

SBIRTCOLORADO

Connecting substance use and health.

SBIRT COLORADO LITERATURE REVIEW SUMMARY: FEBRUARY 2013

PREPARED BY OMNI INSTITUTE

SBIRT AND MARIJUANA USE

There are relatively few rigorous, empirical investigations examining the effectiveness of screening and brief intervention (SBI) for substance use other than alcohol (Saitz et al., 2010). The scarcity of controlled clinical trials using screening, brief intervention, and referral to treatment (SBIRT) has prevented the inclusion of routine drug SBI in preventive service recommendations from the United States Preventive Services Task Force, 2008. This summary provides a brief overview of recent literature on SBIRT for the identification and reduction of harmful marijuana use. The research here demonstrates the need for effective interventions to reduce marijuana use; describes the current evidence base for the use of the SBIRT model with marijuana users; and outlines the current gaps in knowledge and future research directions.

THE ISSUE: CONSEQUENCES OF MARIJUANA USE

According to the 2011 National Survey on Drug Use and Health, since 2008 **marijuana use has been increasing in the U.S. population generally and among young people in particular.** Consistent with increasing trends in marijuana use among young people (aged 12-25) was a decrease in youths' (aged 12-17) perceived risk of marijuana (SAMHSA, 2012a). In the U.S., marijuana use disorders were found to be the most prevalent of illicit substance use disorders (Compton, Grant, Collier, Glantz, & Stinson, 2004), and marijuana had the highest rate of past-year dependence or abuse of all illicit drugs in 2011 (SAMHSA, 2012a). Nationally, rates of individuals aged 12 and older seeking treatment for dependent marijuana use increased from 14 percent of substance abuse treatment admissions in 2000 to 18 percent of admissions in 2010 (SAMHSA, 2012b). The National Institute on Drug Abuse estimates that nine percent of people who use marijuana will become dependent; this number increases to about 17 percent among those who start young and to 25 to 50 percent among daily users (NIDA, 2010).

Marijuana use is associated with negative health effects on multiple systems in the body (Kalant, 2004; Reece, 2009). Physical symptoms of the drug include increased heart rate and fluctuations in blood pressure; psychomotor symptoms include euphoria, anxiety, changes in sensory perception, and impairment of memory and cognition (Leung, 2011). Marijuana may interact with other illicit substances, as well as some prescription medications, and pharmacists and physicians may be less likely to warn about these interactions than with traditional prescription medications (Lindsey, Stewart, & Childress, 2012). Marijuana use has also been associated with increased injury (Gerberich et al., 2003) and increased incidence of motor vehicle crashes (Li et al., 2012). Finally, frequent prenatal exposure to marijuana may negatively affect the behavioral and cognitive development of children (e.g., Day et al., 1994; Fried & Smith, 2001; Goldschmidt, Day, & Richardson, 2000; Goldschmidt, Richardson, Cornelius, & Day, 2004).

COLORADO HIGHLIGHT

As a standard of care, SBIRT Colorado implements screening for substance use including marijuana. About eight percent of patients screen at risk for health and other problems from their pattern of marijuana use. Evidence indicates risky use is increasing (Richmond, Page, Rivera, Reimann and Fischer, in press). A subset of patients using marijuana and receiving SBIRT participated in a follow-up study between 2007 and 2011 (n=307). Six months after services, patients reported a 45 percent reduction in daily marijuana use.

For more information:
www.ImprovingHealthColorado.org



Peer Assistance Services



Research to date has identified several possible adverse outcomes of chronic marijuana use. Marijuana smoke contains some of the harmful and carcinogenic compounds found in cigarette smoke, and some are even more highly concentrated in marijuana smoke (Grotenhermen, 2007; Reece, 2009). The impact of long-term marijuana smoking (100+ lifetime uses) on respiratory health has shown similarities to that of tobacco smoking (Moore, Augustson, Moser, & Budney, 2005). Long-term marijuana use has also been shown to increase risk of lung cancer in those under the age of 55 (Aldington et al., 2008), and marijuana use was associated with neuropsychological decline, especially among adolescent-onset users (Meier et al., 2012). Studies have found that early initiation of marijuana use is related to worse educational outcomes and increased likelihood of other illicit drug use among adolescent-onset users, but the causal nature of this relationship remains unclear (Hall, 2009). Further, growing evidence suggests that chronic marijuana use is a risk factor for the development of psychotic symptoms; however, there is controversy surrounding the causal nature of this association as well (Amar & Potvin, 2007; Hall, 2009; Moore et al., 2007). While negative impacts of chronic marijuana use have been documented in the literature, future research is needed to 1) determine the *unique* impact of long-term marijuana use (marijuana is frequently used in conjunction with alcohol, tobacco, and other drugs), 2) understand how preexisting differences between marijuana users and nonusers contribute to adverse outcomes, and 3) better understand some inconsistent findings in the literature on long-term adverse outcomes from chronic use (Hall, 2009; Hall & Degenhardt, 2009).

In examining marijuana use in the U.S., **it is important to consider the socio-legal context of medical marijuana policy.** Medical marijuana is now legal in 18 states (including Colorado) and the District of Columbia (ProCon.org, 2012). Recent literature suggests that states with medical marijuana laws are likely to have higher rates of marijuana use than states without such laws, including higher rates of use among adolescents (Cerdeira, Wall, Keyes, Galea, & Hasin, 2012; Wall et al., 2011). Substance abuse prevention research has shown that increased use of a substance is related to increased availability, decreased price, and increased advertisement (Joffe & Yancy 2004; Stone, Becker, Huber, & Catalano, 2012). Additionally, factors such as decreased perception of harm and shifting social norms have been shown to have a significant impact on individuals' substance use (Stone et al., 2012). Concerns about medical marijuana diversion (obtaining marijuana from someone with a medical marijuana card) and abuse among Colorado adolescents have also been documented in one preliminary study (Thurstone, Lieberman, & Schmiede, 2011). In Colorado, patients who are currently receiving medical treatment for a debilitating medical condition may apply for a registry identification card for the use of medical marijuana. According to the Colorado Department of Public Health and Environment, the total number of Colorado patients who currently possess valid registry ID cards as of December 31, 2012, is 108,526, which is about 2.85% of the adult (18+) Colorado population. Severe pain and muscle spasms are the most commonly reported conditions among Colorado medical marijuana cardholders (CDPHE, 2012). However, there remains controversy in the literature over the medical value of marijuana, and it is argued that more high-quality clinical trials are needed examining the positive outcomes of medical marijuana relative to its adverse effects (Wang, Collet, Shapiro, & Ware, 2008).

RESEARCH ON THE SBIRT MODEL FOR IDENTIFYING AND REDUCING MARIJUANA USE

The SBIRT model includes universal screening using a validated screening tool, the provision of a brief intervention when indicated, and the availability of more comprehensive services, such as referral to brief treatment or extended treatment (SAMHSA, 2011). Research on SBIRT's effectiveness with illicit substance use, including marijuana, is growing. Here, we present research on SBIRT, or components of the model, for identifying and reducing harmful marijuana use.

Validated Screening Instruments

One barrier to screening for marijuana use in healthcare settings is the lack of brief and easy-to-score screening instruments.

There are some brief screening tools available to identify use of illegal substances. For example, the 10-, 20-, or 28-item versions of the Drug Abuse Screen Test (DAST) are widely used to screen for illegal drug use in a variety of settings, including primary care (Yudko, Lozhkina, & Fouts, 2007). In addition, there is some recent evidence for use of a single-item illegal drug screening question in primary care settings (Smith, Schmidt, Allensworth-Davies, & Saitz, 2010). However, these tools do not screen specifically for marijuana use. The Alcohol, Smoking, and Substance

Involvement Screening Test (ASSIST) was designed to be administered by a healthcare worker to screen for problem use of 10 substance categories, including cannabis (Humeniuk et al., 2008; WHO ASSIST Working Group, 2002). Following classification established by the World Health Organization, scores of four or higher on the Cannabis Specific Substance Involvement scale indicate that patients are at least at moderate risk of experiencing negative consequences from their pattern of cannabis use (Humeniuk, Henry-Edwards, Ali, Poznyak, & Monteiro, 2010). The tool uses the same questions and scoring criteria across all illicit substances (i.e., cannabis is scored similarly to cocaine, opioids, sedatives, etc.). However, while the ASSIST demonstrates strong psychometric properties, some have argued that it is too lengthy for busy primary care settings (Saitz et al., 2010).

Several new screening instruments specific to marijuana use have been developed recently, however more research on these tools is needed before endorsing their widespread use. Some of these instruments are too long to reasonably implement in primary care settings (e.g., the Marijuana Screening Inventory (MSI-X), a 39-item screening instrument; Alexander, 2003; Alexander & Leung, 2004). The self-report Cannabis Use Problems Identification Test (CUPIT) is shorter at 16 items, and was developed to detect current and potentially problematic cannabis use. An initial look at this tool in a community-based sample of at-risk adolescents and adults demonstrated good psychometric properties (Bashford, Flett, & Copeland, 2010). The Cannabis Use Disorders Identification Test (CUDIT) is a 10-item questionnaire modified from the commonly used alcohol screening tool, the AUDIT (Alcohol Use Disorders Identification Test; Adamson & Sellman, 2003). Recent studies have found that the performance of the CUDIT is improved when certain items are revised to be more specific to cannabis use (Adamson et al., 2010; Annaheim, Scotto, & Gmel, 2010). The 6-item Cannabis Abuse Screening Test (CAST) and the 8-item Problematic Marijuana Use (PUM) were tested among adolescents and show promise, yet they also require further validation before their widespread use can be recommended (Bashford, 2009). See Bashford (2009) for a more extensive review of screening tools and assessments for marijuana use.

SBIRT Colorado is a statewide initiative of the Office of the Governor
Funded by Substance Abuse and Mental Health Services Administration
Administered by Colorado Department of Human Services,
Office of Behavioral Health
Managed and implemented by Peer Assistance Services, Inc.

Our mission: Motivate Coloradans to make changes to improve their health and life through universal screening and early substance use intervention.

Brief Interventions (BI) for Marijuana

Research in healthcare settings has found that brief interventions conducted as part of a healthcare visit are associated with reductions in marijuana use. Madras and colleagues (2008) examined data from six states funded to implement SBIRT in various healthcare settings. In addition to reductions in illicit drug use overall, they found that marijuana use specifically was significantly reduced six months after receiving services. Roughly 70% of those who reported using marijuana at baseline were no longer using at follow-up. Bernstein and colleagues (2009) conducted a randomized controlled trial of youth recruited in a pediatric emergency room. They randomly assigned youth to three conditions: 1) A control group provided with a brief handout on marijuana use, 2) an assessed control group that was also administered standardized assessment tools, and 3) a BI group which received the handout, was administered the assessments, and also received a 20-30 minute intervention and booster phone call 10 days later. They found that youth who received the 20-30 minute intervention reported fewer days of use and were “more likely to report efforts to cut back or quit” at the 12-month follow-up than youth in the other two groups (p. 1179).

In an international randomized controlled trial conducted by the World Health Organization (WHO), patients aged 16–62 who scored at moderate risk for marijuana use and received a BI significantly reduced their marijuana use to a greater degree than patients who did not receive a BI (Humeniuk et al., 2008). However, when examining the subset of U.S. patients, reductions in marijuana use for those receiving brief interventions were still observed, but were not significantly different from those in the control group. The authors posit that a BI effect may not have been detected in the U.S. sample because the lengthy consent process may have served as a BI in itself or “diluted the effect of the BI” (p. 73).

Although not implemented in a healthcare setting, another study with university students in Canada, recruited through mass advertising and who were frequent cannabis users, found that 20-30 minute in-person brief interventions in both written and oral formats resulted in reductions in the risk behaviors of deep inhalation and driving after cannabis use at the 12-month follow-up (Fischer, Jones, Shuper, & Rehm, 2012). The authors did not specify exactly where these interventions occurred. Overall, these findings provide support for the effectiveness of brief interventions to reduce harmful marijuana consumption.

Research has also examined the effectiveness of different levels of intervention to decrease marijuana use. These studies find that interventions result in better outcomes than no treatment, with some evidence that extended sessions may be more beneficial. Stephens, Roffman, & Curtin (2000) implemented a randomized control design with adult marijuana users seeking

treatment and found that participants enrolled into an individual two-session brief treatment group and those in a 14-session extended relapse prevention group experienced better outcomes than the delayed treatment control group. However, there were no significant differences between the two treatment groups regarding reductions in use and negative consequences at the 16-month follow-up. The authors suggest the difference in treatment models could have influenced the results. Specifically, the authors found that fewer participants completed the 14-session treatment program than the two-session treatment group. The 14-session intervention was also a group treatment format, whereas the two-session intervention was individualized.

In a study using a randomized control design with participants who sought free outpatient treatment to help quit marijuana use, authors compared a delayed treatment control group with a two-session brief intervention and a nine-session extended treatment program. Both treatment groups experienced greater reductions in marijuana use and negative consequences from use compared with the delayed treatment group, with the nine-session group experiencing the greatest reductions (Marijuana Treatment Project Research Group, 2004). Another study included participants who had expressed a desire to cease cannabis use, randomizing them into a 90-minute one-session cognitive behavioral therapy group, a six-session (one-hour each) cognitive behavioral therapy group, and a delayed treatment control (DTC) group. At the 24-week follow-up, the treatment groups had significantly lower Severity Dependence scores and fewer cannabis-related problems than those in the DTC group (Copeland, Swift, Roffman, & Stephens, 2001). Overall, these findings suggest that a brief intervention will likely result in better outcomes than no treatment, and that extended treatments involving more sessions may result in even more positive outcomes. It is important to note that these studies were not conducted in health-care settings and did not implement a universal screening process. Rather, participants either responded to advertisements about the study or were referred from another source such as social service agencies, medical and nonmedical practitioners, and self-referral.

Levels of training and fidelity to the Motivational Interviewing (MI) model may affect the degree to which interventions are effective at reducing harmful marijuana consumption (McCambridge, Slym, & Strang, 2008; McCambridge, Day, Thomas, & Strang, 2011). McCambridge and colleagues (2008) emphasize that training and fidelity to the motivational interviewing (MI) model should be considered when assessing effectiveness. In a study with adolescents, the researchers compared a brief MI intervention to providing drug information and advice. While both

approaches appeared equally effective, the researchers also found that fidelity to the MI model varied widely making it difficult to draw strong conclusions from their results. In a follow-up study looking specifically at fidelity to the MI model during brief interventions, fidelity to MI spirit (applies a collaborative style, evokes use of personal reasons for change, and supports autonomy) and the use of complex reflections (adding additional meaning when conveying an understanding of what has been said) in particular were related to marijuana cessation (McCambridge et al., 2011).

CURRENT GAPS AND FUTURE DIRECTIONS

More research is needed on the effectiveness of SBIRT with marijuana use before it can be declared an evidence-based practice (Saitz et al., 2010). The studies above are promising with regard to the effectiveness of the SBIRT model with marijuana use.

However, more focused studies examining the impact of shorter, brief interventions delivered in healthcare settings are needed.

Providing SBIRT interventions for marijuana use is further complicated in states that have legalized marijuana for medical or recreational purposes. Marijuana remains, under the Controlled Substances Act of 1970, a Schedule I illegal substance, indicating that the federal government considers marijuana highly addictive with no medical value. However, state marijuana legislation is changing the landscape of marijuana use, treatment, and enforcement at the local level. Research in this area is limited and restricted to medical use, but at least one study found that medical marijuana users felt marijuana was more effective than traditional medicine in addressing symptoms (Coomber, Oliver, & Morris, 2003). Another study found that the majority of customers at a medical marijuana collective in California¹ desired more clinical services and information about marijuana and other substances and how to reduce harm from substance use (Janichek & Reiman, 2012). Furthermore, two states—Colorado and Washington—have recently legalized marijuana for general use. This suggests that in these states healthcare providers will need more resources on how to address marijuana as a legal substance with potential health and other risks. More information on how legalization may influence patterns of marijuana use and the ways patients respond to interventions regarding health and other risks associated with its use is greatly needed.

1 For information on medical marijuana cooperatives and collectives in California, please see the California Office of the Attorney General's Guidelines for the Security and Non-Diversion of Marijuana Grown for Medical Use, Section IV: Guidelines Regarding Collectives and Cooperatives (2008, p. 8). The guidelines can be found at: http://ag.ca.gov/cms_attachments/press/pdfs/n1601_medicalmarijuanaguidelines.pdf

SELECTED BIBLIOGRAPHY

Adamson, S.J., & Sellman, J.D. (2003). A prototype screening instrument for cannabis use disorder: the Cannabis Use Disorders Identification Test (CUDIT) in an alcohol-dependent clinical sample. *Drug and Alcohol Review*, 22, 309-315.

Adamson, S.J., Kay-Lambkin, F.J., Baker, A.L., Lewin, T.J., Thornton, L., Kelly, B.J., & Sellman, J.D. (2010). An improved brief measure of cannabis misuse: the Cannabis Use Disorders Identification Test-Revised (CUDIT-R). *Drug and Alcohol Dependence*, 110, 137-143.

Alcohol and Drug Abuse Weekly. (2006). New codes could encourage more screening and brief intervention. *Alcohol Drug Abuse Weekly*, 18, 6.

Aldington, S., Harwood, M., Cox, B., Weatherall, M., Beckert, L., Hansell, A., ...Beasley, R. (2008). Cannabis use and risk of lung cancer: A case-control study. *European Respiratory Journal*, 31(2), 280-286.

Alexander, D. (2003). A Marijuana Screening Inventory (experimental version): Description and preliminary psychometric properties. *American Journal of Drug and Alcohol Abuse*, 29(3), 619-646.

Alexander, D.E., & Leung, P.L. (2004). The Marijuana Screening Inventory (MSI-X): Reliability, factor structure, and scoring criteria with a clinical sample. *American Journal of Drug and Alcohol Abuse*, 30(2), 321-351.

Alexander, D.E., & Leung, P.L. (2006). The Marijuana Screening Inventory (MSI-X): Concurrent, convergent and discriminant validity with multiple measures. *American Journal of Drug and Alcohol Abuse*, 32, 351-378.

Alexander, D., & Leung, P. (2011). The DSM Guided Cannabis Screen (DSM-G-CS): Description, reliability, factor structure and empirical scoring with a clinical sample. *Addictive Behaviors*, 36, 1095-1100.

Amar, M.B., & Potvin, S. (2007). Cannabis and psychosis: What is the link? *Journal of Psychoactive Drugs*, 39(2), 131-142.

Annaheim, B., Scotto, T.J., & Gmel, G. (2010). Revising the Cannabis Use Disorders Identification Test (CUDIT) by means of Item Response Theory. *International Journal of Methods in Psychiatric Research*, 19(3), 142-155.

Babor, T.F., & Kadden, R.M. (2005). Screening and interventions for alcohol and drug problems in medical settings: What works? *Journal of Trauma Injury, Infection and Critical Care*, 59, S80-S87.

Bashford, J.L. (2009). Screening and Assessment for Cannabis Use Disorders. Background paper for the Australian National Clinical Practice Guidelines for Management of Cannabis Use and Related Issues. *National Cannabis Prevention and Information Centre website: NCPIC-org-au-009-assets.ncpic.net.au/static/pdfs/background-papers/screening-and-assessment-for-cannabis-use-disorders.pdf*

Bashford, J., Flett, R., & Copeland, J. (2010). The Cannabis Use Problems Identification Test (CUPIT): development, reliability, concurrent and predictive validity among adolescents and adults. *Addiction*, 105(4), 615-625.

Bernstein, E., Edwards, E., Dorfman, D., Heeren, T., Bliss, C., & Bernstein, J. (2009). Screening and brief intervention to reduce marijuana use among youth and young adults in a pediatric emergency department. *Academic Emergency Medicine*, 16(11), 1174-1185.

Cerda, M., Wall, M., Keyes, K.M., Galea, S., & Hasin, D. (2012). Medical marijuana laws in 50 states: Investigating the relationship between state legalization of medical marijuana and marijuana use, abuse and dependence. *Drug and Alcohol Dependence*, 120, 22-27.

Cheripitel, C.J., & Ye, Y. (2008). Drug use and problem drinking associated with primary care and emergency Room utilization in the US general population: Data from the 2005 national alcohol survey. *Drug and Alcohol Dependence*, 97, 226-230.

Colorado Department of Public Health and Environment. (2012). Medical Marijuana Registry Program Update (as of 12/31/2012). *CDPHE website: www.Colorado.gov/cs/Satellite/CDPHE-CHEIS/CBON/1251593017044*

Compton, W.M., Grant, B.F., Colliver, J.D., Glantz, M.D., & Stinson, F.S. (2004). Prevalence of marijuana use disorders in the United States: 1991-1992 and 2001-2002. *Journal of the American Medical Association*, 291(17), 2114-2121.

Coomber, R., Oliver, M., & Morris, C. (2003). Using cannabis therapeutically in the UK: A qualitative analysis. *Journal of Drug Issues*, 33(2), 325-356.

Copeland, J., Swift, W., & Rees, V. (2001). Clinical profile of participants in a brief intervention program for cannabis use disorder. *Journal of Substance Abuse Treatment*, 20(1), 45-52.

Copeland, J., Swift, W., Roffman, R., & Stephens, R. (2001). A randomized controlled trial of brief cognitive-behavioral interventions for cannabis use disorder. *Journal of Substance Abuse Treatment*, 21(2), 55-64.

Day, N.L., Richardson, G.A., Goldschmidt, L., Robles, N., Taylor, P.M., Stoffer, D.S., ...Geva, D. (1994). Effect of prenatal marijuana exposure on the cognitive development of offspring at age three. *Neurotoxicology and Teratology*, 16(2), 169-175.

Fischer, B., Jones, W., Shuper, P., & Rehm, J. (2012). 12-month follow-up of an exploratory 'brief intervention' for high frequency cannabis users among Canadian university students. *Substance Abuse Treatment, Prevention, and Policy*, 7, 15.

Fried, P.A., & Smith, A.M. (2001). A literature review of the consequences of prenatal marijuana exposure: An emerging theme of a deficiency in aspects of executive function. *Neurotoxicology and Teratology*, 23, 1-11.

Friedmann, P.D., McCullough, D., & Saitz, R. (2001). Screening and intervention for illicit drug abuse: A national survey of primary care physicians and psychiatrists. *Archives of Internal Medicine*, 161(2), 248-251.

Gerberich, S.G., Sidney, S., Braun, B.L., Tekawa, I.S., Tolan, K.K., & Quesenberry, C.P. (2003). Marijuana use and injury events resulting in hospitalization. *Annals of Epidemiology*, 13, 230-237.

Goldschmidt, L., Day, N.L., & Richardson, G.A. (2000). Effects of prenatal marijuana exposure on child behavior problems at age 10. *Neurotoxicology and Teratology*, 22, 325-336.

Goldschmidt, L., Richardson, G.A., Cornelius, M.D., & Day, N.L. (2004). Prenatal marijuana and alcohol exposure and academic achievement at age 10. *Neurotoxicology and Teratology*, 26, 521-532.

Grotenhermen, F. (2007). The toxicology of cannabis and cannabis prohibition. *Chemistry & Biodiversity*, 4, 1744-1769.

Hall, W. (2009). The adverse health effects of cannabis use: What are they, and what are their implications for policy? *International Journal of Drug Policy*, 20, 458-466.

Hall W., & Degenhardt, L. (2009). Adverse health effects of non-medical cannabis use. *The Lancet*, 374(9698), 1383-1391.

Humeniuk, R.E., Ali, R.A., Babor, T.F., Farrell, M., Formigoni, M.L., Jittiwutikam, J.,...Simon, S. (2008). Validation of the Alcohol Smoking and Substance Involvement Screening Test (ASSIST). *Addiction*, 103(6), 1039-1047.

Humeniuk, R., Dennington, V., & Ali, R. (2008). The effectiveness of brief intervention for illicit drugs linked to the alcohol, smoking, and substance involvement screening test (ASSIST) in primary health care settings: A technical report of phase III findings of the WHO ASSIST randomized controlled trial. *World Health Organization website: www.WHO.int/substance_abuse/activities/assist_technicalreport_phase3_final.pdf*

Humeniuk, R.E., Henry-Edwards, S., Ali, R.L., Poznyak, V., & Monteiro, M. (2010). The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): Manual for use in primary care. *World Health Organization website: whqlibdoc.who.int/publications/2010/9789241599382_eng.pdf*

Janichek, J., & Reiman, A. (2012). Clinical service desires of medical cannabis patients. *Harm Reduction Journal*, 9, 12.

Joffe, A., & Yancy, W.S. (2004). Legalization of marijuana: Potential impact on youth. *Pediatrics*, 113(6), e632-e638.

Kalant, H. (2004). Adverse effects of cannabis on health: An update of the literature since 1996. *Progress in Neuro-psychopharmacology & Biological Psychiatry*, 28(5), 849-863.

Legleye, S., Karila, L., Beck, F., & Reynaud, M. (2007). Validation of the CAST, a general population Cannabis Abuse Screening Test. *Journal of Substance Use*, 12, 233-242.

Lennox, R., Dennis, M.L., Scott, C.K., & Funk, R. (2006). Combining psychometric and biometric measures of substance use. *Drug and Alcohol Dependence*, 83(2), 95-103.

Leung, L. (2011). Cannabis and its derivatives: Review of medical use. *Journal of the American Board of Family Medicine*, 24(4), 452-462.

Li, M., Brady, J.E., DiMaggio, C.J., Lusardi, A.R., Tzong, K.Y., & Li, G. (2012). Marijuana use and motor vehicle crashes. *Epidemiological Reviews*, 34(1), 65-72.

Lindsey, W.T., Stewart, D., & Childress, D. (2012). Drug interactions between common illicit drugs and prescription therapies. *American Journal of Drug and Alcohol Abuse*, 38(4), 334-343.

Madras, B., Compton, W., Avula, D., Stegbauer, T. Stein, J., & Clark, H. W. (2009). Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: Comparison at intake and 6 months later. *Drug and Alcohol Dependence*, 9(1-3), 280-295.

Marijuana Treatment Project Research Group. (2004). Brief treatments for cannabis dependence: Findings from a randomized multi-site trial. *Journal of Consulting and Clinical Psychology*, 72(3), 455-466.

McCambridge, J., Slyn, R., & Strang, J. (2008). Randomized controlled trial of motivational interviewing compared with drug information and advice for early intervention among cannabis users. *Addiction*, 103(11), 1809-1818.

McCambridge, J., Day, M., Thomas, B., & Strang, J. (2011). Fidelity to motivational interviewing and subsequent cannabis cessation among adolescents. *Addictive Behaviors*, 36(7), 749-754.

Meier, M.H., Caspi, A., Ambler, A., Harrington, H., Houts, R., Keefe, R.S.E., ...Moffitt, T.E. (2012). Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proceedings of the National Academy of Sciences*, 109(40), E2657-E2664.

Moore, B.A., Augustson, E.M., Moser, R.P., & Budney, A.J. (2005). Respiratory effects of marijuana and tobacco use in a U.S. sample. *Journal of General Internal Medicine*, 20(1), 33-37.

Moore, T.H.M., Zammit, S., Lingford-Hughes, A., Barnes, T.R.E., Jones, P.B., Burke, M., & Lewis, G. (2007). Cannabis use and risk of psychotic or affective mental health outcomes: A systematic review. *Lancet*, 370, 319-328.

National Institute on Drug Abuse. (2011). Topics in Brief: Marijuana. *NIDA website*: www.DrugAbuse.gov/sites/default/files/marijuana_3.pdf

Okulicz-Kozaryn, K. (2007). Psychometric properties of the Problematic Marijuana Use (PUM) test for adolescents. *Post Psychiatry and Neurology*, 16(2), 105-111.

Pilowsky, D.J., & Wu, L. (2012). Screening for alcohol and drug disorders among adults in primary care: A review. *Substance Abuse Rehabilitation*, 3(1), 25-34.

ProCon.org. (2010, December 14). 18 medical marijuana states and DC: Laws, fees, and possession limits. *MedicalMarijuana.ProCon.org/view.resource.php?resourceID=000881*

Reece, A.S. (2009). Chronic toxicology of cannabis. *Clinical Toxicology*, 47, 517-524.

Richmond, M.K., Page, Katie., Rivera, Laura S., Reimann, B., & Fischer, L. (in press). Trends in detection rates of risky marijuana use in Colorado healthcare settings. *Substance Abuse*.

Saitz, R., Alford, D., Bernstein, J., Cheng, D., Samet, J., & Palfai, T. (2010). Screening and brief intervention for unhealthy drug use in primary care settings: Randomized clinical trials are needed. *Journal of Addiction Medicine*, 4(3), 123-130.

Smith, P.C., Schmidt, S.M., Allensworth-Davies, D., Saitz, R. (2010). A single-question screening test for drug use in primary care. *Archives of Internal Medicine*, 170(13), 1155-1160.

Stephens, R., Roffman, R., & Curtin, L. (2000). Comparison of extended versus brief treatments for marijuana use. *Journal of Consulting and Clinical Psychology*, 68(5), 898-908.

Stone, A.L., Becker, L.G., Huber, A.M., & Catalano, R.F. (2012). Review of risk and protective factors of substance use and problem use in emerging adulthood. *Addictive Behaviors*, 37(7), 747-775.

Substance Abuse and Mental Health Services Administration. (2007). Screening, Brief Intervention, and Referral to Treatment. *SAMHSA website*: www.SAMHSA.gov/prevention/SBIRT/

Substance Abuse and Mental Health Services Administration. (2011). Screening, brief intervention and referral to treatment (SBIRT) in behavioral healthcare. *SAMHSA website*: www.SAMHSA.gov/prevention/sbirt/SBIRTwhitepaper.pdf

Substance Abuse and Mental Health Services Administration. (2012a). Results from the 2011 National Survey on Drug Use and Health: Summary of National Findings (NSDUH Series H-44, HHS Publication No. SMA 12-4713). *SAMHSA website*: www.SAMHSA.gov/data/NSDUH/2k11Results/NSDUHresults2011.htm

Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. (2012b). Treatment Episode Data Set (TEDS): 2000-2010. National Admissions to Substance Abuse Treatment Services (DASIS Series S-61, HHS Publication No. SMA 12-4701). *SAMHSA website*: www.SAMHSA.gov/data/2k12/TEDS2010N/TEDS2010NWeb.pdf

Temple, E.C., Brown, R.F., & Hine, D.W. (2010). The 'grass ceiling': Limitations in the literature hinder our understanding of cannabis use and its consequences. *Addiction*, 106, 238-244.

Thurstone, C., Lieberman, S.A., & Schmiede, S.J. (2011). Medical marijuana diversion and associated problems in adolescent substance treatment. *Drug and Alcohol Dependence*, 118, 489-492.

U.S. Preventive Services Task Force. (2008). Screening for Illicit Drug Use: U.S. Preventive Services Task Force Recommendation Statement (AHRQ Publication No 08-05108-EF-3).

Wall, M.M., Poh, E., Cerda, M., Keyes, K.M., Galea, S., & Hasin, D.S. (2011). Adolescent marijuana use from 2002 to 2008: Higher in states with medical marijuana laws, cause still unclear. *Annals of Epidemiology*, 21(9), 714-716.

Wang, T., Collet, J., Shapiro, S., & Ware, M.A. (2008). Adverse effects of medical cannabinoids: A systematic review. *Canadian Medical Association Journal*, 178(13), 1669-1678.

World Health Organization ASSIST Working Group (2002). The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): Development, reliability and feasibility. *Addiction*, 97(9), 1183-1194.

Young, M., Stevens, A., Porath-Waller, A., Pirie, T., Garrity, C., Skidmore, B., ...Moher, D. (2012). Effectiveness of brief interventions as part of the screening, brief intervention and referral to treatment (SBIRT) model for reducing the non-medical use of psychoactive substances: A systematic review protocol. *Systematic Reviews*, 1(22).

Yudko, E., Lozhkina, O., & Fouts, A. (2007). A comprehensive review of the psychometric properties of the Drug Abuse Screening Test. *Journal of Substance Abuse Treatment*, 32, 189-198.