

## Review

# Tobacco and alcohol use in the context of adolescent pregnancy and postpartum: a scoping review of the literature

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### What is known about this topic

- Adolescent girls are more likely than women of other ages to smoke, drink alcohol and binge drink during pregnancy
- There are important health-related impacts of smoking and drinking alcohol singly, and in combination, on girls'/young women's and foetal health.
- Adolescent girls who smoke cigarettes pre-pregnancy are at a high risk of relapsing in the postpartum period and becoming lifelong smokers.

### What this paper adds

- Researchers have, for the most part, considered tobacco and alcohol use in parallel streams of investigation as opposed to investigating the interconnections and the potential of integrated interventions.
- There are few examples of gender-informed prevention or treatment programmes to prevent and reduce tobacco and alcohol use for pregnant adolescent girls, despite the fact that these approaches to substance use have been strongly encouraged for girls and women.
- There is a clear need for effective and integrated approaches to prevent and reduce tobacco and alcohol use among female adolescents preconception, during pregnancy and postpartum, and to sensitively address the influence of partners and friends.

### Abstract

Adolescent girls are more likely than women of other ages to smoke tobacco or drink alcohol during pregnancy. The health impacts of smoking and drinking for girls and the interconnections between alcohol and tobacco use with adolescent pregnancy underscore the urgent need for integrated approaches to prevent and reduce alcohol and tobacco use among pregnant girls/young women. This article reports on the results of a scoping review of the literature focused on adolescents' use of tobacco and alcohol during pregnancy and postpartum. A search of CINAHL, Medline, Social Science Index and Web of Science identified 40 articles published in the two decades between 1990 and 2012 that met our inclusion criteria related to this age group, pregnancy/motherhood status, and use of both alcohol and tobacco. The review points to compelling gaps in our knowledge and our responsiveness to adolescents aged 19 and under who use alcohol and tobacco during pregnancy and the postpartum period. Research has been primarily descriptive, with separate, parallel streams of investigation to identify trends and predictors of alcohol and tobacco use, prior to, during and following pregnancy. There is a marked lack of effective interventions described in the literature that are designed to prevent or reduce alcohol and tobacco use during pregnancy among adolescent girls; and there are few examples of gender-informed prevention or treatment programmes for this population. Research is needed on interventions that attend to the context of adolescent girls' substance use as well as their preferences and developmental needs for support that encourage sustained behaviour change throughout pregnancy and the postpartum period and that effectively address the influence of partners and friends on use.

**Keywords:** alcohol-related issues, behavioural/lifestyle interventions, scoping review, smoking cessation among young people, teenage pregnancy

Substance use among pregnant adolescents and young women, particularly heavy drinking and smoking, and their associated health/social consequences are recognised internationally as important health problems (CASA 2003, Schinke *et al.* 2008, Simons-Morton *et al.* 2009). Trends reflecting increases in rates of alcohol and tobacco use in this group, the health impacts of smoking and risky drinking (i.e. in excess of recommended guidelines) for young women and the interconnections between alcohol and tobacco use with adolescent pregnancy underscore the urgent need for effective and integrated approaches to prevent and reduce alcohol and tobacco use among pregnant adolescent girls. In this article, we report on a scoping review of the literature to summarise what is known in this subfield and to identify the limitations, gaps and trends on research with pregnant adolescents that target both alcohol and tobacco.

## Background

There are troubling trends in adolescent and young women's alcohol and tobacco use. For example, although youth smoking has declined over recent years, a higher proportion of young women aged 18–19 smoke (24.4%) compared with young men (22.2%) (Health Canada 2007). Girls are also starting to smoke at a younger age (Okoli *et al.* 2013). There are also vulnerable groups where life circumstances or group membership reflects inequities or subcultural norms that contribute to greater likelihood of smoking. In Canada, 46% of Aboriginal girls aged 13–18 years report smoking tobacco (van der Woerd *et al.* 2005) and similarly, in Australia, 50% of Aboriginal girls and young women (18–24 years) report smoking (Australian Bureau of Statistics 2006). Internationally, across many regions, the prevalence of cigarette smoking among girls and boys has become similar (Warren *et al.* 2008), although, in England, girls aged 11–15 years are more likely to be regular smokers than boys (HSCIC 2012a). Furthermore, tobacco use among youth is a significant marker of other substance use and negative health behaviours such as risky drinking (Adlaf *et al.* 2005, HSCIC 2012a).

A high proportion of adolescent girls and young women engage in risky drinking. In the 2004 Canadian Addiction Survey, over 85% of the alcohol consumption reported by females aged 15–24 years was in excess of recommended guidelines (Adlaf *et al.* 2005), and 17% of young women in England (16–24 years of age) reported heavy drinking in the previous week (HSCIC 2012b). In Australia, adolescent girls (10.6%) are more likely than boys (7%) to consume

alcohol at levels considered potentially harmful (Australian Government Preventative Health Taskforce 2008). Young girls also report a higher prevalence of concomitant alcohol and tobacco use than young boys (Leatherdale & Ahmed 2010). Recent international research shows an increase in risky drinking, along with a narrowing of the traditional gender gap in alcohol use among adolescents in many regions of the world (Simons-Morton *et al.* 2009). These levels and trends in girls' drinking become particularly problematic in the context of pregnancy.

Accumulating evidence suggests that adolescent girls are more likely than women of any other age to smoke, drink and use alcohol in excess during pregnancy (Francoeur 2001, CASA 2003, Kaiser & Hays 2005, Delpisheh *et al.* 2006, Bauld 2008, Lindsay *et al.* 2008). Prior use of alcohol and/or cigarettes is associated with increases in sexual risk taking (Hipwell *et al.* 2011) and as a consequence, unwanted, unplanned or unintended pregnancy due to unprotected and unplanned sex. Furthermore, adolescents tend to realise that they are pregnant later in term (Cornelius *et al.* 1994b) and therefore may consume alcohol while being unaware that they are pregnant. The established association between alcohol use and pregnancy can also lead to further pregnancies for an adolescent (UK Department of Health 2010).

The health risks of tobacco and alcohol use during pregnancy are well documented. Tobacco use is associated with pregnancy complications, low-birthweight infants, still birth and sudden infant death. Alcohol use increases the risk of having a child affected by foetal alcohol spectrum disorder and other birth defects and developmental disabilities.

As tobacco and alcohol use co-occur, there is an urgent need for integrated approaches to reduce alcohol and tobacco use among pregnant and postpartum youth. The purpose of this scoping review (Davis *et al.* 2009, Levac *et al.* 2010) was to assess the current state of this subfield of research to provide a narrative overview of the literature; identify and describe what is known about pregnant adolescents' substance use and effective interventions; identify the gaps in this field; and identify and interpret the current issues related to research on interventions for this population.

## Method

We conducted a scoping review of the literature. In the first step, we identified studies focused on adolescent pregnancy and substance use by searching CINAHL, Medline, Social Science Index and Web of

Science with the terms 'adolescent pregnancy', 'teen pregnancy' and 'tobacco' and 'alcohol' and 'substance use' from January 1990 to December 2012. We included all articles published in English related to pregnant adolescents 19 years of age and younger in which the authors investigated the use of tobacco or alcohol use either in isolation, in combination or in the context of other types of substance use during pregnancy or the postpartum period. The focus was restricted to pregnant adolescents aged 19 and under because in many jurisdictions, age 19 marks the legal age for alcohol consumption and other activities defined as adult; and pregnant and parenting adolescents face specific challenges related to their education completion, financial limitations and maturation processes, both psychological and physiological.

In step 2, the team discussed and refined the inclusion criteria and strategy. We found that researchers in the area of adolescent pregnancy employ different age categories in their sampling methods; for example, some constrain samples from 15 to 18 years, while others use age 17, 18 or 19 years as an upper limit, and some expand age categories to include young women over 20 years. Further complicating this field is the fact that some researchers investigating adult pregnant women and substance use include adolescents in their studies. A decision was made to include investigations with expanded age categories where the mean age was 19 years or under. This resulted in three articles added to the review (Kokotailo *et al.* 1994, Scafidi & Field 1997, Deardorff *et al.* 2005). In addition, we excluded the larger literature discussing adolescent and youth substance use or interventions in general as well as review papers. We located a few additional articles by reading the references of retrieved articles and by co-authors, who were experts in this field, identifying articles.

In step 3, we charted the qualifying studies, by reading and extracting the following information: (i) the methodology used; (ii) the characteristics of the sample; (iii) the purpose/focus of the study; and (iv) findings related to characteristics and patterns of substance use; associated risk and protective factors; major features and elements of interventions; and any recommendations for effective interventions. In step 4, the team discussed the extraction chart and decided on a broad thematic outline by which to present the results.

In the tradition of scoping reviews (Davis *et al.* 2009, Levac *et al.* 2010), the team did not conduct a quality assessment of the included studies. We focused on identifying the current state of this sub-field and summarising its breadth to identify research

gaps and trends relevant to the development of future research and interventions.

## Results

We identified 40 articles that met our search criteria (Table 1). All of these articles were empirical reports of quantitative studies with the exception of one qualitative study (Lawson 1994). Thirty-nine of these studies were conducted in the United States. The majority of these articles ( $n = 26$ ) reported results from descriptive quantitative studies. Seven articles reported results from longitudinal studies to investigate trends in the substance use patterns or the outcomes of prenatal tobacco exposure on infants. The remainder of the studies employed experimental designs ( $n = 6$ ).

Of these 40 studies, five studies investigated the factors associated with alcohol use during adolescent pregnancy. Fifteen studies focused on adolescent pregnancy, prevalence and factors associated with their tobacco use, or interventions for tobacco cessation. Twenty studies examined multiple substance use including tobacco and alcohol.

In summarising these studies, we focus on what is learnt about tobacco and alcohol use during pregnancy and postpartum by discussion under three themes.

### Prevalence and patterns of substance use among pregnant adolescents

Examinations of the rates of tobacco use among pregnant adolescents have pointed to concerning patterns. For example, a comparison of tobacco use among adolescent girls in a rural area of the United Kingdom ( $n = 69$ ) indicated that the smoking prevalence of pregnant adolescents was 61% compared to 21% among those who were not pregnant (Seamark & Gray 1998). In a prospective study, Cornelius *et al.* (1995) reported that adolescent girls actually increased their tobacco use from 50% to 60% across the first and third trimesters of pregnancy. The heavier smokers were significantly more likely to drink alcohol and engage in excessive drinking in the first trimester. A questionnaire-based survey with pregnant adolescents in Arkansas yielded different results (Teagle & Brindis 1998). These authors stated that about 20% of the girls surveyed continued to use alcohol during the first trimester and that tobacco use remained at 18%. The most common substances used were cigarettes and alcohol, and use was significantly higher among white people than among African American girls.

**Table 1** Studies investigating pregnant adolescents and their use of tobacco and alcohol ( $N = 40$ )

Authors	Design	Sample	Research focus
Pregnant adolescents and tobacco use ( $N = 15$ )			
Albrecht <i>et al.</i> (1998)	Experimental (RCT) design with three groups	$N = 84$ smoking pregnant adolescents, aged 12–20 years	Examined use of peer support in the Teen FreshStart smoking cessation intervention for pregnant adolescents
Albrecht <i>et al.</i> (1999a)	Experimental, <i>ex post facto</i> design (from Albrecht <i>et al.</i> 1998 RCT study)	$N = 53$ pregnant smoking teens, aged 14–20 years (in intervention groups, Albrecht <i>et al.</i> 1998)	Compared characteristics of pregnant adolescents who decided to complete a smoking cessation intervention ( $n = 41$ ) with pregnant teens who did not complete the intervention ( $n = 12$ ) by examining familial, peer and interpersonal factors
Albrecht <i>et al.</i> (1999b)	Quantitative, descriptive	$N = 94$ pregnant adolescent smokers	Measured the nicotine dependence of pregnant adolescent smokers collected from baseline data of adolescents enrolled in cessation intervention trial (unpublished report by Albrecht <i>et al.</i> 1995, cited in Albrecht <i>et al.</i> 1999b)
Albrecht <i>et al.</i> (2000)	Experimental (RCT) design with three groups	$N = 71$ pregnant adolescent smokers aged 13–19 years	Examined pregnant adolescents' knowledge of the health risks of smoking for the pregnant mother and foetus in relation to their decisions to quit
Albrecht and Caruthers (2002)	Quantitative, descriptive (part of larger RCT tobacco intervention study)	$N = 142$ pregnant smoking teens aged 13–19 years	Described characteristics of pregnant adolescents who smoke and identified specific variables of tobacco use and possible indicators of long-term abstinence
Albrecht <i>et al.</i> (2006)	Experimental, longitudinal (1-year), RCT intervention	$N = 142$ pregnant smoking adolescents aged 14–19 years	Evaluation, short- and long-term, of the effectiveness of a smoking cessation intervention for pregnant adolescents computer randomised to three groups
Bottomley and Lancaster (2008)	Quantitative, descriptive	$N = 81$ pregnant adolescents, smokers, quitters and never smokers	Examined the relationship between smoking and depressive symptoms in pregnant adolescents by comparing smokers and non-smokers during pregnancy at two time points
Cornelius <i>et al.</i> (1994a)	Quantitative, descriptive	$N = 199$ pregnant adolescents aged 12–18 years	Examined tobacco use patterns over the course of pregnancy by comparing use before pregnancy and during the first and third trimesters
Cornelius <i>et al.</i> (1995)	Quantitative, descriptive	$N = 310$ infants and adolescent mothers aged 12–18 years	Examined patterns of use of tobacco and marijuana among pregnant adolescents and the effects of these substances on infants
Cornelius <i>et al.</i> (2007)	Longitudinal correlational study with 6-year follow-up	$N = 357$ pregnant adolescent smokers and non-smokers aged 12–18 years	Investigated the behavioural effects of prenatal tobacco exposure on children at 6 years of age by collecting trimester-specific information from pregnant adolescents with smoking and non-smoking status and conducting 6-year follow-up
Delpishen <i>et al.</i> (2005)	Quantitative, retrospective cohort analysis	$N = 534$ births of adolescent mothers 19 years or younger	Retrospective hospital records study to determine prevalence of smoking among adolescent pregnancies and compare smoking status with low birthweight (compared with 8972 adults who gave birth during the same time)
Feltes (2007)	Secondary data analysis of baseline data from another longitudinal study	$N = 108$ pregnant smoking adolescents aged 14–19 years	Explored relationships between smoking dependence behaviour, depression anger and anxiety in pregnant adolescents

Table 1 (continued)

Authors	Design	Sample	Research focus
Lawson (1994)	Qualitative, descriptive	<i>N</i> = 20 pregnant adolescents aged 16–18 years	To understand the role smoking plays in the lives of pregnant adolescents
Leiner <i>et al.</i> (2007)	Quantitative, descriptive	<i>N</i> = 163; 71 pregnant adolescents and 92 adolescent mothers Various smoking status	Examined pregnant adolescents' knowledge of tobacco-related risks to children associated with smoking during and after pregnancy
Seamark and Gray (1998)	Quantitative, comparative	<i>N</i> = 69; 36 pregnant adolescents and 33 non-pregnant adolescents	Compared the recorded smoking prevalence of pregnant adolescents with non-pregnant adolescents based on records from one private general practice
Pregnant adolescents and alcohol use ( <i>N</i> = 5)			
Cornelius <i>et al.</i> (1999)	Quantitative, descriptive	<i>N</i> = 413 offspring of adolescents aged 12–18 years	Examined the effects of alcohol use during pregnancy on growth and gestational age at birth of infants born to adolescents
Deardorff <i>et al.</i> (2005)	Quantitative, retrospective (using path analysis)	<i>N</i> = 666 young women aged 18–22 who had been pregnant in the past	Examined the role of alcohol in the timing of sexual activity and pregnancy among early-maturing adolescent girls
DeGenna <i>et al.</i> (2007)	Quantitative, retrospective and cross-sectional	<i>N</i> = 413 pregnant adolescents aged 12–18 years; <i>N</i> = 357 captured 6 years later; study based on 6-year follow-up cohort	Examined the effects of early and adverse experiences with alcohol and sex on adolescent drinking the year before and during pregnancy in adolescent mothers at the 6-year postpartum phase
Rhodes <i>et al.</i> (1994)	Quantitative, descriptive	<i>N</i> = 183 pregnant adolescents aged 11–19 years	Reported frequency and intensity of drinking alcohol by African American, Hispanic and white pregnant adolescents and determined the extent to which these women quit, reduced or continued to use alcohol during pregnancy
Weimann and Berenson (1998)	Quantitative, descriptive	<i>N</i> = 378 pregnant adolescents	Identified risk factors for alcohol use among pregnant adolescents who reported alcohol use in the last 30 days, those who discontinued use by first prenatal visit and non-users
Pregnant adolescents and polysubstance use ( <i>N</i> = 20)			
Albrecht <i>et al.</i> (2002)	Quantitative, descriptive	<i>N</i> = 53 pregnant smoking adolescents; aged 12–19 years	Examined the correlations between constructs from family, school (connectedness) and protective individual characteristics with health risk behaviours (tobacco, alcohol and marijuana use) in pregnant adolescents
Barnet <i>et al.</i> (1995)	Quantitative, descriptive	<i>N</i> = 125 adolescent mothers aged 12–18	Examined the correlations between prevalence of substance use in the first 4 months postpartum and factors such as depressive symptoms, stress and social support in adolescent mothers
Berry <i>et al.</i> (2000)	Quantitative, retrospective, longitudinal cohort	<i>N</i> = 1541 women who reported a pregnancy younger than age 19 from among 5053 adolescent females aged 14–21 in the Nat Longitudinal Youth Survey	Examined the risk (substance use) and protective factors for specific ethnic groups regarding adolescent pregnancy (non-Hispanic white, non-Hispanic black, Hispanic, American Indian)
De Genna <i>et al.</i> (2009)	Quantitative, longitudinal, correlational	<i>N</i> = 445 pregnant adolescents aged 12–18 years with follow-up 6 and 10 years postpartum	Examined the tobacco, alcohol and marijuana use prevalence among adolescent mothers at 6 years and 10 years postpartum

**Table 1** (continued)

Authors	Design	Sample	Research focus
Gilchrist <i>et al.</i> (1996)	Quantitative, longitudinal, descriptive	<i>N</i> = 229 pregnant adolescents under 18 years	Investigated patterns of adolescent mothers' substance use (tobacco, alcohol, marijuana and illicit drugs) pre-pregnancy, during pregnancy and 6, 12 and 18 months postpartum
Gillmore <i>et al.</i> (2006)	Quantitative, longitudinal, descriptive	<i>N</i> = 233 unmarried pregnant adolescents aged 17 and younger	Investigated substance use trends in unmarried pregnant adolescents from year 3.5 to 11.5 postpartum to determine patterns of use, how they compared with national trends and whether these mothers 'mature out' of substance use in adulthood
Hussey <i>et al.</i> (1992)	Quantitative, descriptive, prospective study	<i>N</i> = 241 pregnant adolescents 17 years and younger	Identified the factors related to tobacco use during pregnancy among pregnant adolescents
Kaiser and Hays (2005)	Quantitative, descriptive, prospective study	<i>N</i> = 145 pregnant adolescents aged 15–18 years	Assessed the frequency of prenatal health-risk behaviours, including substance use (tobacco, alcohol, illicit drugs) among first-time pregnant adolescents in mid-West United States
Kokotailo <i>et al.</i> (1992)	Quantitative, descriptive	<i>N</i> = 229 pregnant adolescents younger than 18 years	Determined the prevalence of tobacco, alcohol and other drug use among pregnant adolescents attending a pregnancy programme at Johns Hopkins Hospital, Baltimore
Kokotailo <i>et al.</i> (1994)	Quantitative, descriptive, prospective study	<i>N</i> = 119 pregnant adolescents under age 21	Determined prevalence of tobacco, alcohol and drug use during pregnancy among pregnant adolescents in a small city in Wisconsin
Lohr <i>et al.</i> (1992)	Quantitative, descriptive, retrospective and prospective study	<i>N</i> = 241 pregnant adolescents 17 years and younger	Examined factors associated with substance use (alcohol, marijuana, cocaine and other illicit drugs) among pregnant adolescents and how use in previous year was affected by the pregnancy
McDonnell <i>et al.</i> (2007)	Experimental (RCT) with 24-month follow-up	<i>N</i> = 197; 107 treatment adolescents and 90 controls from South Carolina aged 18 and younger	Reported results from an intervention to improve social and educational outcomes for pregnant adolescents from low-income backgrounds by reducing substance abuse, repeat pregnancies and increasing school completion and sense of well-being
Morrison <i>et al.</i> (1998)	Quantitative, longitudinal	<i>N</i> = 255 pregnant, single adolescents aged 12–17 years, mean 16 years	To assess the use of alcohol and drug use among pregnant and parenting adolescents and associated beliefs, intention and attitudes to substance use over time
Sangalang and Rounds (2005)	Quantitative, longitudinal programme evaluation	<i>N</i> = 91 pregnant and parenting adolescents aged 12–18 years	Investigated differences and changes in health behaviours of pregnant and parenting adolescents enrolled in an adolescent parenting programme in North Carolina
Scafidi <i>et al.</i> (1997)	Quantitative, descriptive, prospective study	<i>N</i> = 104 aged 13–21, mean age 18 years; 55 drug-using and 49 non-users	Identified the psychosocial stressors (especially depression) associated with adolescent pregnancy and drug use (including alcohol)
Spears <i>et al.</i> (2010)	Quantitative, longitudinal, secondary analysis of data (four time points)	<i>N</i> = 305 subsample of ethnic minority pregnant adolescents aged 13–18 years	Examined trajectory of substance use (nicotine, alcohol and marijuana) during pregnancy and postpartum among adolescent girls

**Table 1** (continued)

Authors	Design	Sample	Research focus
Spears (2007)	Experimental	<i>N</i> = 305 pregnant adolescents; 222 = experimental and 83 = control group; aged 13–18 years	Examined the different trajectories of use of tobacco, alcohol and marijuana by pregnant adolescents from pregnancy through the postpartum to explain the relationships between specific variables and adolescents' substance use
Teagle and Brindis (1998)	Quantitative, descriptive, prospective study	<i>N</i> = 248 pregnant adolescents aged 15–19 years	Described the ethnic differences (African American and white people) in substance use (tobacco, alcohol, marijuana, other drugs) by pregnant adolescents attending a prenatal clinic
Webbink <i>et al.</i> (2008)	Quantitative, retrospective, descriptive survey	<i>N</i> = 215 teen mothers and 286 twin sisters who had first child at age 20 or older	Analysed the causal effects and consequences of teenage childbearing on smoking, drinking and body size
Zoccolillo <i>et al.</i> (1997)	Quantitative, descriptive	<i>N</i> = 26 pregnant girls or mothers under 18 years	Examined the presence of conduct disorder and alcohol or drug dependence among adolescent mothers

Patterns of alcohol use during adolescent pregnancy appear to be somewhat different from those related to tobacco. The five studies in this review that focused on only alcohol use did not report exceptionally high levels of use during pregnancy or in the postpartum: prevalence of recent alcohol use ranged from 5% to 11% and overall, pregnant adolescents reduced alcohol use throughout their pregnancy. However, in the longitudinal studies in this review, researchers described a pattern of alcohol as well as tobacco use characterised by cessation or decreased and low levels of use during pregnancy followed by rapid resumption during the postpartum, levelling after 1 year (Barnet *et al.* 1995, Gilchrist *et al.* 1996, Morrison *et al.* 1998, Teagle & Brindis 1998, Spears *et al.* 2010).

Longitudinal studies that extended years beyond the first year postpartum point to troubling long-term patterns of substance use (Gillmore *et al.* 2006, Cornelius *et al.* 2007, De Genna *et al.* 2009). For example, a survey-based, longitudinal cohort study examined tobacco, alcohol and marijuana use among adolescent mothers 6 and 10 years postpartum to identify risk factors for substance use (De Genna *et al.* 2009). The authors' alarming findings were that overall tobacco use increased during the 10-year period, and concurrent smoking was significantly associated with risky drinking 6 years after an adolescent pregnancy, with smokers almost two and a half times more likely to engage in drinking above the recommended guidelines. Similarly, the findings of a correlational, longitudinal study with pregnant adolescents and post-pregnancy follow-up indicated that while the smoking prevalence rate at the 6-year mark was

identical to that at the third trimester (58% smokers), daily smoking consumption had increased from a mean of 7.7 cigarettes per day (CPD) at the pre-natal stage to 11.7 CPD at 6-year follow-up (Cornelius *et al.* 2007). It appears that adolescent mothers remain at a much higher risk of substance use than other young women.

### Factors influencing substance use among pregnant adolescents

In this group of studies, researchers explored a variety of factors influencing either tobacco or alcohol use among pregnant adolescents. In some cases, relationships between smoking and alcohol use in the context of adolescent pregnancy were explored. The studies were grouped by primary focus and included studies that were either tobacco-focused, alcohol-focused or explored psychological or social factors related to substance use.

#### *Tobacco-focused studies*

Some researchers were primarily interested in exploring risk factors for tobacco use during adolescent pregnancy. Albrecht *et al.* (1999b) and Albrecht and Caruthers (2002), for example, investigated the nicotine dependence and characteristics of pregnant adolescent smokers in an American inner city community. After examining all demographic variables, six predictors of tobacco use were identified: degree of nicotine dependence; maximum number of cigarettes smoked in the last month; alcohol intake before the pregnancy; religiosity; maternal encouragement to quit; and the compatibility of peer and

parent attitudes. Strong links between tobacco and alcohol were also observed, supporting the notion that pregnant adolescents who engage in one problem or risky behaviour are likely to engage in others.

These findings are similar to earlier research reported by Cornelius *et al.* (1994a) that identified tobacco use to be significantly related to alcohol use and that pregnant adolescents who continued to smoke into the third trimester had more friends who smoked, did not live with a parent, engaged in binge drinking in the first trimester, had experienced earlier age of first intercourse and were white people. Other studies included in this review also concluded that cigarette use is associated with, or a predictor of, alcohol and other drug use (Hussey *et al.* 1992, Kokotailo *et al.* 1992, Teagle & Brindis 1998, De Genna *et al.* 2009). Conversely, adolescents who drink alcohol have also been found to be at higher risk of tobacco and marijuana use during their pregnancy (Cornelius *et al.* 1999). Finally, despite public education efforts, there is some evidence that a lack of awareness related to the health risks of smoking may influence smoking rates in pregnant adolescents. A school district survey in Texas concluded that pregnant adolescents and adolescent mothers have poor knowledge of the risks of smoking with regard to miscarriage and foetal health (Leiner *et al.* 2007).

#### *Alcohol-focused studies*

A number of studies focused on identifying risk factors for alcohol use during adolescent pregnancy. Deardorff *et al.*'s (2005) survey results supported the early-timing hypothesis: girls who experienced early menarche were at increased risk of problems such as alcohol use, early sexual initiation and pregnancy. Alcohol use had a strong influence on the timing of pregnancy, although the temporal order could not be determined. DeGenna *et al.* (2007), however, found that an earlier age of first drink predicted heavier drinking in the year before an adolescent pregnancy, and was negatively related to alcohol use during pregnancy: earlier drinkers were more likely to continue alcohol during their pregnancy. These findings were supported by Weimann and Berenson (1998) who found that among pregnant adolescents, 'recent alcohol users' (past 30 days) were more likely to be older than 15 years, to live at the poverty line or below, to not be in school, to use alcohol during sexual activities, to have a father who uses alcohol and more likely to report tobacco use and recent marijuana use. Specific knowledge about the effects of alcohol on the developing foetus was also associated with abstinence and decreased drinking (DeGenna *et al.* 2007).

#### *Psychological factors*

A small group of studies focused on describing psychological factors that may contribute to substance use. In a comparison of pregnant and non-pregnant adolescents, Berry *et al.* (2000) concluded that higher self-esteem decreased the odds of pregnancy. Girls' self-esteem was also negatively correlated with alcohol use – girls with poor self-esteem drank more. In addition, low self-esteem was found by Spears *et al.* (2010) to predict rapid alcohol resumption in the postpartum period among adolescents. Previous childhood physical or sexual abuse also predicted higher initial use of cigarettes and a more rapid resumption of alcohol use in the first year postpartum. Similarly, in other work, connectedness with school or family was related to less substance use among pregnant adolescents (Albrecht *et al.* 2002). The relationship between substance use and conduct disorder was investigated in one small study (Zoccolillo *et al.* 1997). Almost half of the girls met the criteria for a diagnosis of either conduct or substance use disorder.

In the only qualitative study in this review, Lawson (1994) interviewed pregnant girls and concluded that the psychological role smoking plays must be addressed in interventions aimed at changing substance use patterns, because 65% of these girls smoked a pack a day, used tobacco as a way to control weight, to intentionally deliver smaller babies, and to cope with anxiety and stress in their lives.

Depressive symptoms have been the focus of attention in several studies with varying results. For example, in a secondary analysis of data from a longitudinal study, depressive symptoms were found to be higher among pregnant adolescents regardless of whether they smoked or not; however, adolescents who continued to smoke during their pregnancy were considered to be at higher risk of developing depression (Bottomley & Lancaster 2008). On the other hand, in a dissertation study (Feltes 2007), depression, anger and anxiety did not successfully predict smoking dependence among pregnant adolescents. Other researchers have reported associations between depressive symptoms and alcohol and illicit drug use (Barnet *et al.* 1995, Scafidi & Field 1997, Spears 2007). For example, Barnet *et al.* (1995) reported that 42% of adolescent mothers used alcohol and illicit drugs in the first 4 months postpartum, and these mothers appeared more depressed with higher stress levels and greater need for social support, although the directionality of use and depression was unclear (Barnet *et al.* 1995). Of note is a longitudinal study that reported that over 60% of the adolescent mothers using substances showed depres-



sive symptoms on their CES-D scores and that depressive symptoms were positively correlated with having a substance-using boyfriend, low self-esteem and/or a history of abuse (Spears 2007).

#### *Social and interpersonal factors*

Finally, social and interpersonal factors associated with adolescents' substance use during pregnancy were examined (Kokotailo *et al.* 1992, 1994, Lohr *et al.* 1992, Morrison *et al.* 1998, McDonnell *et al.* 2007, Spears 2007, Webbink *et al.* 2008, Spears *et al.* 2010). Findings indicate that social networks appear to be influential. For example, in a longitudinal study of the use of alcohol and other illicit drugs among pregnant adolescents in the American Northwest, the substance use of boyfriends, best friends and family members were all significantly related to adolescent girls' use during pregnancy, but boyfriends and best friends showed more influence than family (Lohr *et al.* 1992). Similarly, in a retrospective study of twin sisters in Australia comparing adolescent mothers with their sisters who had a child after age 20, the authors concluded that adolescent mothers have spouses who smoke and drink at higher levels than the spouses of non-adolescent mothers (Webbink *et al.* 2008). Having 'lower quality' spouses (less education and income) or not having a spouse was found to be more significant than economic position or number of children in accounting for the adverse health outcomes in adolescent mothers. In addition, these adolescent mothers were more likely to adopt the lifestyle of their spouse or find single parenting extremely stressful. Because the social lives of pregnant and postpartum adolescents were often found to be intertwined with users, researchers advised a consideration of the substance use patterns of boyfriends, partners, husbands and/or family members when designing interventions and teaching girls skills for handling substances in the context of interactions within social networks.

#### **Interventions**

We located few intervention studies specifically targeting substance use among pregnant adolescents. Susan Albrecht has pioneered, modified and evaluated tobacco cessation interventions and their components for this population (Albrecht *et al.* 1998, 1999a, b, 2000, 2002, 2006, Albrecht & Caruthers 2002). She has conducted three randomised controlled trials that have investigated the value and positive influence of a peer-buddy in smoking cessation multicomponent interventions (Albrecht *et al.* 1998); a comparison of pre- and post-intervention tobacco risk knowledge

(Albrecht *et al.* 2000); and the short- and long-term effects of a smoking cessation intervention comparing usual care with the peer-buddy programme (Albrecht *et al.* 2006). These studies demonstrated the potential value of tailored interventions for pregnant adolescents to support tobacco reduction. In a comparative experimental study, she concluded that strong parental disapproval of tobacco use influenced adolescents to participate and that programme designers should consider the involvement of parents in cessation interventions (Albrecht *et al.* 1999a).

Results of a longitudinally designed evaluation of a programme to support parenting skills for adolescent mothers indicated that after 1 year of services, girls' use of cigarettes and alcohol increased substantially. Cigarette use rose from 2% at programme entry (during pregnancy) to 20% at programme completion (1 year postpartum) (Sangalang & Rounds 2005), reflecting the need to address gender-related factors influencing substance use and related stressors faced by adolescent mothers.

We located only one intervention study for pregnant adolescents that addressed substance use in general (McDonnell *et al.* 2007). The goal of the intervention for this multi-faceted RCT field study was to reduce substance use (including tobacco and alcohol) and also improve well-being, reduce repeat pregnancies and increase school graduations. The 24-month, women-centred programme design considered the many social needs of pregnant adolescents such as life skills training and connections with community organisations, using an individualised case management approach to matching adolescents to supportive services. Results were promising in that the project reduced substance use during a time it may have accelerated, and treated adolescents were closer to grade achievement than controls after completing the programme. Additionally, treated adolescents perceived themselves as more capable, less impulsive, having more social supports and better problem solvers than the controls. Nevertheless, the South Carolina study reported an attrition rate of 42% over the 2 years.

#### **Discussion**

This scoping review provides a thematic narrative overview that captures current understandings of pregnant adolescents' tobacco and alcohol use. Research in this subfield has focused primarily on quantitative assessments of the prevalence and patterns in adolescent girls' use of tobacco and alcohol during pregnancy and postpartum. The research has been primarily descriptive, with separate, parallel

streams of investigation to identify trends and predictors of alcohol and tobacco use, prior to, during and following pregnancy. The emergence of additional longitudinal work since Flanagan and Kokotailo's (1999) review provides support for a pattern of postpartum substance relapse among this population. As a set, the studies provide a picture of patterns of use and the psychological, interpersonal and social factors influencing use; however, little research has focused on interventions or best practices for health and social care practitioners who may work with these adolescents and their families. Based on current rates and trends in adolescent girls' alcohol and tobacco use, as well as the considerable health risks of use of alcohol and tobacco in pregnancy, singly and in combination, there is a need for increased attention to the development of effective and integrated approaches to prevention and treatment.

The state of the research also indicates that there are four compelling gaps in our knowledge, which limit our responsiveness to adolescents who use alcohol and tobacco during pregnancy and the postpartum period. Each is described in the following sections.

### Limitations in research approaches

The first-person voices and narratives of adolescents and young mothers have been largely neglected in research. Qualitative research could illuminate their perspectives as well as the social context of their alcohol and tobacco use, include the viewpoints of partners or family members and possibly inspire ideas for helpful prevention and support strategies. Many young mothers (and fathers) using alcohol and tobacco have limited resources and face barriers related to poverty, transportation and childcare, as well as insufficient social support systems and self-efficacy needed to make positive health behaviour changes or productively address structural pressures in their lives (Greaves & Hemsing 2009). The failure to draw on qualitative research designs may result in future treatment and prevention programmes that do not adequately or effectively respond to the complex needs of pregnant and child rearing adolescents.

### Lack of effective interventions

Although the adverse effects of prenatal alcohol and tobacco are well known, there is a marked lack of effective interventions described in the literature that are designed to prevent or reduce alcohol and tobacco use during pregnancy among pregnant adolescents and young women. Programmes should be

developed that target *both* alcohol and tobacco and social challenges this population faces, rather than perpetuate the 'substance by substance' approach. For many young women, their health and pregnancy issues are intertwined and support is needed for multiple, interrelated issues (British Columbia Perinatal Health Program 2010). Instead of single-issue care, professionals and clients would greatly benefit from an integrated approach that addresses both alcohol and tobacco use, as these issues frequently present together during routine care episodes, and pregnant girls and young women tend to use these substances together. In addition, acknowledging the tendency for relapse to alcohol and tobacco use in the postpartum period through innovative approaches that are responsive to this target audience and tailored to their social realities is important (Barnet *et al.* 1995, Gilchrist *et al.* 1996).

### Gender influences

There are few examples of gender-informed prevention or treatment programmes for this population despite the fact that these approaches to substance use have been strongly encouraged for girls and women (Blake *et al.* 2001, Poole *et al.* 2010). An integrative review on substance use recommended that gender-specific interventions for girls address self-esteem, body image, depression and anxiety (Amaro *et al.* 2001). Interestingly, girls who engage in regular physical activity hold a more positive sense of self, greater mood and psychological well-being, and experience less anxiety, depression and psychological stress than girls who are inactive (Higgins *et al.* 2003). Eliciting information for bolstering physical activity in this population could be a novel, feasible and important aspect of a comprehensive intervention to reduce alcohol and tobacco use during pregnancy/postpartum. The inclusion of a physical activity component to a smoking cessation intervention targeting young women in particular has been suggested (McDermott *et al.* 2009), but, to our knowledge, such an intervention has yet to be conducted. The American Lung Association 'Not-on-Tobacco' cessation programme for adolescents is the most widely used and most promising tobacco intervention programme in the United States, based on social cognitive theory and designed to be delivered to gender-specific groups (Branstetter *et al.* 2009). The programme components include recreational and physical activity and could possibly be adapted for pregnant youth outside the school system to address alcohol use and social contextual factors such as boyfriend's, partner's and family's substance use.

### Social and interpersonal influences

Finally, social and interpersonal influences in girls' lives have not been adequately considered. This is evident in the virtual absence of attention paid to the influence of pregnancy-involved adolescent boys and young men in adolescent girls' use of alcohol and tobacco during pregnancy and postpartum, despite evidence that boyfriends are often central to girls' substance use (Blake *et al.* 2001). The role of boyfriends and partners in adolescent substance use during pregnancy has been identified as an important risk factor by some researchers (Bottorff *et al.* 2010, Schneider *et al.* 2010). For this reason, we advocate that the adolescent mother be considered as part of a complex social web, rather than simply as an individual with behaviours that need to be changed. Future research and interventions aimed at sustaining behaviour change may need to consider the influence of partners and friends on substance use and provide sensitive means by which to curb this influence. The failure to do so overlooks a crucial influence on tobacco and alcohol use in adolescents and could undermine the effectiveness of new interventions.

Although programmes that address substance use within the complexity of challenges faced by this group often include pharmacotherapies, nicotine replacement therapy and alcohol pharmacotherapies for pregnant adolescents have not been adequately studied to recommend their use. Even with non-pregnant adolescents, alcohol-related pharmacotherapies are used sparingly, due to health-related side effects, possible interactions with other drugs, challenges with monitoring use and compliance, as well as interest in helping adolescents to establish self-regulation skills, which will serve them well in managing substance use throughout their lives.

Early entry into motherhood and lone motherhood, as well as greater disadvantage with respect to childhood circumstances, education and current disadvantage combine to increase the risk of being a smoker and significantly reduce the odds of quitting in pregnancy. Recent research in the United Kingdom on life course influences highlights how important it is to recognise typical life trajectories of young mothers and address social disadvantage in interventions with adolescent girls and women (Graham *et al.* 2010). The neglect of these social factors may actually result in increased substance use of tobacco and/or alcohol over time (Sangalang & Rounds 2005).

There are limitations to this scoping review. A major challenge in conducting this review was inconsistency in the definitions of adolescents/teens and women. The review was also limited to publications

in English. Accordingly, it is possible that some studies were not identified using the search strategies outlined in this paper. Although a meta-analysis may be possible on a sub-group of studies, because this field of research is at a nascent stage, we pursued a scoping review. The legal issue of minors possessing cigarettes and alcohol may influence the participation and recruitment of adolescents in research studies and their disclosure of use has not been adequately considered in this field of research (Moolchan & Mermelstein 2002). Although alcohol use, smoking and cannabis use may occur together, we have focused on alcohol and tobacco use because, unlike cannabis, the adverse health effects of these substances are well established for women and their infants.

### Conclusion

This scoping review describes research on adolescents' use of tobacco and alcohol during pregnancy and postpartum published over the past two decades. It confirms that research has for the most part considered alcohol and tobacco use in parallel streams of investigation as opposed to investigating the interconnections and the potential of integrated interventions. There is a clear need for effective and integrated approaches to prevent and reduce alcohol and tobacco use among pregnancy-involved adolescents. Yet, there are few examples of gender-informed prevention or treatment programmes in the literature. Intervention-based research needs to attend to the context of adolescents' substance use and their preferences and developmental needs for support; to promote sustained behaviour change throughout pregnancy and the postpartum period; and to sensitively address the influence of partners and friends. The lack of qualitative studies in this field of research needs to be resolved to inform the development of the appropriate content of such interventions. All of these identified gaps need to be rectified in research, practice and policy development to address the significant population of pregnant adolescents who smoke and drink alcohol, along with their involved partners and friends.

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