



# Substance Use and Preconception Care: A Review of the Literature

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## Abstract

Substance use has detrimental effects on reproductive health, especially on pregnancy outcomes. In this paper, we review the literature on substance use among both men and women during the preconception period. Preconception care (PCC) is increasingly recognized as a vital component of optimal maternal and infant health outcomes. The US Centers for Disease Control and Prevention (CDC) issued recommendations of PCC that include risk reduction before conception. There is a gap in the literature regarding substance use during the preconception period, however, as the emphasis on risk reduction before conception has focused mainly on women and selected substances. Further, there is a need to understand the existing evidence on substance use related disparity issues such as who has the highest prevalence, who has the worse effects, and who is least likely to get screened and treated. An understanding of these disparity issues is critical to effective PCC and optimal pregnancy outcomes.

**Keywords:** Preconception care, Substance use, Pre-pregnancy health

## Introduction

Preconception care (PCC) is defined as “a set of interventions that aim to identify and modify biomedical, behavioral, and social risks to a woman’s health or pregnancy outcome through prevention and management, emphasizing those factors which must be acted on before conception or early in pregnancy to have maximal impact” (p. 5) (1). This definition was released by the US Centers for Disease Control and Prevention (CDC) in conjunction with the 10 recommendations for PCC to improve preconception health and healthcare in 2006. The release of the PCC definition and 10 recommendations marked a milestone in the recognition of the importance of health before conception/pregnancy, and this recognition was based on accumulating evidence of the connection between PCC and pregnancy outcomes.

PCC has been gradually recognized to have a positive impact on maternal and child health outcomes over the years. Early on, it was linked to specialty services provided to women who had concerns about, and/or a history of, adverse pregnancy outcome (2). Later, PCC was associated with efforts to prevent low birth weight (3). Recently, PCC has been described as a form of primary prevention for women of reproductive age (14–44 years), prior to a first pregnancy or between pregnancies, to promote health; assess risks; and intervene and modify behavioral, biomedical, and social risk factors that threaten optimal maternal and infant health outcomes (4). More recently, the scope of PCC has been broadened to include care for

men of reproductive years (5). Nonetheless, women are still the main target for PCC interventions, and risk reduction is the core for PCC (1).

The preconception risk factors identified include substance use (6), which in the preconception time frame is generally defined as intake of alcohol, tobacco, illegal substances and non-prescribed medications, and caffeine (7). Cessation of substance use as a part of the PCC intervention has been reported to reduce the risk of spontaneous abortion, preterm delivery, and birth defects (8). According to the CDC, preterm births and birth defects are still significant contributors to infant mortality (9). Hence, there is a need to further examine the existing evidence on substance use and PCC to identify the gap and to propose directions for future research. This examination of the literature needs to include the evidence for both men and women, as PCC can be viewed as a vital component that should be included in the health package for women and men of reproductive age to improve maternal and infant health outcomes.

Thus, the purpose of this paper is to provide a review and discussion of the current literature on substance use in relation to PCC and reproductive health outcomes. More specifically, in this paper, we will describe the prevalence of substance use among men and women during the preconception period, explore the effects of substance use during the preconception period on reproductive health outcomes, and discuss existing substance use screening tools and interventions that can be adopted for PCC. The

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findings from this review can contribute to the development of recommendations for practice, policymaking, and future research.

## Methods

This state-of-the-art review sought the current state of knowledge about substance use in the preconception period. We conducted comprehensive searches of databases such as CINAHL, Medline, PsycINFO, and Academic Search Complete, specifically looking for the most current literature pertaining to substance use and PCC. The following key words were used for the search: substance use, preconception care, and pregnancy. The CDC published guidelines for PCC in 2006, and we, therefore, searched over the last 10 years, from 2006 to 2016, specifically addressing PCC. We also reviewed some historical literature pertaining to substance use and pregnancy in order to include this well-researched evidence as it relates to preconception health.

## Results

### Prevalence of Substance Use

Overall, women tended to be aware of the consequences of substance use when planning pregnancy; however, this has not prevented all substance use during preconception period for both planned and unplanned pregnancies (10,11). Despite women's intentions to adopt healthy behaviors, Lum et al did not observe a change in women's use of alcohol or cigarettes and observed only a moderate decrease in caffeinated beverages during the preconception window or when attempting to become pregnant (11). According to Lum et al, cigarette smoking decreased in later cycles; however, that decrease might have been related to not conceiving (11). The findings on alcohol use are consistent with other studies' findings but not with cigarette use. In their review of state preconception health indicators from the 2009 US national survey data, Robbins et al found that one-quarter of the women reported pre-pregnancy tobacco use and one-fifth continued to smoke during pregnancy (12).

Among women of childbearing age, alcohol use was reported by 54.2%, and 25% reported binge drinking, with over 50% the women who reported having had some alcohol during pregnancy (12). These findings include percentages that were higher than those of Tsai et al who found that 13% of non-pregnant women of childbearing years engaged in binge drinking during 2001–2003 (13). Oza-Frank et al found that the alcohol use rate was as high as 70% at 2–6 months post-delivery in their sample of 3446 women (14). This rate was derived from a questionnaire item that concerned women's alcohol use within the past 2 years, which included the preconception period. Liu et al conducted a longitudinal study of alcohol use in women from preconception and beyond and found that most women who reported alcohol consumption in the preconception time frame abstained from alcohol use during pregnancy (15).

According to Oza-Frank et al, preconception counseling on alcohol use was not found to alter alcohol use rates among the women in later stages of their pregnancies (14). They also found that the smoking rate was almost 25%, which was much lower than the alcohol use rate among the same population. This finding, however, is consistent with that of Albright and Rayburn, who found that alcohol use is more prevalent than tobacco use or illicit drug use during preconception (7). Pregnancy intention seemed to make a difference in smoking behavior during the preconception period; specifically, women with intended pregnancies were less likely to smoke.

Men tended to be aware of substance use consequences in general; however, they were less aware of consequences related to fertility (10). In their study of men aged 15–29, Choiriyah et al found that 60% of men were in need of PCC and that 58% of men reported binge drinking in the last year (16). There is a dearth of literature in regard to men's preconception health, and, overall, most of the studies reported difficulty with the study of men and women during the preconception time frame when the pregnancy was not planned.

### Effects of Substance Use on Reproductive Health

Substance use has detrimental effects on reproductive health, especially on pregnancy outcomes. However, most available evidence is related to substance use during pregnancy. Less and sometimes mixed findings are seen for the effects of substance use during the preconception period. The evidence regarding the effects of tobacco smoking and moderate alcohol intake on male fertility has been inconsistent (17,18). Smoking, however, clearly has a significantly harmful effect, diminishing female fertility (19,20). Much like male fertility, evidence is not conclusive as to whether alcohol consumption has an impact on female fertility (21,22). There is evidence, however, that excessive alcohol intake in males is associated with testicular atrophy, decreased libido, erectile dysfunction, and reduced effectiveness of assisted reproductive technology (ART) procedures (17,23,24). Although the evidence was minimal, anabolic steroids and recreational drugs can cause damage to sperm, but the sperm may recover with discontinuation of use of steroids and drugs (17).

The use of illicit drugs, such as cocaine, marijuana, and methamphetamines, is associated with pregnancy complications, such as placental abruption, low birth weight infants, an increased risk of infant mortality, and neonatal abstinence syndrome (6,25–28). Further, caffeine intake in women prior to pregnancy has not been conclusively shown to affect fertility; however, it may increase their risk for spontaneous abortion in the first trimester (29–31). Even though there is conflicting evidence in the literature about the effects of substance use and fertility, it is recommended that men and women cease use of these substances for fertility, preconception health, and overall good health (6,17,18,21,23,24,32).

Substance use during pregnancy harms both the

mother and her infant, causing damaging effects that can last a lifetime. Alcohol exposure during pregnancy can cause maternal morbidity, neonatal birth defects, and developmental disabilities (6,22,27,32-34). The most well-known detrimental outcome of alcohol use in pregnancy is fetal alcohol syndrome in the infant (35). Tobacco smoking during pregnancy causes a range of adverse pregnancy outcomes, including placental abruption, miscarriage, preterm birth, and low birth weight (20,36,37). The evidence is overwhelming as to the effects of substance use in pregnancy, and, therefore, such use should be avoided before and during pregnancy.

#### Preconception Care and Substance Use Screening

Regardless of the mixed findings in regard to the effects of substance use during the preconception period, it is clear that substance use during the preconception period has profound consequences for birth outcomes. The purpose of PCC is to promote preconception health and increase positive birth outcomes through the identification of risk and the implementation of treatment to address the risk. There are significant challenges and barriers, however, that impede the dissemination of PCC: lack of awareness (38-42), not seeing oneself as at risk (40), ambivalence toward seeking PCC (42), and cultural norms that do not prioritize family planning (38,43). Professionals also report barriers in providing PCC: lack of awareness of guidelines to provide PCC (41,44) and lack of time (42,45). Many women associate PCC with having a health problem and, therefore, based on their perception of being healthy, do not seek PCC (38,42). In addition, although some women understand the importance of PCC, they are ambivalent about accessing such care (42).

PCC focuses primarily on women with the goal of reducing adverse birth outcomes. Thus, far less is known about PCC among men. In fact, the definition of PCC is not inclusive of men (41,46). Consequently, men are less aware of PCC, less likely to discuss childbearing with their doctor, and less likely to discuss PCC with their partner (40). For example, Frey et al reported that, of the 39% men in their study who were interested in receiving PCC, only 8% recalled discussing PCC with their doctor (47). In another study, men and women completed a survey that assessed their reproductive plans during their primary care visit. The assessment included questions about contraception use, desire for children, and other risk behaviors. The results revealed that 26% of the men and women were at risk for an unintended pregnancy based on inconsistent contraception use. Nevertheless, 95% of women and 61% of men reported that the assessment was important to them and provided an opportunity to access birth control and counseling about risk behaviors (48). These results substantiate the need to include men in PCC. Although not always acknowledged, men play a vital role in planning pregnancies with their partners and in having positive birth outcomes (38,49,50).

PCC offers significant benefits for men as well as for

women. When men participate in PCC, they develop reproductive life plans to determine when they want to become fathers, which enables them to be financially, emotionally, and physically equipped for fatherhood (47,50). PCC is also an opportunity to screen for STDs and other diseases, which enhances reproductive and overall health (46). Frey et al recommended that PCC involve social services (money management, employment training), clinical support (mental health treatment), and couple and parental support (communication and preparation for fatherhood) (46).

#### Substance Use Screening Tools

The Substance Abuse and Mental Health Services Administration (SAMHSA) developed a protocol to promote universal screening for substance use. This protocol includes screening, brief intervention, and referral for treatment (SBIRT) (51). The primary focus of SBIRT is early detection and intervention of substance use. Several substance use screening tools are available in the literature and in practice. Goodman and Wolff (52) conducted a systematic review of substance use screening tools available to providers in both the prenatal and primary women's health care settings. The authors summarized eight tools that have been validated in primary care or specialty settings. The Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) screens for specific drugs of abuse, ethanol, and tobacco. The Alcohol Use Disorders Identification Test (AUDIT-C) screens for ethanol use. The Two-Item Conjoint Screening Tool (TICS) screens for ethanol and drug use. The Substance Use Risk Profile Pregnancy Scale screens for ethanol and tetrahydrocannabinol (THC). The Tolerance, Annoyed, Cut-down, Eye-opener (T-ACE) screens for heavy ethanol use only. The Tolerance, Worried, Eye-openers, Amnesia, K[C] Cut Down (TWEAK) also screens for heavy ethanol use only. Both CRAFFT and 4P's Plus are acronyms based on their respective screening questions in two separate screening tools. CRAFFT screens for ethanol and drug use, while 4P's Plus screens for all substance use in pregnancy.

Although Goodman and Wolff proposed that healthcare providers choose from a number of tools for screening women for substance use during primary care and pregnancy (52), only the 4P's Plus and the Substance Use Risk Profile-Pregnancy Scale are screening tools developed specifically for use with pregnant women. This means that the other 6 tools can be used for screening during times of non-pregnancy, including the PCC period. Further, these tools are not gender specific. For example, the ASSIST was validated in a population of incarcerated men (53), and the AUDIT-C was validated on a Veterans Affairs population (54). These tools are appropriate for substance use screening of both men and women. Strobbe (55) recommended 3 valid and reliable screening tools to assess tobacco and drug use. These 3 tools are the AUDIT-C, Fagerström Test for Nicotine Dependence (FTND), and Drug Abuse Screening Test-20. The FTND is a 6-item

screening tool that assesses addiction to nicotine (56). The Drug Abuse Screening Test-20 is 20-item screening tool that detects over-the-counter, prescribed, and nonmedical drug use (57).

The advancement in technology has provided health-care providers with another platform to integrate screening via the Internet (58,59). Online and computer-based screenings are becoming more widely used in clinical settings because they decrease social desirability responses, increase response rates, and provide privacy (60-62). Delrahim-Howlett et al tested an online screening and brief intervention for substance use among a group of at-risk women (58). The experimental group received personalized feedback and a report about the risks associated with their alcohol use. The control group received general information regarding the risks and adverse consequences of substance use. Women from both groups decreased their risky drinking and overall consumption in social settings. These results were still evident at the 2-month follow-up. The results demonstrate online screening and intervention as valid methods to screen and provide brief intervention. Landkroon et al (59) used an online version of the Preconception Health Assessment form (63) and included lifestyle behaviors such as smoking, alcohol consumption, and drug use, including prescription and over-the-counter medication, to screen women who were receiving PCC at an outpatient clinic. The authors found that use of the online version of the form was just as effective as in-person medical history assessments. In addition, a majority of the women reported satisfaction with the efficiency and clarity of the screening tool.

Goodman and Wolff recommended that, prior to integrating a screening tool, primary care providers consider the feasibility of the screening tool and its ability to discriminate multiple dimensions of substance use (i.e., moderate to heavy and binge drinking) (52). They also recommended that patients be screened alone to protect confidentiality. To ensure fidelity, all staff members should be adequately trained in administering the screening tool and following standard protocol (52).

### Brief Interventions

There are a variety of interventions to offer both men and women who test positive for substance use, including motivational interviewing (MI), psychiatric counseling, and inpatient treatment, depending on the severity and motivation for treatment. MI is an effective technique to elicit change. The objective of this intervention, which has roots in cognitive-behavioral approaches, is to provide individuals with sufficient education and knowledge regarding the severity of preconception risk behaviors on future birth outcomes, with the hope that, as a result, individuals will become introspective and self-motivated to change (51,52,64-66). SAMHSA offers online training to develop or enhance motivational interviewing skills, integrating the six elements of the FRAMES model into brief interventions, optimizing the motivation to change. FRAMES

involves feedback on personal risk, responsibility for personal control, advice to change drinking behavior, a menu of options reduce or stop risk behavior, empathic practitioners whose understanding is empowering and encouraging, and self-efficacy to encourage self-motivating statements and confidence in one's ability to improve. Practitioners remain empathic, nonjudgmental, respectful of the right to self-determination, and value the dignity and worth of all patients (55,67).

The original Changing High-Risk Alcohol Use and Increasing Contraception Effectiveness (CHOICES) intervention was launched by the CDC in 2007, with the purpose of preventing alcohol-exposed pregnancy (64,68). Since that time, the program has been implemented on a nationwide basis and has been proven effective by significantly reducing alcohol-exposed pregnancy (AEP) risk. The CHOICES intervention targets 2 behaviors: alcohol use and ineffective contraception and consists of 4 motivational interview sessions and one contraception consultation. The interviews include discussion of goal setting; self-monitoring of substance use, sexual behaviors, and contraception use; journaling; readiness to change; development of a change plan; and a debriefing of the contraception consultation. CHOICES can be implemented in a wide variety of settings; specifically, the program can be modified for group settings and shortened to accommodate the unique needs of each facility. The CHOICES intervention has been implemented and shown to be effective in high-risk settings by the Indian Health Services, SAMHSA, the Texas Office of Prevention of Developmental Disabilities, and the New York State Office of Alcoholism and Substance Abuse Services (64,69).

Although the CHOICES intervention is used primarily to reduce AEP, Parrish et al proposed expanding the CHOICES intervention to reduce nicotine-exposed pregnancy (NEP) and to promote the smoking cessation intervention for women at risk (66). They found that the co-occurrence of AEP and NEP risks was more prevalent than the AEP risk alone (16%). Specifically, 14% of the women in the study were at risk for NEP and 5%, for AEP. The risk of NEP was greater for women who were incarcerated and for those who were seen at substance abuse centers. A PCC intervention that targets multiple risk behaviors is more effective and efficient, especially for at-risk populations (43,66).

A critical resource for healthcare providers with a desire to integrate screening and brief interventions into practice is the National Institute on Alcohol Abuse and Alcoholism publication, "Helping Patients Who Drink Too Much: A Clinician's Guide" (70). This guide can help practitioners to recognize and treat individuals who consume alcohol over the recommended guidelines of consumption. This publication is available in print as well as online, and providers can access online training (55).

### Referrals for Treatment

Brief interventions are effective for many patients. Some

patients, however, may need to be referred for specialized treatment. The SAMHSA Substance Abuse Treatment Services locator can be helpful in assisting patients to find licensed substance abuse treatment facilities. Referrals for substance abuse treatment also might include referrals to self-help groups. Groups such as Alcoholics Anonymous, Women for Sobriety, Narcotics Anonymous, SMART Recovery, Al-Anon, and Nar-Anon offer individuals consistent accountability, mentorship, and mutual aid (54). Research has shown that self-help groups teach effective treatment techniques that are critical to improve substance use outcomes (71-74).

Although face-to-face self-help groups have demonstrated a positive effect on substance use outcomes, they do present barriers that hamper treatment, including geographic location and patients' lack of access to group services, inadequate finances, and embarrassment. Research has shown that e-self-help interventions, i.e., treatment via the Internet, combat these barriers and are effective in decreasing substance use (75-77). Patients can choose from brief or long-term e-self-help interventions as well as from individual and group formats. Healthy People 2020 Preconception Health and Behaviors Objective MICH 16 calls for women to receive preconception health and to practice the prevention guidelines, which include abstaining from cigarette smoking and alcohol (78). Because the Internet has broadened the treatment options for consumers, a larger group of individuals has access to services and opportunities to improve their substance use outcomes and overall health.

### Discussion

This review indicated that there is a gender disparity in terms of evidence on substance use in relation to PCC. It is clear that more research is needed to better understand and intervene in regard to substance use among men. More available evidence will be important for policy formulation; for example, although the Healthy People 2020 Preconception Health and Behaviors Objective MICH 17 calls for a reduction in infertility among men and women, it does not specifically address substance use in relation to preconception for men (78).

Preconception substance use screening is vital to the prevention of adverse birth outcomes (65). As for practice, preconception substance use screening should be a universal component in primary care. Screening is an effective means to assess risk behaviors that result in adverse birth outcomes. Preconception should entail risk assessment, education, and treatment for risk behaviors (45). Men are more likely to participate in substance use than are women and, as a result, experience more severe consequences (79,80). Therefore, it is crucial that men are adequately screened for substance use during the preconception period.

Almost half of all pregnancies are unplanned. Often, women become pregnant because their birth control fails (38). Therefore, a significant component of PCC includes

family planning. Family planning includes contraception counseling and the development of a family life plan for men and women. Practitioners should ensure that birth control selection is based on each woman's unique experience (38,81). Practitioners also must be cautious about imposing a Eurocentric preconception plan for birth control or family planning on their patients, especially women whose culture or community norms do not necessarily include a plan for pregnancies (38,43). The Black women in Canady et al.'s study considered preconception planning as "middle-class thinking" (38). Practitioners also must consider religious beliefs and preferences as they relate to birth control and childbearing, as some women subscribe to religious beliefs that do not promote birth control (82). Another critical component of family planning is education, which includes providing pertinent information about risks behaviors, adequate nutrition, supplements, and appropriate times to conceive between births and abortions to optimize health and birth outcomes (82).

The finding from Oza-Frank et al that preconception counseling negatively affected women's likelihood to smoke only in the last 3 months of pregnancy is a good indication that barriers exist in the provision of effective PCC (14) but that there is a need for preconception counseling (83). Health professionals serve men and women from diverse backgrounds, and it is imperative that practitioners provide culturally sensitive PCC. Culturally sensitive PCC entails providing trained interpreters, bilingual practitioners, and translated forms; using open-ended questions; and active listening (84). Practitioners also must acknowledge the impact of culture on patients' beliefs regarding childbearing, contraception use, and family planning (38,39,43,44,81,82,84). The PEARLS (Partnership, Empathy, Apology, Respect, Legitimization, and Support) interviewing tool is useful in providing culturally sensitive PCC and strengthening the practitioner-patient relationship. This technique uses a tell-ask-tell method and empowers patients to educate their practitioner through their unique stories (85). The GATHER (Greet patients, Ask patients about themselves, i.e., cultural values, beliefs regarding family planning, Tell patients about their options, Help patients choose, Explain what to do, and Return for follow-up) guide is another effective culturally sensitive tool for reproductive health providers to integrate into practice. Patients whose practitioner implemented the GATHER technique were more satisfied with care and consistently used family planning services (86).

### Ethical Issues

Not applicable.

### Conflict of Interests

The authors have no conflicts of interest to disclose.

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## References

- Johnson K, Posner SF, Biermann J, et al. Recommendations to improve preconception health and health care—United States. A report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. *MMWR. Recommendations and Reports: Morbidity and Mortality Weekly Report Recommendations and Reports/ Centers for Disease Control*. 2006;55(RR-6):1-23.
- Chamberlain G. The pre-pregnancy clinic. *Br Med J*. 1980;281:29-30. doi:10.1136/bmj.281.6232.29.
- Institute of Medicine Committee to Study the Prevention of Low Birth Weight. Preventing low birth weight [DX Reader version]. Accessed 2016 January. <http://www.nap.edu/catalog/511/preventing-low-birthweight><http://www.nap.edu/catalog/511/preventing-low-birthweight>.
- Biermann J, Dunlop AL, Brady C, Dubin C, Brann JA. Promising practices in preconception care for women at risk for poor health and pregnancy outcomes. *Matern Child Health J*. 2006;10(1):21-28.
- Warner JN, Frey KA. The well-man visit: addressing a man's health to optimize pregnancy outcomes. *J Am Board Fam Med*. 2013;26(2):196-202. doi:10.3122/jabfm.2013.02.120143.
- Floyd RL, JackBW, CefaloR, et al. The clinical content of preconception care:alcohol, tobacco, and illicit drug exposures. *Am J Obstet Gynecol*. 2008;199(6):S333-S339. doi:10.1016/j.ajog.2008.09.018.
- Albright BB, RayburnWF. Substance abuse among reproductive age women. *Obstet Gynecol Clin North Am*. 2009;36(4):891-906. doi:10.1016/j.ogc.2009.10.008.
- Williams L, ZapataLB, D'Angelo DV, Harrison L, Morrow B. Associations between preconception counseling and maternal behaviors before and during pregnancy. *Matern Child Health J*. 2012;16(9):1854-1861. doi:10.1007/s10995-011-0932-4.
- Centers for Disease Control and Prevention. Infant mortality. <http://www.cdc.gov/reproductivehealth/maternalinfant-thealth/infantmortality.htm>. Accessed 2016 January.
- Chang G, McNamara TK, Orav EJ, Wilkins-Haug L. Alcohol use by pregnant women: partners, knowledge, and other predictors. *J Stud Alcohol*. 2006;67(2):245-251.
- Lum KJ, Sundaram R, Buck Louis GM. Women's lifestyle behaviors while trying to become pregnant: evidence supporting preconception guidance. *Am J Obstet Gynecol* 2011;205(3):203.e1-7. doi:10.1016/j.ajog.2011.04.030.
- Robbins CL, Zapata LB, Farr SL, et al. Core state preconception health indicators—pregnancy risk assessment monitoring system and behavioral risk factor surveillance system, 2009. *MMWR Morb Mortal Wkly Rep*. 2014;63(3):1-62.
- Tsai J, FloydRL, Green PP, Boyle CA. Patterns and average volume of alcohol use among women of childbearing age. *Matern Child Health J*. 2007;11(5):437-45. doi:10.1007/s10995-007-0185-4.
- Oza-Frank R, Kachoria R, Keim SA, Klebanoff MA. Provision of specific preconception care messages and associated maternal health behaviors before and during pregnancy. *Am J Obstet Gynecol*. 2015;212(3):372.e1-8. doi:10.1016/j.ajog.2014.10.027.
- Liu W, Mumford E, Petras H. Maternal alcohol consumption during the perinatal and early parenting period: a longitudinal analysis. *Matern Child Health J*. 2016;20(2):376-385. doi:10.1007/s10995-015-1836-5.
- Choiriyah I, Sonenstein FL, AstoneNM, et al. Men aged 15-44 in need of preconception care. *Matern Child Health J*. 2015;19(11):2358-2365. doi:10.1007/s10995-015-1753-7.
- Kulkarni M, Hayden C, Kayes O. Recreational drugs and male fertility. *Trends in Urology & Men's Health*. 2014;5(5):19-23. doi:10.1002/tre.414
- Sadeu JC, Hughes CL, Agarwal S, Foster WG. Alcohol, drugs, caffeine, tobacco, and environmental contaminant exposure: reproductive health consequences and clinical implications. *Crit Rev Toxicol*. 2010;40(7):633-52. doi:10.3109/10408444.2010.493552.
- Baird D, Wilcox A. Cigarette smoking associated with delayed conception. *JAMA*. 1985;253(2):2979-2983.
- Hammoud A, Bujold E, Sorokin Y, et al. Smoking in pregnancy revisited: findings from a large population-based study. *Am J Obstet Gynecol*. 2005;192(6):1856-63. doi:10.1016/j.ajog.2004.12.057.
- Juhl M, Nyboe Andersen A, Grønbaek M, Olsen J. Moderate alcohol consumption and waiting time to pregnancy. *Hum Reprod*. 2001;16(12):2705-9. doi:10.1093/humrep/16.12.2705.
- Tan C, Denny C, Cheal N, Sniezek J, Kanny D. Alcohol use and binge drinking among women of childbearing age—United States, 2011-2013. *MMWR Morb Mortal Wkly Rep*. 2015;64(37):1042-1046. doi:10.15585/mmwr.mm6437a3.
- Sharma R, Biedenharn KR, Fedor J, Agarwal A. Lifestyle factors and reproductive health: taking control of your fertility. *Reprod Biol Endocrinol*. 2013;11(66):1-15. doi:10.1186/1477-7827-11-66.
- La Vignera S, Condorelli RA, Balercia G, Vicari E, Calogero AE. Does alcohol have any effect on male reproductive function? A review of literature. *Asian J Androl*. 2013;15(2):221-5. doi:10.1038/aja.2012.118.
- Derauf C, LaGasse LL, Smith LM, et al. Prenatal methamphetamine exposure and inhibitory control among young school-age children. *J Pediatr*. 2012;161(3):452-459. doi:10.1016/j.jpeds.2012.02.002.
- LaGasse LL, Derauf C, Smith LM, et al. Prenatal methamphetamine exposure and childhood behavior problems at 3 and 5 years of age. *Pediatrics*. 2012;129(4):681-8. doi:10.1542/peds.2011-2209.
- Lassi ZS, Imam AM, Dean SV, Bhutta ZA. Preconception care: caffeine, smoking, alcohol, drugs and other environmental chemical/radiation exposure. *Reprod Health*. 2014;11(Suppl 3):S6. doi:10.1186/1742-4755-11-S3-S6.
- Little B, Snell L, Klein V, Gilstrap L. Cocaine abuse during pregnancy: maternal and fetal implications. *Obstet Gynecol*. 1989;73(2):157-160.
- Greenwood DC, Thatcher NJ, Ye J, et al. Caffeine intake during pregnancy and adverse birth outcomes: a systematic review and dose-response meta-analysis. *Eur J Epidemiol*. 2014;29(10):725-734. doi:10.1007/s10654-014-9944-x.
- Tolstrup JS, Kjær SK, Munk C, et al. Does caffeine and alcohol intake before pregnancy predict the occurrence of spontaneous abortion? *Hum Reprod*. 2003;18(12):2704-2710. doi:10.1093/humrep/deg480.
- Wilcox A, Weinberg C, Baird D. Caffeinated beverages and decreased fertility. *Lancet*. 1998;332:1453-1456.
- Charness ME, Riley EP, Sowell ER. Drinking during pregnancy and the developing brain: is any amount safe? *Trends Cogn Sci*. 2016;20(2):80-82. doi:10.1016/j.tics.2015.09.011.

33. Riley EP, Infante MA, Warren KR. Fetal alcohol spectrum disorders: an overview. *Neuropsychol Rev.* 2011;21(2):73-80. doi:10.1007/s11065-011-9166-x.
34. World Health Organization (WHO). Global status report on alcohol and health. [http://apps.who.int/iris/bitstream/10665/112736/1/9789240692763\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/112736/1/9789240692763_eng.pdf). Accessed January 2016.
35. Jones J, Smith D, Ulleland C, Streissguth A. Patterns of malformation in offspring of chronic alcoholic mothers. *Lancet.* 1973;2:1267-1271.
36. Herrmann M, King K, Weitzman M. Prenatal tobacco smoke and postnatal secondhand smoke exposure and child neurodevelopment. *Curr Opin Pediatr.* 2008;20(2):184-190. doi:10.1097/MOP.0b013e3282f56165.
37. U.S. Department of Health and Human Services. The health consequences of smoking—50 years of progress: a report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
38. Canady RB, Tiedje LB, Lauber C. Preconception care & pregnancy planning: voices of African American women. *MCN Am J Matern Child Nurs.* 2008;33(2):90-97. doi:10.1097/01.NMC.0000313416.59118.93.
39. Hillemeier MM, Weisman CS, Chase GA, Dyer A, Shaffer ML. Women's preconceptional health and use of health services: implications for preconception care. *Health Ser Res.* 2008;43:54-75. doi:10.1111/j.1475-6773.2007.00741.x.
40. Mitchell EW, Levis DM, Prue CE. Preconception health: awareness, planning, and communication among a sample of US men and women. *Matern Child Health J.* 2012;16(1):31-39. doi:10.1007/s10995-010-0663-y.
41. Stephenson J, Patel D, Barrett G, et al. How do women prepare for pregnancy? Preconception experiences of women attending antenatal services and views of health professionals. *PLoS One.* 2014;9(7):e103085. doi:10.1371/journal.pone.0103085.
42. van der Zee B, de Beaufort ID, Steegers EA, Denktas S. Perceptions of preconception counselling among women planning a pregnancy: a qualitative study. *Fam Pract.* 2013;30(3):341-346. doi:10.1093/fampra/cms074.
43. Chuang CH, Hwang SW, McCall-Hosenfeld JS, et al. Primary care physicians' perceptions of barriers to preventive reproductive health care in rural communities. *Perspect Sex Reprod Health.* 2012;44(2):78-83. doi:10.1363/4407812.
44. Sanders LB. Preconception care: practice and policy implications for nurses. *Policy Polit Nurs Pract.* 2009;10(2):129-133. doi:10.1177/1527154409338494.
45. Shannon G, Alberg C, Nacul L, Pashayan N. Preconception healthcare delivery at a population level: construction of public health models of preconception care. *Matern Child Health J.* 2014;18(6):1512-1531. doi:10.1007/s10995-013-1393-8.
46. Frey KA, Navarro SM, Kotelchuck M, LuMC. The clinical content of preconception care: preconception care for men. *Am J Obstet Gynecol.* 2008;199(6 Suppl 2):S389-S395. doi:10.1016/j.ajog.2008.10.024.
47. Frey KA, Engle R, Noble B. Preconception healthcare: what do men know and believe? *Am J Men's Health.* 2012;9(1):25-35. doi:10.1016/j.jomh.2011.11.001.
48. Dunlop AL, Logue KM, Miranda MC, Narayan DA. Integrating reproductive planning with primary health care: an exploration among low-income, minority women and men. *Sex Reprod Health.* 2010;1:37-43. doi:10.1016/j.srh.2010.01.001.
49. Almeling R, Waggoner MR. More and less than equal: how men factor in the reproductive equation. *Gend Soc.* 2013;27(6):821-842. doi:10.1177/0891243213484510.
50. Moos MK. From concept to practice: reflections on the preconception health agenda. *J Womens Health.* 2010;19(3):561-567. doi:10.1089/jwh.2009.1411.
51. Substance Abuse and Mental Health Services Administration. Enhancing motivation for change in substance, treatment improvement protocol series, No. 35. Rockville, MD: Substance Abuse and Mental Health Services Administration; 1999.
52. Goodman DJ, Wolff KB. Screening for substance abuse in women's health: a public health imperative. *J Midwifery Womens Health.* 2013;58(3):278-287. doi:10.1111/jmwh.12035.
53. Wolff N, Shi J. Screening for substance use disorder among incarcerated men with the alcohol, smoking, substance involvement screening test (ASSIST): a comparative analysis of computer-administered and interviewer-administered modalities. *J Subst Abuse Treat.* 2015;53:22-32. doi:10.1016/j.jsat.2015.01.006.
54. Bush K, Kivlahan DR, McDonnell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. *Arch Intern Med.* 1998;158(16):1789-195.
55. Strobbe S. Prevention and screening, brief intervention, and referral to treatment for substance use in primary care. *Prim Care.* 2014;41(2):185-213. doi:10.1016/j.pop.2014.02.002.
56. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström Test of Nicotine Dependence: a revision of the Fagerström Tolerance Questionnaire. *Br J Addict.* 1991;86(9):1119-1127.
57. Yudko E, Lozhkina O, Fouts A. A comprehensive review of the psychometric properties of the drug abuse screening test. *J Subst Abuse Treat.* 2007;32(2):189-198. doi:10.1016/j.jsat.2006.08.002.
58. Delrahim-Howlett K, Chambers CD, Clapp JD, et al. Web-based assessment and brief intervention for alcohol use in women of childbearing potential: a report of the primary findings. *Alcohol Clin Exp Res.* 2011;35(7):1331-1338. doi:10.1111/j.1530-0277.2011.01469.x.
59. Landkroon AP, de Weerd S, van Vliet-Lachotzki E, Steegers EAP. Validation of an Internet questionnaire for risk assessment in preconception care. *Public Health Genomics.* 2010;13(2):89-94. doi:10.1159/000228980.
60. Hides L, Cotton SM, Berger G, et al. The reliability and validity of the alcohol, smoking and substance involvement screening test (ASSIST) in first-episode psychosis. *Addict Behav.* 2009;34(10):821-825. doi:10.1016/j.addbeh.2009.03.001.
61. McNeely J, Strauss SM, Wright S, et al. Test-retest reliability of a self-administered alcohol, smoking and substance involvement screening test (ASSIST) in primary care patients. *J Subst Abuse Treat.* 2014;47(1):93-101. doi:10.1016/j.jsat.2014.01.007.
62. Wolford G, Rosenberg S, Rosenberg H, et al. A clinical trial comparing interviewer and computer-assisted assessment among clients with severe mental illness. *Psychiatr Serv.* 2008;59(7):769-775. doi:10.1176/appi.ps.59.7.769.
63. de Weerd S, van der Bij AK, Cikot RJ, et al. Preconception

- care: a screening tool for health assessment and risk detection. *Prev Med.* 2002;34(5):505-511. doi:10.1006/pmed.2002.1009.
64. Johnson SK, Velasquez MM, von Sternberg K. CHOICES: an empirically supported intervention for preventing alcohol-exposed pregnancy in community settings. *Res Soc Work Pract.* 2015;25(4):488-492. doi:10.1177/1049731514543668.
  65. Keough VA, Jennrich JA. Including a screening and brief alcohol intervention program in the care of the obstetric patient. *J Obstet Gynecol Neonatal Nurs.* 2009;38(6):715-722. doi:10.1111/j.1552-6909.2009.01073.x.
  66. Parrish D, von Sternberg K, Velasquez MM, et al. Characteristics and factors associated with the risk of a nicotine exposed pregnancy: expanding the CHOICES preconception counseling model to tobacco. *Matern Child Health J.* 2012;16(6):1224-1231. doi:10.1007/s10995-011-0848-z.
  67. Miller WR, Sanchez VC. Motivating young adults for treatment and lifestyle change. In: Howard GS, Nathan PE, eds. *Alcohol Use and Misuse by Young Adults.* Notre Dame, IN: Notre Dame Press; 1994.
  68. Velasquez MM, Ingersoll KS, Sobell MB, et al. A dual-focus motivational intervention to reduce the risk of alcohol-exposed pregnancy. *Cogn Behav Pract.* 2010;17(2):203-212. doi:10.1016/j.cbpra.2009.02.004.
  69. Centers for Disease Control and Prevention. CHOICES: program for women about choosing healthy behaviors. [http://www.cdc.gov/ncbddd/fasd/documents/choices\\_onepager\\_-april2013.pdf](http://www.cdc.gov/ncbddd/fasd/documents/choices_onepager_-april2013.pdf). Accessed January 2016.
  70. National Institute on Alcohol Abuse and Alcoholism (NIAAA). *Helping patients who drink too much: a clinician's guide.* Rockville, MD: NIAAA; 2005.
  71. Dadich A. Expanding our understanding of self-help support groups for substance use issues. *J Drug Educ.* 2010;40(2):189-202. doi:10.2190/DE.40.2.f.
  72. Kendra MS, Weingardt KR, Cucciare MA, Timko C. Satisfaction with substance use treatment and 12-step groups predicts outcomes. *Addict Behav.* 2015;40:27-32. doi:10.1016/j.addbeh.2014.08.003.
  73. Timko C, Sutkowi A, Cronkite RC, Makin-Byrd K, Moos RH. Intensive referral to 12-step dual-focused mutual-help groups. *Drug Alcohol Depend.* 2011;118(2-3):194-201. doi:10.1016/j.drugalcdep.2011.03.019.
  74. Wells EA, Donovan DM, Daley DC, et al. Is level of exposure to a 12-step facilitation therapy associated with treatment outcome? *J Subst Abuse Treat.* 2014;47(4):265-274. doi:10.1016/j.jsat.2014.06.003.
  75. Dedert EA, McDuffie JR, SteinR, et al. Electronic interventions for alcohol misuse and alcohol use disorders: a systematic review. *Ann Intern Med.* 2015;163(3):205-214. doi:10.7326/M15-0285.
  76. Riper H, Spek V, Boon B, et al. Effectiveness of e-self-help interventions for curbing adult problem drinking: a meta-analysis. *J Med Internet Res.* 2011;13(2):e42. doi:10.2196/jmir.1691.
  77. White A, Kavanagh D, Stallman H, et al. Online alcohol interventions: a systematic review. *J Med Internet Res.* 2010;12(5):e62. doi: 10.2196/jmir.1479.
  78. Healthy People 2020. 2020 Topics and objectives: maternal, infant, and child health objectives, preconception health behaviors. <http://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives>. Accessed January 2016.
  79. Miniño AM, Heron MP, Murphy SL, Kochanek KD. Deaths: final data for 2004. *Natl Vital Stat Rep.* 2007;55(19):1-119.
  80. Swendsen L, Burstein M, Case B, et al. Use and abuse of alcohol and illicit drugs in U.S. adolescents: results of the National Comorbidity Survey-Adolescent Supplement. *Arch Gen Psychiatry.* 2012;69(4):390-398. doi: 10.1001/archgenpsychiatry.2011.1503.
  81. Ruhl C, Moran B. The clinical content of preconception care: preconception care for special populations. *Am J Obstet Gynecol.* 2008;199(6 Suppl 2):S384-S388. doi:10.1016/j.ajog.2008.09.019.
  82. Lassi ZS, Dean SV, Mallick D, Bhutta ZA. Preconception care: delivery strategies and packages for care. *Reprod Health.* 2014;11(Suppl 3):S7. doi:10.1186/1742-4755-11-S3-S7.
  83. Rose H, Rolland B, Subtil D, et al. The need for developing preconception counseling in addiction medicine. *Arch Womens Ment Health.* 2013;16(5):433-434. doi:10.1007/s00737-013-0374-7.
  84. American College of Obstetricians and Gynecologists. Cultural sensitivity and awareness in the delivery of health care. Committee Opinion, 493. <http://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Cultural-Sensitivity-and-Awareness-in-the-Delivery-of-Health-Care>. Accessed January 2016.
  85. Novack DH, Suchman AL, Clark W, et al. Calibrating the physician: personal awareness and effective patient care. *JAMA.* 1997;278(6):502-509.
  86. Moos MK. Preconception health: where to from here? *Womens Health Issues.* 2006;16(4):156-158. doi:10.1016/j.whi.2006.03.004.

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