to quit smoking (Moss, Allen, Giovino, & Mills, 1992).

Similar to adult psychiatric populations, smoking appears highly prevalent among adolescents with psychiatric and substance abuse disorders (Brown, Lewinsohn, Seeley, & Wagner, 1996; Upadhyaya, Deas, Brady, & Kruesi, 2002). One study found that among children and adolescents hospitalized for psychiatric disorders (ages 8-18 years old), 47 out of 120 or 39.4% were current smokers (Upadhyaya, Brady, Wharton, & Liao, 2003). MacPherson and colleagues found that for 183 adolescents with psychiatric disorders (excluding current psychotic disorders, violent behavior, or cognitive impairment), 58.5% were regular smokers (MacPherson, et al., 2007). Adolescent smokers with psychiatric disorders appear to be at increased risk for tobacco dependence by adulthood than those without psychiatric disorders (M. G. Myers & Brown, 2005). The mean age of smoking initiation for this group of 13-17 year olds was 11.2 years with a progression to weekly smoking by 12.6 years (MacPherson, et al., 2007). Among adolescents with psychiatric disorders served in the public mental health system in Colorado, the prevalence rate of smoking was 19.6%, but this number is likely much lower than the actual prevalence rate because findings were based on self-report (Morris et al., 2006).

## **Risk Factors and Correlates of Smoking**

Adolescents in the general population experiment with or begin regular tobacco use for a number of reasons related to age related social and parental norms, tobacco advertising, peer pressure, parental smoking, weight control, and curiosity (Fiore, 2000; Pierce, Choi, Gilpin, Farkas, & Berry, 1998; Preventing tobacco use among young people. A report of the Surgeon General. Executive summary," 1994). Factors associated with youth tobacco use include low socioeconomic status, use and approval of tobacco use by peers or siblings, smoking by parents or guardians, accessibility, availability and price of tobacco products, a belief that tobacco use is normative, lack of parental support or involvement, low levels of academic achievement, lack of skills to resist negative influences, low self-image or self-esteem, and belief in the benefits of tobacco use ("Preventing tobacco use among young people. A report of the Surgeon General. Executive summary," 1994; Reducing tobacco use: a report of the Surgeon General: executive summary," 2000). A recent study found among 217 youths (mean age 12.2 years) that an experience of relaxation in response to the first dose of nicotine was the strongest predictor of later tobacco dependence (DiFranza, Savageau, Fletcher, Pbert, et al., 2007). Tobacco dependence was also predicted by familiarity with Joe Camel, novelty seeking, and depressed mood (DiFranza, Savageau, Fletcher, O'Loughlin, et al., 2007). Additionally, tobacco use in adolescence is associated with many other health risk behaviors, including higher risk sexual behavior and use of alcohol or other drugs ("Preventing tobacco use among young people. A report of the Surgeon General. Executive summary," 1994).

Adolescents who smoke are at significantly increased risk for mental illnesses and other substance abuse problems. They are three times more likely to drink alcohol, eight times more likely to smoke marijuana, and 22 times more likely to use cocaine than adolescents who do not smoke ("Effect of ending an antitobacco youth campaign on adolescent susceptibility to cigarette smoking--Minnesota, 2002-2003," 2004). Psychiatric disorders such as Attention-Deficit/Hyperactivity Disorder (ADHD), disruptive behavioral disorders, anxiety, depression, and psychotic disorders have been associated with increased smoking rates for adolescents (Brown, et al., 1996; Milberger, Biederman, Faraone, Chen, & Jones, 1997). Adolescents who become regular smokers are also more likely to report heightened levels of stress, depression, and anxiety (Brown, et al., 1996; Chassin, Presson, & Sherman, 1984; Escobedo, Reddy, & Giovino, 1998; Koval, Pederson, Mills, McGrady, & Carvajal, 2000; Patton, et al., 1996; Pederson, Ahluwalia, Harris, & McGrady, 2000; Sonntag, et al., 2000; Stein, Newcomb, & Bentler, 1996).

## **Intervening with Youth**

### ***General Guidelines***

Tobacco cessation using the 5A's method (Ask-Advise-Assess-Assist-Arrange) is recommended to be offered on a regular basis to all adolescents who smoke (Fiore, 2000; Rosen & Maurer, 2008; Tobacco Use Prevention and Cessation for Adults and Mature Adolescents Executive Summary," 2004). People entering a healthcare setting should be asked about their tobacco use status and tobacco use should be documented. Providers should advise all tobacco users to quit and then assess their willingness to make a quit attempt. Persons who are ready to make a quit attempt should be assisted in the effort. Follow up should then be arranged to determine the success of quit attempts.

The full 5 A's model as presented above is most appropriate for agencies and organizations that have tobacco cessation medications and/or behavioral services available for consumers. For agencies and organizations that do not have tobacco cessation services readily available, the 2A's and R (Ask, Advise, and Refer) model is now being employed. This allows sites to provide some level of intervention and then make appropriate referrals. Current trials of the 2A's and R model are being conducted at the Children's Hospital of Colorado with moderate success in reducing parent and youth smoking (Diane Herrick, personal communication).

Whether using the 5A's or 2A's and R models, health providers in all settings should screen and document youth smoking status. Asking adolescents about smoking when their parent or guardian is not present may yield more accurate answers (Rosen & Maurer, 2008). To protect children from secondhand smoke, clinicians can also ask parents about tobacco use and offer them cessation advice and assistance. If youth or parents are smoking, clinicians should strongly encourage complete abstinence (Milton, Maule, Backinger, & Gregory, 2003; Rosen & Maurer, 2008).

For those settings able to offer services to nicotine dependent youth, combinations of counseling, nicotine replacement therapy (NRT), and other psychoactive medications (e.g., bupropion SR) are being utilized (Hanson, Allen, Jensen, & Hatsukami, 2003; Hurt, et al., 2000; Killen, et al., 2004; Moolchan, et al., 2005; Rosen & Maurer, 2008; Smith, et al., 1996; Upadhyaya, Brady, & Wang, 2004). Counseling has been shown to be effective in the treatment of adolescent smokers, and adolescent smokers should be provided with counseling interventions to aid them in quitting smoking ("A clinical practice guideline for treating tobacco use and dependence: 2008 update. A U.S. Public Health Service report," 2008).

Guidelines differ on the use of NRT for youth. The PHS 2008 Clinical Guideline does not recommend use of NRT or bupropion SR for adolescents as there is

little evidence to date that these medications are effective in promoting long-term smoking abstinence. On the other hand, the Institute for Clinical Systems Improvement (ICSI) Health Care Guideline for Patients and Families: Tobacco Prevention Cessation for Children, ("Health Care Guideline fro Patients and Families: Tobacco Prevention and Cessation for Children," 2005) recommends aggressive treatment intervention for smoking cessation in adolescents age 16 years or older, including NRT and/or other pharmacotherapy.

### ***Prevention Strategies***

There are no tobacco use prevention programs that are directly targeted toward youth with mental illnesses, but there have been studies of youth prevention programs in the general population. School-based prevention programs typically have only short term effects on adolescents (Ranney, et al., 2006). Successful programs are grade, age, and culture appropriate, focusing on the immediate consequences of smoking and on coping strategies (Rosen & Maurer, 2008; Sussman, Lichtman, Ritt, & Pallonen, 1999).

A recent Cochrane review, (Sowden, Arblaster, & Stead, 2003) examined randomized and non-randomized studies of multi-component community interventions for smoking prevention in youth in the general population (below age 25 years), comparing them to no intervention, single component, and school-based programs. The review found that there was some evidence that coordinated multi-component programs can reduce smoking among young people more effectively than single component strategies. For example, one study found that smoking prevalence was lower for a group receiving a media, school, and homework intervention when compared to a group receiving the media component only (Sowden, et al., 2003).

### ***Cessation Strategies***

There is not yet sufficient evidence for the effectiveness of smoking cessation programs for adolescents. Few empirical studies to date have rigorously examined the tobacco cessation processes and interventions for adolescents in general, and less so for adolescents with psychiatric disorders (MacPherson, et al., 2007). We do know that more than half of adolescent smokers report intentions to quit smoking and a majority also report prior cessation attempts (Burt & Peterson, 1998; Ershler, Leventhal, Fleming, & Glynn, 1989; Stanton & McGee, 1996; Sussman, Stacy, Ames, & Freedman, 1998); however, data on the duration of adolescent abstinence following cessation attempts demonstrate a frequent and rapid return to smoking (Burt & Peterson, 1998; Pierce, et al., 1998; Zhu, Sun, Billings, Choi, & Malarcher, 1999). Thus, it appears that a majority of adolescent smokers desire to quit smoking and engage in cessation attempts, yet experience little success. While cessation studies with youth have demonstrated smoking reduction or increased cessation rates immediately after treatment interventions, these gains were typically lost at long term follow-up.

Based on the existing evidence, it appears that interventions that incorporate longer intervention periods as well as booster sessions are warranted.

One of the earliest literature reviews found that most intervention studies with adolescents demonstrate reductions in overall daily smoking but that interventions lead to low abstinence rates (Sussman, et al., 1999). A meta-analysis calculated average quit rates across 66 youth cessation studies and found an immediate post-program quit rate of about 14% for intervention groups compared to about 7% for control groups (Sussman, 2002). Intervention approaches from these studies included the eight theoretical frameworks below, with many intervention studies using more than one of these strategies:

- 1) Social influence models, such as teaching ways to combat social influences or perceptions that promote tobacco use;
- 2) Cognitive-behavioral approaches, which emphasize self-management and skills training;
- 3) Motivational enhancement, in which the emphasis is placed on clarifying ambivalent feelings about quitting and highlighting positive expectations about cessation;
- 4) Response-contingent reinforcement, where incentives are given for behavioral change;
- 5) Supply reduction approaches, which tend to be more typical of policy programs, and are usually either focused on price or restricting access to tobacco;
- 6) Addiction focused approaches, which include pharmacological approaches or other ways of coping with withdrawal;
- 7) Transtheoretical model of change (stages of change) approaches, in which interventions may be tailored to an individual's level of readiness to change; and
- 8) Affect clarification, which emphasizes techniques meant to clarify conflicting feelings and moods (Mermelstein, 2003).

More recently, some complex approaches which have been tailored to the youth's preparation for quitting through behavioral therapy programs have demonstrated moderate success. Although there are few of these studies, these approaches have shown promise of leading to higher rates of continued abstinence at six months (Grimshaw & Stanton, 2006). Of the 15 controlled trials (with a total of 3,605 youth under the age of 20) meeting Cochrane Review criteria (Grimshaw & Stanton, 2006), three of these trials used or tested the transtheoretical model (stages of change) approach, two tested pharmacological aids to quitting (NRT and bupropion), and the rest used various psychosocial interventions such as motivational enhancement or behavioral management (Grimshaw & Stanton, 2006). The trials evaluating the transtheoretical

interventions achieved moderate long-term success persisting at the two-year follow up. Neither of the pharmacological intervention trials achieved statistically significant results, but both had small sample sizes with low power to detect effects (Grimshaw & Stanton, 2006).

In the general population, adolescent quit rates appear to be highest when tobacco cessation programs are school-based (Sussman, et al., 1999); however, to date there are no school programs, local or state tobacco control efforts, or tobacco prevention or cessation media campaigns in the literature that specifically target youth with mental illnesses. CDC guidelines for school health programs recommend that each school institute a policy on tobacco use, support tobacco cessation, and provide program-specific training ("Preventing tobacco use among young people. A report of the Surgeon General. Executive summary," 1994). Tobacco control education programs are more effective when combined with strong antismoking policies at the schools and when they are part of a comprehensive local or state tobacco cessation effort (Rosen & Maurer, 2008). Smoke free school zones have been found to decrease smoking rates up to 40% when the ban is implemented and enforced (Sargent & DiFranza, 2003). There is also a dose-response relationship in the number of exposures to anti-tobacco advertising and adolescents' ability to recall them (Rosen & Maurer, 2008). Exposure to at least one state-funded anti-tobacco advertisement in the previous four months was associated with lower reported rates of friends' smoking and a greater perceived harm of smoking (Emery, et al., 2005). Additional antismoking strategies that have demonstrated success in reducing smoking and smoking initiation include smoking bans at home, increased tobacco prices, and limiting access to tobacco, especially online purchasing (Rosen & Maurer, 2008).

One of the youth strategies being widely used in schools and other community settings is the Not-On-Tobacco (N-O-T) Program. SAMHSA has identified N-O-T as a model intervention program for tobacco cessation for youth 14 through 19 years of age. N-O-T is based on social cognitive theory and incorporates training in self-management and stimulus control; social skills and social influence; stress management; relapse prevention; and techniques to manage nicotine withdrawal, weight management, and family and peer pressure ("Not On Tobacco - SAMHSA Model Programs," 2008). The N-O-T program emphasizes experiential learning, in which youth have opportunities to identify and practice positive coping skills. The programs employ role-playing and rehearsal, journaling, and relaxation techniques. Youth learn social and emotional competence by developing skills to seek positive social support and learning alternative ways to cope with problems (instead of smoking). N-O-T consists of ten weekly, 50-minute group sessions for 10 consecutive weeks with four optional booster sessions. Teachers, school nurses, counselors, other staff, and volunteers receive special training from the American Lung Association (ALA) to facilitate group sessions in schools and other community settings. A review of multiple studies has found some effectiveness across these programs (Grimshaw & Stanton, 2006), but it appears that the programs utilizing multiple intervention strategies are the most effective.

For instance, three interventions (5 trials) using cognitive behavioral therapy did not individually achieve statistically significant results (Grimshaw & Stanton, 2006). It was the complex approaches that showed continued abstinence at six months, especially those incorporating stages of change interventions.

### ***Pharmacotherapy***

The U.S. Food and Drug Administration has not approved any tobacco cessation medications for adolescents (Rosen & Maurer, 2008). Medications such as NRT, bupropion SR, and other pharmacological agents have not yet been sufficiently tested in adolescents per the PHS Clinical Guideline Update 2008 ("A clinical practice guideline for treating tobacco use and dependence: 2008 update. A U.S. Public Health Service report," 2008); however, several studies have shown that bupropion is safe and effective for smoking cessation in adolescents, with cessation rates of up to 27% at 6 months (Killen, et al., 2004; O'Connell, et al., 2004; Upadhyaya, et al., 2004). Selective serotonin reuptake inhibitors (SSRIs) have not been found to be effective in smoking cessation for adolescents. The tricyclic antidepressant nortriptyline (Pamelor), as well as the  $\alpha_2$  adrenergic agonist clonidine (Catapres) show some treatment efficacy in studies but have more negative side effects than bupropion (Rosen & Maurer, 2008). Varenicline (Chantix), a nicotinic receptor antagonist, has also not been labeled for use in adolescents (Rosen & Maurer, 2008).

### ***Nicotine Replacement Therapy***

Outcomes of clinical trials of NRT in adolescents have been mixed. Studies using the nicotine patch show a decrease in number of cigarettes smoked, but abstinence rates have been only 5% after 6 to 12 months (Hurt, et al., 2000; Smith, et al., 1996). Higher cessation rates were found in a study that combined NRT with cognitive behavioral therapy (Hanson, et al., 2003; Moolchan, et al., 2005). Hanson and colleagues (2003) conducted a double-blind, placebo-controlled, randomized trial of NRT with adolescents. Participants attended 10 treatment visits over 13 weeks. The NRT group experienced a significantly lower craving score and lower overall withdrawal symptom score in comparison to a placebo group. Moreover, the nicotine patch appeared safe for adolescents to use as no differences were found in experiences of adverse events. Another recent observational study examined whether adolescents who were not interested in quitting could significantly reduce cigarette smoking. The study compared a group receiving NRT to a placebo control group, and found that 49.4% of participants had reduced smoking by at least 50% at 6 months (Hanson, Zylla, Allen, Li, & Hatsukami, 2008).

### ***Combination Pharmacology***

Killen and associates (2004) conducted a randomized clinical trial of the efficacy of bupropion SR combined with the nicotine patch in the treatment of adolescent

smokers compared to a group receiving the patch plus placebo. Both groups also received group skills training sessions. At week 10 of the study, the patch plus placebo group actually achieved better outcomes (28% abstinence) than the patch plus bupropion group (23% abstinence). At week 26, the results were about equal with 7% of the placebo group versus 8% of the patch plus bupropion group maintaining abstinence. Although the study demonstrated a lack of treatment effect with the addition of bupropion, adolescents in both treatment groups were able to reduce their consumption of cigarettes to a few cigarettes per day or less, and maintained this reduction over time.

### ***Intervention Issues and Considerations***

In reviews of intervention trials, different definitions of quitting were often used and many smaller trials did not achieve adequate sample sizes to determine statistically significant intervention effects (Grimshaw & Stanton, 2006). Attrition and participant loss prior to follow up are a considerable problem in intervention studies for young smokers, and must be minimized in order to assure that missing data will not compromise the interpretation of study findings (Grimshaw & Stanton, 2006).

While some intervention approaches are worthy of consideration, there is a need for better evidence before any large scale investments in specific programs are made. Additional well-designed, adequately powered, randomized, controlled intervention trials are needed for adolescent smokers, with rigorous definitions of cessation (sustained abstinence that is biochemically verified) and a minimum of six months follow up.

### **Special Consideration for Psychiatric and Substance Abuse Disorders**

Interventions with demonstrated effectiveness for the general population of adolescents should also be utilized for youth with mental illnesses, but these adolescents will often require face-to-face and more intensive level of intervention ("*A Guide for Making Informed Decisions - CDC*," 2004; MacPherson, et al., 2007). Specifically for youth with mental illnesses, cognitive therapy has led to increased smoking cessation rates (McDonald, Colwell, Backinger, Husten, & Maule, 2003). Other studies investigating a combination of NRT and counseling have also demonstrated modest improvements in abstinence rates (Brown, et al., 2003; Hanson, et al., 2003; Moolchan & Schroeder, 2004; Patten, et al., 2001). There have been some disparate findings regarding the effectiveness of motivational interviewing for smoking cessation in youth with mental illnesses. Brown and colleagues (2003) found no significant difference between motivational interviewing versus brief advice interventions; however, another study found that a one session motivational interviewing intervention led to higher rates of abstinence at 6 months than brief advice (Colby, et al., 2005). One opportunity for intervening is immediately after

psychiatric treatment or hospitalizations when many adolescents have been shown to make a quit attempt. Adolescents who reduced their smoking by 50% or more immediately after an intervention maintained a lower level of smoking up to a year later (MacPherson, et al., 2007).

### ***Anxiety Disorders***

There is an association between smoking and anxiety disorders, and smoking may increase the risk of certain anxiety disorders during late adolescence and into early adulthood. Adolescents who are heavy smokers (i.e., greater than or equal to 20 cigarettes a day) have greater risk of agoraphobia, generalized anxiety disorder, and panic disorder during early adulthood; however, the reverse is not true. Anxiety disorders during adolescence are not significantly associated with chronic cigarette smoking during early adulthood (Johnson, et al., 2000). Sonntag and colleagues (2000) further found that the onset of social phobia is associated with the initiation of smoking. Anxiety in general predicts the initiation of experimental smoking, but adolescents' peer groups play a significant role in determining this association (Patton, et al., 1998). When comparing the sexes, boys with anxiety disorders started daily smoking earlier than girls with anxiety disorders (Ilomaki, et al., 2008; Ilomaki, Sodervall, Ilomaki, Hakko, & Rasanen, 2007). Across girls and boys, the presence of an anxiety disorder is associated with poorer cessation outcomes (MacPherson, et al., 2007).

### ***Attention Deficit / Hyperactivity Disorder***

Adolescents with Attention Deficit / Hyperactivity Disorder (ADHD) are more likely than other adolescents to be smokers (Upadhyaya, et al., 2004), however this association appears to be mediated by the presence of co-occurring conduct disorder (Brook, Duan, Zhang, Cohen, & Brook, 2008). Results from a longitudinal study found that childhood ADHD predicts adolescent conduct disorder, and that conduct disorder has a direct effect on increased daily smoking in adulthood for this population (Brook, et al., 2008). The authors suggest that prevention or treatment aimed at reducing conduct disorder may be most successful at reducing smoking in later life for adolescents currently diagnosed with ADHD. Lambert and Hartsough (1998) also conducted a study focusing on young adults who as children were diagnosed with ADHD. The study showed that participants with and without ADHD did not differ in age of initiation of smoking, but there was a significant difference in the age they became regular smokers. By age 17, 46% of all participants with ADHD, as contrasted with 24% of the participants without ADHD, reported smoking cigarettes daily. This difference continued into adulthood where 42% of participants with childhood ADHD were current smokers, compared to 26% of those without a childhood diagnosis of ADHD (Lambert & Hartsough, 1998).

## ***Depression***

The association between smoking and depression in adolescence has been well-established, but it remains unclear whether smoking precedes depression or vice versa. In a prospective study, smoking was found to increase the risk of developing a major depressive disorder and drug abuse / dependence after controlling for other psychiatric disorders (Brown, et al., 1996). Wu and Anthony (1999) also found that tobacco use increased the risk for later depression but depressed mood was not associated with subsequent smoking. At the same time, Munafo and colleagues (2007) found that current depressed mood and symptoms do not increase the risk of becoming regular smokers among adolescents without a psychiatric diagnosis of depression, but may increase the risk of experimenting with cigarettes, especially in the presence of negative social influences (Munafo, Hitsman, Rende, Metcalfe, & Niaura, 2007).

Suicidal ideation and attempts are also related to smoking. One study found that adolescents who had been psychiatrically hospitalized had over a twofold risk for suicide attempts if they smoked over 15 cigarettes a day (Riala, et al., 2007). Additionally, if an adolescent also smoked the first cigarette immediately after waking there was over a threefold risk of suicide attempts. Interestingly, unlike suicide attempts, suicidal ideation was not associated with smoking behavior. It was concluded that heavy daily smoking may increase the risk of suicidal behavior independent of current psychiatric diagnosis (Riala, et al., 2007).

## ***Bipolar Disorder***

Research suggests that bipolar disorder is predictive of subsequent smoking behavior, with juvenile onset bipolar disorder increasing the risk for cigarette smoking and other substance abuse disorders (West, et al., 1996; Wilens, et al., 2004). It was found that 4% of adolescents without a mood disorder smoked while the prevalence rate among adolescents with bipolar disorder was 31% (Wilens, et al., 2007). This study further found that 63% of adolescents with bipolar disorder and substance abuse disorders (including smoking) experienced full onset of bipolar disorder prior to smoking and other substance abuse, and that bipolar disorder was a significant risk factor for smoking independent of other psychiatric comorbidities including conduct disorder. This is similar to reports that bipolar disorder in adults precedes smoking and other substance abuse.

## ***Disruptive Behavior Disorders***

Brown and colleagues (Brown, et al., 1996) found significant relationships between smoking and drug abuse / dependence and between smoking and disruptive behavior disorders. Disruptive behavior disorders (e.g. conduct or oppositional defiant disorders) are significantly associated with and precede development of daily smoking in adolescents. Conduct disorder in adolescence has been well-established as an early predictor of later adult tobacco use as well

as other drug use in clinical and non-clinical samples (Brook, Whiteman, Cohen, Shapiro, & Balka, 1995). Boys with conduct and oppositional defiant disorders have an earlier onset of daily smoking than girls with these disorders, but both boys and girls with disruptive behavior disorders start smoking earlier than adolescents with other psychiatric disorders (Ilomaki, et al., 2007).

### ***Psychotic Disorders***

Psychotic disorders appear to develop secondarily to the initiation of daily smoking for both boys and girls, but the time between initiation of smoking to the onset of psychosis is longer for boys (Ilomaki, et al., 2007). It has been suggested that smoking may be a prodromal sign of schizophrenia, but there may be gender differences in this regard. Also, the time gap between smoking and the development of schizophrenia is narrower than other psychoses such as brief psychotic disorder or schizoaffective disorder (Ilomaki, et al., 2007; Riala, Hakko, Isohanni, Pouta, & Rasanen, 2005).

### ***Substance Abuse***

Adolescents with substance abuse / dependence disorders smoke at substantially higher rates than adolescents in the general population (Myers & Brown, 1994; Upadhyaya, et al., 2002). They have a high rate of smoking persistence (Myers & Brown, 1997), and increased evidence of tobacco-related health comorbidities (Myers & Brown, 1994). Baseline levels of smoking and the presence of a substance abuse disorder are important correlates of smoking and cessation outcomes (Brown, et al., 1996; MacPherson, et al., 2007).

Myers and MacPherson (2004) found that, among adolescents who received inpatient or outpatient substance abuse treatment, 62% had previously attempted smoking cessation in their lifetime and 54% reported a quit attempt within the last year. Almost half (40%) of those who had attempted to quit reported a single attempt, while 28% reported two attempts and an additional 14% reported three cessation attempts. Within a year, 98% of those who had tried to quit were smoking again, half of these having started to smoke again within one week of the quit attempt. Most of these quit attempts were abrupt and often unassisted (e.g., no counseling or NRT). These youth cited concern about their health as the most primary reason for quitting, closely followed by their perception that this was a “nasty habit” (Myers & MacPherson, 2004).

There is limited evidence for a youth smoking reduction and cessation intervention consisting of 6 weekly, one-hour sessions focused on motivational enhancement, nicotine as an addictive drug, smoking as a learned behavior, stimulus/ urge control strategies, social support for quitting, quit plans, and relapse prevention (Myers & Brown, 2005). Among adolescents in substance abuse treatment, participants receiving the treatment had greater cessation rates

than a control group, but these differences were seen only at the 3-month follow-up assessment.

### ***Co-Occurring Substance Abuse and Psychiatric Disorders***

Daily smoking in adolescence is associated with later alcohol/ illicit drug abuse and depressive disorders, while anxiety and conduct or oppositional defiant disorders were associated with subsequent initiation of daily smoking (Ilomaki, et al., 2007). Brown and colleagues (2003) found that, among adolescents who were hospitalized for either psychiatric and/or substance abuse disorders, those who had comorbid substance abuse disorders smoked more during follow-up even after receiving either motivational interviewing or brief advice interventions. Those youth with anxiety disorders receiving the same treatments smoked less and were more likely to be abstinent (Brown, et al., 2003).

### **Measurement Issues**

Adolescent smokers report highly variable patterns and levels of smoking (Fritz, et al., 2008). There is a need to better assess changes in tobacco use among adolescents, especially the need to distinguish whether a quit attempt has been made as well as how long the quit attempt was sustained (MacPherson, et al., 2007). Smoking reduction may lead to later cessation, but there is no gold standard for measuring smoking change across time for youth. In the adult literature, reductions of 50% or greater are predictive of later cessation outcomes (Hyland, et al., 2005), and a similar heuristic would be very useful in tracking cessation strategies for youth.

A continuous time-line, follow-back (TLFB) method may be useful for youth (MacPherson, et al., 2007). Using TLFB, information would be gathered regarding the number of cigarettes smoked, number of standard alcohol drinks consumed, and classes of illicit substances used for each of the 90 days preceding hospitalization, and at each follow-up going back to the point of the last study interview. The TLFB methodology uses a calendar format to provide temporal cues to assist in recall and assesses use of cigarettes and self-reported quit attempts at baseline and since the previous assessment.

Additional standardized measures with sound psychometric properties have been developed for studies with adolescent tobacco users. The National Cancer Institute has a Measures Guide for Youth Tobacco Research ("Measures Guide for Youth Tobacco Research," 2008) that consists of measures that were peer-reviewed, have good psychometric properties, and that were normed on adolescent populations. Some of these measures include: the Adolescent Smoking Consequences Questionnaire, the Hooked on Nicotine Checklist (HONC), the Modified Fagerstrom Tolerance Test (mFTQ).

Parental, social, and legal smoking prohibitions on tobacco use in the youth population may reduce the validity of self-report questionnaires such as the modified Fagerstrom test which ask such questions as “Do you find it difficult to refrain from smoking in places where it is forbidden?” (Franken, Pickworth, Epstein, & Moolchan, 2006). Therefore, markers of the frequency and intensity of exposure to smoke may also be useful predictors of youth smoking cessation and possibly also degree of tobacco dependence (Franken, et al., 2006).

#### **IV. QUALITATIVE DATA FINDINGS**

##### **Key Informant Interviews**

Key Informant interviews were conducted with youth mental health and substance abuse providers, youth substance abuse researchers, STEPP staff, and youth cessation intervention program staff. The following are the barriers and opportunities in regard to tobacco cessation for youth with mental illnesses and substance abuse disorders identified by key informants:

##### ***Barriers***

1. Motivation for quitting tobacco is low among adolescents, especially among those with mental health and substance abuse issues. Most adolescents are in the precontemplative stage of change about smoking, and do not believe that they are addicted to tobacco.
2. Adolescents with mental illnesses often have an attitude of fatalism; that they are going to die anyway so why bother quitting smoking. For many adolescents, their own mortality is too abstract a concept, especially because they have not experienced any long term health consequences from smoking.
3. Providers who work with youth with mental illnesses often face competing treatment demands (e.g. addressing serious mental health and substance abuse issues, truancy, etc.) such that tobacco cessation is often a low priority and does not get addressed.
4. Mental health and substance abuse providers do not systematically screen for tobacco use. Also, many mental health providers do not address tobacco use among adolescents with mental health issues even when they know adolescents are smoking.
5. Mental health centers are not addressing minor possession of tobacco.
6. Little is known about the smoking patterns of youth. Some youth report only smoking on the weekends at parties, and because they do not smoke during the week, do not see themselves as addicted.
7. There is the potential for abuse of nicotine replacement therapy (NRT patch or gum) among youth. Also there are no dosing guidelines for NRT

- for adolescents relative to the frequency with which they smoke, and adolescents may inaccurately report smoking patterns. Therefore, there is a risk associated with prescribing NRT to adolescents, especially when they may be underreporting their tobacco use.
8. Tobacco companies are actively targeting youth, as cigarette packaging is now marketed as clothing and accessory items.
  9. Successful school-based programs, such as the Not-On-Tobacco (NOT) program are not geared to address the smoking cessation needs of youth with mental illnesses.

### ***Opportunities***

1. Youth need to feel that it is their choice to quit tobacco, rather than to be told they must do so by adults.
2. Peer leaders who have quit smoking themselves are the most effective people to outreach and engage youth in smoking cessation.
3. The location for smoking cessation counseling/ intervention has to be convenient for youth. It has to be someplace that they are already going, such as the mental health center or residential facility.
4. Smoking cessation for youth with mental illnesses needs to focus on increasing coping skills, increasing emotional regulation skills, and stress reduction.
5. Smoking cessation programs need to increase youth's awareness that they are smokers and need to educate youth about the addiction cycle, especially how nicotine affects their brain chemistry. Youth do seem interested in learning about how addiction affects their brain and behavior.
6. Smoking cessation education and counseling interventions for youth need to be age- and developmentally- appropriate.
7. Younger children may respond more than older children and adolescents to education about health (e.g., 6<sup>th</sup> graders). Parents still have an influence over younger children's behavior, while older teenagers are more influenced by peers.
8. Many youth have undiagnosed mental illnesses that may be detected when addressing tobacco cessation with them.
9. Tobacco cessation programs for youth need to be tailored for geography (urban vs. rural).
10. Youth use technology such as the internet and cell phones. Such technology (e.g., cell text messages, internet) has been leveraged for tobacco cessations interventions for youth in the general population, and should be considered for youth with mental illnesses and substance abuse issues.

11. Screening for tobacco use among youth (e.g. asking and advising youth with mental illnesses to quit) is the first intervention step.

### **Focus Groups**

The following barriers and opportunities have emerged from thematic coding of statewide focus groups with youth:

#### ***Barriers***

1. Peer pressure can lead to smoking and youth may find it hard to resist smoking when they want to “look cool” in front of their peers.
2. It is hard for youth to quit smoking if their parents are smoking.
3. Smoking has benefits, such as it helps to calm one down and deal with stress and anger.
4. Telling youth to quit smoking without providing support is not effective.
5. Some youth do not appear concerned about the health effects of smoking.
6. Adults who are judgmental about smoking are not helpful to youth trying to quit tobacco.

#### ***Opportunities***

1. Peer support is helpful in quitting tobacco.
2. Providers need to give youth medication such as NRT to help them quit tobacco.
3. Youth need support from teachers, parents, and mental health providers to help them quit smoking. This support is more helpful than just telling them to quit.
4. Youth who have tried to quit smoking note that distracting themselves (e.g., listening to music) or doing other things such as chewing gum or eating sunflower seeds are helpful strategies.
7. Youth would like supportive smoking cessation groups.
8. Youth recognize that tobacco use, especially smoking, has a social stigma.
9. Tobacco free laws make it harder for youth to start smoking.
10. Youth are aware that tobacco use is unhealthy and feel that showing graphic pictures of the health effects of tobacco use might help them think about quitting.

## V. RECOMMENDATIONS

Based on a review of the literature and input from key informants and focus group participants, the below recommendations are offered.

- **Tobacco prevention and cessation interventions should be integrated into existing mental health and substance abuse treatment programs.**

Smoking prevention and cessation strategies should focus on youth with mental illnesses and substance use disorders. In comparison to the general population of youth, these individuals are prone to initiate smoking earlier, smoke more heavily, are at greater risk for tobacco dependence, and are likely to suffer greater medical comorbidities associated with smoking. Youth with anxiety disorders, Attention Deficit/ Hyperactivity Disorder, disruptive behavioral disorders, depression, psychotic disorders and substance abuse disorders are much more likely to develop tobacco dependence and have greater difficulty in quitting smoking than their peers without mental illnesses and/or substance abuse. Heavy smoking at a young age is also significantly associated with increased risk for suicide attempts. Emerging tobacco interventions need to address the unique social, biological, psychological, and developmental needs of this high risk population. Tobacco cessation programs that are active and engaging and that provide experiential learning opportunities are more readily acceptable to youth.

Since youth with mental illnesses are often served in alternative school and community mental health settings or substance abuse treatment facilities, incorporating age-appropriate tobacco cessation strategies into existing mental health and/or substance abuse treatment programs in these settings is strongly recommended.

- **Although the research is limited, tools exist and should be utilized to serve the cessation needs of youth with mental illnesses and substance abuse disorders.**

More study is necessary, but research has shown modest effectiveness among tobacco cessation interventions targeting youth with psychiatric illnesses and substance abuse. Motivational interviewing (i.e., stages of change) and cognitive-behavioral therapy strategies (e.g., developing coping skills, enhancing positive social support) appear to be the most promising tobacco cessation interventions for youth with mental illnesses. Multiple concurrent strategies have shown more promise in smoking prevention and cessation than single interventions. Such strategies might include coordinated media campaigns; school-based, family-based, and community-based interventions; and medical provider interventions

targeting secondhand smoke reduction and youth tobacco cessation in families. Meta-analysis and literature review have shown that family-oriented therapies are superior to other treatment approaches and enhance the effectiveness of other treatments. Also, while the research evidence for use of NRT and other medications is lacking for the general population, youth with mental illnesses and substance abuse disorders tend to be more nicotine dependent and might benefit from pharmacological aids during a quit attempt.

- **Providers should be encouraged to use low-burden interventions with all youth and their family members.**

All clinicians should be encouraged and trained to screen youth and family members for tobacco use and to provide a strong, personalized message that youth and family members should abstain from tobacco use. Clinicians should treat tobacco dependence as a chronic condition that requires repeated intervention. For those treatment settings unable to provide more intensive tobacco cessation interventions, asking about tobacco use and advising tobacco users to quit at every visit requires little time, but may have significant positive outcomes. As community- and hospital- based treatment sites promote screening and recording clients' tobacco use, provider awareness will increase and more intensive interventions may emerge.

## VI. REFERENCES

- Backinger, C. L., Fagan, P., Matthews, E., & Grana, R. (2003). Adolescent and young adult tobacco prevention and cessation: current status and future directions. *Tob Control, 12 Suppl 4*, IV46-53.
- Brook, J. S., Duan, T., Zhang, C., Cohen, P. R., & Brook, D. W. (2008). The association between attention deficit hyperactivity disorder in adolescence and smoking in adulthood. *Am J Addict, 17(1)*, 54-59.
- Brook, J. S., Whiteman, M., Cohen, P., Shapiro, J., & Balka, E. (1995). Longitudinally predicting late adolescent and young adult drug use: childhood and adolescent precursors. *J Am Acad Child Adolesc Psychiatry, 34(9)*, 1230-1238.
- Brown, R. A., Lewinsohn, P. M., Seeley, J. R., & Wagner, E. F. (1996). Cigarette smoking, major depression, and other psychiatric disorders among adolescents. *J Am Acad Child Adolesc Psychiatry, 35(12)*, 1602-1610.
- Brown, R. A., Ramsey, S. E., Strong, D. R., Myers, M. G., Kahler, C. W., Lejuez, C. W., et al. (2003). Effects of motivational interviewing on smoking cessation in adolescents with psychiatric disorders. *Tob Control, 12 Suppl 4*, IV3-10.
- Burt, R. D., & Peterson, A. V., Jr. (1998). Smoking cessation among high school seniors. *Prev Med, 27(3)*, 319-327.
- Campion, J., Checinski, Ken and Nurse, Jo (2008). Review of smoking cessation treatments for people with mental illness. *Advances in Psychiatric Treatment 14*, 208-216.
- Chassin, L., Presson, C. C., & Sherman, S. J. (1984). Cognitive and social influence factors in adolescent smoking cessation. *Addict Behav, 9(4)*, 383-390.
- A clinical practice guideline for treating tobacco use and dependence: 2008 update. A U.S. Public Health Service report (2008). *Am J Prev Med, 35(2)*, 158-176.
- Colby, S. M., Monti, P. M., O'Leary Tevyaw, T., Barnett, N. P., Spirito, A., Rohsenow, D. J., et al. (2005). Brief motivational intervention for adolescent smokers in medical settings. *Addict Behav, 30(5)*, 865-874.
- Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised.* (1987). (Third Edition, Revised. ed.). Washington D.C.: American Psychiatric Association.
- DiFranza, J. R., Savageau, J. A., Fletcher, K., O'Loughlin, J., Pbert, L., Ockene, J. K., et al. (2007). Symptoms of tobacco dependence after brief intermittent use: the Development and Assessment of Nicotine Dependence in Youth-2 study. *Arch Pediatr Adolesc Med, 161(7)*, 704-710.
- DiFranza, J. R., Savageau, J. A., Fletcher, K., Pbert, L., O'Loughlin, J., McNeill, A. D., et al. (2007). Susceptibility to nicotine dependence: the

- Development and Assessment of Nicotine Dependence in Youth 2 study. *Pediatrics*, 120(4), e974-983.
- Effect of ending an antitobacco youth campaign on adolescent susceptibility to cigarette smoking--Minnesota, 2002-2003 (2004). *MMWR: Morbidity and Mortality Weekly Report*, 53(14), 301-304.
- Emery, S., Wakefield, M. A., Terry-McElrath, Y., Saffer, H., Szczypka, G., O'Malley, P. M., et al. (2005). Televised state-sponsored antitobacco advertising and youth smoking beliefs and behavior in the United States, 1999-2000. *Arch Pediatr Adolesc Med*, 159(7), 639-645.
- Ershler, J., Leventhal, H., Fleming, R., & Glynn, K. (1989). The quitting experience for smokers in sixth through twelfth grades. *Addict Behav*, 14(4), 365-378.
- Escobedo, L. G., Reddy, M., & Giovino, G. A. (1998). The relationship between depressive symptoms and cigarette smoking in US adolescents. *Addiction*, 93(3), 433-440.
- Fiore, M. C., et al. (2000). Treating Tobacco use and dependence: Clinical Practice Guideline. . *U.S. Department of Health and Human Service*.
- Franken, F. H., Pickworth, W. B., Epstein, D. H., & Moolchan, E. T. (2006). Smoking rates and topography predict adolescent smoking cessation following treatment with nicotine replacement therapy. *Cancer Epidemiol Biomarkers Prev*, 15(1), 154-157.
- Fritz, D. J., Wider, L. C., Hardin, S. B., & Horrocks, M. (2008). Program strategies for adolescent smoking cessation. *J Sch Nurs*, 24(1), 21-27.
- Grimshaw, G. M., & Stanton, A. (2006). Tobacco cessation interventions for young people. *Cochrane Database Syst Rev*(4), CD003289.
- A Guide for Making Informed Decisions - CDC* (2004). *Youth Tobacco Cessation*.
- Hanson, K., Allen, S., Jensen, S., & Hatsukami, D. (2003). Treatment of adolescent smokers with the nicotine patch. *Nicotine Tob Res*, 5(4), 515-526.
- Hanson, K., Zylla, E., Allen, S., Li, Z., & Hatsukami, D. K. (2008). Cigarette reduction: An intervention for adolescent smokers. *Drug Alcohol Depend*.
- Health Care Guideline for Patients and Families: Tobacco Prevention and Cessation for Children (2005). [Guideline]. *ICS/*.
- Horn, K., Fernandes, A., Dino, G., Massey, C. J., & Kalsekar, I. (2003). Adolescent nicotine dependence and smoking cessation outcomes. *Addict Behav*, 28(4), 769-776.
- Hurt, R. D., Croghan, G. A., Beede, S. D., Wolter, T. D., Croghan, I. T., & Patten, C. A. (2000). Nicotine patch therapy in 101 adolescent smokers: efficacy, withdrawal symptom relief, and carbon monoxide and plasma cotinine levels. *Arch Pediatr Adolesc Med*, 154(1), 31-37.
- Hyland, A., Levy, D. T., Rezaishiraz, H., Hughes, J. R., Bauer, J. E., Giovino, G. A., et al. (2005). Reduction in amount smoked predicts future cessation. *Psychol Addict Behav*, 19(2), 221-225.
- Illomaki, R., Riala, K., Hakko, H., Lappalainen, J., Ollinen, T., Rasanen, P., et al. (2008). Temporal association of onset of daily smoking with adolescent substance use and psychiatric morbidity. *Eur Psychiatry*, 23(2), 85-91.

- Illomaki, R., Sodervall, J., Illomaki, E., Hakko, H., & Rasanen, P. (2007). Drug-dependent boys are more depressed compared to girls: a comorbidity study of substance dependence and mental disorders. *Eur Addict Res*, 14(3), 161-168.
- Johnson, J. G. P., Cohen, P. P., Pine, D. S. M. D., Klein, D. F. M. D., Kasen, S. P., & Brook, J. S. P. (2000). Association Between Cigarette Smoking and Anxiety Disorders During Adolescence and Early Adulthood. *JAMA*, 284(18), 2348-2351.
- Killen, J. D., Robinson, T. N., Ammerman, S., Hayward, C., Rogers, J., Stone, C., et al. (2004). Randomized clinical trial of the efficacy of bupropion combined with nicotine patch in the treatment of adolescent smokers. *J Consult Clin Psychol*, 72(4), 729-735.
- Koval, J. J., Pederson, L. L., Mills, C. A., McGrady, G. A., & Carvajal, S. C. (2000). Models of the relationship of stress, depression, and other psychosocial factors to smoking behavior: a comparison of a cohort of students in grades 6 and 8. *Prev Med*, 30(6), 463-477.
- Lambert, N. M., & Hartsough, C. S. (1998). Prospective study of tobacco smoking and substance dependencies among samples of ADHD and non-ADHD participants. *J Learn Disabil*, 31(6), 533-544.
- MacPherson, L., Strong, D. R., Kahler, C. W., Abrantes, A. M., Ramsey, S. E., & Brown, R. A. (2007). Association of post-treatment smoking change with future smoking and cessation efforts among adolescents with psychiatric comorbidity. *Nicotine Tob Res*, 9(12), 1297-1307.
- McDonald, P., Colwell, B., Backinger, C. L., Husten, C., & Maule, C. O. (2003). Better practices for youth tobacco cessation: evidence of review panel. *Am J Health Behav*, 27 Suppl 2, S144-158.
- Measures Guide for Youth Tobacco Research (2008). from [http://cancercontrol.cancer.gov/tcrb/guide\\_measures.html](http://cancercontrol.cancer.gov/tcrb/guide_measures.html)
- Mermelstein, R. (2003). Teen smoking cessation. *Tob Control*, 12 Suppl 1, i25-34.
- Milberger, S., Biederman, J., Faraone, S. V., Chen, L., & Jones, J. (1997). ADHD is associated with early initiation of cigarette smoking in children and adolescents. *J Am Acad Child Adolesc Psychiatry*, 36(1), 37-44.
- Milton, M. H., Maule, C. O., Backinger, C. L., & Gregory, D. M. (2003). Recommendations and guidance for practice in youth tobacco cessation. *Am J Health Behav*, 27 Suppl 2, S159-169.
- Moolchan, E. T., Robinson, M. L., Ernst, M., Cadet, J. L., Pickworth, W. B., Heishman, S. J., et al. (2005). Safety and efficacy of the nicotine patch and gum for the treatment of adolescent tobacco addiction. *Pediatrics*, 115(4), e407-414.
- Moolchan, E. T., & Schroeder, J. R. (2004). Quit attempts among African American teenage smokers seeking treatment: gender differences. *Prev Med*, 39(6), 1180-1186.
- Moss, A. J., Allen, K. F., Giovino, G. A., & Mills, S. L. (1992). Recent trends in adolescent smoking, smoking-uptake correlates, and expectations about the future. *Adv Data*(221), 1-28.

- Munafo, M. R., Hitsman, B., Rende, R., Metcalfe, C., & Niaura, R. (2007). Effects of progression to cigarette smoking on depressed mood in adolescents: evidence from the National Longitudinal Study of Adolescent Health. *Addiction, 103*(1), 162-171.
- Myers, M. G., & Brown, S. A. (1994). Smoking and health in substance-abusing adolescents: a two-year follow-up. *Pediatrics, 93*(4), 561-566.
- Myers, M. G., & Brown, S. A. (1997). Cigarette smoking four years following treatment for adolescent substance abuse. *Journal of Child & Adolescent Substance Abuse, 7*(1), 1-15.
- Myers, M. G., & Brown, S. A. (2005). A controlled study of a cigarette smoking cessation intervention for adolescents in substance abuse treatment. *Psychol Addict Behav, 19*(2), 230-233.
- Myers, M. G., & MacPherson, L. (2004). Smoking cessation efforts among substance abusing adolescents. *Drug Alcohol Depend, 73*(2), 209-213.
- Not On Tobacco - SAMHSA Model Programs (2008). *SAMHSA Model Programs (Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services)*
- O'Connell, M. L., Freeman, M., Jennings, G., Chan, W., Greci, L. S., Manta, I. D., et al. (2004). Smoking cessation for high school students. Impact evaluation of a novel program. *Behav Modif, 28*(1), 133-146.
- Patten, C. A., Ames, S. C., Ebbert, J. O., Wolter, T. D., Hurt, R. D., & Gauvin, T. R. (2001). Tobacco use outcomes of adolescents treated clinically for nicotine dependence. *Arch Pediatr Adolesc Med, 155*(7), 831-837.
- Patton, G. C., Carlin, J. B., Coffey, C., Wolfe, R., Hibbert, M., & Bowes, G. (1998). Depression, anxiety, and smoking initiation: a prospective study over 3 years. *Am J Public Health, 88*(10), 1518-1522.
- Patton, G. C., Hibbert, M. E., Carlin, J., Shao, Q., Rosier, M., Caust, J., et al. (1996). Menarche and the onset of depression and anxiety in Victoria, Australia. *J Epidemiol Community Health, 50*(6), 661-666.
- Pederson, L. L., Ahluwalia, J. S., Harris, K. J., & McGrady, G. A. (2000). Smoking cessation among African Americans: what we know and do not know about interventions and self-quitting. *Prev Med, 31*(1), 23-38.
- Pierce, J. P., Choi, W. S., Gilpin, E. A., Farkas, A. J., & Berry, C. C. (1998). Tobacco industry promotion of cigarettes and adolescent smoking. *JAMA, 279*(7), 511-515.
- Preventing tobacco use among young people. A report of the Surgeon General. Executive summary (1994). *MMWR Recomm Rep, 43*(RR-4), 1-10.
- Ranney, L., Melvin, C., Lux, L., McClain, E., Morgan, L., & Lohr, K. N. (2006). Tobacco use: prevention, cessation, and control. *Evid Rep Technol Assess (Full Rep)*(140), 1-120.
- Redmond, W. H. (2002). Smoking reduction among high school seniors: a test of selected indicators. *J Adolesc Health, 31*(5), 417-424.
- Reducing tobacco use: a report of the Surgeon General: executive summary (2000). [Journal Article]. *MMWR: Morbidity and Mortality Weekly Report, 49*(RR-16), 1-27.

- Riala, K., Hakko, H., Isohanni, M., Pouta, A., & Rasanen, P. (2005). Is initiation of smoking associated with the prodromal phase of schizophrenia? *J Psychiatry Neurosci*, 30(1), 26-32.
- Riala, K., Viilo, K., Hakko, H., Rasanen, P., Group, S. T.-S. R., Riala, K., et al. (2007). Heavy daily smoking among under 18-year-old psychiatric inpatients is associated with increased risk for suicide attempts. [Research Support, Non-U.S. Gov't]. *European Psychiatry: the Journal of the Association of European Psychiatrists*, 22(4), 219-222.
- Rosen, I. M., & Maurer, D. M. (2008). Reducing tobacco use in adolescents. *Am Fam Physician*, 77(4), 483-490.
- Sargent, J. D., & DiFranza, J. R. (2003). Tobacco control for clinicians who treat adolescents. *CA Cancer J Clin*, 53(2), 102-123.
- Selected cigarette smoking initiation and quitting behaviors among high school students--United States, 1997 (1998). *MMWR: Morbidity and Mortality Weekly Report*, 47(19), 386-389.
- Smith, T. A., House, R. F., Jr., Croghan, I. T., Gauvin, T. R., Colligan, R. C., Offord, K. P., et al. (1996). Nicotine patch therapy in adolescent smokers. *Pediatrics*, 98(4 Pt 1), 659-667.
- Smoking Cessation Resources Fact Sheet (2004). Retrieved August 15 2008, from [http://www.lungusa.org/site/c.dvLUK9O0E/b.44456/k.7B2A/Smoking\\_Cessation\\_Resources\\_Fact\\_Sheet.htm](http://www.lungusa.org/site/c.dvLUK9O0E/b.44456/k.7B2A/Smoking_Cessation_Resources_Fact_Sheet.htm)
- Sonntag, H., Wittchen, H. U., Hofler, M., Kessler, R. C., Stein, M. B., Sonntag, H., et al. (2000). Are social fears and DSM-IV social anxiety disorder associated with smoking and nicotine dependence in adolescents and young adults? [Research Support, Non-U.S. Gov't]. *European Psychiatry: the Journal of the Association of European Psychiatrists*, 15(1), 67-74.
- Sowden, A., Arblaster, L., & Stead, L. (2003). Community interventions for preventing smoking in young people. *Cochrane Database Syst Rev*(1), CD001291.
- Stanton, M. D., & Shadish, W. R. (1997). Outcome, attrition, and family-couples treatment for drug abuse: a meta-analysis and review of the controlled, comparative studies. *Psychol Bull*, 122(2), 170-191.
- Stanton, W. R., & McGee, R. (1996). Adolescents' promotion of nonsmoking and smoking. *Addict Behav*, 21(1), 47-56.
- Stein, J. A., Newcomb, M. D., & Bentler, P. M. (1996). Initiation and maintenance of tobacco smoking: Changing personality correlates in adolescence and young adulthood. *Journal of Applied Social Psychology*, 26(2), 160-187.
- Sussman, S. (2002). Effects of sixty-six adolescent tobacco use cessation trials and seventeen prospective studies of self-initiated quitting. [Journal]. *Tobacco Induced Diseases* Vol 1(1), pp. 35-81.
- Sussman, S., Lichtman, K., Ritt, A., & Pallonen, U. E. (1999). Effects of thirty-four adolescent tobacco use cessation and prevention trials on regular users of tobacco products. *Subst Use Misuse*, 34(11), 1469-1503.

- Sussman, S., Stacy, A. W., Ames, S. L., & Freedman, L. B. (1998). Self-reported high-risk locations of adolescent drug use. *Addict Behav*, 23(3), 405-411.
- Tobacco Use Prevention and Cessation for Adults and Mature Adolescents Executive Summary (2004). Retrieved August 15, 2008, from [http://icsi.org/tobacco\\_use\\_prevention\\_and\\_cessation\\_for\\_adults\\_and\\_mature\\_adolescents\\_2510.html](http://icsi.org/tobacco_use_prevention_and_cessation_for_adults_and_mature_adolescents_2510.html)
- Upadhyaya, H. P., Brady, K. T., & Wang, W. (2004). Bupropion SR in adolescents with comorbid ADHD and nicotine dependence: a pilot study. *J Am Acad Child Adolesc Psychiatry*, 43(2), 199-205.
- Upadhyaya, H. P., Brady, K. T., Wharton, M., & Liao, J. (2003). Psychiatric disorders and cigarette smoking among child and adolescent psychiatry inpatients. *Am J Addict*, 12(2), 144-152.
- Upadhyaya, H. P., Deas, D., Brady, K. T., & Kruesi, M. (2002). Cigarette smoking and psychiatric comorbidity in children and adolescents. *J Am Acad Child Adolesc Psychiatry*, 41(11), 1294-1305.
- Use of cessation methods among smokers aged 16-24 years--United States, 2003 (2006). *MMWR Morb Mortal Wkly Rep*, 55(50), 1351-1354.
- West, S. A., Strakowski, S. M., Sax, K. W., McElroy, S. L., Keck, P. E., Jr., & McConville, B. J. (1996). Phenomenology and comorbidity of adolescents hospitalized for the treatment of acute mania. *Biol Psychiatry*, 39(6), 458-460.
- Wilens, T. E., Biederman, J., Adamson, J., Monuteaux, M., Henin, A., Sgambati, S., et al. (2007). Association of bipolar and substance use disorders in parents of adolescents with bipolar disorder. *Biol Psychiatry*, 62(2), 129-134.
- Wilens, T. E., Biederman, J., Kwon, A., Ditterline, J., Forkner, P., Moore, H., et al. (2004). Risk of substance use disorders in adolescents with bipolar disorder. *J Am Acad Child Adolesc Psychiatry*, 43(11), 1380-1386.
- Wu, L. T., & Anthony, J. C. (1999). Tobacco smoking and depressed mood in late childhood and early adolescence. *Am J Public Health*, 89(12), 1837-1840.
- Zhu, S. H., Sun, J., Billings, S. C., Choi, W. S., & Malarcher, A. (1999). Predictors of smoking cessation in U.S. adolescents. *Am J Prev Med*, 16(3), 202-207.

## APPENDIX I. LITERATURE REVIEW

### Intervention/ Survey Studies

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
1999	Altman, D.G., Wheelis, A.Y., McFarlane, et al.	The relationship between tobacco access and use among adolescents: a four community study	Social Science & Medicine 48: 759-775	<b>General Population</b>  RCT cross-sectional and longitudinal	Over 3 years, multiple community interventions including community education, merchant education, and voluntary policy change	<ul style="list-style-type: none"> <li>▪ In treatment communities, the proportion of stores selling tobacco to minors dropped (75% at baseline to 0% at final post-test).</li> <li>▪ In the comparison communities, proportions were 64% and 39%, respectively.</li> <li>▪ Although availability of tobacco through commercial outlets was reduced in intervention communities, youths reported still being able to obtain tobacco from other sources.</li> <li>▪ Predicted treatment effects on reported use of tobacco were observed cross-sectionally and longitudinally for younger students (7th graders).</li> <li>▪ Intervention did not impact tobacco use among older students (9th and 11th graders) although the trends were in the predicted direction for 9th graders.</li> <li>▪ A significant intervention effect was found for sex--females in the intervention communities were less likely to use tobacco post-intervention than females in the comparison communities.</li> </ul>	Four rural communities, in school and community settings; self-report measures, face to face, and mailed survey
1996	Brown, R.A., Lewinsohn, P.M., Seeley, J.R. et al.	Cigarette smoking, major depression, and other psychiatric disorders among adolescents	Journal of the American Academy of Child Adolescent Psychiatry, 35(12): 1603-1610	<b>Psychiatric Population</b>  Cross-sectional and prospective study	A representative sample of 1,709 adolescents (aged 14 through 18 years) assessed by using semistructured diagnostic interviews	<ul style="list-style-type: none"> <li>▪ Cross-sectional analyses revealed significant relationships of drug abuse/dependence and disruptive behavior disorders with adolescent smoking, even after the co-occurrence of all other disorders was controlled.</li> <li>▪ Prospectively, smoking was found to increase the risk of developing an episode of MDD and drug</li> </ul>	School-based, surveys, clinical interviews, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
						<p>abuse/dependence, after adjusting for other disorders.</p> <ul style="list-style-type: none"> <li>▪ Lifetime prevalence of MDD remained a significant predictor of smoking onset, after controlling for other disorders.</li> <li>▪ Gender did not moderate any of the relationships between psychopathology and smoking.</li> </ul>	
2003	Brown, R.A., Ramsey, S.E., Strong, D.R. et al.	Effects of motivational interviewing on smoking cessation in adolescents with psychiatric disorders	Tobacco Control, 12:3-10	<p><b>Psychiatric Population</b></p> <p>RCT of MI vs. brief advice (BA) for smoking cessation</p>	<p>Sample (n = 191) 13-17 year olds, admitted for psychiatric hospitalization, smoked at least one cig/ week past four weeks, did not meet DSM-IV criteria for current psychotic disorder. MI: 2, 45 minute individual sessions, BA: 5-10 minutes of advice and information quitting smoking. Eligible participants given 8 week regimen of nicotine patch upon hospital discharge.</p>	<ul style="list-style-type: none"> <li>▪ MI did not lead to better smoking outcomes compared to BA.</li> <li>▪ MI was more effective than BA for increasing self efficacy regarding ability to quit.</li> <li>▪ MI was more effective than BA for adolescents with little or no intention to change their smoking, but was actually less effective for adolescents with pre-existing intention to cut down or quit smoking.</li> <li>▪ Adolescents with comorbid substance use disorders smoked more during follow up while those with anxiety disorders smoked less and were more likely to be abstinent.</li> </ul>	<p>Private, University Psychiatric inpatient adolescent smokers with substance abuse disorders; face to face</p>
2005	Colby, S.M., Monti, P.M., Tevyaw, T.O., et al.	Brief motivational intervention for adolescent smokers in medical settings	Addictive Behaviors, 30:865-874	<p><b>General Population</b></p> <p>RCT of MI vs. brief advice (BA)</p>	<p>Tested efficacy of using a brief motivational interviewing intervention to reduce smoking among adolescent patients. Patients aged 14-19 years (N=85) randomly assigned to receive either one session of motivational interviewing (MI) or standardized brief advice (BA) to quit smoking.</p>	<ul style="list-style-type: none"> <li>▪ Self-report data indicated that 7-day abstinence rates at 6-month follow-up were significantly higher in the MI group than the BA group, but this difference was not confirmed biochemically.</li> <li>▪ Self-reported smoking rate (average cigarettes per day) was significantly lower at 1, 3, and 6 months follow-up than it was at baseline.</li> <li>▪ Cotinine levels indicated reduced smoking for both groups at 6 months, but not at 1 month.</li> <li>▪ At 3-month follow-up, only MI group showed cotinine levels that were</li> </ul>	<p>Outpatient hospital clinic and Emergency Department adolescent patients; face to face</p>

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
						<p>significantly reduced compared to baseline.</p> <ul style="list-style-type: none"> <li>Findings offer some support for MI for smoking reduction among non-treatment-seeking adolescents, but overall changes in smoking were small.</li> </ul>	
2007	Curry, S.J., Emery, S., Sporer, M.S., et al.	A national survey of tobacco cessation programs for youths	American Journal of Public Health, 97(1):171-177	<p><b>General Population</b></p> <p>Survey of a national sample of existing community-based tobacco cessation programs for youths</p>	<p>Used a 2-stage sampling design with US counties as the first-stage probability sampling units. Then used snowball sampling in selected counties to identify administrators of tobacco cessation programs for youth. Collected data on cessation programs when programs were identified.</p> <p>The study profiled 591 programs in 408 counties.</p>	<ul style="list-style-type: none"> <li>Programs were more numerous in urban counties; fewer programs were found in low-income counties.</li> <li>State-level measures of smoking prevalence and tobacco control expenditures were not associated with program availability.</li> <li>Most programs were multisession, school-based group programs serving 50 or fewer youths per year.</li> <li>Program content included cognitive-behavioral components found in adult programs along with content specific to adolescents.</li> <li>The median annual budget was 2000 dollars.</li> <li>Few programs (9%) reported only mandatory enrollment, 35% reported mixed mandatory and voluntary enrollment, and 56% reported only voluntary enrollment.</li> <li>There is homogeneity among community-based tobacco cessation programs for youth.</li> <li>Programs are least prevalent in the types of communities for which national data show increases in youths' smoking prevalence.</li> </ul>	National tobacco cessation programs for youth, surveys to administrators and key informants
2006	Diviak, K.R., Wahl, S.K., O'Keefe, J.J., et al.	Recruitment and retention of adolescents in a smoking trajectory study: who participates and	Substance Use & Misuse, 41:175-182	<p><b>General Population</b></p> <p>Longitudinal study</p>	713 (ranging from susceptible nonsmokers to regular smokers) 8th and 10th grade students at 18 schools in the Chicago metropolitan area completed brief	<ul style="list-style-type: none"> <li>Chi-square analyses revealed that female and white students were more likely to participate than male and nonwhite students.</li> <li>Recruitment rates did not vary by parental smoking status, students' experience with smoking, or student</li> </ul>	School setting; face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
		lessons learned			screening surveys.	grade. <ul style="list-style-type: none"> <li>Overall, gender and race were significant predictors of participation.</li> <li>No significant differences were found in retention on the demographic, smoking experience, or psychosocial variables measured.</li> </ul>	
2003	Hanson, K., Allen, S., Jensen, S., & Hatsukami, D.	Treatment of adolescent smokers with the nicotine patch	Nicotine & Tobacco Research, 5(4): 515-526	<b>General Population</b> Double-blind, placebo-controlled, RCT of nicotine patch	Examined the effects of the nicotine patch on craving and withdrawal symptoms, safety, and compliance among adolescents. The study design was a double-blind, placebo-controlled, randomized trial of the nicotine patch. The intervention also provided cognitive-behavioral therapy and a contingency-management procedure. Participants (n=100) attended 10 treatment visits over 13 weeks.	<ul style="list-style-type: none"> <li>Compared with placebo patch group, active nicotine patch group experienced a significantly lower craving score and overall withdrawal symptom score as well as a time trend toward lower scores in craving only.</li> <li>No differences by treatment group were found in experiencing adverse events, except that the participants in the placebo patch group reported more headaches than those in the active nicotine patch group.</li> <li>As another measure of safety, the overall mean salivary cotinine levels were significantly lower at 1, 6, 8, and 10 weeks post-quit compared with baseline levels, although these results were confounded by dropouts.</li> <li>A significant number of participants were compliant with using the nicotine patch daily.</li> <li>Point prevalence (7-day and 30-day abstinence rates) and survival analysis of participant abstinence indicated no significant differences between treatment groups.</li> </ul>	University research setting or schools; Face to face
2008	Hanson, K., Zylla, E., Allen, S., et al.	Cigarette reduction: an intervention for adolescent smokers	Drug and Alcohol Dependence, 95 (1-2): 164-168.	<b>General Population</b> RCT open label trial of nicotine patch and nicotine	Participants aged 13–19 years (n = 103) recruited from 14 traditional and alternative high schools. Participants attended 4 treatment visits over 4 weeks and follow-up visits at 3- and	<ul style="list-style-type: none"> <li>91.3% completed the study until the end-of-treatment.</li> <li>85.1% completed the 3-month follow-up visit.</li> <li>71.3% completed the 6-month follow-up visit.</li> <li>Participants had a very high prevalence of co-morbidity.</li> </ul>	University research setting, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
				gum w/ placebo control	6-months. Participants were told to reduce their smoking by 25% of baseline smoking during the 1st week and by 50% of baseline smoking during subsequent 3 weeks.	<ul style="list-style-type: none"> <li>▪ With regard to the percentage of participants who achieved a 50% reduction of baseline smoking, there were no significant differences among treatment groups.</li> <li>▪ At the end-of-treatment, 49.4% of participants had reduced smoking by at least 50%.</li> <li>▪ There was no significant group, visit or interaction effect of a biomarker measure for carcinogen exposure.</li> <li>▪ The authors note that reduction may be a potential aid to engage adolescents who are unable or unwilling to quit, but should not be an end goal.</li> </ul>	
2003	Horn, K., Fernandes, A., Dino, G., et al.	Adolescent nicotine dependence and smoking cessation outcomes	Addictive Behaviors, 28:769-776	<p><b>General Population</b></p> <p>Pre-post quasi-experimental design, matched by school</p>	Examined adolescent nicotine dependence and its impact on smoking cessation outcomes with two treatments of varying intensity: a brief, self-help intervention and an intensive, multi-session, school-based cessation curriculum called Not On Tobacco (N-O-T).	<ul style="list-style-type: none"> <li>▪ 80% of adolescent smokers in this study were moderately to highly nicotine-dependent, using the Fagerstrom Tolerance Questionnaire.</li> <li>▪ Nicotine dependence was positively correlated with duration of smoking and number of cigarettes smoked daily.</li> <li>▪ Data showed that the more cigarettes teens smoked daily and the longer they had smoked the more dependent they were.</li> <li>▪ 20% had low nicotine dependence despite years of smoking and high smoking rates.</li> <li>▪ The relationship between nicotine dependence and cessation outcomes varied by treatment intensity.</li> <li>▪ The brief intervention was successful with only low-dependent smokers, whereas the intensive, multisession, N-O-T intervention was effective with smokers possessing a range of nicotine dependence, including high-dependent smokers.</li> </ul>	School-based, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
2004	Killen, J.D., Robinson, T.N., Ammerman, S., et al.	Randomized clinical trial of the efficacy of bupropion combined with nicotine patch in the treatment of adolescent smokers	Journal of Consulting and Clinical Psychology, 72(4):729-735	General Population RCT	211 adolescent smokers (age 15–18 years), were randomized to 1 of 2 groups: (a) nicotine patch plus bupropion SR or (b) nicotine patch plus placebo.  Group skills training sessions were conducted each week by research staff.	<ul style="list-style-type: none"> <li>▪ Abstinence rates at Weeks 10 and 26 were as follows: (a) patch plus bupropion, 23% and 8%, (b) patch plus placebo, 28% and 7%.</li> <li>▪ Despite the lack of a treatment effect, a large majority of adolescents in both treatment groups reduced their consumption to a few cigarettes per day or less and maintained this reduction over time.</li> <li>▪ Examination of survival curves revealed that by the end of treatment many had managed to avoid a return to daily smoking. The addition of bupropion to nicotine patch did not improve abstinence rates but authors report that the level of bupropion (150mg) may have been too low.</li> </ul>	University research setting; face to face
2007	Kleinjan, M., Brug, J., van den Eijnden, R.J.J.M., et al.	Associations between the transtheoretical processes of change, nicotine dependence and adolescent smokers' transition through the stages of change	Addiction, 1003:331-338	General Population cross-sectional study	25 secondary schools throughout the Netherlands participated. Assessed 721 participants in grades 9 and 10, on adolescents' stage of change, the use of processes of change and nicotine dependence (T1). Stage transitions were assessed 1 year later (T2).	<ul style="list-style-type: none"> <li>▪ Few associations were found between the processes of change and stage transitions.</li> <li>▪ Nicotine dependence contributed significantly to the explanation of adolescents' transition from preparation to action, after adjustment for processes of change.</li> <li>▪ No evidence for moderating effect of nicotine dependence in the relation between the processes of change and stage transitions was found.</li> <li>▪ Authors concluded that processes of change do not seem significant in explaining adolescents' stage transitions and it might be more useful to focus on treating nicotine dependence.</li> </ul>	School-based, survey, face to face
2007	Lui, J., Peterson Jr., A.V., Kealey, K.A., et al.	Addressing challenges in adolescent smoking cessation: Design and baseline characteristics of the HS group-	Preventative Medicine, 45:215-225	General Population Large population based, group randomized	Hutchinson Study of High School Smoking (HS Study) Trial used a population-based survey to proactively identify and recruit all high school juniors who had	<ul style="list-style-type: none"> <li>▪ Baseline results showed that 75.1% of all participants did not want help with smoking.</li> <li>▪ 48.5% did not intend to smoke in the future.</li> <li>▪ 81% of smokers participated in the intervention.</li> </ul>	School-based, face to face, telephone intervention

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
		randomized trial		(by school) intervention vs. control trial, multi-wave design	smoked in the past month. For ethical and intervention reasons, some nonsmokers were enrolled in the intervention (N=2151).		
2007	MacPherson, L., Strong, D.R., Kahler, C.W., et al.	Association of post-treatment smoking change with future smoking and cessation efforts among adolescents with psychiatric comorbidity	Nicotine & Tobacco Research, 9(12):1297-1307	<b>Psychiatric Population</b> RCT	Psychiatrically hospitalized adolescents (N = 183), controlled trial comparing motivational interviewing to brief advice. Quit attempters, reducers, and maintainers defined based on, having made a quit attempt, having reduced smoking by at least 50%, and having reduced smoking by less than 50%, respectively, in the first week after hospital discharge.	<ul style="list-style-type: none"> <li>▪ Baseline smoking levels and presence of a substance use disorder or anxiety disorder were predictive of outcomes.</li> <li>▪ After controlling for covariates, quit attempters smoked less during follow-up than did the other change groups and reducers smoked less than maintainers.</li> <li>▪ Quit attempters evidenced a higher percentage of quit attempts during follow-up than did the other change groups.</li> <li>▪ Reducers had a greater average percentage of quit attempts during follow-up than did maintainers.</li> <li>▪ Groups did not differ on cotinine-verified abstinence rates across the follow-up period.</li> </ul>	Psychiatric Inpatient; face to face
2007	Monuteaux, M.C., Spencer, T.J., Faraone, S.V., et al.	A randomized, placebo-controlled clinical trial of bupropion for the prevention of smoking in children and adolescents with Attention-Deficit Hyperactivity Disorder	Journal of Clinical Psychiatry, 68(7): 1094-1101.	<b>Psychiatric Population</b> Double- blind, placebo controlled, RCT	Youth 9-18 diagnosed ADHD without regular nicotine use. Study medication (Bupropion/ placebo). 100 mg/day at baseline, titrate to max 150 mg daily in week 1, 200 mg daily week 2, 300 mg daily week 3.	<ul style="list-style-type: none"> <li>▪ Rate of any positive cotinine screen through out study: Placebo 28%, Bupropion 46%</li> <li>▪ Bupropion group 2.3 times more likely to initiate smoking over the course of follow up period, not significant (p = .07)</li> <li>▪ No evidence that Bupropion prevents smoking in youth with ADHD</li> <li>▪ Post hoc analysis: patients treated with stimulants less likely to initiate and continue smoking over follow up period</li> </ul>	Outpatient, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
2005	Moolchan, E., Robinson, M., Ernst, M., et al.	Safety and Efficacy of the Nicotine Patch and Gum for the Treatment of Adolescent Tobacco Addiction	Pediatrics, 115 (4): 407- 414.	<b>General Population</b> Double-blind, double-dummy, RCT	3 comparison groups: (1) active patch and placebo gum (2) active gum and placebo patch (3) placebo gum and placebo patch. All participants received 45 minute CBT group session at end of each treatment visit	<ul style="list-style-type: none"> <li>▪ Conducted in inner city outpatient clinic, sample recruited from community through media.</li> <li>▪ Baseline psychiatric assessments revealed 75% of subjects had at least 1 current psychiatric diagnosis. (ODD, CD, ADHD most common)</li> <li>▪ Prolonged abstinence at 3 months: Patch 17.7%, Gum 6.5%, Placebo 2.5%. Nicotine patch significantly more effective</li> <li>▪ Patch and gum well tolerated and appeared safe</li> </ul>	Outpatient clinic, face to face
2008	Munafo, M., Hitsman, B., Rende, R., et al.	Effects of progression to cigarette smoking on depressed mood in adolescents: evidence from the National Longitudinal Study of Adolescent Health	Addiction, 103 (1): 162-171.	<b>General Population</b> Longitud. Cohort study	Data drawn from National Longitudinal Study of Adolescent Health. Smoking status assessed by self report. Depression assessed using modified CES-D	<ul style="list-style-type: none"> <li>▪ "never smokers" with depressed mood at baseline predicted progression to smoking initiation at follow up.</li> <li>▪ "ever smoking" at baseline marginally predicted depressed mood at follow up in females</li> <li>▪ Smoking initiation significantly predicted CES-D score at follow-up among males and females, though magnitude greater for females.</li> </ul> <p>Conclusions:</p> <ul style="list-style-type: none"> <li>▪ Data supports possibility depressed mood may enhance risk of experimenting with cigarettes</li> <li>▪ Possibility that repetitive nicotine use directly causes depressed mood and may contribute to eventual development of dependence.</li> </ul>	In home interviews, face to face
2005	Myers, M.G. & Brown, S.A.	A controlled study of a cigarette smoking cessation intervention for adolescents in substance abuse treatment	Psychology of Addictive Behaviors, 19(2): 230-233.	<b>Substance Abuse</b> Controlled evaluation	Smoking reduction and cessation (SRC) intervention: 6 weekly 1 hour sessions (includes motivational enhancement, urge control, barriers to change, relapse prevention, goal setting). Control: Wait	<ul style="list-style-type: none"> <li>▪ Greater proportion of SRC reported cessation attempts and point abstinence than WL.</li> <li>▪ Point abstinence only significantly different between groups at 3 month</li> <li>▪ Baseline data show WL participants significantly more likely to be in precontemplative stage.</li> <li>▪ Abstinence rates in SRC group appeared higher at 3 month follow-up</li> </ul>	Outpatient, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
					List (WL) group, participants offered intervention following completion of follow up assessments	than end of treatment. Delayed effect suggests intervention motivated participants to engage in change efforts.	
2004	Myers, M.G. & MacPherson, L.	Smoking cessation efforts among substance abusing adolescents	Drug & Alcohol Dependence, 73(2): 209-213.	<b>Substance Abuse</b> Non-randomized survey/ interview	None: Questionnaire regarding smoking history, current smoking, and motives for cessation attempts	<ul style="list-style-type: none"> <li>▪ 62% of full sample attempt cessation in lifetime, 54% in previous year.</li> <li>▪ Of cessation attempters, 65% resumed smoking within 1 month.</li> <li>▪ Health was highest endorsed reason for quitting, followed by "nasty habit" and pressure from parents.</li> </ul>	Inpatient and Outpatient substance abusing youth
2008	Myers, M., MacPherson, L.	Adolescent Reasons for Quitting Smoking: Initial Psychometric Evaluation	Psychology of Addictive Behaviors 22 (1): 129-134.	<b>General Population</b> Non randomized survey/ interview	Nicotine dependence assessed with modified Fagerstrom Tolerance Questionnaire. Intentions for smoking cessation and cessation efforts assessed. Reasons for quitting assessed using Adolescent Reasons for Quitting questionnaire (ARFQ)	<ul style="list-style-type: none"> <li>▪ Psychometric characteristics of ARFQ: exploratory analyses yielded 3 subscales: Short term consequences, Social Disapproval, Long Term concerns.</li> <li>▪ Long Term Concerns subscale showed the strongest relationships with concurrent intentions for cessation and significantly predicted quit attempts at 3 months.</li> <li>▪ Different relationships between subscales and quit attempts over time: social disapproval predicted cessation efforts over full follow up, Long term concerns only at 3 months.</li> <li>▪ Variables related to motivation for behavior change fluctuate over time.</li> </ul>	School based, face to face and self report interviews
2001	Prokhorov, A.V., Hudmon, K.S., de Moor, C.A., et al.	Nicotine dependence, withdrawal symptoms, and adolescents' readiness to quit smoking	Nicotine & Tobacco Research, 3(2): 151-155.	<b>General Population</b> Cross sectional survey	In school paper and pencil survey: smoking status, intentions to start or quit, smoking related characteristics. Nicotine dependence: modified Fagerstrom Tolerance, Nicotine withdrawal: DSM IV,	<ul style="list-style-type: none"> <li>▪ Readiness to quit among current smokers: 52.5% in Precontemplation, 16.0% in Contemplation, 7.5% in Preparation, 13.2% in Action, 10.8% in Maintenance.</li> <li>▪ Of those in Precont, Cont, Prep: 18.1% substantial nicotine dependence, 45.2% moderate dependence, 36.7% no dependence.</li> </ul>	School based, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
					Readiness to quit: stages of change.	<ul style="list-style-type: none"> <li>Nicotine withdrawal: higher withdrawal associated with increased number of quit attempts.</li> </ul>	
2002	Ramsey, S.E., Brown, R.A., Strong, D.R., Sales, S.D.	Cigarette smoking among adolescent psychiatric inpatients: prevalence and correlates	Annals of Clinical Psychiatry, 14(3): 149-153.	<b>Psychiatric Population</b> Medical record review	Adolescents (13-17) admitted to inpatient psychiatric hospital over 1 year period	<ul style="list-style-type: none"> <li>Current smoking prevalence = 59.8%</li> <li>Smokers more likely to be Caucasian</li> <li>13 year olds significantly less likely to smoke than other age groups</li> <li>Smokers had significantly elevated rates of substance abuse/ dependence.</li> <li>Smokers did not have elevated rates of any other psychiatric disorder</li> <li>Findings suggest need for thorough assessment of smoking and specialized smoking interventions for this population</li> </ul>	Inpatient, record review
2003	Robinson, L.A., Vander Weg, M.W., Riedel, B.W., et al.	"Start to stop": results of a randomized controlled trial of a smoking cessation programme for teens	Tobacco Control, 12 Suppl 4: 26-33.	<b>General Population</b> Controlled RCT	Students 13-19 from 18 schools. Randomly assigned to 4 session behavioral program (social influence theoretical framework, motivational enhancement and training in social or stress management skills) or control condition (CDC pamphlet).	<ul style="list-style-type: none"> <li>Post Test quit rates between groups: 20.1% in STS group, 24.2% in control group (p= .45)</li> <li>At 12 month follow up: 26.3% in STS group, 27.5% control (p= .88)</li> <li>Cotinine samples indicate 50% of those reported quitting falsified smoking status</li> <li>Attitude toward smoking had not improved in treated group relative to control group after intervention</li> </ul>	School based, face to face and phone follow up
1998	Sargent, J.D., Mott, L.A., Stevens, M.	Predictors of smoking cessation in adolescents	Archives of Pediatrics & Adolescent Medicine, 152(4): 388- 393.	<b>General Population</b> Longitud. Cohort study	School based survey: Monitoring the Future Project Questionnaire. Collected tobacco use, attitudes and behaviors data. Participants followed for 1 to 2 years	<ul style="list-style-type: none"> <li>92% of students with strong intentions to quit were occasional smokers.</li> <li>61% of occasional smokers with strong intentions to quit succeeded.</li> <li>Statistically significant associations were found between smoking cessation and smoking status at baseline (lower</li> </ul>	School- based cohort study

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
						<p>levels of smoking associated with higher quit rates).</p> <ul style="list-style-type: none"> <li>Participants with cessation experience had lower cessation rates (12.0% vs 30.9% with no experience, <math>p = .001</math>).</li> <li>Participants wanting to quit at baseline had lower cessation rates than those who did not (<math>p = .009</math>)</li> </ul>	
1996	Smith, T.A., House, R.F., Croghan, I.T. et al.	Nicotine patch therapy in adolescent smokers	Pediatrics, 98(4) 659- 667.	General Population Non-randomized open label, 6 month follow up	Nicotine patch therapy: daily for 8 weeks (22 mg/ day for 6 weeks, 11 mg/ day for 2 weeks). Weekly behavioral counseling (methods for coping with feelings, techniques for overcoming triggering, relapse prevention). Comparison group: adult smokers participating in an inpatient cessation and nicotine patch study	<ul style="list-style-type: none"> <li>At week 8, 14% had biochemical validation of their reported abstinence from smoking.</li> <li>There was a significant decrease in reported daily smoking, suggesting possible positive effect.</li> <li>82% experienced at least on adverse effect, 68% reported skin reaction. Skin reactions were no more prevalent than those reported in adult studies.</li> <li>At week 4, mean blood cotinine level significantly higher than baseline, though nicotine toxicity did not seem to be an issue.</li> <li>Nicotine patch therapy safe and well tolerated in these subjects.</li> </ul>	School based study, face to face
2007	Solberg, L.I., Boyle, R.G., McCarty, M., et al.	Young adult smokers: are they different?	American Journal of Managed Care 13(11): 626-632.	General Population Cross sectional survey: Mail survey, phone follow up	Mail Survey sent to 18-24 year old health care system enrollees, and 25- 64 year old enrollees. Follow up survey sent to responders at 12 months	<ul style="list-style-type: none"> <li>Among current smokers, daily smoking more common among older than younger smokers.</li> <li>Among daily smokers- young adults more likely to report making quit attempts in past year, less likely to use resources to aid attempts.</li> <li>Young adult smokers as interested in quitting, more likely to make quit attempts, and as likely to quit 1 year later as adults</li> </ul>	Mail survey with phone follow up

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Intervention	Results	Setting/ Type of Contact
2007	Strong, D.R., Kahler, C.W., Abrantes, A.M., et al	Nicotine dependence symptoms among adolescents with psychiatric disorders: using a Rasch model to evaluate symptom expression across time	Nicotine & Tobacco Research, 9(5): 557-569.	<b>Psychiatric Population</b>  Data collected from participants recruited for a previously conducted RCT	Assessments (Adolescent Nicotine Dependence Interview, modified Fagerstrom Tolerance Questionnaire, Timeline Followback, readiness to quit, biological verification of abstinence) conducted prior to RCT and at 6 and 12 month follow ups	<ul style="list-style-type: none"> <li>▪ Changes in smoking levels related longitudinally to changes in nicotine dependence, and changes in nicotine dependence were related to changes in motivation to quit and readiness to change.</li> <li>▪ Results from Rasch model suggest that DSM-IV and mFTQ symptoms represent overlapping and complementary indicators of the severity of nicotine dependence.</li> </ul>	Inpatient and outpatient, face to face
2003	Upadhyaya, H.P., Brady, K.T., Wharton, M., Liao, J.	Psychiatric disorders and cigarette smoking among child and adolescent psychiatry inpatients	American Journal of Addictions, 12(2): 144-152.	<b>Psychiatric Population</b>  Non-randomized Survey	Survey of nicotine use administered to children/ adolescents during inpatient psychiatric hospital stay, within 48 hours of admission	<ul style="list-style-type: none"> <li>▪ Smoking prevalence = 39/2% (higher than general adolescent population).</li> <li>▪ <i>Modified Fagerstrom Tolerance Questionnaire</i> scores significantly correlated to subject's self report of addiction</li> <li>▪ Major depression, conduct disorder, and cannabis use significantly associated with high rates of smoking.</li> <li>▪ ADHD was not significantly higher as compared to non-ADHD participants.</li> <li>▪ Most common endorsed reasons for smoking were stress and peer influence</li> </ul>	Inpatient/ face to face

## Review Articles

Yr of Pub	Author	Article Name	Volume# / Issue#	Conclusions/Discussion
2003	Backinger, C.L., Fagan, P., Matthews, E., & Grana, R.	Adolescent and young adult tobacco prevention and cessation: current status and future directions	Tobacco Control 12(Suppl IV): iv46-iv53	<p><b>General Population</b> All smoking prevention studies from 1990 to 2002 in the USA and all identified smoking cessation studies for adolescents were reviewed. School based curricula alone are found to be generally ineffective but when combined with other approaches such media and smoke-free policies are effective. There is a lack of adolescent smoking cessation studies to date and these need to be conducted with attention to high risk smokers and less than daily smokers. Also prevention and cessation programs need to address other tobacco products in addition to cigarettes.</p>
2007	Backinger, C.L., Michaels, C.N., Jefferson, A.M., et al	Factors associated with recruitment and retention of youth into smoking cessation intervention studies – a review of the literature	Health Education Research, 23(2): 359-368.	<p><b>General Population</b> Fifty-five articles from 1976 to 2004 reporting cessation outcomes were reviewed to examine the associations between collected variables and recruitment and retention rates. Most studies relied on a combination of recruitment methods, were conducted in school settings, and included sample sizes &lt; 150. Studies with participants who smoked ≤ 5 cigarettes per day (cpd) were more likely to have recruitment rates ≥ 85%. Studies with participants who smoked ≥ 6 cpd were more likely to have high retention rates. Studies that did not use incentives (e.g., cash, gift cards, class release time, pizza) were more likely to have retention rates at the end of intervention ≥ 85%. Finding indicate a lack of information reported about recruitment and retention procedures in tobacco cessation studies suggesting the need for additional research and analyses to identify successful methods.</p>
2008	Bancej, C., O'Loughlin, J., Platt, R.W., Paradis, G., Gervais, A.	Smoking cessation attempts among adolescent smokers: a systematic review of prevalence studies	Tobacco Control, 16 (6):8-22.	<p><b>General Population</b> Fifty-two articles of national population based studies from 1990 to 2005 reporting the prevalence, frequency, and/or duration of cessation attempts among smokers aged 10 to 20 years old. Among adolescent smokers, the median 6-month, 12-month, and lifetime cessation attempt prevalence was 58% (range 22-73%), 68% (range 43-92%), and 71% (range 28-84%) respectively. More than half had made multiple attempts. Among smokers who had attempted cessation, the median prevalence of relapse was 34, 56, 89, and 92% within 1 week, 1 month, 6 months, and 1 year, respectively. Younger (age&lt;16 years) and non-daily smokers experienced a similar or higher prevalence of cessation attempts compared with older (age ≥16 years) or daily smokers. The prevalence of relapse by 6 months following the longest cessation attempt was similar across age and smoking frequency. The high prevalence of cessation attempts and relapse among adolescent smokers extends to young adolescents and non-daily smokers. Cessation surveillance, research and program development should be more inclusive of these subgroups.</p>

Yr of Pub	Author	Article Name	Volume# / Issue#	Conclusions/Discussion
1993	Bruvold, W.H.	A meta-analysis of adolescent smoking prevention programs	American Journal of Public Health, 83(6):872-880.	<b>General Population</b> Completed a meta-analysis of 94 separate interventions. Behavioral effect sizes were found to be largest for interventions with a social reinforcement orientation, moderate for interventions with either a developmental or a social norms orientation, and small for interventions with the traditional rational orientation. Attitude effect sizes followed the same pattern, but knowledge effect sizes were similar across all four orientation categories. Because behavioral effect represents the fundamental objective of programs for prevention of adolescent tobacco use, the present results indicate that school-based programs should consider adopting interventions with a social reinforcement, social norms, or developmental orientation.
2007	Kealey, K.A., Ludman, E.J., Mann, S.L., et al	Overcoming barriers to recruitment and retention in adolescent smoking cessation	Nicotine & Tobacco Research, 9(2):257-270.	<b>General Population</b> Problems associated with low recruitment and retention include identifying smokers, obtaining active parental consent, protecting participants' privacy, respecting participants' autonomy, and making participation relevant and accessible to adolescents. This paper describes nine strategies for minimizing these recruitment and retention problems via a proactive telephone counseling intervention, and reports on their implementation among 1,058 smokers from 25 high schools in Washington state. Results are as follows: (a) 85.9% of parents of minor-age seniors provided active consent for their teen's participation, (b) 89.8% of eligible smokers were successfully contacted by counselors, (c) 86.5% of contacted smokers consented to participate in the cessation counseling, (d) 93.8% of consented smokers participated in smoking cessation counseling calls, and (e) 72.2% of participating smokers completed their full intervention. These results demonstrate that older teens who smoke, and their parents, are receptive to confidential cessation counseling that is personally tailored, supportive of their autonomy, and proactively delivered via the telephone.
2003	McDonald, P., Colwell, B., Backinger, C., et al.	Better Practices for Youth Tobacco Cessation: Evidence of Review Panel	Am J Health Behav 27(Suppl2): 144-158.	<b>General Population</b> A panel of experts (researchers, policy analysts, and program providers) reviewed 66 adolescent cessation studies. 18 studies were dropped from the review (failed to provide explicit outcomes). Of the 48 remaining studies, 20 were rated high to moderate validity. 9 studies reported effective treatments, all of which used Cognitive Behavioral techniques. All effective interventions were voluntary treatments. Delivery settings: interventions were delivered in school settings outside the classroom, 5 study interventions took place in the classroom, and 4 in clinical settings. Conclusions: promising methods for helping adolescents quit smoking have been developed. CBT models are promising.
2003	Mermelstein, R.	Teen smoking cessation	Tobacco Control, 12 (Suppl 1): 25-34.	<b>General Population</b> Review of need for cessation interventions among youth, i.e. low rates of spontaneous cessation, and overview of current interventions including school based, pharmacological, health care settings, and internet. Discussion includes need to incorporate "lessons learned" from adult cessation literature and suggests interventions that capitalize on beneficial peer networks.

Yr of Pub	Author	Article Name	Volume# / Issue#	Conclusions/Discussion
2003	Orleans, C., Bratic, E., Backinger, C., et al.	Youth Tobacco Cessation Collaborative and National Blueprint for Action	Am J Health Behav 27 (Suppl 2): 103-119.	<p><b>General Population</b>            After a CDC conference on youth tobacco cessation in 1997, the Youth Tobacco Cessation Collaborative (YTCC) was formed to address key gaps, identify goals, and create a blueprint for action. Long term goals were to develop a comprehensive framework for the coordinated work needed to discover, develop, and disseminate effective strategies for youth tobacco cessation. Short term implementation goals and strategies included: 1) Increase access to developmentally appropriate and effective tobacco-use cessation services and interventions for adolescents and young adults. 2) Improve the capacity to deliver effective tobacco-use cessation services and interventions and current delivery channels and resources, and provide existing program leaders with guidance and tools for self-assessment and continuous quality improvement. Short term demand goals and strategies included: 1) Identify and advocate for policies and environments that motivate and support youth tobacco cessation. 2) Increase quitting motivation and attempts among young smokers, and generate increased youth interest and participation in effective cessation programs and services. 3) Increase advocacy and support for youth tobacco cessation among peers, providers, decision makers and community gatekeepers, the public, and youth themselves.</p>
2008	Robinson, L.A., Emmons, K.M., Moolchan, E.T., Ostroff, J.S.	Developing smoking cessation programs for chronically ill teens: lessons learned from research with healthy adolescent smokers	Journal of Pediatric Psychology, 33 (2): 133-144.	<p><b>Medically Ill Teen Population</b>            Review of cessation literature shows both potential rewards of developing quit programs for teens, as well as difficulties that may be encountered when programs target teens with medical illnesses. Medically ill teens may be prone to harms of smoking due to chronic illnesses and treatment related complications. Historically, youth cessation programs have found most teens discount risk of distant health consequences, therefore programs have not emphasized health consequences. However, medically ill teens may have more concerns about present and future health, health concerns may provide motivation for quitting. Psychological impact of having a chronic medical illness should be considered when programs are developed- recommend training in prosocial and proactive skills for coping with illness related stress. Recommend social support, close friends can be engaged to provide support for quit attempt. Cessation programs that emphasize methods for restoring peer connections may be especially effective for adolescents who experience social disruption because of their illness. Timing of the intervention may also be important- it is not clear what moments are the most "teachable" (i.e. is it appropriate to intervene soon after diagnosis with a serious illness?). Conclusions: Chronically ill teens that smoke need advice to quit, may require a family based or peer network approach, intervention programs will need to address the unique difficulties medically ill teens face when trying to quit, pharmacotherapy will need to be considered carefully- risks and benefits weighed.</p>

Yr of Pub	Author	Article Name	Volume# / Issue#	Conclusions/Discussion
2002	Upadhyaya, H.P., Deas, D., Brady, K.T., Kruesi, M.	Cigarette smoking and psychiatric comorbidity in children and adolescents	J of Am Acad Child Adolesc Psych, 41(11): 1294- 1305.	<p><b>Psych population</b> Organized by psychiatric disorder, comparison of adult and adolescent studies. For children and adolescents: <u>ADHD</u>: mixed results, some studies find no association with smoking, others do. Those with ADHD initiate earlier &amp; have more difficulty quitting. <u>ODD/CD</u>: strong link with smoking <u>Depression</u>: more evidence that MD may be risk factor for smoking than vice versa. Association with smoking shown in several cross sectional studies. Some longitudinal studies indicate smoking may be risk factor for MD. <u>Anxiety</u>: depression and anxiety predicted smoking initiation and transition to daily smoking. Social fears/ phobia associated with higher rates of nicotine dependence, more closely associated than among adults. <u>Substance Abuse</u>: adolescent drinking and smoking are related in a bidirectional, dose-dependent manner, similar to adults. Longitudinal studies show smoking a possible risk factor for development of substance abuse disorders, particularly early onset regular smokers. Early smoking significantly associated with lifetime substance use disorders. <u>Summary and Clinical Implications</u>: the comorbidity may be explained by chance, common vulnerability to both psychiatric disorder and smoking (genetic/ environmental), self medication, and/ or neurobiological alterations. With exception of ADHD and anxiety disorders, onset of smoking generally precedes other psychiatric disorders. In clinical settings, important to assess smokers for psychiatric disorders and assess adolescents with mental illnesses for smoking. Nicotine dependence and psychiatric comorbidity should be addressed simultaneously. Evidence suggests need to target prevention and treatment of smoking before the age 13.</p>

## Prevalence, Predictors, and Correlates Studies

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Method	Results	Setting/ Type of Contact
2008	Brook, J.S., Duan, T., Zhang, C., et al.	The association between Attention Deficit Hyperactivity Disorder in Adolescence and Smoking in Adulthood	The American Journal on Addictions, 17:54-59	<b>General Population</b>  Prospective, Longitudinal study	Data were collected via structured interviews of representative families in the northeastern United States (N = 641). The mean ages of the offspring were as follows: 14 years (T2, 1983), 17 years (T3, 1985-1986), and 32 years (T6, 2002). The dependent variable was the participants' daily cigarette smoking in their early thirties.	<ul style="list-style-type: none"> <li>▪ Logistic regression analyses indicated that the relationship between Attention Deficit Hyperactivity Disorder (ADHD) and daily smoking behavior was mediated by Conduct Disorder (CD) with control on gender, age, SES, and adolescent smoking.</li> <li>▪ CD had a direct effect on daily smoking in adulthood.</li> <li>▪ Findings suggest that ADHD is related to CD, which in turn is associated with daily smoking.</li> <li>▪ Interventions with adolescents with ADHD at an early age might lead to some reduction in later smoking provided that the intervention has a positive effect on CD.</li> <li>▪ For those adolescents who never had ADHD, our findings suggest that prevention or treatment aimed at reducing CD may be most successful in reducing daily smoking later in adulthood.</li> </ul>	University research setting, interviews, survey, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Method	Results	Setting/ Type of Contact
2006	Brook, J.S., Ning, Y., & Brook, D.W.	Personality risk factors associated with trajectories of tobacco use	The American Journal on Addictions, 15:426-433	<b>General Population</b>  Prospective longitudinal study	African-American and Puerto Rican male and female young adults (N = 451, mean age 26) from an inner-city community. Data were collected at four time points over a period of 13 years using structured interviews.	<ul style="list-style-type: none"> <li>▪ Subjects who were unconventional, experienced intrapersonal distress, and used alcohol and illegal drugs were more likely to belong to one of the smoking trajectory groups than to the nonsmoking group.</li> <li>▪ The early-starting continuous group scored highest on these personal risk attributes.</li> <li>▪ The long-term impact of unconventional behavior, intrapersonal distress, and drug use on developmental trajectories of smoking support the importance of early intervention and prevention.</li> </ul>	School and community based, survey, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Method	Results	Setting/ Type of Contact
2007	Dijk,F., Reubsæet, A., de Nooijer, J., & de Vries, H.	Smoking status and peer support as the main predictors of smoking cessation in adolescents from six European countries	Nicotine & Tobacco Research, 9(Suppl 3):S495-S504	<b>General Population</b> Longitudinal study	Compared 1,335 adolescent smokers and quitters from six European countries with regard to attitudes toward smoking, self-efficacy, social influences, and intentions to quit smoking.	<ul style="list-style-type: none"> <li>▪ At 6-month follow-up, occasional, weekly, and daily smokers who had quit indicated less social influence of friends and siblings toward smoking, acknowledged more disadvantages of smoking, and expressed more confidence that they would be able to not to smoke in various tempting situations.</li> <li>▪ Logistic regression analyses revealed that smoking status at baseline and social influence of peers were the main predictors of cessation.</li> <li>▪ As adolescents who smoke regularly are less likely to quit, strategies to prevent them from taking up the habit are important.</li> <li>▪ The influence of peers calls for inclusion of peer groups in cessation strategies.</li> </ul>	School setting; face to face
2007	Hemmingsson, T., Kriebel, D., Tynelius, P., et al.	Adolescent mental health predicts quitting in adulthood: a longitudinal analyses	The European Journal of Public Health, 18(1) 66-70	<b>General Population</b> longitudinal study	Smoking status and indicators of poor mental well-being from childhood and adolescence were collected at age 18 in 1969 from 49 321 men at compulsory conscription for military service. Follow-up data on smoking status were collected among a random subset (n=694) who participated in one	<ul style="list-style-type: none"> <li>▪ Approximately half of the smokers at age 18 in 1969 had quit by the time they were resurveyed (1981-2002).</li> <li>▪ Those who had not quit and who reported smoking more than 10 cigarettes/day at age 18 (persistent heavy smokers), were more likely to have had childhood and adolescent indicators of poor mental health measured at age 18 in 1969 than non-smokers or quitters.</li> </ul>	Military setting, surveys, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Method	Results	Setting/ Type of Contact
					or more annual national Swedish Surveys of Living Conditions in 1981-2001.		
2007	Ilomäki, R., Riala, K., Hakko, H., et al.	Temporal association of onset of daily smoking with adolescent substance abuse and psychiatric morbidity	European Psychiatry, 23(2): 85-91	<b>Psychiatric Population</b> Observational Study	Data from 508 adolescents admitted to psychiatric hospitalization were collected. Cox proportional hazard model were used to compare the initiation of daily smoking (DS) between adolescents with and without substance use (SUD), and other psychiatric disorders.	<ul style="list-style-type: none"> <li>▪ Rates of DS were high across psychiatric diagnoses.</li> <li>▪ Boys started smoking at younger age (12.4 years) than girls (13.0 years).</li> <li>▪ Both boys and girls diagnosed with conduct or oppositional defiant disorders (COD) and also girls with SUD started daily smoking earlier as compared to those of same gender without these disorders.</li> <li>▪ COD were found to be primary to the initiation of DS among boys. SUD, psychotic, and depressive disorders (DEP) were found to be secondary to DS among both genders.</li> </ul>	Inpatient psychiatric adolescents ages 12-17 years in Finland
2000	Johnson, J.G., Cohen, P., Pine, D.S., et al.	Association between smoking and anxiety disorders during adolescence and early adulthood	Journal of the American Medical Association, 284(18): 2348-2351	<b>General Population</b> Prospective longitudinal study	Community-based sample of 688 youths (mean age at baseline = 14 years) interviewed in their homes Logistic regression analyses were used to determine whether associations between smoking and anxiety disorders remained significant after controlling for demographic and clinical covariates	<ul style="list-style-type: none"> <li>▪ Heavy cigarette smoking (<math>\geq 20</math> cigs/day) during adolescence was associated with higher risk of agoraphobia, generalized anxiety disorder, and panic disorder during early adulthood after controlling for age, gender, difficult childhood temperament, alcohol and drug use, anxiety and depressive disorders during adolescence, and parental smoking, educational level, and psychopathology.</li> </ul>	Community-based sample, interviews conducted in youth homes; face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Method	Results	Setting/ Type of Contact
2000	Koval, J.J., Pederson, L.L., Mills, C.A., et al.	Models of the relationship of stress, depression, and other psychosocial factors to smoking behavior: a comparison of a cohort of students in grades 6 and 8	Preventive Medicine, 30: 463-477	General Population longitudinal study	Six specific hypotheses regarding putative mechanisms by which stressful life events might lead to initiation of smoking among 1543 adolescents were proposed and tested on a Grade 6 cohort of students in Scarborough, Ontario, Canada. The same relationships were examined for the students when they were in Grade 8 and compared to the earlier Grade 6 results.	<ul style="list-style-type: none"> <li>▪ Males and females differ with regard to the variables and interrelationships in both years and in the final models developed.</li> <li>▪ In Grade 6, there are more smoking environment items for males than for females.</li> <li>▪ By Grade 8, male smoking is influenced by mastery, social conformity, and rebelliousness, while for females environmental smoking and rebelliousness are important.</li> </ul>	School setting, face to face
2007	Macy, J.T., Seo, D.C., Chassin, L., et al.	Prospective predictors of long-term abstinence versus relapse among smokers who quit as young adults	American Journal of Public Health, 97(8): 1470-1475	General Population Prospective longitudinal study	Participants first recruited in 6 <sup>th</sup> through 12 <sup>th</sup> grade who completed 4 annual surveys and who had quit for at least 1 year between the ages of 18 and 24 years (n=327) were divided into those who later reported not smoking for more than 5 years (long-term abstinence) or reported current smoking, defined as smoking at least monthly (relapse).	<ul style="list-style-type: none"> <li>▪ 67% of participants maintained long-term abstinence and 33% relapsed.</li> <li>▪ The strongest predictor of avoiding relapse was marrying a nonsmoker.</li> <li>▪ Other predictors included making 1 lifetime quit attempt, having as a young adult only 1 parent who smoked, and working in a completely smoke-free building.</li> </ul>	School setting; surveys; face to face
2007	Munafò, M.R., Hitsman, B., Rende, R., et al.	Effects of progression to cigarette smoking on depressed mood in adolescents: evidence from the National Longitudinal	Society for the Study of Addiction, 103(1) 162-171	General Population Quasi-experimental study	Data drawn from National Longitudinal Study of Adolescent Health, an ongoing study to assess the health status of adolescents, and explore	<ul style="list-style-type: none"> <li>▪ Various relationships between smoking status and depressed mood were observed, with general trend for these effects greater among females.</li> <li>▪ Smoking status at baseline did not significantly predict CES-D score at follow-up, although this effect</li> </ul>	Community setting, In-home interviews, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Method	Results	Setting/ Type of Contact
		Study of Adolescent Health			causes of adolescent health-related behaviors. Nationally representative sample of adolescents from the USA (n = 12 149), including a subsample reported never having smoked a cigarette at baseline (n = 5475), aged on average 15 years at baseline and of predominantly European ancestry.	<p>approached significance in females.</p> <ul style="list-style-type: none"> <li>▪ Among never smokers at baseline, level of depressed mood predicted subsequent progression to smoking initiation but not progression to regular smoking.</li> <li>▪ Among never smokers at baseline, progression to smoking initiation during follow-up period was associated with higher CES-D scores at follow-up, even after adjusting for baseline depressed mood with this effect greater for females than for males.</li> <li>▪ Among those who initiated smoking, progression to regular smoking was associated with higher CES-D score at follow-up among females but not males.</li> </ul>	
2007	Riala, K., Viilo, K., Hakko, H., Räsänen, P.	Heavy daily smoking among under 18-year-old psychiatric inpatients is associated with increased risk for suicide attempts	European Psychiatry, 22:219-222	Psychiatric Population Cross-sectional study	Data collected from 411 patients (age 12-17 years) admitted to inpatient psychiatric hospital between April 2001 and July 2005. Number of daily cigarettes (>15) and time of first cigarette after waking up (within 30 min) were used as indicators of heavy daily smoking.	<ul style="list-style-type: none"> <li>▪ After adjusting for psychiatric diagnoses an over twofold risk for suicide attempts was found among adolescents who smoked over 15 cigarettes a day.</li> <li>▪ Additionally, if an adolescent also smoked the first cigarette immediately after waking up the risk was over threefold.</li> <li>▪ Suicidal ideation was not associated with smoking behaviour.</li> <li>▪ Among adolescents with severe psychiatric illnesses, heavy daily smoking may increase the risk of suicidal behaviour independently of current psychiatric diagnosis.</li> </ul>	Inpatient psychiatric hospital, face to face
2000	Sonntag, H., Wittchen, H.U., Kessler, R.C., & Stein, M.B.	Are social fears and DSM-IV social anxiety disorder associated with smoking and nicotine dependence in adolescents and	European Psychiatry, 15:67-74	General Population Prospective longitudinal study	Collected baseline and 4 year follow-up data from the Early Developmental Stages of Psychopathology Study (EDSP), a prospective-longitudinal community	<ul style="list-style-type: none"> <li>▪ At baseline, 35.7% were regular smokers, and 18.7% met DSM-IV criteria for nicotine dependence.</li> <li>▪ 27.2% reported at least one social fear, and 7.2% met criteria for DSM-IV social phobia, most of whom reported first onset of social fear problems prior</li> </ul>	Community-based sample, face to face

Yr of Pub	Author	Article Name	Volume# / Issue#	Study Design	Method	Results	Setting/ Type of Contact
		young adults?			study of 3,021 adolescents and young adults in Munich Germany. Smoking behavior and psychopathology were assessed with the M-CIDI and its DSM-IV algorithms.	<p>to smoking initiation.</p> <ul style="list-style-type: none"> <li>▪ Cross-sectional retrospective baseline analyses revealed that social fears and DSM-IV social phobia were both significantly associated with higher rates of nicotine dependence.</li> <li>▪ Prospective-longitudinal analyses showed that baseline non-users with social fears and baseline non-dependent users with social fears had increased risk of onset of nicotine dependence during follow-up period of 4 years, even when controlling for co-morbid depressive disorders.</li> <li>▪ Social anxiety was found to be significantly associated with nicotine dependence in both cross-sectional retrospective and prospective-longitudinal analyses.</li> <li>▪ It is suggested that social fears could lead to heavy tobacco use as smoking is a socially acceptable behavior that relieves anxiety in social situations.</li> </ul>	
2008	Wilens, T.E., Biederman, J., Adamson, J.J., et al.	Further evidence of an association between adolescent bipolar disorder with smoking and substance use disorders: a controlled study	Drug and Alcohol Dependence, 95(3): 188-198	<b>Psychiatric Population</b> Case-controlled study of outpatient adolescents with bipolar disorder	Adolescents with bipolar disorder (n=105, age 13.6+/-2.5 years [mean]; 70% male) and without bipolar disorder ("controls"; n=98, age 13.7+/-2.1 years; 60% male). Rates of substance use and other disorders were assessed with structured interviews (KSADS-E for subjects younger than 18, SCID for 18-year-old subjects).	<ul style="list-style-type: none"> <li>▪ Bipolar disorder was associated with a significant age-adjusted risk for any substance use disorder, alcohol abuse, drug abuse and dependence, and cigarette smoking, independent of attention deficit/hyperactivity disorder, anxiety, and conduct disorder (CD) diagnoses.</li> <li>▪ The primary predictor of substance use disorders in bipolar youth was older age.</li> <li>▪ Adolescent bipolar disorder is a significant risk factor for substance use disorders and cigarette smoking, independent of psychiatric comorbidity.</li> </ul>	Psychiatric outpatient, face to face

## **APPENDIX II.**

### **Key Informants & Focus Groups**

#### **Key Informants**

N=20

Aurora Mental Health Center

Centennial Mental Health Center

Jefferson Center for Mental Health

San Luis Valley Mental Health Center

Signal Behavioral Health Care

Synergy

Arapahoe House

The Children's Hospital

Access Behavioral Care

Division of Behavioral Health, Ft. Logan

Colorado Clinical Guidelines Collaborative (CCGC)

STEPP

National Jewish Medical and Research Center QuitLine

Aurora Research Institute

#### **Focus Groups**

N=6 focus groups

N=24 adolescents and transitional age youth, ages 13-22 years old

2 rural settings (Larimer and Alamosa), 1 urban (Denver metro area, Aurora)

## APPENDIX III.

### Recommendations for Toolkit Changes

*The following are recommendations for augmenting the current “Smoking Cessation for Persons with Mental Illnesses: A Toolkit for Mental Health Providers” to address the cessation needs of youth with mental illnesses and substance use disorders.*

1. The current toolkit should be divided into two large sections: one for adults and one for youth. The rationale for this is to allow providers to easily turn to the youth section rather than looking through the whole toolkit content. Each youth section of the toolkit should include separate information specific to adolescents (ages 13-17 years old) and to transitional age youth (ages 18-25 years old) where necessary in order to address the unique needs of these subpopulations.
2. Similar to the adult section of the toolkit, there should be the following tabbed sections: **Overview, Tobacco Use, Mental Illness, and Substance Abuse, Assessment and Intervention Planning, Tobacco Cessation Treatment for Youth with MI/SA, Relapse Prevention, National and Local Youth Tobacco Cessation Resources , Literature Review, and Toolkit References.**
3. The **Overview section** would include: (a) statistics for youth about smoking and MI/SA; (b) information about why smoking cessation is particularly crucial for this population; and (c) an overview of the additional sections.
4. The **Tobacco Use, Mental Illness, and Substance Abuse** section would include: (a) the unique challenges youth with MI/SA face in regard to tobacco use: Biological, Psychological, Social (Family and Peer), Stigma, and Tobacco Industry targeting; (b) a description of specific mental disorders and their relation to tobacco use (e.g., Disruptive Behavior Disorders, Anxiety, Depression, Psychotic Disorders); and (c) a description of tobacco use in relation to other comorbid substance abuse for youth (this information could be derived from the Signal Behavioral Health Care Tobacco Cessation Toolkit for Substance Abuse).
5. The **Assessment and Intervention Planning** section would include: (a) information on screening youth and their parents for tobacco use and how to incorporate this screening into existing MI/SA clinical practice; (b) brief counseling recommendations and referral; (c) discussion of Readiness to Quit and Stages of Change and how these would apply to youth; (d) Cultural Considerations: recommendations for health care clinicians, families, peers; and (e) resources.
6. The **Tobacco Cessation Treatment for Adolescents with Mental Illness** section would include: (a) key findings regarding cessation treatment (*with the caveat that there is a lack of research in this area, but noting reasons why smoking cessation is crucial for this group*); (b)

- components of emerging intensive intervention programs (Inpatient, Outpatient, School and Community Based Components); (c) current behavioral interventions for smoking cessation which includes an overview of ongoing cessation programs locally and nationally and discusses successful counseling elements that are unique to youth; and (d) prescribing medications: considerations for youth with MI/SA (*again, with the caveat that the 2008 Clinical Guidelines do not recommend pharmacotherapy for youth in general, but that such therapies may be considered for tobacco dependence in transitional age youth with MI/SA*).
7. The **Relapse Prevention section** would include: (a) Components of Minimal Practice Relapse Prevention and (b) Components of Prescriptive Relapse Prevention, both adapted for youth.
  8. The **Local and National Youth Tobacco Cessation Resources section** would include: (a) local cessation programs and resources; (b) national cessation programs and resources; and (c) web-based and text-based interventions and resources.
  9. The **Literature Review** section would include the tables included in this report in Appendix I with studies of the prevalence, correlates of tobacco use for youth with MI/SA, intervention studies for youth, and review articles of cessation programs.
  10. The final section would include **Toolkit References for Youth**.