Effectiveness of psychological interventions to reduce alcohol consumption among pregnant and postpartum women: a systematic review

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ABSTRACT

Purpose: To synthesise the available evidence on psychological interventions to reduce alcohol consumption among pregnant and postpartum women.

Methods: Six electronic databases were searched to identify controlled studies targeting pregnant and postpartum women who drink or are at-risk of drinking due to previous patterns of alcohol use. Controlled quantitative studies such as randomised controlled trials and quasi-experimental studies were included. The search was limited to peer-reviewed articles in English. The methodological quality of studies was assessed using the Cochrane risk of bias tool. A narrative synthesis of the findings was conducted.

Results: In total, 12,610 records were screened, and 11 studies were eligible for inclusion (9 with pregnant women, 2 with postpartum women). All studies were randomised controlled trials. Five studies had positive or partially-positive primary outcomes of reductions in drinking or abstinence, and their interventions ranged from multi-session brief interventions to self-help manuals based on cognitive behavioural components. All studies showed considerable methodological limitations.

Conclusions: Psychological interventions may be effective in promoting abstinence or reducing alcohol consumption among pregnant and postpartum women. Interventions that demonstrated some efficacy showed higher level of engagement with pregnant women compared to studies which delivered interventions in a single session. Paucity of evidence, inconsistency of outcomes, large heterogeneity in the interventions, and methodological weaknesses limit the ability to make final conclusions about the overall effectiveness of these interventions. Findings highlight the need for better quality research on this topic.

Keywords

Alcohol, pregnant women, postpartum women, psychological interventions.

INTRODUCTION

The global prevalence of alcohol use in pregnancy is approximately 10%, with large variations of 0-60% seen across countries and regions (Popova et al. 2017). Alcohol consumption during pregnancy

has been linked to harm for the developing embryo and foetus and to adverse pregnancy outcomes including increased risk of miscarriage, still-birth, preterm delivery, sudden infant death, and low birthweight (Bailey and Sokol 2011). The most severe consequences of alcohol use during pregnancy are the Fetal Alcohol Spectrum Disorders (FASD) (Bertrand et al. 2004) which includes Fetal Alcohol Syndrome (FAS), recognisable by the presentation of morphological anomalies, pre- and/or post-natal growth retardation, and neurodevelopmental abnormalities (Institute of Medicine; Committee to Study Fetal Alcohol Syndrome 1996). Although the literature has focused mainly on the adverse effects of heavy alcohol use and binge drinking during pregnancy, the effects of light-to-moderate alcohol consumption have also been investigated (Henderson et al. 2007; Patra et al. 2011; Mamluk et al. 2017).

After birth, maternal alcohol consumption continues to expose the infant to the negative effects of alcohol through breastfeeding. Healthcare recommendations therefore advise breastfeeding women to avoid drinking alcohol entirely as a precaution, or otherwise minimise consumption (Royal College of Obstetricians and Gynaecologists 2018).

The aforementioned negative consequences of pre- and post-natal alcohol use make this behaviour an important target for intervention. Current guidelines recommend the use of brief interventions for hazardous alcohol consumption in pregnant and postpartum women in primary care (NICE 2014; WHO 2014). Brief interventions are opportunistic interventions developed for use in non-specialist settings to reduce alcohol consumption and prevent alcohol-related harms through time-limited assistance (usually a single session) (Center for Substance Abuse Treatment 1999; Kaner et al. 2018). These interventions adopt a preventative approach and include provision of feedback about the risks of continued heavy drinking, information on harms associated with alcohol use, and motivational enhancement for alcohol reduction. Brief therapies go beyond brief interventions and offer more extensive support (at least 6 sessions) and are more appropriate for people with heavier and potentially more harmful patterns of drinking (Center for Substance Abuse Treatment 1999).

Past systematic reviews have evaluated the evidence around non-pharmacological interventions for alcohol use in pregnancy but have had considerable limitations. A Cochrane review examined the effectiveness of psychological and educational interventions for the reduction of alcohol use among pregnant women as well as women planning pregnancy, but only Randomised Controlled Trials (RCTs) were considered for inclusion (Stade et al. 2009). While Gilinsky et al. (2011) expanded the eligible study designs to include non-Randomised Controlled Trials (non-RCTs), they limited the population to all pregnant women attending antenatal care and to interventions delivered in that setting. In 2013, Gebara et al. (2013) conducted a review specifically focused on brief interventions for women, with pregnant women as a sub-population. Other than the limited scope of intervention type, the review restricted the publication years of their search (2006-2011). Finally, Fergie et al. (2018) reviewed the literature on behavioural support interventions for alcohol and other drug use in pregnancy. Their review was limited to RCTs, and their main aim was to examine the behavioural change techniques utilised in the interventions.

In summary, these earlier systematic reviews all had significant limitations that prevent any one of these reviews from providing an all-encompassing summary of the evidence for psychological interventions to address alcohol use among pregnant and postpartum women. For example, past systematic reviews limited their scope to interventions delivered in antenatal care only (Gilinsky et al. 2011) or brief interventions only (Gebara et al. 2013). Study designs were limited to randomized controlled trials (Stade et al. 2009; Fergie et al. 2018), and those systematic reviews which included quasi-experimental studies as well (Gilinsky et al. 2011; Gebara et al. 2013) had other limitations (e.g. excluding postpartum women, limited scope of literature search). We define the postpartum period as up to six months post childbirth, the recommended period for breastfeeding (WHO 2003; Romano et al. 2010). Postpartum women are an important population group to be targeted along with pregnant women. Previous reviews also had a narrow focus on intervention effectiveness, providing little information of the content, structure and delivery format of the interventions. This information is essential in order to enable decision-making around the feasibility of implementing the

interventions in real-world contexts. The aim of this systematic review is to complement earlier reviews on the topic by identifying, describing, and evaluating psychological interventions for the reduction of alcohol consumption among both pregnant and postpartum women. The objectives of this review are to (1) synthesise the evidence on the effectiveness of psychological interventions; (2) to describe the content of the psychological strategies; and (3) to summarise the delivery platform, the delivery agent (health care provider), and their training.

METHODS

This systematic review was conducted according to PRISMA guidelines (Moher et al. 2009). The PRISMA checklist is included in Appendix 1. A protocol for this review was registered on the international prospective register of systematic reviews (PROSPERO) (Registration number: CRD42019141595).

Eligibility Criteria

We included studies which focused on pregnant and/or postpartum women who consumed any amount of alcohol during pregnancy or six months postpartum. We also included studies of pregnant women who were at-risk of alcohol consumption during pregnancy or in the postpartum period due to previous patterns of alcohol use that were potentially harmful. No restrictions for inclusion were applied to the age of women, or the number of weeks of gestation at which pregnant women were enrolled. Studies which enrolled women after the six months post-partum period were excluded. We included studies which measured alcohol consumption or its risk-level via validated screening tools, clinician assessments or biological measures. We included studies which delivered a psychological (non-pharmacological) intervention explicitly aimed at the reduction of alcohol consumption (reduction and/or abstinence). Interventions addressing co-morbidities including illicit drug-use were

eligible for inclusion if the intervention was explicitly aimed at the reduction of alcohol consumption. We only included controlled quantitative studies such as RCTs or non-RCTs (quasi-experimental studies) where the intervention was compared to either one or more control groups. Our inclusion and exclusion criteria are described in Appendix 2.

Search terms and strategy

Search terms were structured around alcohol use, pregnancy, and psychological interventions, and included study-design terms. Medline, Embase, Global Health, PsychInfo, Cinahl Plus and Web of Science were searched until August 2020. No restrictions were applied to study setting but only English peer-reviewed articles were included. The complete search strategy for Medline is included in Appendix 3. The database search was complemented by handsearching of reference lists of included articles. Studies included in past systematic reviews on this topic were also assessed for eligibility (Stade et al. 2009; Gilinsky et al. 2011; Gebara et al. 2013; Fergie et al. 2018).

Analyses and quality appraisal

The methodological quality of the included studies was assessed using the revised Cochrane Risk of Bias tool (RoB 2.0) (Sterne et al. 2019), a tool specifically developed to assess the risk of bias of RCTs at the study and the outcome level. It was initially planned that the methodological quality of non-randomised controlled trials would be assessed using the Cochrane ROBINS-I tool (Sterne et al. 2016), but no studies with this design were identified. The findings of this systematic review were summarised through a narrative synthesis following Popay's guidelines (Popay et al. 2006).

RESULTS

Search Results

A total of 12,610 records were identified. After screening titles and abstracts, 79 full-text articles were assessed for eligibility. The PRISMA flow diagram in Figure 1 below presents the number of records considered at each stage of the review. A second reviewer screened 10% of the full-text articles, and any disagreements around inclusion were either resolved by consensus or discussed with a third independent party.

<Place Figure 1 around here>

General Characteristics of Studies

A total of 11 studies, including 2,198 women (1,840 pregnant; 358 postpartum) were included in this review (Reynolds et al. 1995; Handmaker et al. 1999; Chang et al. 1999, 2005; O'connor and Whaley 2007; Fleming et al. 2008; Tzilos et al. 2011; van der Wulp et al. 2014; Rubio et al. 2014; Ondersma et al. 2015, 2016). Nine of the included studies enrolled pregnant women (Reynolds et al. 1995; Handmaker et al. 1999; Chang et al. 1999, 2005; O'connor and Whaley 2007; Tzilos et al. 2011; Rubio et al. 2014; van der Wulp et al. 2014; Ondersma et al. 2015), and two studies enrolled women in the postpartum period (Fleming et al. 2008; Ondersma et al. 2016). Three of the 11 studies identified in this review were not included in previous systematic reviews on this topic: two of the newly identified studies enrolled pregnant women (Rubio et al. 2014; Ondersma et al. 2015) and one study enrolled postpartum women (Ondersma et al. 2016). All studies were conducted in high-income settings, with 10 studies from the USA, and one from the Netherlands (van der Wulp et al. 2014). Nine of the studies were individual RCTs, while two studies were cluster-randomised (O'connor and Whaley 2007; van der Wulp et al. 2014). Three of the RCTs were pilot studies with a sample size of 50 or below (Handmaker et al. 1999; Tzilos et al. 2011; Ondersma et al. 2015).

Table 1 summarises the study characteristics and findings of the included studies. Appendix 4 contains an extended table with additional study and population characteristics including further demographic information on the included study population.

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Study Populations

There was large variability in the inclusion criteria applied regarding alcohol use. Among studies with pregnant women (n=9), two enrolled women who reported any alcohol consumption (Reynolds et al. 1995) or at least one drink (Handmaker et al. 1999) in the month of pregnancy prior to enrolment; two studies enrolled women that had consumed any amount of alcohol since pregnancy recognition (O'connor and Whaley 2007; van der Wulp et al. 2014); while one study required specific quantity-frequency thresholds of consumption for the periods before and after pregnancy recognition (Rubio et al. 2014). In the remaining four studies (Chang et al. 1999, 2005; Tzilos et al. 2011; Ondersma et al. 2015), a positive T-ACE (Tolerance, Annoyance, Cut down, and Eye opener) score (2 or above) was used to detect prenatal risk drinking. The T-ACE is a widely used and validated four-item alcohol screening test developed for use with pregnant women (Sokol et al. 1989).

Similar variability regarding inclusion criteria and definition of alcohol-related risk was seen among the two studies targeting postpartum women. The Healthy Moms study considered any consumption of alcohol in the previous 28 days of the postpartum period as high risk (Fleming et al. 2008), while the other study assessed risk based on alcohol consumption in the 12 months prior to the pregnancy (along with a positive T-ACE score postpartum) (Ondersma et al. 2016). Pregnant and postpartum women in the included studies were identified in routine care and were not seeking treatment for an alcohol use disorder.

Intervention Content and Delivery

Most of the identified studies aimed to test the effectiveness of a particular intervention for the reduction of alcohol use, with this intervention mainly described as a brief intervention (Chang et al. 1999, 2005; O'connor and Whaley 2007), motivational interview (Handmaker et al. 1999), or as having elements of both (Fleming et al. 2008; Tzilos et al. 2011; Rubio et al. 2014; Ondersma et al. 2015, 2016). One study compared two different types of brief intervention (health counselling and computer-tailored feedback) against usual care (van der Wulp et al. 2014), while another study described its intervention as a Cognitive-behavioural therapy-based self-help manual (Reynolds et al. 1995). All of the studies were individually delivered – no group interventions were identified.

All the studies were delivered in healthcare settings. Most were delivered within routine prenatal or postpartum services, with the exception of one study where the intervention was delivered during an inpatient childbirth hospital stay (Ondersma et al. 2016). Four of the included studies used computer-based delivery of the interventions (Tzilos et al. 2011; van der Wulp et al. 2014; Ondersma et al. 2015, 2016). For studies that used face-to-face delivery, the most common delivery agents were medical professionals such as physicians (Chang et al. 1999, 2005; Fleming et al. 2008), nurses or midwives (Chang et al. 2005; Fleming et al. 2008; Rubio et al. 2014; van der Wulp et al. 2014), or clinical psychologist (Handmaker et al. 1999). One study had nonmedical professionals (nutritionists) as delivery agents (O'connor and Whaley 2007). Only one study used non-professional providers (lay counsellors) to deliver the intervention, but did not describe the lay counsellor educational or professional background (Rubio et al. 2014). One study described the delivery agents as health educators within obstetric clinics, but also did not specify their professional background (Reynolds et al. 1995).

Table 2 summarises the content and delivery of each intervention as reported in the studies.

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Alcohol Use Outcomes

In studies with pregnant women, only two included studies showed positive results in their primary outcomes at follow-up, demonstrating significantly higher rates of abstinence in the intervention group compared to the control group (Reynolds et al. 1995; O'connor and Whaley 2007). The interventions in these studies were multi-session 10-to-15-minute workbook-driven brief intervention delivered by nutritionists at every prenatal care visit if the woman continued to drink (O'connor and Whaley 2007), and a 9-day CBT-based self-help manual delivered to women attending prenatal care (Reynolds et al. 1995). Two other studies demonstrated partially positive alcohol-use outcomes in favour of the intervention group. Handmaker et al. (1999) showed significant reductions in peak blood alcohol content compared to control, yet no significant between-group differences in total alcohol consumption or days of abstinence. The intervention used in this study was a 1-hour motivational interview preceded by an hour-long alcohol assessment. Van Der Wulp et al. (van der Wulp et al. 2014) demonstrated an effect in favour of a 2-session computer-tailored feedback intervention compared to usual care for the abstinence outcome at 6 months, yet average weekly alcohol consumption was only significantly lower among those women whose drinking level was low-to-average at baseline. One of the two identified studies with postpartum women showed significant reductions in all primary alcohol use outcomes, as well as statistically significant differences between groups favouring the intervention (Fleming et al. 2008). In this study (Healthy Moms study), the intervention was delivered in two sessions by physicians or nurses at obstetric practices, and consisted of a workbook-based 15-minute brief intervention followed by two behaviour change reinforcement phone calls.

Risk of Bias Assessment

The studies had several methodological weaknesses. Most studies described an adequate computer-generated randomisation, with the exception of three studies where the randomisation was not described (Reynolds et al. 1995; Handmaker et al. 1999; O'connor and Whaley 2007). Through the use of time-matched computer-delivered control conditions, three studies (Tzilos et al. 2011; Ondersma et al. 2015, 2016) were able to blind personnel (e.g. care providers, investigators) from the interventions that were delivered to the participants, thus decreasing the risk of performance bias. The majority of studies described blinded outcome assessments. More than half the studies had low attrition (<20%) (Reynolds et al. 1995; Chang et al. 1999, 2005; Fleming et al. 2008; Tzilos et al. 2011; Ondersma et al. 2015), and two studies imputed missing data using appropriate statistical methods (van der Wulp et al. 2014; Ondersma et al. 2016). Further risk of bias assessments are presented in Table 3.

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DISCUSSION

Based on the available evidence, psychological interventions may be effective in promoting abstinence or reducing alcohol consumption among pregnant and postpartum women. The ability to draw conclusions on the effectiveness of the identified interventions is hindered by several factors. First, a low number of studies (eleven) were identified. Of these, only four studies with pregnant women (Reynolds et al. 1995; Handmaker et al. 1999; O'connor and Whaley 2007; van der Wulp et al. 2014) and one study with postpartum women (Fleming et al. 2008) showed positive or partially positive outcomes for alcohol use. Second, studies included women 'at risk' of alcohol consumption based on pre-pregnancy drinking behaviour; these women were included in an effort to reduce underreporting of alcohol consumption and to predict future risk (Chang et al. 1999, 2005; Tzilos et al. 2011; Ondersma et al. 2015). This may have resulted in the inclusion of pregnant women who

were not drinking at baseline as well as women who had a relatively low average alcohol consumption at baseline, which may have attenuated the treatment effect. Third, characteristics of the control group may have contributed to a lack of treatment effect. In studies where reductions in alcohol use were observed in both study arms, it was speculated that the receipt of a comprehensive alcohol assessment, or even a briefer alcohol screen, may have led to the reduction of alcohol consumption in the control arm with pregnant (Chang et al. 1999, 2005; Ondersma et al. 2015) and postpartum women (Ondersma et al. 2016). Another factor to consider when discussing effectiveness of interventions is the use of self-reported outcome measures. Due to social stigma around alcohol consumption in pregnancy and during breastfeeding, self-reported outcomes are susceptible to underreporting (Ernhart et al. 1988; Lange et al. 2014; Oni et al. 2018). Outcome assessments in studies at baseline may have also been highly susceptible to recall bias as participants were asked to recall details of their alcohol consumption over long follow-up periods of up to 12 months prior to the pregnancy.

The majority of psychological interventions consisted of brief interventions, motivational interviews or had elements of both. Despite this similarity, there was considerable variability in the content and strategies employed in these interventions including the number and duration of sessions. This points to a lack of standardisation of what brief and motivational interventions consist of in practice. In the case of interventions for postpartum women, the fact that only one of two identified studies showed positive outcomes in the intervention group (Fleming et al. 2008) precludes us from drawing any conclusions other than suggesting that brief interventions based on the principles of motivational interviewing may be effective in reducing alcohol use among postpartum women, and that further research is urgently needed among this population. However, among pregnant women, we observed that interventions that showed some efficacy were longer in duration and required more frequent engagement with intervention content compared to studies or brief interventions typically delivered in a single session. For example one of the brief interventions involved brief but multiple contacts in repeated sessions (O'connor and Whaley 2007), and the other one consisted of a 9-session self-help

manual, which was preceded by a 10-minute educational session and followed up with a phone call (Reynolds et al. 1995). Moderator analyses conducted in studies also revealed trends between treatment effect and baseline drinking. A few studies showed that the intervention was significantly more effective at maintaining abstinence among women who were abstinent at baseline (Chang et al. 1999), while another study showed significantly higher quit rates among women with lower levels of baseline alcohol consumption (Reynolds et al. 1995). Conversely, two studies revealed significantly greater reductions of alcohol consumption among women in the intervention group with higher levels of alcohol consumption at baseline (Handmaker et al. 1999; Chang et al. 2005). Further research is needed among postpartum women to determine whether interventions show greater efficacy at higher levels of engagement among women with higher levels of drinking.

Concerning the delivery of interventions, the fact that all the identified studies in this review were conducted within a health care setting narrows the review to women who have recognised their pregnancy and initiated prenatal care, and postpartum women who received clinic-based postnatal care. Women who drink at higher levels may delay antenatal care of have late pregnancy recognition, and therefore miss an opportunity for an alcohol use reduction intervention (Choi et al. 2014). This points towards important considerations for the integration of alcohol use interventions within clinic-based care, particularly concerning the ability of those interventions to reach the pregnant and postpartum women who need them most. Community outreach efforts and case-finding could increase the number of pregnant and postpartum women engaged in clinic-based care, and thus enhance the impact of the interventions embedded within prenatal and postnatal care. The utilisation of computer-delivered interventions and interventions delivered by non-medical professionals, health educators or lay counsellors provides insight into the potential feasibility of non-traditional delivery modalities and delivery agents that could also support the scalability of interventions and their greater impact.

Limitations

Our study has a few limitations. The search was limited to published journal articles in English only, and we did not search for grey literature. Only one author (LS) was involved in the literature search and data extraction. However, any queries regarding inclusion of studies and data extraction were discussed with another author (DF) and 10% of the data extraction was verified. Due to the large variability in outcomes and content of psychological interventions, a meta-analysis was not conducted, and studies were synthesised narratively only.

Conclusions

Our findings point to some potentially effective psychological interventions and strategies for the reduction of alcohol consumption among pregnant and postpartum women. Integration of alcohol use interventions within prenatal care may be a first step in communities in which alcohol use among pregnant women is common, but this needs to be complemented by community outreach efforts and case-finding to promote earlier pregnancy recognition among vulnerable women who may not initiate prenatal care on their own. Our review found that psychological interventions to reduce alcohol use among pregnant and postpartum women were all implemented in high-income countries, and shows that more research on psychological interventions is needed in more diverse and international contexts. There may also be a need to conceptualise alcohol use on a spectrum of risk levels as per World Health Organization (WHO) recommendations (WHO 2014). While self-help and brief interventions may be a good first step for at-risk women, findings from this review suggest that more extensive interventions (such as brief therapies) may be more effective for pregnant women who engage in higher levels of drinking. Our review also elucidates the potential for the use of self-help strategies and computer-delivered interventions within the continuum of care for alcohol use. We conclude that psychological interventions may be effective in promoting abstinence or reducing alcohol consumption among pregnant and postpartum women, and that additional research is

required to develop contextually appropriate psychological interventions to reduce alcohol use in pregnancy.

Declarations

Funding

NA

Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of the London School of Hygiene and Tropical Medicine.

Consent to participate

NA

Consent for publication

NA

Conflicts of interests

The authors declare that they have no conflicts of interests.

Availability of data and material

Data and materials of this systematic review can be obtained from the corresponding author.

Code availability

NA

References

Bailey BA, Sokol RJ (2011) Prenatal alcohol exposure and miscarriage, stillbirth, preterm delivery, and sudden infant death syndrome. Alcohol Res Health 34:86–91

Bertrand J, Floyd R, Weber M, et al (2004) Fetal Alcohol Syndrome: Guidelines for Referral and Diagnosis. Atlanta, GA

Center for Substance Abuse Treatment (1999) Brief Interventions and Brief Therapies for Substance Abuse. Substance Abuse and Mental Health Services Administration (US), Rockville, MD

Chang G, McNamara TK, Orav EJ, et al (2005) Brief intervention for prenatal alcohol use: a randomized trial. Obstet Gynecol 105:991

Chang G, Wilkins-Haug L, Berman S, Goetz MA (1999) Brief intervention for alcohol use in pregnancy: a randomized trial. Addiction 94:1499–1508

Choi KW, Abler LA, Watt MH, et al (2014) Drinking before and after pregnancy recognition among South African women:The moderating role of traumatic experiences. BMC Pregnancy Childbirth 14:97. https://doi.org/10.1186/1471-2393-14-97

Ernhart CB, Morrow-Tlucak M, Sokol RJ, Martier S (1988) Underreporting of alcohol use in pregnancy. Alcohol Clin Exp Res 12:506–511. https://doi.org/10.1111/j.1530-0277.1988.tb00233.x

Fergie L, Campbell KA, Coleman-Haynes T, et al (2018) Identifying Effective Behavior Change Techniques for Alcohol and Illicit Substance Use During Pregnancy: A Systematic Review. Ann Behav Med 53:769–781. https://doi.org/10.1093/abm/kay085

Fleming MF, Lund MR, Wilton G, et al (2008) The Healthy Moms Study: the efficacy of brief

409 alcohol intervention in postpartum women. Alcohol Clin Exp Res 32:1600–1606

410 Gebara CF de P, Bhona FM de C, Ronzani TM, et al (2013) Brief intervention and decrease of
411 alcohol consumption among women: a systematic review. Subst Abuse Treat Prev
412 Policy 8:31. https://doi.org/10.1186/1747-597X-8-31

413 Gilinsky A, Swanson V, Power K (2011) Interventions delivered during antenatal care to
414 reduce alcohol consumption during pregnancy: A systematic review. Addict Res Theory
415 19:235–250. https://doi.org/10.3109/16066359.2010.507894

416 Handmaker NS, Miller WR, Manicke M (1999) Findings of a pilot study of motivational
417 interviewing with pregnant drinkers. J Stud Alcohol 60:285–287

418 Henderson J, Gray R, Brocklehurst P (2007) Systematic review of effects of low–moderate
419 prenatal alcohol exposure on pregnancy outcome. BJOG An Int J Obstet Gynaecol
420 114:243–252. https://doi.org/10.1111/j.1471-0528.2006.01163.x

421 Institute of Medicine; Committee to Study Fetal Alcohol Syndrome (1996) Fetal Alcohol
422 Syndrome: Diagnosis, Epidemiology, Prevention, and Treatment, 1st edn. National
423 Academies Press, Washington, D.C.

424 Kaner EFS, Beyer FR, Muirhead C, et al (2018) Effectiveness of brief alcohol interventions in
425 primary care populations. Cochrane Database Syst Rev.
426 https://doi.org/10.1002/14651858.CD004148.pub4

427 Lange S, Shield K, Koren G, et al (2014) A comparison of the prevalence of prenatal alcohol
428 exposure obtained via maternal self-reports versus meconium testing: a systematic
429 literature review and meta-analysis. BMC Pregnancy Childbirth 14:127.
430 https://doi.org/10.1186/1471-2393-14-127

431 Mamluk L, Edwards HB, Savović J, et al (2017) Low alcohol consumption and pregnancy and
432 childhood outcomes: time to change guidelines indicating apparently 'safe' levels of
433 alcohol during pregnancy? A systematic review and meta-analyses. BMJ Open
434 7:e015410. https://doi.org/10.1136/bmjopen-2016-015410

435 Moher D, Liberati A, Tetzlaff J, et al (2009) Preferred Reporting Items for Systematic Reviews

436 and Meta-Analyses: The PRISMA Statement. PLoS Med 6:e1000097.
437 https://doi.org/10.1371/journal.pmed.1000097

438 NICE (2014) Antenatal and postnatal mental health: clinical management and service clinical
439 management and service guidance guidance

440 O'connor MJ, Whaley SE (2007) Brief intervention for alcohol use by pregnant women. Am J
441 Public Health 97:252–258

442 Ondersma SJ, Beatty JR, Svikis DS, et al (2015) Computer-delivered screening and brief
443 intervention for alcohol use in pregnancy: A pilot randomized trial. Alcohol Clin Exp Res
444 39:1219–1226

445 Ondersma SJ, Svikis DS, Thacker LR, et al (2016) A randomised trial of a computer-delivered
446 screening and brief intervention for postpartum alcohol use. Drug Alcohol Rev 35:710–
447 718

448 Oni HT, Buultjens M, Abdel-Latif ME, Islam MM (2018) Barriers to screening pregnant
449 women for alcohol or other drugs: A narrative synthesis. Women and Birth.
450 https://doi.org/https://doi.org/10.1016/j.wombi.2018.11.009

451 Patra J, Bakker R, Irving H, et al (2011) Dose–response relationship between alcohol
452 consumption before and during pregnancy and the risks of low birthweight, preterm
453 birth and small for gestational age (SGA)—a systematic review and meta-analyses.
454 BJOG An Int J Obstet Gynaecol 118:1411–1421. https://doi.org/10.1111/j.1471-
455 0528.2011.03050.x

456 Popay J, Roberts H, Sowden A, et al (2006) Guidance on the conduct of narrative synthesis in
457 systematic reviews. ESRC Methods Program 1:b92

458 Popova S, Lange S, Probst C, et al (2017) Estimation of national, regional, and global
459 prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic
460 review and meta-analysis. Lancet Glob Heal 5:e290–e299.
461 https://doi.org/10.1016/S2214-109X(17)30021-9

462 Reynolds KD, Coombs DW, Lowe JB, et al (1995) Evaluation of a self-help program to reduce

463 alcohol consumption among pregnant women. Int J Addict 30:427–443

464 Romano M, Cacciatore A, Giordano R, La Rosa B (2010) Postpartum period: three distinct
465 but continuous phases. J Prenat Med 4:22–25

466 Royal College of Obstetricians and Gynaecologists (2018) Alcohol and Pregnancy

467 Rubio DM, Day NL, Conigliaro J, et al (2014) Brief motivational enhancement intervention to
468 prevent or reduce postpartum alcohol use: a single-blinded, randomized controlled
469 effectiveness trial. J Subst Abuse Treat 46:382–389

470 Sokol RJ, Martier SS, Ager JW (1989) The T-ACE questions: practical prenatal detection of
471 risk-drinking. Am J Obstet Gynecol 160:863–870. https://doi.org/10.1016/0002-
472 9378(89)90302-5

473 Stade BC, Bailey C, Dzendoletas D, et al (2009) Psychological and/or educational
474 interventions for reducing alcohol consumption in pregnant women and women
475 planning pregnancy. Cochrane Database Syst Rev.
476 https://doi.org/10.1002/14651858.CD004228.pub2

477 Sterne JAC, Hernán MA, Reeves BC, et al (2016) ROBINS-I: a tool for assessing risk of bias in
478 non-randomised studies of interventions. BMJ 355:i4919.
479 https://doi.org/10.1136/bmj.i4919

480 Sterne JAC, Savović J, Page MJ, et al (2019) RoB 2: A revised tool for assessing risk of bias in
481 randomised trials. BMJ 366:. https://doi.org/10.1136/bmj.l4898

482 Tzilos GK, Sokol RJ, Ondersma SJ (2011) A randomized phase I trial of a brief computer-
483 delivered intervention for alcohol use during pregnancy. J Women's Heal 20:1517–
484 1524

485 van der Wulp NY, Hoving C, Eijmael K, et al (2014) Reducing alcohol use during pregnancy
486 via health counseling by midwives and internet-based computer-tailored feedback: a
487 cluster randomized trial. J Med Internet Res 16:e274

488 WHO (2014) Guidelines for the identification and management of substance use and

substance use disorders in pregnancy. World Health Organization, Geneva

WHO (2003) Global Strategy for Infant and Young Child Feeding. World Health Organization, Geneva