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SBIRT for adolescent drug and alcohol use: Current status and future directions

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Abstract

Adolescence is a period of rapid biological, psychological, and social development in the human life cycle. Drug and alcohol misuse during this critical period poses substantial problems for individual and public health, yet is highly prevalent in the United States and elsewhere. The screening, brief intervention, and referral to treatment (SBIRT) model may be well-suited for identifying and intervening with adolescents who are at-risk of developing substance use disorders and those adolescents whose substance use puts them at risk for injury or illness. This article reviews the literature on SBIRT for adolescent populations, focusing on findings from randomized controlled trials. The limited evidence suggests that brief interventions may be effective with adolescents, but a number of gaps in the literature were identified. Considerations for implementing SBIRT with adolescent populations are discussed. Randomized trials are needed that have adequate statistical power, employ longer-term follow-ups, and test the effectiveness of SBIRT for adolescents in various service delivery settings.

Keywords

screening; brief intervention; treatment referral; SBIRT; adolescent

1. Introduction

Alcohol and drug use by adolescents is widely prevalent in the U.S. According to the National Survey on Drug Use and Health, one in ten youth ages 12–17 in the U.S. report using illicit drugs in the past 30 days. Past month alcohol use is reported by 27.2% of underage persons, while 18.1% report consuming 5 or more drinks on a single occasion within the past month (Substance Abuse and Mental Health Services Administration [SAMHSA], 2010). Findings from the Monitoring the Future study, an ongoing effort to monitor drug use behaviors among high school students, show that prevalence of past month alcohol consumption is 14% among 8th graders, 21% among 10th graders, and 49% among 12th graders. By the time students leave high school, 48% will have used illicit drugs, and

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the majority will have experienced alcohol intoxication (Johnston, O'Malley, Bachman, & Schulenberg, 2011).

These high rates of alcohol and drug use during adolescence are concerning because they coincide with a major developmental period in the life course. Drug and alcohol misuse during adolescence impacts critical stages of brain development (Volkow & Li, 2005; Lubman, Yucel, & Hall, 2007). Equally alarming are the serious problems associated with use, including: death from alcohol and/or drug intoxication; motor vehicle crashes and other trauma; hepatitis and HIV infection; teen pregnancy; violence; criminal behavior; school failure; and family problems (Hingson, Heeren, Jamanka, & Howland, 2000; Mathers, Toumbourou, Catalano, Williams, & Patton, 2006; Miller, Naimi, Brewer, & Jones, 2007; Fergusson & Lynskey, 1996; Windle, 2004; Clark, Martin, & Corneius, 2008). Furthermore, substance use in adolescence increases the risk for substance use disorders later in life (Englund, Egeland, Oliva, & Collins, 2008; Hingson, Heeren, & Winter, 2006; Swift, Coffey, Carlin, Degenhardt, & Patton, 2008).

The majority of adolescents who use alcohol or drugs do not seek and are not enrolled in specialty treatment services (SAMHSA, 2010). In fact, in 2009, approximately 1.8 million (7.2%) U.S. youths between the ages of 12 and 17 were believed to need substance abuse treatment, yet only approximately 150,000 of them actually received it (SAMHSA, 2010). Although rates of substance use disorders and treatment need have decreased somewhat among youth over the last decade, there remains a large unmet need for intervention services (SAMHSA, 2010). Thus, the traditional passive service delivery model of waiting for patients to seek treatment is not only inappropriate for early intervention efforts, but is also inadequate in engaging out-of-treatment individuals in needed services. Hence, effective approaches to identify alcohol and drug use by adolescents before they experience a serious adverse consequence or advance to more severe levels of alcohol and drug use are needed.

A promising approach to evaluate and intervene with adolescents who are at risk for alcohol and drug use problems is to provide Screening, Brief Interventions and Referral to Treatment (SBIRT). SBIRT is a comprehensive, integrated, public health approach to the screening and identification of individuals engaged in risky alcohol and drug use, and the delivery of early brief interventions to these people in order to reduce risky use (SAMHSA, 2012). In 2003, SAMHSA's SBIRT cooperative agreement with the States emphasized two specific areas of research interest: (1) early detection and intervention (i.e., Screening and Brief Intervention) for at-risk alcohol and drug use, and (2) closing the treatment gap (e.g., Brief Treatment and Referral to Treatment) for alcohol and drug use disorders.

SBIRT for adult alcohol use problems is recommended by the U.S. Preventive Health Task Force and its utilization for drug problems shows promise in adult populations (Bernstein et al., 2005; Ondersma, Chase, Svikis, & Schuster, 2005; Ondersma, Svikis, & Schuster, 2007). Recently, the American Academy of Pediatrics published a policy statement endorsing the use of SBIRT for adolescents using alcohol and other drugs (2012). Advantages of SBIRT include its ability to screen many individuals quickly, to identify cases that otherwise would have gone unnoticed, to find cases in the initial stages of problematic use prior to their developing actual abuse or dependence diagnoses, to provide an intervention that can be delivered in a very short amount of time, and to close the gap between treatment need and utilization by enhancing motivation to change and facilitating access to treatment. Thus, SBIRT can be used in many settings that adolescents naturally frequent. For instance, most adolescents attend school, and survey research in U.S. high schools shows that substance use is highly prevalent among students (NIDA, 2011). Likewise, an estimated 75% of adolescents in the U.S. receive medical care services annually (Newacheck, Brindis, Cart, Marchi, & Irwin, 1999). Positive screens for substance

abuse among 12-to-17-year-olds range from 8% in pediatric clinics to 24% in rural-based family practice (Knight et al., 2007). Hence, both schools and medical environments seem to be logical places for implementing SBIRT programs.

The purpose of this paper is to review the extant literature on the effectiveness of SBIRT for adolescents. Although there are a variety of definitions of adolescence (Council on Child and Adolescent Health, 1998; Canadian Paediatric Society, 2003; Society for Adolescent Medicine, 1995; World Health Organization, 2011), the focus of our review is on U.S. high-school-age adolescents, ages 14 through 17.

As there is a robust scientific literature supporting the effectiveness of brief interventions for alcohol use among U.S. college students (Carey, Scott-Sheldon, Carey, & DeMartini, 2007), the age range of the traditional college student (e.g., 18–22) bridges the typical time period from late adolescence to young adulthood, and the college experience represents a unique social environment, we will not include reference to the findings of studies conducted specifically with college students in the U.S. As compulsory education in Great Britain ends at 16, there is substantial age overlap between their Further Education College population and that of U.S. high school students. Hence we have elected to include those studies from Great Britain that fill all other inclusion criteria described below. This review focuses solely on findings from randomized clinical trials (RCTs) to examine what could be considered the best evidence from the most rigorous research designs.

2. Methods

Inclusion criteria for this review were: randomized clinical trials examining one or more SBIRT component (e.g., Screening, Brief Intervention, or Referral to Treatment), studies that included at least some participants 14 through 17 years of age, and English language publications. For those studies that focused primarily on brief interventions, we included only those papers that indicated some form of screening to identify possible at-risk populations, including studies in which the venue itself was believed to attract a high-risk population (e.g., youth drop-in centers or emergency departments).

Exclusion criteria were: studies focusing solely on older populations (e.g., U.S. college age students), universal prevention interventions, treatments that exceeded 3 sessions in length, and foreign language publications. Universal interventions were excluded because they provide interventions to all individuals in a population without screening for risk and are not necessarily targeted at high risk populations. Interventions exceeding 3 sessions in length could more aptly be called brief treatment rather than brief intervention.

An electronic literature search of PubMed, PsycINFO, and ERIC for randomized controlled trials using the keywords “adolescent,” “SBIRT,” “brief intervention,” “motivational interviewing,” “drugs,” and “alcohol” yielded 320 articles. The lead author read the title and abstract of each article to determine potentially relevant studies. Papers that clearly did not meet inclusion criteria were excluded. Of the remaining articles, the full text article was obtained and examined to conclusively determine whether the particular study was an RCT, included the appropriate age range of participants, and accurately represented one or more components of the SBIRT model. Given the lack of studies that examined the full SBIRT spectrum, we include in this review RCTs that focused on brief interventions only. Also, given that several studies included a wide range of age, we incorporated studies with at least some participants in the 14 to 17 year age range.

A total of 13 articles describing separate RCTs for SBIRT among adolescents were found through the search strategy. Multiple publications from a single study were pooled and, for the purposes of this review, evaluated as a single RCT. One additional article that was not

initially identified in our search but met the inclusion criteria was found in a meta-analysis of motivational interviewing for adolescents (Jensen et al., 2011) and another was identified during a final round of paper revisions. Thus, a total of 15 studies are included in this review. All studies included are considered effectiveness trials based on their "real world" settings (AHRQ, 2006).

While SBIRT is a comprehensive, integrated process, studies examining the full continuum of SBIRT services are largely absent from the literature. We note that the majority of the studies we identified in this review of the literature focus on a sub-component of SBIRT, with most assessing screening and brief interventions (SBI) or brief motivational interviewing (BI/BMI). While outcome measures varied from substance use behaviors, to attitudes, to adverse consequences of use, the present review focused on substance use outcomes. Interestingly, none of the studies identified in our adolescent SBIRT literature review focused on the referral to treatment (RT) aspect of SBIRT, mirroring the dearth of RT-focused research among adult populations.

After categorizing RCTs based on the implementation setting (primary care, emergency department, school, other), we summarized the RCTs based on seven characteristics: (1) the sample size and geographic location of the study; (2) the substance targeted (alcohol, illicit drugs, or both), (3) the screening instrument employed; (4) the conditions or arms in the RCT; (5) the outcome variable(s) and assessment(s); (6) the follow-up period; and (7) whether the brief intervention was found to be effective.

3. Results

A summary of identified studies describing RCTs of SBIRT services for adolescents is presented in Table 1. The ages of the participants varied from 12 to 22. Inclusion criteria varied in that some of the studies included adolescents who were at risk but did not report use of alcohol or drugs, such as those who reported riding in a car with an intoxicated driver. Some studies focused exclusively on alcohol, while others targeted illicit drug use. There was also considerable variability in the measurement time frame for outcomes. Most importantly, there are very few randomized clinical trials, and many of those that have been conducted have small sample sizes and are likely to be underpowered.

The results section of the article is structured in three parts. First, we review the core components of the SBIRT model and their application in the adolescent literature. Second, we review the methodology and main outcome findings for adolescent SBIRT RCTs according to the type of settings in which interventions were tested. Finally, we discuss the current state of the science, identify gaps in the evidence base, and suggest directions for future research.

3.1. Elements of the SBIRT Model

3.1.a. Screening—Screening in the SBIRT model can be implemented with a universal population, such as screening all adolescent patients at a pediatric health clinic, and most SBIRT interventions begin with screening for drug or alcohol use behaviors. A multi-site randomized trial conducted in primary care clinics found that the use of a structured substance abuse screening protocol resulted in higher detection rates of substance use among adolescents compared to usual clinical practice (Stevens et al., 2008), underscoring the utility of systematic screening. In contrast to an approach in which individual patients are screened for substance use, some SBIRT studies assumed that all individuals in a sub-population, such as youth attending community outreach centers (Grenard et al., 2007), are at risk and should have a brief intervention.

Prior studies have used various measures to screen for alcohol, drugs, or high-risk behaviors. There is a wide range of time periods covered by screening tools (e.g., anywhere from behaviors exhibited within the past few hours to behaviors exhibited at any time during the adolescent's life). A small handful of questionnaires have been found to have empirical support as screening tools for adolescent substance use.

The CRAFFT, a brief questionnaire used to identify adolescents at risk for drug use or alcohol problems (Knight et al., 1999) was recommended as a screening tool by the American Academy of Pediatrics (2012) and is one of the few standardized screening instruments used in RCTs of adolescent SBIRT (D'Amico, Miles, Stern, & Meredity, 2008; Stern, Meredith, Gholson, Gore, & D'Amico, 2007). The mnemonic CRAFFT questionnaire consists of six yes/no questions including: (1) "Have you ever ridden in a Car driven by someone (including yourself) who was high or had been using alcohol or drugs?" (2) "Do you ever use alcohol or drugs to Relax, feel better about yourself or fit in?" (3) "Do you ever use alcohol or drugs while you are Alone?" (4) "Do you ever Forget things you did while using alcohol or drugs?" (5) "Do your Family or Friends ever tell you that you should cut down on drinking or drug use?" and (6) "Have you ever gotten into Trouble while you were using alcohol or drugs?" The CRAFFT has been shown to correlate strongly with the DSM-IV diagnostic categories of abuse and dependence when compared to a structured diagnostic interview, and a CRAFFT score of 2 or higher was found to be sensitive to identifying problem use, abuse, and dependence (Knight, Sherrit, Shrier, Harris, & Chang, 2002). The CRAFFT has demonstrated adequate internal consistency values (0.65 to 0.86) and high test-retest reliability (Dhalla, Zumbo, & Poole, 2011).

The AUDIT (Alcohol Use Disorders Identification Test) is another standardized screening instrument used in RCTs of adolescent SBIRT (Bernstein et al., 2010). The 10-item AUDIT was developed by the World Health Organization as an alcohol use screening tool to be used with patients in primary care medical settings. The item content domains include hazardous alcohol use levels (how much is consumed and how often), dependence symptoms (impaired control, increased salience of drinking), and harmful use behaviors (blackouts, injuries, others' concern about use). The AUDIT has been internationally validated with a wide range of populations, including adolescents, and it possesses high internal consistency, with a test-retest reliability of r=.86 (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The AUDIT has also been shown to correlate highly with the CRAFFT, r=.65 (Nevitt, Lundak, & Galardi, 2006). A modified version of the AUDIT was developed for use with adolescents ages 13–19. Questions were adapted for use with this age range and differ from the adult version (Chung, Colby, Barnett, Rohsenow, Spirito, & Monti, 2000).

A variety of other approaches for screening have been used in trials. In one trial, the Adolescent Diagnostic Interview (ADI) was employed (Winters & Leitten, 2007). However, this instrument takes up to 50 minutes to administer and therefore is generally not suitable for most service settings, which require a rapid initial appraisal of risk level. Other approaches have been to draw screening questions from longer standardized instruments (Bernstein et al., 2010), or to supplement standardized instruments with additional questions (D'Amico et al., 2008). For example, as their screening measure Spirito and colleagues (2004; 2011) used either a blood alcohol level or response to a single self-report item in their study of SBIRT for youth in an Emergency Department (ED): alcohol use within the past 6 hours. In this context, a single item may be appropriate as there is inherently additional information available (i.e., a recent serious injury necessitating medical intervention). Thus, the content of the screening questions varies considerably across studies according to the specific locus and focus of the intervention.

The screening tools described above, whether actual scales or various items addressing the behaviors of interest, all use self-report. Self report items have been shown to be appropriate, reliable and valid with adolescents (Winters, Stinchfield, Henly, & Schwartz, 1990; Winters & Kaminer, 2008), however a subset of adolescents will not admit to substance use despite having engaged in the behavior (Williams & Nowatzki, 2005). The Emergency Department studies by Spirito and colleagues (2004; 2011) also used blood alcohol level as an additional screening procedure. Although the allure of biometric confirmatory tests is tempting, from a precision point of view, their absence from adolescent SBIRT studies is not surprising given the numerous logistical problems associated with obtaining such data, as well as their limited utility (i.e., tests that can be rapidly conducted on site only confirm use within the past few hours or days, rather than longer-term patterns of use). Research with adolescents shows that self-report and biological tests both have their limitations and can lead to inaccurate conclusions about substance use (Williams & Nowatzki, 2005).

3.1.b. Brief interventions—In contrast to universal interventions, such as school-based prevention programs that target all students regardless of their current risk level, the intervention components of SBIRT better resemble a selective or secondary prevention intervention targeting people exhibiting mild to severe symptom levels, or who are believed to be at elevated risk of developing an illness (Gordon, 1983).

Among the RCTs presented in Table 1, brief interventions ranged from as brief as a single 15-minute session in primary care practices (D'Amico et al., 2008) to multiple 60 minute sessions in schools (Winters & Leitten, 2007). The range in length of BI sessions is not surprising given the fact that time is structured differently in different settings. In a hospital emergency department, the typical patient-staff interaction may be as little as several minutes during a single encounter. Conversely, a school setting affords much more time, for example, a 40-minute class period repeated daily over the course of a semester.

Though brief interventions may be provided by practitioners such as physicians and other medical staff, controlled trials of BIs with adolescents have often used dedicated mental health practitioners to deliver the intervention (Johnston, Rivara, Droesch, Dunn, & Copass, 2002; Winters & Leitten, 2007). BIs have also been provided by peer outreach workers (Marsden et al., 2006), health educators (D'Amico et al., 2008; Walker, Roffman, Stephens, Berghuis & Kim, 2006), and even via electronic media such as computerized interventions (Cunningham et al., 2009; Maio et al., 2005; Walton et al., 2010). When the BI is opportunistic (i.e., not the intended reason for the visit or interaction) and designed to be incorporated into the framework of an already occurring interaction, such as a medical visit to the ED or a primary care appointment, the setting necessitates that the intervention be of a shorter duration, regardless of who is performing the intervention. BIs that become independent encounters conducted by specialized interventionists may incur fewer time constraints.

BIs have commonly been developed around the technique of motivational interviewing (MI). Studies have found that motivational interviewing can be an effective approach for addressing adolescent substance use (Jensen et al., 2011; Tripodi et al., 2010). This technique is represented among the majority of RCTs involving adolescent SBIRT (Grenard et al., 2007; McCambridge & Strang, 2004; McCambridge, Slym, Strang, 2008; Walker et al., 2006; Winters & Leitten, 2007; D'Amico et al., 2008; Bernstein et al., 2010; Cunningham et al., 2009; Spirito et al., 2004; 2011; Marsden et al., 2006; Peterson, Baer, Wells, Ginzler, & Garrett, 2006). MI assists the patient in resolving ambivalence about making changes through selective reinforcement of "change talk" in a highly empathic therapy process (Miller & Rollnick, 2002), and to help them recognize the reality of costs

and benefits associated with harmful substance use (Center for Substance Abuse Treatment, 1999; Henry-Edwards, Humeniuk, Monteiro, Poznyak, 2003). MI is particularly appropriate for patients who are ambivalent regarding changing their substance use behaviors, and because it is a self-guided process it is well suited for adolescent developmental issues (e.g., desire for autonomy, resistance to authority; Cunningham et al., 2009).

3.1.c. Referral for treatment—Among the adolescent SBIRT studies we included in our review, none reported on the referral for treatment process used for those individuals identified as needing additional care. In fact, among those studies that described their sampling process, none reported the percentage of participants who were screened as severe enough to require a direct referral for treatment, or those needing additional treatment beyond the BI they received. Referral to treatment may have been viewed by researchers as outside the scope of the RCT, which invariably focused on the brief intervention component of SBIRT.

3.2. Adolescent SBIRT RCTs: Outcome Findings by Setting

3.2.a. Primary care—A pilot study conducted in a primary care clinic in Los Angeles by D'Amico and colleagues (2008) showed promising findings regarding marijuana use. In this study 42 patients ages 12 to 18 were randomly assigned to either brief intervention (BI) based on MI or assessment only with usual care. At 3-month follow-up, the BI group reported using marijuana fewer times (but not fewer days) than the assessment only control group. Although no significant changes were found in reported alcohol use behaviors for either the intervention or control group participants, there were a number of limitations in the study including sample size and a relatively high drop-out rate in the intervention group (D'Amico et al., 2008). While this study lends further uncertainty regarding the effectiveness of BIs for alcohol use among youth, the authors suggest that BIs may be effective at reducing marijuana use in primary care settings.

3.2.b. Emergency departments—Six large random-assignment studies of adolescent patients (age range 12 to 21) in urban U.S. emergency departments (ED) found no group difference in reduction in drinking or binge drinking at any of their follow-up interviews at 3-, 6- or 12-months for groups assigned to MI-based BI compared to assessment only (Bernstein et al., 2010; Johnston et al., 2002; Maio et al., 2005; Spirito et al., 2004; Spirito et al., 2011; Walton et al, 2010). Four of these studies enrolled ED patients regardless of their self-reported relationship between the ED visit and alcohol use (Bernstein et al., 2010; Walton et al., 2010; Johnston et al, 2002; Maio et al., 2005) and two included participants regardless of whether they drank at all (Johnston et al., 2002; Maio et al., 2005). All but one of the ED studies used an interventionist to deliver the BI. One study, however, by Maio and colleagues (2005), used a computerized BI based on social learning theory. This study found no group differences at 3- and 12-month follow-up in self-reported alcohol use and binge drinking in the group of 14–18 year old ED patients receiving the BI vs. assessment only.

In contrast to the above-mentioned studies, Spirito and co-workers (2004) conducted a study of a targeted intervention for 13–17 year old ED patients who either tested positive for blood alcohol or who self-reported drinking just prior to the ED visit. Participants were randomly assigned to a single MI-based BI session (averaging 45 minutes in length) or standard care. No group differences in drinking or binge drinking were noted at 3-, 6-, or 12-month follow-up. However, among the sub-group who reported problematic alcohol use at baseline, the group assigned to BI reported fewer drinking days and fewer binge drinking days at the one year follow-up.

A subsequent study by the Spirito and colleagues (2011) compared a 45-minute MI-based BI to BI plus a 1-hour family session (which included adolescents and parents) in an RCT. This study was conducted in an urban ED with 125 adolescents 13–17 years of age who tested positive for alcohol or reported drinking within 6 hours prior to the hospital visit. Follow-up assessments were conducted at 3-, 6-, and 12-months. While participants in both the standard BI and the family-enhanced BI reported significant decreases in days of drinking, drinks per occasion, and days of high-volume drinking, there were no significant between-group differences (BI *vs.* family-enhanced BI) in change over time on any of these outcomes. However, a supplementary analysis found that fewer participants in the family-enhanced BI condition than the BI alone condition reported high-volume drinking days at the 3 month follow-up.

To date, there is only one published RCT of BI for drug use (marijuana) among adolescent ED patients (Bernstein et al., 2009). This study recruited ED patients 14–21 years of age who reported smoking marijuana during at least 3 days in the month prior to enrollment or having had a least one problem associated with marijuana during that time frame. Participants who were randomly assigned to an MI session conducted by older peers were more likely to report marijuana abstinence at 12 months, greater reductions in marijuana use, fewer days high among those who used marijuana, and more referrals to community resources as compared to an assessment-only control group.

3.2.c. Schools—Schools also hold promise as venues for universally screening adolescents for alcohol and drug use problems. SBIRT services conducted in schools have the advantage of being highly accessible to adolescents, either during or after school hours (Winters, Leitten, Wagner, & Tevyaw, 2007). Additionally, there is a large population of U.S. high school students whose alcohol and drug use does not rise to the level of dependence but whose use could be considered problematic, making these students potentially good candidates for brief motivational interventions.

Despite the obvious appeal of using schools for SBIRT interventions, there have been few studies in high schools. A pilot random assignment study conducted in Los Angeles found that adolescents were able to engage in a brief intervention in a high school setting. However, the sample size ($N = 17$) was too small to detect significant changes in behaviors from baseline to the 3-month follow up (Grenard et al, 2007).

Ninety-seven adolescents participated in a school-based motivational enhancement therapy intervention, known as the Teen Marijuana Check-Up (TMCU; Walker et al., 2006). The authors used 17 items from the Global Appraisal of Individual Needs – Initial version (GAIN-I; Dennis, Funk, Godley, Godley, & Waldron, 2004) to assess days of marijuana use and whether or not participants met DSM-IV criteria for dependence or abuse. TMCU participants were interviewed at baseline and 3-month follow-up and compared with a delayed feedback control group. Both groups significantly reduced marijuana use at the 3-month follow-up but no between group differences were observed. Significant reductions in marijuana use were observed at follow-up only for 9th and 10th grade participants and only if they were in the preparation/action stage of change.

Winters and Leitten (2007) conducted a 3-arm randomized trial of BI with 79 students 14 to 17 years of age. Participants were students who were referred by school personnel for an alcohol or illicit drug problem that did not rise to the level of dependence. The study compared two brief MI sessions without parental involvement *v.* the two brief MI sessions plus a single-session BI involving both the parent and the adolescent *v.* an assessment-only control group. Findings indicated that at 6-month follow-up the group that received the BI involving parents had significantly better outcomes in terms of alcohol use, binge drinking

and days of drug use as compared to the assessment only group, and fewer days of drinking as compared to BI alone. The latter group had significantly fewer days of drinking than the assessment alone group.

In London, England, McCambridge and Strang (2004; 2005) conducted a cluster randomized trial with 200 students 16–20 years of age who had either weekly cannabis use or had used stimulants in the past 3 months to either assessment only or an MI-based BI delivered by research staff. They measured alcohol and drug use at 3- (McCambridge & Strang, 2004) and 12-month follow-up (McCambridge & Strang, 2005). These authors found a significant decrease in self-reported alcohol, tobacco, and cannabis use days in the BI group as compared to the assessment only group at 3-months but not 12-months post-enrollment. This study supported the targeted approach to multiple substances (alcohol, tobacco, and drugs).

In another RCT with 326 students ages 16–19 who smoked marijuana at least weekly, McCambridge, Slym and Strang (2008) found no differences at 3- and 6-month follow-up across 16 different measures of marijuana use, cigarette use, or alcohol use between groups assigned to a single session of motivational interviewing or to a control group receiving drug information and advice.

3.2.d. Other community settings—Two other RCTs were conducted in community settings outside schools and health care organizations. Marsden and co-workers (2006) randomly assigned 342 London youth ages 16–22 years old who reported using cocaine or ecstasy and were recruited from the community to either assessment only or a 45–60 minute BI session conducted by a counselor trained in MI. No between-group differences were found in drinking or drug use at the 6-month follow-up.

In the U.S., Peterson et al. (2006) conducted a three-group RCT among 285 homeless youth ages 14–19 in Seattle, Washington. Participants who reported binge drinking and/or using illicit drugs in the 30 days prior to study enrollment were randomly assigned to either a “no baseline assessment” condition, an assessment only condition, or a treatment condition involving a BI conducted by a counselor trained in MI. The BI group showed greater reduction in illicit drug use (though not cannabis) compared to assessment only group at 1-month but not 3-month follow-up. There were no between-group differences in alcohol use, binge drinking or marijuana use at either follow-up point.

4. Discussion

Early interventions for moderate levels of drug and alcohol can be targeted at high school-age youth, a critical developmental phase into adulthood. Unfortunately, it is apparent that the body of literature on SBIRT for adolescents provides an underdeveloped evidence base for several of its components. This is especially apparent when compared with the mature literature on brief intervention for alcohol use in adults (Bertholet, Daeppen, Weitlisbach, Fleming, & Burnand, 2005; Cuijpers, Riper, & Lemmers, 2004; D’Onofrio,Fiellin, Pantalon, Chawarski, Owens, et al., 2012; Moyer, Finney, Swearington, & Vergun, 2002; U.S. Preventive Service Task Force, 2007; Whitlock, Polen, Green, Orleans, & Klein, 2004; Wilk, Jensen, & Havighurst, 1997) and for college students (Carey et al., 2007). There is solid evidence supporting the reliability and validity of several brief screening instruments, including the CRAFFT. However, the RCTs of SBIRT have, to date, used a wide variety of instruments and questionnaires and they have included participants along the continuum of alcohol and drug use depending on the focus of the study, making comparison of studies challenging.

While there are a number of RCTs of brief interventions in several different types of settings, it was not possible to conduct a meta-analysis of the extant literature because of the heterogeneous populations (ages 12–22), inclusion criteria (adolescents who use alcohol and drugs as well as those who reported being in a car with an intoxicated driver but who themselves have not used alcohol or drugs) and outcome measures. Although biological confirmation of self-report is ideal, self-reports among adolescents have been found to be reliable (Winters, Stinchfield, Henly, & Schwartz, 1990; Winters & Kaminer, 2008). Moreover, biological confirmation of self-reported substance use among non-substance dependent participants may be of limited utility given the narrow time frame of detection for common biological testing of urine, saliva, and breath.

This review of the literature suggests several critical considerations for service delivery, as well as future research. Screening is an indispensible ingredient of the SBIRT model, serving as the gateway for further intervention. Optimal screening instruments should be reliable and valid. If they are to be adopted and readily used within field settings, such as emergency departments and primary care settings, and they also need to be brief to administer and quick and easy to score and interpret (Babor & Kadden, 2005). Brevity is an especially important consideration for research studies examining brief interventions so that the assessment instrument itself does not exert “treatment” effects. In addition, it is clear that establishing criteria within these types of settings to aid in the identification of individuals who might benefit most from brief interventions, versus those individuals in need of specialized treatment, would help providers in triaging patients within these types of busy medical settings.

Because SBIRT is well suited for addressing a range of alcohol and drug use problems from use to dependence, screening should cast a wide net to identify as many individuals who could benefit from services as possible. As such, it could be argued that measurement specificity should be paramount, at least in the initial screening. On the other hand, in many service settings this could be impractical, and it may be optimal instead to focus on identifying the “right” individuals who could benefit most from intervention. As yet, there is still limited empirical guidance on what subpopulations of adolescents in need of treatment for alcohol and/or drug use are more likely to benefit from SBIRT.

4.2. Research issues for SBIRT with adolescents

An oft-overlooked yet important concern in studies of SBIRT is the possibility that any change in substance use might be an artifact of regression to the mean (Finney, 2008). Thus, use of appropriate comparison groups, preferably determined through prospective random assignment, are paramount. There is also the issue of potential therapeutic effect of providing research assessments to control participants in studies of brief interventions. In such studies it is possible that the assessment itself in the absence of further interventions can impact on substance use behaviors and thus confound intervention effects (Jenkins, McAlaney, & McCambridge, 2009; Walters, Vader, Harris, & Jouriles, 2009). Selection bias can also be problematic in these types of studies, as individuals interested in decreasing or monitoring their drug or alcohol consumption may be more likely to enroll. A concern specific to research on SBIRT with adolescents is the natural effect of age and maturation on the likelihood of substance use. Substance use prevalence in adolescent populations is not static, but increases dramatically within a fairly narrow age range. All of these considerations make randomized trials indispensible in this line of research.

Ethical and logistical issues surrounding using children as human subjects likely contribute to the relative dearth of controlled studies on SBIRT with adolescents. Research with children requires assent from the child and informed consent from a parent or guardian, which may be perceived as stigmatizing (Stern et al., 2007). In fact, several of the studies of

SBIRT in primary care settings have reported difficulty in recruiting participants (Stern et al., 2007). The research team conducting the marijuana check-up study (Swan, Schwartz, Berg, etc al., 2008) credited Washington state's law permitting adolescents to receive substance abuse treatment without parental consent as instrumental in attracting potential participants to their study.

One potential approach to recruitment is to obtain assent and parental consent before screening, but this could be logistically cumbersome given that many individuals must be screened to identify the relatively few who would meet eligibility criteria. An alternative approach is to implement a research study within an existing clinical SBIRT program, and recruiting suitable participants after screening. However, such an approach raises the question of how much information to disclose during parental consent about why the adolescent qualifies for the study. Adolescents may have little interest in participating in a research study if they perceive that their parents might learn about their substance use, regardless of whatever confidentiality assurances researchers provide.

Ensuring informed consent of the parent while fostering sufficient trust with the adolescent to obtain reliable and valid self-report data can be a delicate balancing act. Indeed, one secondary analysis of combined data from two studies of adolescent substance use found evidence that requiring parental informed consent may result in lower rates of study enrollment and a selection bias toward participants with lower levels of substance use (Rojas et al., 2008). The U.S. federal regulations governing human subject protection permit waiving parental consent under certain conditions (e.g., if research could not be carried out without the waiver) for studies that an IRB considers to be of no more than minimal risk (http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html#46.116). Older adolescents who seek health care on their own (for example, for a sexually transmitted disease) may be permitted by an IRB to enroll in a minimal risk study with a waiver of parental consent or with an opt-out for parents who are not present. Conversely, parents of minor children may be required to provide transportation, consent, and insurance coverage for outpatient or inpatient care if referral for treatment is warranted. These issues must be carefully considered by the IRB responsible for the study given that children's participation in research can be viewed as a conflict of the children's right to be protected (and thereby requiring parental informed consent) and the right to participate in research (Powell & Smith, 2009).

Another challenge is ensuring that an intervention is developmentally appropriate (D'Amico et al., 2005). While the numerical age difference between 12- and 21-year-olds is relatively small, the developmental difference represents a chasm. In addition to the biological and psychological transformations that occur during adolescence, the social and role transformations, such as decreased parental control, increased social problem solving, and middle school vs. high school social influences can significantly impact the initiation or continuation of substance use (Morris & Wagner, 2007). This idea is reflected in the different sequence of questions for Elementary School, Middle School, and High School age adolescents on the screening tool recently develop jointly by the National Institute on Alcohol Abuse and Alcoholism and the American Academy of Pediatrics (2011).

Despite the potential practical and implementation challenges to initiating SBIRT studies in schools, which include fear on the part of school administrators of being labeled as a school with "problems" and need for additional training for school counselors (Winters & Leitten, 2007), there are a number of clear advantages. First, adolescents are available in large numbers in schools, making screening and the provision of services logistically feasible. Second, in many schools there is a nurse or health or mental health suite in which SBIRT services and studies can be imbedded. Third, school personnel are able to observe students

over extended periods of time and determine changes in behavior and alcohol and drug use that would warrant referral for screening.

5. Limitations

There are several limitations to this review. As there is fluctuation in substance use rates over the years, the epidemiological data presented in the introduction of the paper was from 2010 and hence only approximates the prevalence of alcohol and illicit drug use among adolescents during the time that the review's clinical trials were reported (from 1999 through 2011). Nevertheless, during the past decade, alcohol and drug use among adolescents has remained a problem of high national significance.

It is important to note that conclusions regarding the effectiveness of brief interventions for adolescents must be viewed from the perspective that a number of the studies reviewed herein included both adolescents and young adults, with considerable heterogeneity in participant age-mix characteristics across the studies. For example, all of the participants in the Winters and Leitten (2007) study were ages 14–17, while just 30% of the sample in the study by Bernstein and coworkers (2010) fell into that age group. Therefore, the range of participants' ages in studies makes it difficult to draw firm conclusions about the high school age population. More studies are needed that examine the effectiveness of SBIRT among adolescents in more narrowly defined age categories.

We note that two previous meta-analyses were conducted on treatment for adolescent substance abuse. The meta-analysis by Jensen and colleagues (2011) included studies of tobacco and the meta-analysis by Tripodi and coworkers (2010) included quasi-experimental research and/or studies with up to 24 sessions. We did not conduct a meta-analysis of existing RCTs of SBIRT for adolescents due to the small number of studies which included brief interventions for alcohol and drugs and their heterogeneity in terms of substance use, populations, and measures, as well as insufficient data in the studies to calculate a meaningful measure of effect size. There were no RCTs in the literature that addressed the full spectrum of SBIRT, as most of the studies were of either screening and BI or focused on BI alone, and none addressed referral to treatment. Finally, there were limited data on how adolescents view help-seeking and how to enhance their motivation for help-seeking for substance misuse and other related issues such as depression and coping with stress.

6. Conclusions

This review reveals that there is a growing literature on components of adolescent SBIRT, although no study meeting inclusion criteria for the present review addresses the entire continuum of services as envisioned by SAMHSA (2012). The preponderance of RCTs address brief interventions for alcohol use among adolescents seeking care in EDs. There were fewer studies conducted in primary care clinics, schools, and other community settings and none addressed referral to treatment. Thus, there is a need for additional research to fill these gaps in the evidence base.

This review suggests several directions for future research on SBIRT with adolescents. First, more research is needed on valid screening instruments, particularly for drug use, which can be compared to existing screening instruments such as the CRAFFT or the WHO ASSIST (Humeniuk et al., 2008), or diagnostic interviews such as the CIDI (Knight et al., 1999; Forman, Svikis, Montoya, & Blaine, 2004). In addition, more RCTs are needed, particularly RCTs that are adequately powered to detect conventionally small-to-medium intervention effects, as typically seen for brief interventions in other populations (e.g., Carey et al., 2007). In addition, RCTs are needed that examine SBIRT in different promising venues, since schools, primary care offices, and hospital emergency departments are likely to be

quite divergent in terms of implementation issues and service delivery milieus that could impact effectiveness and outcomes. Participant samples should be relatively homogenous in terms of their alcohol and drug use exposure and, when possible, confirmation of self-report through the use of biological measures such as urine, breath, or hair testing is suggested.

Despite the fact that MI was used in many of these adolescent studies, few included measures of motivation to change as either an outcome in and of itself or a moderator of outcome. Future studies should not only document intervention effects in rigorous clinical trials, but should attempt to map the key pathways through which any intervention effects occur. Future research could also include examinations of patient satisfaction with the interventions, which has been little studied, but may play a role in retention and receptivity to the intervention, as well as differing formats such as group, individual and web-based interventions (Kia-Keating, Brown, Schulte, & Monreal, 2009).

If the existing literature sheds only dim light on screening and brief intervention for adolescents, the referral-to-treatment part of SBIRT remains a black box. Future studies should examine service linkages and longer-term outcomes for adolescents who are determined to have a substance use disorder requiring additional treatment beyond a brief intervention.

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Table 1

Randomized Controlled Trials of SBIRT for Adolescents

Authors (year)	Participants & Location	Substance Targeted	Screening Instrument(s)	Treatment Conditions		Alcohol and Drug Use Outcome Variables	Follow-up Period	BI Effective (Yes/No)
Primary Care								
D'Amico, Miles, Stern, et al. (2008)	*N* = 42 Ages 12–18; Los Angeles, CA	Alcohol and marijuana	CRAFFT	**1** **2**	Usual Care BI with MI by case manager	Self-reported alcohol and marijuana use; items from various surveys, e.g., Monitoring the Future; RAND Adolescent/ Young Adult Panel Survey	3-month	No: for alcohol use and binge drinking Yes: for number of times used marijuana (but not number of days)
Emergency Dept.								
Bernstein, Edwards, Dorfman, et al. (2009)	*N* = 210 Ages 14–21 Boston, MA	Marijuana	Youth Behavioral Risk Factor Surveillance Survey	**1** **2** **3**	No assessment control Assessment only BI with MI (by older peers)	Self-reported marijuana use via Timeline Followback Calendar	3-, and 12-month	Yes: Compared to assessment-only controls, BI group reported higher marijuana abstinence rates at 12 months and greater reductions in use.
Bernstein, Heeren, Edward, et al. (2010)	*N* = 853 Ages 14–21 Boston, MA	Alcohol	Youth Behavioral Risk Factor Surveillance Survey and AUDIT	**1** **2** **3**	No assessment control Assessment only BI with MI (by older peer + 10-day telephone follow-up)	Self-reported alcohol use via Timeline Followback Calendar	3- and 12-month	No: no between-group differences in alcohol use.
Johnston, Rivara, Droesch, et al. (2002)	*N* = 631 Ages 12–20 Seattle, Washington	Alcohol	None All injured patients	**1** **2**	Assessment only BI with MI by social worker	Self-reported binge drinking on questionnaire	3- and 6-month	No: no between-group differences in binge drinking

Authors (year)	Participants & Location	Substance Targeted	Screening Instrument(s)	Treatment Conditions		Alcohol and Drug Use Outcome Variables	Follow-up Period	BI Effective (Yes/No)
Maio, Shope, Blow, et al. (2005)	*N* = 671 Ages 14–18 Ann Arbor and Flint, Michigan	Alcohol	None All patients with minor injury	**1** **2**	Assessment only Computerized BI based on social learning theory	Self-reported alcohol use and binge drinking on the Alcohol Misuse Index and Alcohol Frequency/ Quantity Index	3- and 12-month	No: no between-group differences in alcohol use or binge drinking
Spirito, Monti, Barnett, et al. (2004)	*N* = 152 Ages 13–17 Providence, Rhode Island	Alcohol	Alcohol-use just prior to ED visit	**1** **2**	Assessment only BI with MI by research staff	Self-reported alcohol use and binge drinking on Adolescent Drinking Questionnaire &; Adolescent Drinking Inventory	3-, 6- and 12-month	No: no between-group differences for entire sample Yes: BI group had lower rates of drinking and binge drinking but only for the subset with baseline problem-drinking
Spirito, Sindelar-Manning, Colby, et al. (2011)	*N* = 125 Ages 13–17 urban Northeastern U.S.	Alcohol	Alcohol use just prior to ED visit (self-report, or biological alcohol concentration in blood, breath, or saliva)	**1** **2**	BI with MI by research staff BI + 1-hour family BI session	Self-reported alcohol use on the Adolescent Drinking Questionnaire (days of drinking; drinks per occasion, days of high-volume drinking)	3-, 6- and 12-month	No: no significant between-group differences. Yes: Both BI groups significantly reduced drinking.. BI + family group had significantly fewer high-volume drinking days than BI group at 3 months only.
Walton, Chermack, Shope, et al. (2010)	*N* = 726 Ages 14–18 Flint, Michigan	Alcohol	Audio Computer-Assisted Self Interview of Alcohol use	**1** **2** **3**	Assessment only BI with MI by social worker BI with MI by Computer	Self-reported alcohol use and binge drinking on AUDIT-C; Problem Oriented Screening Instrument for Teenagers (POSIT)	3- and 6-month	No: no between group-differences in alcohol use or binge drinking
School								
Grenard, Ames, Wiers, et al. (2007)	*N* = 18 Ages 15–18 Los Angeles, CA	Alcohol and drugs	None All students at continuation high schools	**1**	Assessment only	Self-reported alcohol use & binge	3-month	Unknown: under-powered

Authors (year)	Participants & Location	Substance Targeted	Screening Instrument(s)	Treatment Conditions		Alcohol and Drug Use Outcome Variables	Follow-up Period	BI Effective (Yes/No)
				2	BI based on MI by interviewers	drinking; marijuana & other drug use on questionnaire and Rutgers Alcohol Problem Index		
McCambridge & Strang (2004; 2005)	*N* = 200 Ages 16–20; London, England	Alcohol, tobacco and drugs	Marijuana and stimulant use survey	**1** **2**	Assessment only BI based on MI by research staff	Self-reported alcohol, tobacco, marijuana and other drug use, Severity of Dependence Scale	3- and 12 month	Yes: BI as compared to assessment only at 3-but not 12-month had decrease in cigarette, alcohol and marijuana
McCambridge, Slym & Strang (2008)	*N* = 326 Ages 16–19; London, England	Marijuana (primary), tobacco, and alcohol	Self-reported weekly or more cannabis use frequency	**1** **2**	Drug information & advice BI with single session MI	16 measures of self-reported marijuana, cigarette, and alcohol use and related problems; Severity of Dependence Scale; AUDIT	3- and 6 month	No: no between-group differences
Walker, Roffman, Stephens, et al (2006)	*N* = 97 Ages 14–19; Seattle, WA	Marijuana (primary), alcohol, and other drugs	Stages of change questionnaire and self-reported past 60-day use on GAIN-I items	**1** **2**	BI/BT based on MI by Health Educators Delayed feedback control group	Self-reported past 60-day use; GAIN-I	3-month	No: no between group differences
Winters & Leitten (2007)	*N* = 79 Ages 14–17 Suburban, MN	Alcohol and drugs	Adolescent Diagnostic Interview, Substance Use Module	**1** **2** **3**	Assessment only 2 BI sessions by therapist 2 BI sessions by therapist + 1 session with parent	Self-reported alcohol and binge drinking and drug use via Timeline Followback; Adolescent Diagnostic Interview; Personal Consequences Scale; Treatment	6-month	Yes: BI + parent had better outcomes on all measures as compared to assessment only and fewer days of drinking compared to BI alone. BI alone had fewer days of alcohol use than assessment only.

Authors (year)	Participants & Location	Substance Targeted	Screening Instrument(s)	Treatment Conditions		Alcohol and Drug Use Outcome Variables	Follow-up Period	BI Effective (Yes/No)
						Services Review		
Marsden, Stillwell, Barlow, et al., (2006)	*N*=342 Ages 16–22 London, England	Alcohol, cocaine & ecstasy	Self-reported cocaine or ecstasy use	**1** **2**	Assessment only BI with MI (45–60 min long) by youth drug workers and researcher staff	Self-reported frequency and quantity of ecstasy, cocaine, and alcohol use; Maudsley Addiction Profile, Severity of Dependence Scale, AUDIT	6-month	No: no between-group differences in BI
Peterson, Baer, Wells, et al. (2006)	*N* = 285 Ages 14–19; homeless youth Seattle, Washington	Alcohol and drugs	Self-reported alcohol and drug use in past 30 days	**1** **2** **3**	No assessment Assessment only BI with MI by counselor	Self-reported alcohol and drug use frequency via Timeline Followback; Rutgers Alcohol Problem Index.	1- and 3 month	Yes: BI group had greater decreases in illicit drug use (but not marijuana) compared to controls at 1 months but not at 3 months No: no between-group change in marijuana or alcohol use at 1- or 3-months