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A Review of Motivational Smoking Cessation Programs for Adolescents in the Schools

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This review provides a qualitative overview of school-based smoking cessation programs for adolescents, with a focus on motivationally based programs. Project-Ex and Not-On-Tobacco are two heavily studied interventions with substantial empirical support. Other programs such as use of Motivational Interviewing with the stage of change model have preliminary support. Patterns commonly shared by successful programs included the use of psychoeducational resources, trained cessation counselors, and collaboration among students in the specified program. Further research among all programs is recommended to provide additional empirical support and determine what program components are most effective. Implications, limitations, and areas for future research are also addressed.

Introduction

Cigarette smoking represents the leading and most preventable cause of death in the United States (Backinger, Fagan, Matthews, & Grana, 2003; Centers for Disease Control and Prevention, 2002). Unfortunately, research suggests that students often initiate smoking during middle school and have likely established a strong addiction to tobacco by the time of high school enrollment (Johnson, O'Malley, Bachman, & Schulenberg, 2003). Furthermore, adolescents often experience physical, psychological, and social consequences as a result of smoking (e.g., lung cancer, tooth decay,

financial hardship; Sussman, Dent, & Lichtman, 2001; American Academy of Pediatrics, 1999). Consequently, it is important to develop effective interventions with the main purpose of reducing and/or preventing smoking among adolescent youth. To reach this goal, increased attention is needed to develop effective school-based smoking cessation programs that can reach a large number of adolescents over a brief amount of time and that are also cost-effective in nature (Botvin, 2000).

While a variety of treatment approaches (e.g., cognitive therapy, behavioral therapy, rational emotive behavior therapy) and interventions (e.g., hypnosis, pharmacology, counseling, contingency management, desensitization, relaxation) have been empirically tested and supported for adults, the current literature evaluating smoking cessation interventions for youth is sparse and not well-developed (Garrison, Christakis, Ebel, Wiehe, & Rivara, 2003; Sussman, Sun, & Dent, 2006). Research consistently suggests that youth fail to quit smoking because of a lack of motivation for behavior change. Most recently, smoking cessation programs targeting youth have begun incorporating motivational enhancement and reinforcement strategies to help individuals clarify goals and values while simultaneously increasing their willingness to change negative patterns of behavior (Pallonen, 1998). In addition to yielding higher quit rates among adolescents who smoke, research indicates that smoking cessation programs based on motivational principles are encouraging, feasible, and have a positive impact on smoking cessation because of their capability to tailor techniques to an individual's level of readiness to change and need level (Shegog, McAlister, Hu, Ford, Meshack, & Peters, 2005).
In order to facilitate the formation of effective policies and positive practices among practitioners, the current review seeks to provide a resource for those desiring to develop and

establish effective school-based smoking cessation programs. The authors describe a qualitative review that includes evidenced-based, motivational interventions targeted at youth. While other study designs and programs may be effective, this review focuses specifically on evidence-based practices using motivational strategies because these practices have shown particular promise for youth smoking cessation (Grimshaw & Stanton, 2010; Mermelstein, 2003; Sussman, Sun, & Dent, 2006). Additionally, this review selected programs that included a description of the intervention including theoretical orientation, adequate research design, follow-up analyses, attrition analyses, and use reliable and valid outcome measures. It is important to note that several other research reviews (e.g, Backinger et al., 2003; Bruvold, 1993; Garrison, Dimitri, Christakis, Ebel, Wieche, & Rivara, 2003; Grinshaw & Staton, 2010; Mermelstein, 2003; Sussman, Sun, & Dent, 2006) have been published in the area of adolescent smoking cessation and prevention. The following briefly summarizes their findings and also discusses how the present review provides additional content to fulfill a critical research gap.

Bruvold (1993) evaluated 94 separate interventions in a meta-analysis and found that social reinforcement interventions had a larger effect size with regard to changes in behaviors in comparison to developmental or social norm interventions for *preventing* adolescent smoking. While these findings provided useful information, the study failed to include youth *cessation* interventions, which are also a critical area of need (Pierce & Gilpin, 1996). On the other hand, several researchers have conducted meta-analyses that included adolescent *cessation* interventions; for example, Sussman (2002) identified the following eight theoretical approaches and /or techniques implemented across 66 cessation reports: social influence, cognitive-behavioral, motivational enhancement, supply reduction, pharmacological addition, change model, affect clarification, and response-contingent

reinforcement. Results found that approaches based on motivation enhancement and contingency-based reinforcement had higher quit rates in comparison to other treatment modalities. Similarly, Sussman, Sun and Dent (2006) reviewed 48 adolescent smoking cessation studies and found higher quit rates for interventions including cognitive-behavioral techniques, social influence models, and motivational enhancement principles.

Finally, Grinshaw and Staton (2010) and Mermelstein (2003) highlighted the role of motivation to quit as a significant predictor for improving intervention success. These researchers suggested that future studies should explore the effectiveness of specific approaches, with the primary goal of enhancing adolescent smoking cessation by incorporating principles of motivational enhancement. Based on these recommendations the current review examines the evidence for school-based smoking cessation programs for adolescents that are motivational in nature. Additionally, it seeks to incorporate studies providing adequate intervention descriptions, strong research design, reliable/valid measures, and appropriate statistical techniques for data interpretation. It is hoped that this analysis will provide new insight by examining specific programs that use motivation-focused interventions, such as motivational enhancement and the transtheoretical stage of change model. Before discussing the methods of the current study, the following paragraphs will briefly review the theoretical underpinnings of these programs.

The transtheoretical model (TTM; Prochaska, DiClemente, & Norcross, 1992) of behavioral change places individuals into one of five stages (e.g., contemplation), indicating their readiness to change a particular behavior (e.g., smoking). Individuals in the pre-contemplation stage have not

considered changing their behavior, while individuals in the contemplation stage are considering change within the next six months. Individuals in the preparation stage are planning to change their behavior within the next 30 days. Those in the action stage have successfully made changes (e.g., reduced number of cigarettes smoked in a day) over the past 30 days, while those in the maintenance stage have successfully changed their behavior for the past six months. The stages are not linear, as individuals may regress to a previous stage at some point (Erol & Erdogan, 2008; Sutton, 2001). The stages of change help in understanding how people begin or terminate a particular behavior, how they decide upon the pros and cons of continuing that particular behavior, and their confidence in and beliefs about changing that particular behavior (Aveyard et al., 1999; Aveyard et al., 2001; Erol & Erdogan, 2008).

The stage of change model has played an integral role in the development of motivational interviewing. Motivational interviewing (MI; Miller & Rollnick, 2002) is a brief, client-centered intervention characterized by the following four general behaviors: expressing empathy, developing a discrepancy, rolling with resistance, and supporting self-efficacy. MI focuses on and normalizes a client's ambivalence. It strives to increase the probability that an individual will decide upon and maintain a specific change strategy (Erol & Erdogan, 2008; Lawendowski, 1998) by utilizing the therapist's characteristics of empathy and respect to encourage awareness. This awareness is hoped to bring light to the discrepancy between where the individual currently is and where the individual wants to be as well as the individual's self-efficacy to make changes (Lawendowski, 1998). A related intervention, motivational enhancement therapy (MET), utilizes MI principles in a structured format

incorporating assessment, personalized feedback, and follow-up sessions (Lawendowski, 1998).

Methods

Selection of studies

To search the literature for empirical studies of smoking cessation, electronic databases including PsychInfo, Web of Science, Cochrane Libraries, Pub Med, Scopus, EMBASE, and CINAHL were examined. Search terms included "smoking cessation", "adolescents" (youth), "school-based" (school), and "motivational intervention". Alternative search terms, such as "middle school" or "high school" in place of "adolescents" or "youth," did not yield additional articles. Articles published prior to May 2011 were accessed. Only studies published in the English language were included in the current review. Results were further narrowed to exclude studies with college populations as the goal of this review was to inform the practice of secondary school practitioners. Reference sections of identified articles were also scanned to find additional publications. In total, 23 articles that described empirical instigations and met all criteria were included in the current review.

Sample

The range of ages of participants across the 23 reviewed studies was 12-20 years old. All studies involved a population of middle and/or high school students in public schools. Some studies targeted specific groups of students such as minority students (e.g., Sun et al., 2007). Most of the studies included populations of voluntary students (e.g., Erol & Erdogan, 2008) but some included groups of students in trouble for violating school smoking polices (e.g., Kelly & Lapworth, 2006). These differences are noted and should be considered

when evaluating the results as these populations likely differ in their readiness to change their smoking behaviors.

Organization of the Review

The reviewed studies were primarily organized by program to facilitate individual program evaluation by those interested in implementing these or similar interventions in their own school(s). More widely known and studied programs are included first, followed by those with less research and empirical support. When specific program names were not provided, studies using similar interventions were grouped together in the review to provide a more efficient overview (e.g., computer-based interventions). A goal of most smoking cessation programs is that they be accessible, efficacious, cost-effective, and transportable (Norman et al., 2008). In this review, multiple program components were examined. These included theoretical orientation, description of intervention, research design, length of follow-up, attrition, and outcome measures. Ideally, research on these programs should demonstrate the use of experimental designs, random assignment to groups, a comparison group, adequate sample size, a manualized treatment, significant outcomes at end of treatment and follow-up, and replications of the results.

Review/Results

Nine programs or types of interventions were identified that fit the review criteria as described in the selection of studies section above. An overview of these programs, their theoretical orientation, and their results are listed in Table 1. The following paragraphs review the basic findings for each intervention, followed by conclusions regarding the feasibility of implementation of each based on the currently available research.

Project EX

Project EX is an evidence-based, school-based smoking cessation program for teens (Sussman, McCuller, Zheng, Pfingston, Miyano, & Dent, 2004). Project EX consists of eight sessions, implemented across six-weeks; the project is a refinement of project Towards No Tobacco (Sussman, Dent, & Lichtman, 2001), which used social influence and chemical dependency models to address teen smoking cessation. Project EX expands on the previous program by operating from the premise that teens fail to quit smoking due to social influence, nicotine dependency, and a lack of motivation. Therefore, Project EX uses a motivational enhancement framework, to increase coping strategies when trying to quit smoking or to maintain quit status while also increasing awareness of the reasons for students to discontinue smoking (Sussman, Dent, & Lichtman, 2001).

Sussman, Dent, and Lichtman's (2001) initial study evaluating the effectiveness of Project EX used randomized block design procedures for standard care control, Project EX alone, or Project EX with a school community component conditions across 18 alternative high schools (n=128) in southern California. Tobacco use behaviors, nicotine dependence, and stages of tobacco use were assessed at baseline, immediately post treatment, and at a three month follow-up. Evaluation of both Project EX conditions compared to the standard care condition showed that Project EX had significantly higher quit rates (17% versus 8% with the carbon monoxide (CO) adjusted quit rates) than the standard care condition. A follow-up study, conducted by McCuller, Sussman, Wapner, Dent and Weiss (2006), assessed motivation to quit as a mediator in the previous study and found that 26% of the treatment effect could be accounted for by changes in motivation. In 2007, Sun et al. evaluated the effectiveness of Project EX as a classroom-based program for

both smoking prevention (for nonsmokers) and smoking cessation in high school students. The researchers found significant increases in program-specific knowledge and significant decreases in smoking intentions and self-reported weekly smoking, suggesting the feasibility and effectiveness of Project EX as a classroom based prevention/intervention model. Project EX has also shown promising effects for high school students in a pilot study in Wuhan, China and in conjunction with smoking cessation aids (Sussman et al., 2004). Overall, Project EX shows promise for adolescent smoking cessation in a wide range of students.

Not on Tobacco

Not-on-Tobacco, or N-O-T, is one of the many emerging school-based programs targeting smoking in high school students. This voluntary program designed specifically for 14- to 19- year-old students who smoke on a daily basis, includes ten voluntary sessions lasting one hour in length. Four additional booster sessions are provided in same-sex groups led by same-sex group facilitators who have been trained in implementing the N-O-T curriculum. In addition to the overall goal of smoking cessation in high school students, N-O-T's goals include reducing smoking behaviors, promoting healthy behaviors, increasing adaptive lifestyle choices, improving stress management and coping skills, and teaching students positive social skills among their peer groups (Franks et al., 2007).

Current literature on the N-O-T program reveals a trend of positive outcomes for students after completion of the curriculum, especially when compared to a control group (Dino, Horn, & Meit, 1998). In studies comparing the N-O-T program to control groups undergoing brief intervention therapy or other programs for smoking cessation, those individuals who completed the N-O-T curriculum tended to

show higher quit rates, higher motivation to quit, and in most cases, significant changes in their smoking behaviors (Dino, Horn, & Meit, 1998; Horn, Dino, Kalsekar, & Fernandes, 2004; Köhler, Schoenberger, Beasley, Phillips, 2008). According to a 2005 study in which Horn, Dino, Kalsekar, and Mody implemented the N-O-T program curriculum in both a controlled environment with a control group and in a real-world environment without a control group, the controlled condition and field condition revealed quit rates of 19% and 26% respectively. Additionally, students who utilized this smoking cessation curriculum showed relatively higher attendance rates than students who did not (Horn, Dino, Kalsekar, & Fernandes, 2004). Based upon current research, the N-O-T program will most likely have the greatest impact on a rural populations of students who smoke regularly (Horn, Dino, Kalsekar, & Fernandes, 2004), although the program could also prove to be valuable in other settings. The program's design seems to be feasible and can be generalized and implemented in a number of locations, which adds to its appeal within the school system (Franks et al., 2007).

ASCENT

The ASCENT program is a school-based adolescent smoking cessation program with theoretical underpinnings in both cognitive behavioral therapy and the stage of change model. This psychoeducational program was designed as to be delivered in six, one-hour weekly sessions during school hours by one group leader. It utilizes multiple activities, including group discussions, interactive games, role plays, a workbook, a video, and weekly homework assignments to enhance students' knowledge and motivation to change their smoking habits.

A randomized control trial was carried out to test the efficacy of the program compared to an assessment-only control group

(Hoffman, Nemes, Weil, Zack, Munly, & Hess, 2008). Promising results were found in favor of the treatment group at all assessment points (post, 30-day, 1-year) on outcomes including lower tobacco use, decreased urges, and reduced negative symptoms as well as more quit attempts, greater confidence, and higher overall quit rates. Additional findings included heightened awareness of triggers, strategies to cope with withdrawal, and peer refusal skills. Finally, students reported an increase in awareness of smoking consequences, motivation for quitting, and positive movement in the stage model for quitting. At the conclusion of the study, 31% of the treatment group reported having quit smoking as compared to 23% of the control group. Although the difference between groups at the end of the study was not significantly different, both groups' quit rates were higher than the average rate for youth smoking cessation programs. It is unclear what exactly contributed to these high quit rates, even in the assessment-only condition. The authors suggest that extra contact and attention with the interventionist may have contributed. A lack of biochemical verification of quit rates due to problems with the saliva continine test kits brings the validity of the self-reported quit rates into question. Overall, this program is promising but further implementation and testing is needed.

Motivational Interviewing (MI) with Transtheoretical Model (TTM)

Although TTM has not been shown to be effective with adolescents when used in conjunction with computer technology, there may be other methods that are able to successfully incorporate the stages of change and TTM into an intervention that is effective at reducing smoking behaviors in adolescents. One such tactic is using TTM in conjunction with motivational interviewing. Erol and Erdogan (2008) used MI in conjunction with TTM to promote smoking cessation in adolescents. In this intervention, 60 ninth through twelfth

grade students received five 45-minute sessions consisting of MI and TTM activities (e.g., exploring pros and cons of smoking). The results of the three-month and six-month follow-ups found modest decreases in smoking among participating adolescents. Additionally, one-third of the adolescents had ceased smoking at the six-month follow-up. Unfortunately, this study lacked a control group. The stage of change model combined with MI is a promising intervention for adolescent smoking cessation; however, additional research is needed in this area.

Internet/Computer-based Interventions

Currently, there is debate whether internet cessation programs can provide as effective a substitution as face-to-face interactions (Patten et al., 2006). Chen and Yeh (2006) examined the outcomes of an integrated smoking cessation program in one school (tx n= 39, control n=38) utilizing a combination of school-based sessions and an internet-based instruction components, compared in an experimental design. Results indicated that students participating in the treatment group experienced a significant reduction in cigarette use, increased cessation attempts, and increased self-efficacy. It should be noted that the control group was comprised of students who did not want to participate in the treatment. Norman et al. (2008) analyzed the efficacy of the Smoking Zine website integrated into a group MI intervention. The study used a two-group randomized control trial with 1,402 males and female students in grades 9 through 11 in Canada. Using a multi-level logistical growth model, the study found that student smokers' cigarette use was not impacted by the program but their intentions to smoke decreased over the six month follow-up period. There was a problem with significant attrition throughout the study. Aveyard (2001) delivered a TTM-based intervention using computer technology in the schools using three classroom sessions and three computer

sessions. In all, Aveyard analysed data from ninth grade students at 53 schools. There were a total of 8352 participants with 4125 in the intervention group and 4227 in the control group. The results of these studies indicated that using computers along with TTM was no more effective than exposure to only the health education currently provided by schools at both one-year (Aveyard et al., 1999) and two-year follow-ups (Aveyard et al., 2001). Woodruff et al. (2007) utilized Internet-based social network combined with motivational interviewing conducted in real-time by a smoking cessation counselor. The authors studied 136 adolescents from high schools that were randomly selected into an intervention or control group and used follow-up surveys for all participants at baseline, the end of treatment, and at three and twelve month follow-up time points. They found short-term success when introducing concepts related to relapse prevention, stage of change theory and social/support group interactions to provide semi-structured online sessions (Woodruff et. al, 2001, 2007). Real-time interactive discussion (between smokers and professionals and other smokers) shows potential to intensify the efficacy of internet interventions. Overall, more research is needed on specific computer-based interventions in order to draw more solid conclusions regarding their effectiveness.

Telephone Counseling for Smoking Cessation

There is strong appeal in implementing a smoking cessation intervention over telephones. A number of obstacles related to retention and participation concerns, specifically of young adults, are addressed by such a method (Zhu, Tedeschi, Anderson, & Pierce, 1996). Of note are the following presumed benefits: participants can remain relatively anonymous; individuals receive services in a convenient location without the need for transportation; the telephone format helps equalize the power differential between

counselor and client; personalized treatment planning is possible; and phone counseling allows for low cost treatment and broad implementation. Kealey et al. (2007) present a suitable case for the use of proactive telephone counseling interventions consisting of MI and cognitive behavioral skills training (CBST), two theoretical strategies found in the majority of addiction counseling programs. However, despite the many potentially positive attributes of telephone based interventions for smoking cessation, researchers investigating its implementation have been met with mixed results. Currently, the most commonly cited study on telephone intervention for adolescent smoking cessation is the Hutchinson Smoking Prevention Project (HSPP). Peterson, Kealey, Mann, Marek and Sarason (2000) conducted a randomized trial of MI and CBST in fifty Washington State high schools that targeted high school juniors with follow-up at one year. The authors contend the main outcome was six months prolonged abstinence from smoking; however the results are not conclusive. The authors reported numerous marginal, but not statistically significant results. The use of telephone based counseling for smoking cessation in adolescents may provide an efficacious and cost-effective means of intervention; therefore, it merits additional exploration (Villanti, 2010). Tedeschi, Zhu, Anderson, Cummins and Ribner (2005) suggest a systematic method of providing telephone counseling, which may be a good candidate for future studies to properly evaluate telephone based counseling interventions. To date, however, there is no evidence that it might be an effective treatment approach for adolescents in the schools.

HYP

The HYP program utilizes motivational interviewing (MI) to encourage smoking cessation with middle and high school students who have been sanctioned for violations of school

tobacco policy. The efficacy of this program utilizing individual, one-hour MI sessions was compared to standard care and counselor advice using a randomized design (Kelly & Lapworth, 2006). Assessment data was collected at the end of treatment and at one, three, and six month intervals. Results showed significant short-term decreases in smoking for the MI intervention group relative to standard care, however, these results were not maintained at the three and six month follow-up. Gains in self-efficacy were maintained relative to standard care throughout follow-up. In conclusion, more detailed analysis of this program and its use in conjunction with disciplinary referrals deserves further research attention but currently lacks sufficient empirical support.

Kickin' Butts

The Kickin' Butts program is a school-based tobacco cessation program with theoretical underpinnings in the stage of change model which has demonstrated the ability to decrease adolescent smoking rates (Joffe, McNeely, Colantuoni, An, Wang, & Scharfstein, 2009). Joffe and colleagues (2009) tested the efficacy of a reformatted version of the program designed to be implemented twice-weekly, in thirty-minute sessions during lunch against a similarly reformatted version of the Not-On-Tobacco (N-O-T) program. Assessment was conducted at the end of the program, and at one, three, six, and twelve month follow-up time points. In the 2009 study the reformatted Kickin' Butts program was not shown to affect quit rates at any of the assessment points. It was noted that randomization occurred at the individual level, which may have contributed to diffusion of the interventions into the control group. In sum, the reformatted Kickin' Butts program cannot be recommended for implementation at this time.

Start to Stop

The Start to Stop program is a school-based smoking cessation program for students caught smoking at school. It has theoretical bases in social cognitive theory and the stage of change model, assuming the need for both motivational enhancement and skills training to help adolescents quit smoking. The program is delivered in four, 50-minute sessions by a health educator followed by a brief stage matched intervention via phone calls for one year. Assessment was completed at the end of the program and again after one year. Favorable program ratings, increased knowledge, and higher retention rates were found; however, no changes in attitude towards smoking or cessation rates were detected. Assessment, which included biochemical verification of quit status, revealed significant falsification of cessation reports. In sum, there is no evidence at this time that this program affected student cessation rates.

Conclusion

Implications

Our review demonstrates that additional research needs to be conducted on evidence-based motivational smoking cessation interventions for adolescents despite the presumed benefits held by this particular approach. Well-established programs such as Project-Ex and Not-On-Tobacco hold the most potential for immediate implementation in the schools. Other programs, such as MI with TTM, have some support but require further research. A few programs (e.g., Start to Stop) do not have empirical support for implementation at this time. Internet or computer-based interventions have mixed results that require more detailed analysis of specific program components that work. Given these conclusions, practitioners considering the use of motivational smoking cessation interventions for adolescents are encouraged to consider the

specific characteristics of their targeted population in conjunction with the specific details from the reviewed studies along with the conclusions of this review.

In our review, the programs with the most success utilized trained professionals and psychoeducational resources to provide smoking cessation services within a collaborative, student-centered atmosphere. This is consistent with previous research demonstrating that a multi-theory approach is more effective in accounting for changes in adolescent smoking behavior (Collins & Ellickson, 2004). Overall, school districts and individual classrooms should consider utilizing motivational enhancement strategies in order to maximize adolescent smoking cessation and minimize rates of smoking. Specifically, these programs should explore the roles of motivation and confidence in stopping smoking and also assist students in reducing ambivalence towards quitting. Self-help materials and engaging in cost-benefit analysis may be helpful in eliciting students' consideration of change. Assessment of students' stage of change in addition to behavioral outcomes is important for gaining understanding of the usefulness of motivational strategies utilized in interventions. Furthermore, previous research has concluded that it seems appropriate to implement such interventions in school settings with approximately five to eight sessions lasting for at least 20 minutes in duration (Sussman, Sun, Dent, 2006).

Practical Implications for Schools

Considering the above discussion, each school district should use a problem-solving team approach to establish need and to evaluate the logistics of implementing one of the evidence based programs mentioned. The principal, dean, and any other personnel who handle referrals for smoking are essential team members. In addition, program developers and facilitators need to be team members in order to ensure

efficacy of the program. Once the need for a program has been identified and agreed upon by the team members, a cost-benefit analysis of smoking cessation programs based on the school's specific needs, available resources, and support is necessary.

Coordination and logistics of the smoking cessation programs must be considered as part of the cost-benefit analysis. For example, student need and willingness to participate in such a program must be evaluated. Further, costs of the programs and considering whether students will pay for the program (e.g., when a student is referred s/he pays a fee to participate in the program) will be necessary. Other practical concerns include identifying a location in which the program will be implemented and obtaining parental consent for students to participate in the program.

In sum, Project EX and Not on Tobacco appear to be the most promising for school-wide implementation in terms of evidence-based interventions. These programs also have federal support. Specifically, Project EX and Not on Tobacco utilized control groups and several stages of research in order to construct and test their programs. However, in terms of practicality, these programs require more time to complete (8 sessions for each) and more resources than some schools may be able to dedicate. For example, scheduling the sessions without disrupting the school day or extracurricular activities is of concern. Transportation issues must also be considered. In general, an afterschool program may be the best option as long as students are able to arrange transportation. Other programs, such as the phone counseling and internet-based cessation counseling, appear easier to implement in terms of operating resources but have had mixed empirical support. However, these programs may also have the benefit of reaching a wider student population due to the nature of the

counseling (via phone or internet rather than face-to-face). This may be of particular benefit for schools located in more rural areas. Further, phone counseling programs for adults are already in place in many states and an extension of state-wide implementation to include adolescents may be a feasible means of service provision.

Limitations

While the use of youth smoking cessation interventions based on motivational enhancement principles appears promising, several limitations within the current literature should be noted. First, the largest limitation of the current study is its narrow focus on only motivationally-based interventions provided in the schools. Inclusion of other types of interventions would allow practitioners a wider array of options to choose from for implementation. Second, there continues to be inconsistency across studies with respect to defining 'smoking' and 'quitting" behavior. For example, the criteria for measuring smoking cessation behavior was self-reported quitting for seven days in one study while 30 days in another study (Grimshaw & Stanton, 2010). As a result, it becomes difficult to compare and evaluate the effectiveness of current research trials. Similarly, there is a need for greater consistency in terms of methodology— whether for total number of sessions, length of study, provider characteristics (e.g., training level, education), or outcome measures utilized. A final limitation of the present review is that only studies published in the English were reviewed—possibly resulting in bias or unintentionally overlooking additional studies. As noted earlier, studies conducted outside of the school and those not using motivational-based strategies were also excluded. Based on these limitations, several areas for future research are warranted.

Future Research

Based on the current review, a critical gap remains in empirical evidence for motivational-based school smoking cessation programs. However, there are also problems in theoretical and methodological approaches in this area. It is important to develop a universal definition for "quitting" so that comparison studies can be performed (Kohler, Schoenberger, Phillips, 2008). Researchers should also consider implementing longitudinal studies that collect follow-up data across longer durations of time and that are based on repeated multiple measures. Studies based on longer interventions may also enhance relapse prevention success. Similarly, it would be helpful for future researchers to corroborate self-report data and behavioral observations with biochemical measures of abstinence (Colby, 2005). Third, it is important for researchers using motivational techniques in youth smoking cessation interventions to specifically examine which components are effective, especially for diverse populations (Lai, Cahill, Qin, & Tang, 2010). Furthermore, it is critical that smoking cessation interventions based on motivational enhancement are marketed to at-risk youth explicitly describing the benefits of quitting and that participation in cessation programs will not result in negative labels (e.g., weak) or consequences (e.g., punishment; Mermelstein, 2003). Finally, as youth cigarette smoking continues to be a significant concern, it is important to work collaboratively with a variety of stakeholders (e.g., parents, adolescents, administrators, teachers, etc.) in order to develop and study more cost-effective, feasible, and practical smoking-cessation interventions for the schools.

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Program/Study	Intervention and Theory	Populations and Settings	Length of Program/Follow-up	Outcome Measures	Results	Evaluation of Design
Project EX : (Sun et al., 2007; Sussman et al., 2001; Sussman et al., 2004)	School-based motivational enhancement	High school age (15-20); at alternative high schools California	Eight sessions over a six-week period 3 month follow-up	Self-report and carbon monoxide levels: *Tobacco use behaviors; modified Fagerstrom nicotine dependence scale; stages of change for tobacco use and cessation*	Project EX has produced significant effects (as measured by 30-day quit rate) in comparison to standard care control groups.	Experimental design. Control group. Sample size = 330. Structured manualized treatment. Follow-up. Quit rate = 17% compared to 7% for control group. Multiple replications.
Not on Tobacco (NOT): (Dino, Horn, & Melt, 1998; Dino et al., 2001; Franks et al., 2007; Horn et al., 2005; Joffe et al., 2009; Köhler et al., 2008)	School-based "total health approach" (includes motivational issues and physical, psychological, and social impact of smoking)	Ages 12-19 (across studies); gender specific Geared toward "regular" smokers (1-5 cigarettes per day) Multiple states included in the studies (i.e. Florida, Alabama, and Maryland)	10 sessions plus 4 boosters 3, 6 month follow-up	Self report and carbon monoxide levels: *Tobacco use behaviors; modified Fagerstrom nicotine dependence scale; quit history; stages of change for tobacco use and cessation; beliefs and knowledge about smoking*	NOT has generally shown higher quit rates than brief interventions control groups.	Numerous studies. Primarily experimental designs, both with and without control groups. Total of over 6000 youth in 489 schools. Structured manualized treatment. Quit rates of 19-26%. Multiple replications.

ASCENT: (Hoffman et al., 2008)	School-based TTM and CBT	Ages 14-18 Maryland	6, 1 hr sessions 1 year follow-up	Self-report and cotinine validation: *Smoking behavior; stage of change; Minnesota Nicotine Withdrawal Questionnaire (NWQ); Fagerstrom Test for Nicotine Dependence (mFTQ), and a measure of saliva cotinine levels; quitting history; Smoking Refusal Self Efficacy Questionnaire (SRSEQ)*	Results indicated significant reductions in current smokers, # cigarettes, but lacked chemical validation.	Experimental design. Control group. Random assignment. Adequate sample size. Quit rate of 31% compared to 23% for control group. Some internal validity issues. Replications needed.
Motivational interviewing (MI): (Erol & Erdogan, 2008)	School-based MI and TTM	Ages 13-20; Males only Turkey	5, 45-minute sessions 3, 6 month follow-up	Self report: *Tobacco use behaviors; modified Fagerstrom nicotine dependence scale; decisional balance sheets; situational temptation scales; stages of change*	Stage-based (TTM) motivational interviewing had positive outcomes at follow-up.	Single group pre-post design. No control group. Sample size = 60 Turkish males. Quit rates of 18.3 and 33.3% at 3 and 6 months. No replications reported.

				for tobacco use and cessation; situational temptation scales		
Internet/computer based: (Aveyard et al., 2001; Aveyard et al., 1999; Chen & Yeh, 2006; Norman et al., 2008; Patten et al., 2006; Woodruff et al., 2001; Woodruff et al., 2007)	School-based (Patten et al., was home-based but recruited in schools). Two were atheoretical; one used TTM, and the other two were eclectic in nature (Social Learning Theory, behavioral, relapse prevention, TTM, social support/group interaction, health communication and decision-making theories)	Ages 13-18 California, Canada, Connecticut, Minnesota, Wisconsin, England	The studies reviewed used between 6 and 7 sessions (ranging from 45-minutes to 2 hours) Studies ranged from 1 month to 12 month to 2 year follow-up	Self-report: *Likelihood of Action Scale for Smoking–Adolescents (LASS-A);intentions to smoke; past week abstinence and smoking behaviors; number of quit attempts; latency to first cigarette of the day; readiness to quit; current smoking category*	Mixed results. Some internet/computer based interventions have shown a significant reduction in smoking behaviors across the studies (in comparison to control groups) but others have not.	Designs primarily experimental with random assignment and control/comparison groups. Sufficient sample sizes. Some manualized treatments. Results minimal due to attrition. Several replications.

Phone counseling: (Kealey et al., 2007; Peterson et al., 2000)	School-based MI and CBST	Ages 16-20 Washington	Participant-determined number of 15-minute calls 1 year follow-up	Self –report and cotinine validation: *Smoking behaviors; smoking cessation stage of* change	Phone counseling interventions have many benefits; however, these studies have shown limited support for the use of phone counseling. Marginal, but not significant results were found in the HSPP.	Designs are both randomized control and single group designs. Sample sizes are large. Treatments appear to be manualized. Abstinence rates of 21.8% (experimental) versus 17.7% (control group) but not significant
HYP: (Kelly & Lapworth, 2006)	School-based MI	Ages 14-18 involuntary populations Australia	1,3,6 month follow-up	Self-report: *Quantity Frequency; Smoking Refusal Self Efficacy Questionnaire (SRSEQ)*	Results indicated significant short term reductions in smoking but results were not maintain through follow-up.	Experimental design. Treatment group compared to alternate treatment. Small sample size. Manualized. Long terms gains not achieved. Replications needed.

Kickin' Butts: (Joffe et al., 2009)	School-based TTM	Ages 14-18 Maryland	15 sessions of 30 minutes each (revised format from 8-50 minute sessions) 1,3, 6, 12 month follow-ups	Self-report: *smoking behaviors, quit rates, nicotine dependence, and stage of change*	Results indicated no significant differences on any measured outcomes variables.	Experimental design, random assignment. Control group. Large sample size. Manualized treatment shortened to fit lunchtime. Non-significant results comparing experimental to alternative treatment group. Replications needed.
Start to Stop: (Robinson et al., 2003)	School-based Social cognitive theory and TTM	Ages 14-18 involuntary populations	4- 50 minute sessions 1 year follow-up with monthly check in	Self report: *smoking behavior, nicotine dependence, stage of change, attitude, and knowledge*	Results indicated significant improvements in knowledge only.	Experimental design. Control group. Random assignment. Large sample size. Significant gains not achieved. Replications needed.