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# Alcohol and nicotine use during pregnancy: it's nature, occurrence and consequences

A thesis presented for the degree of Doctor of Philosophy awarded by  
The Robert Gordon University

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## ABSTRACT

This PhD project investigated the nature, occurrence, and consequences of alcohol and nicotine use during pregnancy. The main objective being to identify those at risk of continued alcohol and nicotine use, to determine the current practice of midwives in Grampian and to identify the consequences in terms of infants' and mothers' health.

Study 1 aimed to provide an estimate of the prevalence of pregnant women drinking alcohol and smoking in Grampian, and to determine the best predictors of the behaviours. One hundred and thirty pregnant women took part in study 1. Thirty-five percent of participants reported drinking during pregnancy. Parity, health locus of control and theory of planned behaviour variables distinguished between pregnant drinkers and abstainers. Seventy-four percent of participants were non-smokers prior to becoming pregnant. Of the smokers, 47% continued to smoke during pregnancy and 53% quit. Continued smokers differed from smokers who stopped for health locus of control and theory of planned behaviour constructs.

Study 2 involved a questionnaire survey of midwives' knowledge, attitudes and practice regarding alcohol and nicotine use during pregnancy. Almost 30% of community midwives in this sample (n=17/52) reported not routinely asking their patients about their alcohol use and none reported using a screening questionnaire. Over 65% felt they still required training in smoking cessation and over 86% still felt they required training in supporting pregnant patients to change drinking habits. The main barriers to providing advice were a lack of training and a lack of time. Midwives who drank more alcohol per week had more permissive attitudes towards alcohol use during pregnancy that were more permissive than the current government guidelines.

Finally, study 3 aimed to take forward the results of study 1 and examine the potential consequences of alcohol use on newborn infants and new mothers. No significant differences were found for infants exposed to low-level alcohol use for a number of health outcomes. First-time mothers who drank during pregnancy reported spending a longer time in hospital after labour and, within all mothers who drank during pregnancy, lower attachment scores were reported at 3 months after birth, despite no significant differences in terms of health outcomes and mental well being. However,



these findings are exploratory and factors other than drinking during pregnancy may be influential.

The three studies together provide an insight into the incidence and determinants of alcohol and nicotine use during pregnancy and shed light on midwives' practice and barriers to providing advice to pregnant patients. The results yield strategies for intervention work and recommendations for practice and further research.



## LIST OF ABBREVIATIONS

<b>AAP</b>	American Academy of Pediatrics
<b>ACOP</b>	American College of Obstetricians and Gynecologists
<b>DoH</b>	Department of Health
<b>HLC</b>	Health Locus of Control
<b>FAS</b>	Foetal Alcohol Syndrome
<b>FHLC</b>	Foetal Health Locus of Control
<b>GP</b>	General Practitioner
<b>MFA</b>	Maternal-Foetal Attachment
<b>NICE</b>	National Institute of Clinical Excellence
<b>NRES</b>	NHS Research Ethics Committee
<b>NRT</b>	Nicotine Replacement Therapy
<b>PBC</b>	Perceived Behavioural Control
<b>PND</b>	Postnatal depression
<b>RCM</b>	Royal College of Midwives
<b>RCOG</b>	Royal College of Obstetricians and Gynaecologists
<b>SES</b>	Socio-economic Status

**TPB** Theory of Planned Behaviour

**TRA** Theory of Reasoned Action

**WHO** World Health Organization



### 1.1. ALCOHOL IN BRITAIN AND SCOTLAND

Two billion people drink alcohol worldwide (WHO 2004) and alcohol consumption poses both a significant universal threat to health, and a challenge for governing bodies. Whilst tobacco use remains the greatest cause of global deaths (8.8% of deaths are due to tobacco whilst 3.2% are caused by alcohol), there is little difference between alcohol and tobacco in the percentage of total years of life lost (4.0% and 4.1% respectively; WHO 2007). Alcohol consumption is, therefore, a challenge for public health and nowhere more so than in Europe, where the greatest number of disability-adjusted life years are lost due to alcohol (WHO 2006). Europeans consume far more alcohol per capita (8.6 litres) than any other region in the world, including America (6.98 litres; WHO 2006). Despite this, it is America that has the strictest and most long-standing abstinence message for pregnant women. Within Europe, country-specific drinking patterns emerge; heavy drinkers in Spain and Italy spread their consumption over the week, whilst drinkers in the UK and Ireland tend to drink heavily once or twice a week putting them more at risk of acute consequences (WHO, 2006).

The UK government defines one unit of alcohol as eight grammes and the Department of Health (DoH 1995) advises men to exceed no more than four units a day<sup>1</sup> and women no more than three units in one day. The 2002 General Household Survey of Great Britain (DoH 2004a) asked 14770 men and women aged 16 and over to report their alcohol consumption in the past week. Thirty eight percent of men and 23% of women had exceeded the Department of Health guidelines on at least one day in the previous week. Furthermore, a national study conducted in 2000 looked at the drinking habits of 16 to 74 year olds and found that more women than men were drinking at heavy or hazardous levels (39% of men were exceeding 5 drinks on a typical

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<sup>1</sup> One unit is the equivalent of a half pint of ordinary strength beer, a small (125ml) glass of wine, or a single shot measure of spirit

drinking day and 42% of women were exceeding 3 drinks). The rates of women drinking in excess of 14 units per week has increased substantially over recent years; from 10% in 1988 to 17% in 2002, a 7% increase (Alcohol Concern 2008). This tendency for British people to drink alcohol to excess commences early in life. The rates of young people using alcohol in 2006 suggest that 40% of 15-year-olds, and 15% of 13 year olds had drunk alcohol in the previous week (SALSUS 2007). Around half of all Scottish boys and girls aged 15 have been drunk 2 or more times (Currie et al. 2008) and around one in four 15- and 16-year olds reported being drunk at least 3 times in the last 30 days in 1999 (Hibell et al. 2000).

The UK is one of the heaviest drinking countries in Europe, and Scottish adults consume on average 23 units per week, 4 more units of alcohol per week than those in England (Scottish Government 2008a). The total cost of alcohol misuse in Scotland is estimated to exceed £500 per year for every adult living in Scotland; and costs NHS Scotland around £400 million annually (Scottish Government 2008b). Alcohol sales data shows that in Scotland, enough alcohol was purchased in 2007 for every man and woman over 16-years-old to exceed the sensible weekly drinking guidelines (of 21 units per week) on every week of the year (Scottish Government 2008a). Further differences exist between Scotland and the rest of the UK in terms of the type of alcohol that is drunk. Although the predominant drink of choice in Scotland, as with the rest of the UK, is beer, almost twice the volume of spirits was sold in Scotland than in England and Wales (3.6 litres per capita compared to 1.8 litres per capita; Alcohol Statistics Scotland 2009).

Alcohol abuse and dependence (defined in box 1 below) are psychiatric disorders acknowledged to have serious health consequences (Grant et al. 2004). Drinking at levels that regularly exceed the healthy drinking guidelines also has a significant impact on health. Excessive alcohol intake increases the risks of experiencing a number of disorders such as pancreatitis, and certain cancers, whilst other disorders such as alcohol liver disease and alcohol psychosis, are entirely attributable to alcohol use (Scottish Executive 2002).

**Box 1: DSM-IV Diagnostic criteria (Grant et al. 2004)**

Alcohol abuse and dependence are maladaptive patterns of drinking leading to clinically significant impairment/distress

**Alcohol abuse** one or more of:

Failure to fulfil major role obligations due to drinking, recurrent drinking in hazardous situations, drinking-related legal problems, continued drinking despite drinking-related social and interpersonal problems

**Alcohol dependence** all of:

Tolerance, withdrawal, drinking larger amounts/for a longer period than intended, persistent desire/unsuccessful attempts to cut down, spending great deal of time obtaining alcohol, drinking or recovering from effects of drinking, giving up important activities for drinking, continued consumption despite alcohol-exacerbated physical/psychological problem

Alcohol affects women's bodies differently from men, making women particularly vulnerable to cancers, digestive problems, coronary heart disease and stroke (Alcohol Concern 2008). Excessive alcohol intake is also linked to negative behavioural consequences for women, including higher incidences of unsafe sex, vulnerability to attack, and increased social and mental problems (Alcohol Concern 2008). The impact of alcohol on the health of people in Scotland has increased in recent years; alcohol-related death rates have more than doubled in the last fifteen years and in the last decade, alcohol-related attendance at hospitals has increased by fifty percent (Scottish Government 2008a). Furthermore, over the last two decades Scotland has had the fastest growing chronic liver disease and cirrhosis rates in the world (Scottish Government 2008a).

A number of socio-economic factors have been linked with higher alcohol consumption in the general population. Robinson and Bugler (2010) report the alcohol and nicotine related findings of the 2008 General Lifestyle Survey; a National survey of households in the UK. Higher average weekly consumption rates are found in higher socio-economic classes; 13.8 units per week in those with a managerial or professional occupation, and 10.6 units in routine and manual worker households

(Robinson and Bugler 2010). This difference between socio-economic classes was especially pronounced for women (Robinson and Bugler 2010). Similarly, higher earning households reported higher weekly consumption than those with lower earnings; women in households with a gross weekly income of over £1000 drank more than twice (11.2 units) that of women in households earning less than £200 per week (5.2; Robinson and Bugler 2010).

If we consider the rates of drinking and the volume of alcohol consumed in Scotland and the UK, it can be seen that a drinking culture exists for much of the population where drinking without considering the recommended levels is second nature. In Western countries, Alcohol is “a marker of celebration and sociability” (Harris 2010, pp. 1262). Furthermore, Van Wersch and Walker (2009) found that binge-drinking appeared normal to individuals due to the salience of the behaviour both culturally and within their social circles. The participants in this study held positive connotations with binge drinking; it was seen as a way of celebrating, and as relaxing and enjoyable. Drinking can hold important meanings for individuals (for example, drinking as a reward or as ‘time-out’), and have powerfully associated expectations such as relaxation and fun (Peele and Grant, 1999). Orford and colleagues (2002) explored British heavy drinkers’ perceived benefits of alcohol consumption and found that notions of pleasure were the most important reasons for drinking. Within such a culture, and with such meanings and expectations associated with drinking, it is likely that a significant number of women may drink heavily before recognising that they are pregnant. Additionally, attitudes towards drinking during pregnancy and what is perceived as an acceptable level may differ in the UK due to widespread over-consumption of alcohol in the general population. If public health policies are to be effective in tackling alcohol use during pregnancy, research evidence must come from culturally specific UK studies examining a range of psychosocial factors.

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## 1.2. GUIDELINES FOR ALCOHOL CONSUMPTION DURING PREGNANCY

Advice regarding alcohol consumption during pregnancy has changed significantly worldwide over recent years. One exception is America where the message for pregnant women has been to abstain completely from alcohol since 1981. Guidelines

for health professionals from the American Academy of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) released in 1997 state that clinicians should ask pregnant women about past and present alcohol use on their first prenatal visit (AAP and ACOG 1997). In 2001 the National Health and Medical Research Council (NHMRC) of Australia replaced their previous message of abstinence during pregnancy (1992) with advice that if women do drink they should limit this to seven standard drinks a week and no more than two drinks in one day spread over at least two hours (NHMRC 2001). The most recent Australian NHMRC guidance (2007) reversed the 2001 guidance change and stated that, based on systematic literature reviews and prospective cohort studies, not drinking is the safest option (NHMRC 2007). O'Leary (2007) reviewed policies on alcohol in pregnancy in English-speaking countries; in Canada the guidance stated that abstinence is the prudent choice, in Ireland and New Zealand abstinence is stated to be the safest option, and in South Africa abstinence is advised.

Over recent months and years, pregnant women have received mixed messages from the UK Government, British health agencies and the media. In the UK, health advice regarding alcohol use during pregnancy from the Department of Health (DoH), National Institute of Clinical Excellence (NICE) and the Royal College of Obstetricians and Gynaecologists (RCOG) has varied considerably, as shown in table 1.1 below.



Table 1.1: Recommendations of UK health agencies regarding alcohol consumption in pregnancy 2003-2008

Year	Source	Recommendations
2003	NICE	“limit alcohol consumption to no more than 1 standard unit per day” (pp. 21)
2006	DoH	“no more than 1 or 2 units, once or twice a week and avoid getting drunk” (pp. 14)
2006	RCOG	“the only way to be absolutely certain that your baby is not harmed by alcohol is not to drink at all during pregnancy or while you are trying for a baby” (RCOG 2006a, pp. 5) “there is no evidence from harm from low levels of alcohol consumption, defined as no more than one or two units of alcohol once or twice a week” (RCOG 2006b, pp. 1)
2007	DoH	“as a general rule, pregnant women or women trying to conceive should avoid drinking alcohol. If they choose to drink, they should drink no more than one or two units of alcohol once or twice a week and should not get drunk” (pp. 14)
2008	NICE	“... avoid alcohol in the first 3 months if possible. If women choose to drink alcohol, advise them to drink no more than 1 to 2 UK units, once or twice a week” (pp. 24)

The advice for pregnant women has changed substantially in only a few years. In 2003, women were reassured that 7 units of alcohol a week was a safe level, whereas only 3 years later the RCOG recommended abstinence. The advice also varied according to the source, at the same time as the RCOG was recommending abstinence,

the DoH was suggesting up to four units per week (on two occasions) was unlikely to do any harm. This variation in advice is likely to have led to confusion for both pregnant women and antenatal health care providers, and it is doubtful that pregnant women were receiving clear or consistent advice. Furthermore, there is some doubt held by health professionals in the field about whether abstinence during pregnancy is warranted. For example, in 2003 the online information and resource service for midwives stated that: "Women can be reassured that light, infrequent drinking constitutes no risk to their baby" (O'Brien 2008, pp.16). Reassuring women that there was 'no risk' would have been misleading and no definition was provided as to what 'light' or 'infrequent' drinking related to. This information is unlikely to have benefited pregnant women or midwives.

The reluctance to implement abstinence guidelines, stemmed from the argument that there is no robust evidence to prove that light drinking during pregnancy is associated with foetal harm. However, as discussed next (in section 1.3), a number of research studies have suggested that even low-level drinking is linked to changes in foetal and infant behaviour (e.g. Hepper, Dornan and Little 2005; Sood et al. 2001) and childhood growth rates (Day and Richardson 2004), although the implications of these findings are currently unknown. In addition, researchers have hypothesised that there may be some maternal-foetal pairs who have a predisposition to harm from low levels of alcohol consumption who are indistinguishable given the current level of knowledge (Mukherjee et al. 2005). It is accepted that the expression of alcohol in the blood varies significantly depending on body size, age, metabolism, length of time between drinks, and what food has been ingested (NHS Choices 2009a). Therefore, the same volume of alcohol may affect different maternal-foetal pairs in different ways. Given that antenatal alcohol use offers no benefits to the outcomes of pregnancy, and that the threshold for harm is uncertain, many researchers and health professionals feel that abstinence is the only safe message for pregnant women (e.g. Berg, Lynch and Coles 2008, Mukherjee et al. 2005). Furthermore, given the low levels of knowledge in the UK surrounding what constitutes a unit (NHS 2009a), and the fact that alcohol use is often underreported, defining a hypothesised 'safe' limit in terms of units or drinks is unlikely to be helpful for many pregnant women. There appears to be sounder

justification for advising women to abstain, rather than choosing an arbitrary number of units where some level of risk may still exist.

### 1.3. OUTCOMES OF ALCOHOL USE DURING PREGNANCY

The idea that the prenatal environment may influence later offspring health and behaviour has existed for many years (Schlotz and Phillips 2009). Research conducted over the past two decades has shown:

*... a compelling case that early environment is specifically linked with impaired cognitive function, behavioural disorders especially hyperactivity/inattention, and psychiatric conditions such as mood disorders and schizophrenia (Schlotz and Phillips 2009 p. 905)*

A summary of the main factors influencing the prenatal environment and later developmental outcomes are presented in figure 1.1.

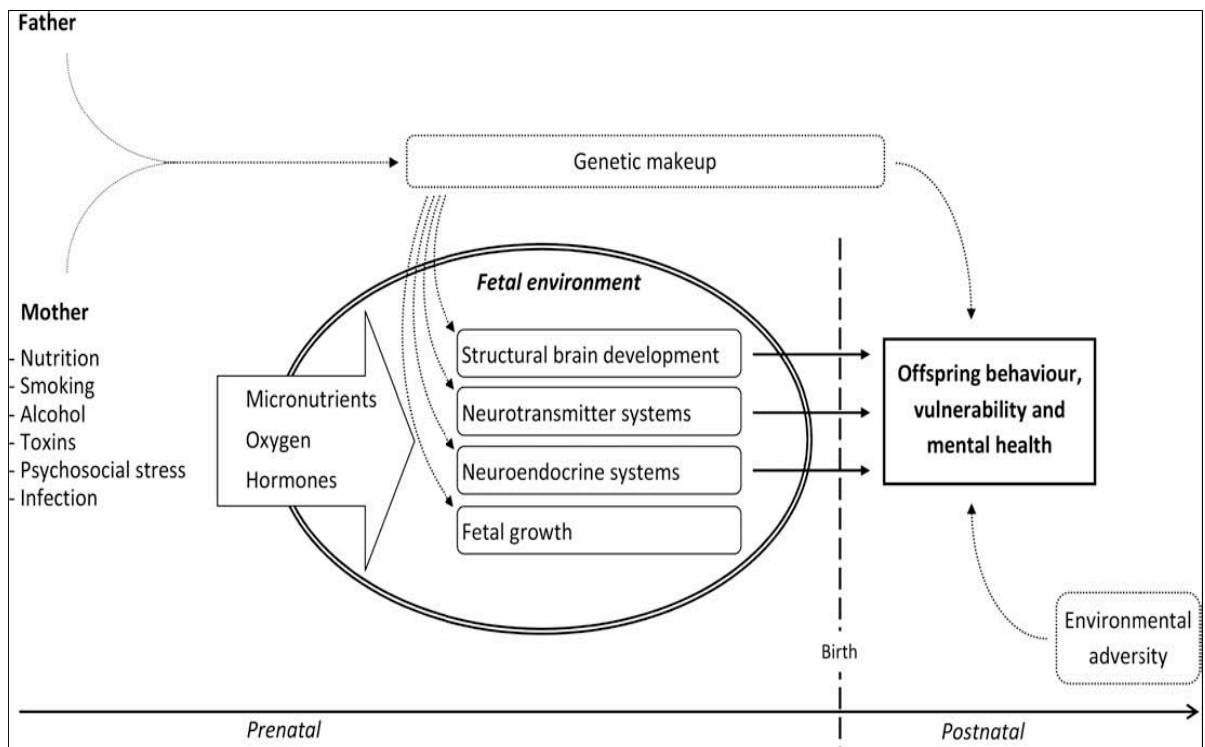


Figure 1.1: Influences on the prenatal environment and associations with postnatal development and health (taken from Schlotz and Phillips 2009)

Both maternal and paternal genetic makeup, along with maternal health, behaviour and well-being influence the foetal environment. Maternal nutrition, nicotine and alcohol use, exposure to infection and toxins, and psychological well-being are postulated to affect the foetal environment both indirectly and directly. The mechanisms behind these influences are through the altered transfer of oxygen and nutrients across the placenta, and through the direct transfer of hormones, toxins and other agents into the foetal blood stream. Post-birth influences such as environmental adversity and the continuing influence of the child's genetic makeup are also important. A number of factors can result in the postnatal environment being considered adverse, including family conflict, socio-economic status, sub-optimal parenting and attachment (Schlotz and Phillips 2009).

The most severe consequence of heavy prenatal alcohol exposure is Foetal Alcohol Syndrome (FAS). FAS was first identified in 1973 by Jones and Smith and the diagnostic criteria is shown in box 2 below. Where some, but not all, of the diagnostic criteria are present, a diagnosis of partial foetal alcohol syndrome, alcohol-related birth defects, or alcohol-related neurodevelopmental disorder may be made as appropriate.

**Box 2: Diagnostic criteria for Foetal Alcohol Syndrome**

1. Confirmed maternal alcohol exposure
2. Facial abnormalities (flat upper lip, flattened philtrum and flat midface)
3. Evidence of growth restriction in at least one of: low birth weight for gestational age, decelerating weight not due to nutrition, disproportionately low weight to height
4. Evidence of central nervous system neurodevelopment abnormalities in at least one of: decreased cranial size, structural brain abnormalities, neurological hard or soft signs (impaired fine motor skills, neurosensory hearing loss, poor tandem gait, poor eye-hand coordination)

Since the discovery of FAS, the majority of research has focussed on the effects of heavy drinking and its relation to adverse outcomes. However, FAS is by no means the only adverse consequence of prenatal alcohol exposure. In terms of birth outcomes, drinking on more than 2 days a week is associated with reduced gestational age (Sokol et al. 1999). Alcohol use of greater than 2 drinks a week (but less than 2 drinks a day) increased the risk of malformations (such as chromosomal, neural tube, cardiovascular, renal and musculoskeletal defects) from 3.1% of pregnancies to 5.8% (Polygenis et al. 1998). Moderate alcohol levels during pregnancy have also been shown to be related to adverse outcomes in the longer-term; hyperactivity in 4-year-olds (Streissguth et al. 1989), longer reaction times (Jacobson et al., 1994), and an increased risk for psychiatric disorders (for example, somatoform, substance abuse/dependence, manic and depressive disorders) in adult offspring (Barr et al. 2006). Research examining prenatal alcohol exposure has, to date, had a focus on heavy maternal alcohol use and few studies have looked into the potential effects of low to moderate prenatal alcohol exposure (Huizink and Mulder 2006). A review of research examining the effects of low-level alcohol use is presented in section 4.1.1.

There are a number of potential mechanisms for the effects of prenatal alcohol exposure on the infant. Animal studies have found alterations in brain development including neuronal loss, altered neuronal circuitry and dose-response related effects on brain morphology (Huizink and Mulder 2006). Human studies have found corresponding differences in the brains of prenatally alcohol-exposed children; reductions in the basal ganglia (Archibald et al., 2001), thinning and displacement of the corpus callosum (Sowell et al. 2001) and reduced cerebellar size (Sowell et al. 1996). Furthermore, prenatally exposed 13-month olds showed higher levels of post-stress cortisol (Jacobson, Bihun and Chiodo 1999). This type of altered stress reactivity may be involved in the development of psychopathology and drug-seeking behaviours (Huizink and Mulder 2006).

One difficulty in interpreting the results of research in this field is that studies may examine alcohol use at different stages of pregnancy. Some studies have focused exclusively on alcohol exposure in the first trimester (e.g. Floyd 1999; Konovalov et al. 1997) whilst others have examined the second and third trimesters (e.g. Hepper et al.

2005; Streissguth et al. 1996). The issue of whether there is a 'critical period' for alcohol exposure is uncertain. Foetal development is complex and exposure of differing levels at different time points is associated with different outcome effects. Lundsberg, Brackan and Saftlas (1997) found that drinking in the first month of pregnancy produced increased risks for growth restriction whilst drinking in month seven was associated with an increase in the risk of preterm delivery. In a review of the literature, Eckardt et al. (1998) draw a number of conclusions; heavy alcohol use early in pregnancy leads to the most severe consequences (morphological anomalies, sensory deficits and mental disability), but there is also an effect of alcohol throughout pregnancy and/or a later critical period.

A further difficulty when evaluating the impact of lower-level alcohol use, are the differing definitions of what constitutes low- or moderate-level drinking. For example, if a pregnant woman has one binge-drinking episode throughout the whole of her pregnancy what kind of drinker is she? Is she considered a heavy drinker even if it occurs once during the pregnancy? Research has highlighted the importance of examining binge drinking as well as average intake when evaluating prenatal alcohol exposure. Eckardt et al. (1998) argue that even one occasion of binge-drinking (defined as five or more units in one day) at a critical period can have a significant impact upon developmental outcomes of offspring. Further research found that 28.5% of prenatally exposed offspring showed abnormal brain morphology after 3 binge drinking episodes throughout the pregnancy (Konovalov et al. 1997). It is therefore important for research to examine both average alcohol consumption along with episodes of binge-drinking when determining the impact of exposure.

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#### 1.4. INCIDENCE OF ALCOHOL USE DURING PREGNANCY

Significant numbers of women worldwide continue to drink at least some alcohol whilst pregnant. In the US, where abstinence has been the message for the longest time, around one in four pregnant women reported binge drinking in the 1<sup>st</sup> trimester (Cornelius et al. 1994) and one in five continued to drink throughout pregnancy at some level (Stratton et al. 1997). More recent research suggests that the average annual incidence of drinking during pregnancy in the US is now lower; 12.2% drinking

at any level and 1.9% binge drinking (Denny et al. 2009). In Europe, recent estimates suggest women are consuming at a higher level than in the US. Researchers estimate that 23% of Norwegian women consume alcohol whilst pregnant, 25% report binge drinking in weeks 0-6 of the pregnancy, whilst 85% report changing their drinking patterns change at pregnancy recognition (Alvik et al. 2006). A Swedish study (Goransson et al. 2003) conducted in Stockholm, suggests that around 1/3 of Swedish women regularly consume alcohol throughout pregnancy. Recent research suggests that a significant proportion of pregnant Swedish women are drinking more than the recommended levels. Magnusson et al. (2005) reported that “an unexpected proportion of pregnant women in Sweden consume alcohol at levels likely to produce adverse effects” (pp.1). In their study, 15% of participants drank at levels exceeding 70g (8.75 UK units) of alcohol a week (on at least 2 weeks) and/or drank 60g (7.5 UK units) in one day (on 2 or more occasions). In Spain, a study carried out on a random sample of deliveries between 1998-2002, suggests that 22.7% of women reported consuming alcohol during the pregnancy (Palma et al. 2007).

In the UK, the incidence of prenatal alcohol consumption varies; 33% (Haslam and Lawrence 2004), 37% (Kelly et al. 2009), 54% (Bolling et al. 2007). This variation in frequency of alcohol consumption reflects the variety of methodologies used. The lowest rates were found by Haslam and Lawrence (2004) who had antenatal health professionals obtain reports of current alcohol use in pregnant women (at any stage of pregnancy). Both Kelly et al. and Bolling et al. obtained retrospective accounts of drinking during pregnancy as part of large-scale nation-wide studies. Kelly and colleagues conducted interviews with participants in their homes nine months after birth, whilst Bolling et al. conducted a questionnaire survey with women at 4-10 weeks post-partum. A number of factors may influence reporting rates for each of these methodologies. Reporting alcohol use to a health professional or researcher in an interview setting may result in under-reporting due to the perceived status of the interviewer/health professional and social desirability effects, guilt or embarrassment. Furthermore, retrospectively reporting alcohol consumption that occurred nine months previously is likely to be affected by recall bias.

Very few studies have examined the prevalence of drinking alcohol during pregnancy in Scotland. Plant (1984) conducted a study examining the alcohol consumption of 1,008 pregnant women attending antenatal clinics in Edinburgh between 1981 and 1982. All the women interviewed were 12 weeks pregnant and the majority were aged between 21 and 35 years old, married or living with a partner and Scottish born. Around 80% of women had drunk alcohol since becoming pregnant and 38.5% within the last 7 days. Plant asked women to report their consumption in the previous week and, on average, women had consumed between 3 and 4 units. The participants were also asked to report an estimate of the maximum number of units they had drunk in one day since becoming pregnant. Most participants reported a maximum of 4.4 units on one occasion but a significant number (35.6%) reported consuming 5 units or more in a single occasion since becoming pregnant. Furthermore, 21.2% of Scottish women in Plant's study reported having felt the effects of alcohol on drinking occasions since becoming pregnant. Plant's study is one of few examining the drinking habits of pregnant women in Scotland. It gives us an insight into drinking habits in Scotland in the early 1980s but a more contemporary estimate of the prevalence of drinking during pregnancy in Scotland is warranted. The recently published Growing Up in Scotland (GUS) survey sheds some light on current levels of drinking during pregnancy in Scotland. Around one quarter of the participants in the GUS survey reported drinking at some level with their most recent pregnancy (Anderson et al. 2007). However, this was based on retrospective reporting of alcohol consumption in an interview setting. Women may be unable to recall their drinking patterns and may feel unable to discuss such a potentially sensitive subject during a face-to-face interview.

The discrepancies in incidence rates can be attributed to a number of causes. The different measures and the different study designs employed to identify drinkers are likely to play a part. Furthermore, social desirability effects may be important. Drinking and smoking during pregnancy are liable to be viewed as 'negative' behaviours. Pregnant women who are drinking and smoking may feel social pressure to report their behaviour in a more positive light than is accurate. Therefore, any prevalence estimates are likely to be an under-estimate of the true levels of drinking



during pregnancy. Whilst it is probable that no self-report measure will give an exact picture of alcohol use (or indeed of nicotine use), information gleaned from numerous studies employing a variety of approaches should be integrated to give an overall impression of use. Understanding the rates of pregnant women drinking and smoking during pregnancy is necessary in order to establish if health care practice and health promotion strategies are effectual.

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#### 1.5. NICOTINE USE IN THE UNITED KINGDOM AND SCOTLAND

Smoking is accepted as an important cause of illness and disease. It is estimated to be the cause of around one third of all cancers (Robinson and Bulger 2010) and is one of the most significant contributing factors to decreased life expectancy (Chambers 2009). Smokers are more than twice as likely to die of coronary disease, and are at greater risk of pneumonia, emphysema and pleurisy (Department of Health 2010).

The prevalence of cigarette smoking has declined over the past 3 decades as shown in figure 1.2. Forty-five percent of the population smoked in 1974 and this rate fell substantially in the 1970s and 80s until levelling out at around 27% in 1994. A second decline then began in the early 2000s and the latest data suggests that 22% of men and 21% of women were smokers in 2008 (Robinson and Bulger 2010).

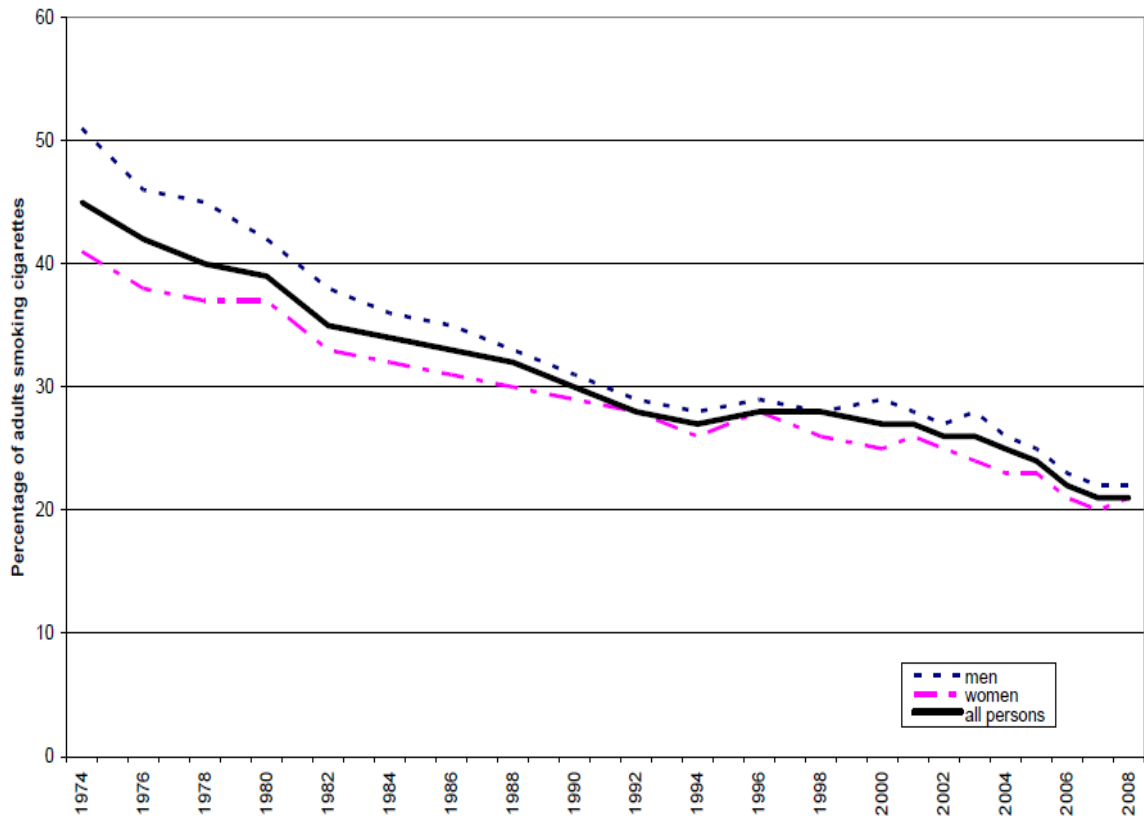


Figure 1.2 Prevalence of smoking in the UK 1974-2008 (taken from Robinson and Bulger 2010)

In almost every year since 1974, Scotland has had a higher prevalence of smoking than in England (Robinson and Bulger 2010). The latest data shows that a significantly larger proportion of Scottish people (24%) are smokers than in England (21%; Robinson and Bulger 2010).

There are a number of socio-demographic risk factors for smoking. Co-habiting men and women have almost twice the prevalence of smoking (33% and 30% respectively) as married people (16%; Robinson and Bulger 2010). Whilst people working in occupations classed as ‘manual’ are 1.7 times more likely to smoke than non-manual workers (Robinson and Bulger 2010).

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#### 1.6. GUIDELINES FOR NICOTINE USE DURING PREGNANCY

With regard to smoking during pregnancy, the advice from the government is clear; abstain from smoking as soon as you know you are pregnant. In fact, the implication from the ‘NHS Choices smoking and pregnancy’ website is, “the truth is that every

cigarette you smoke harms your baby” (NHS 2010). The message for women to cease smoking during pregnancy has been consistent for many years and questions relating to smoking have been included as part of midwives’ standard assessment practices for some time. The contrast between advice regarding nicotine use and advice regarding alcohol use is notable, as is the support available for women attempting to change their behaviour (see section 1.10).

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## 1.7. OUTCOMES OF SMOKING DURING PREGNANCY

The effects of prenatal exposure to cigarette smoke are well documented. In the period 2000-2004, an estimated 776 infants died annually from cases attributable to maternal smoking (Tong et al. 2009). Prenatal nicotine use is associated with a dose dependent reduction in birth weight (Adams and Melvin 1998, Blake et al. 2000, Lumley 1987), small head circumference for gestational age (Kallen 2000, Lindley et al. 2000), premature birth (Floyd et al., 1993), small for gestational age (Fantuzzi et al. 2008, Figueras et al. 2008) and sudden infant death syndrome (Adams and Melvin 1998). When smoking ceases before 15 weeks gestation, however, the risks for spontaneous preterm birth, and small for gestational age are no greater than for non-smokers (McGowan et al. 2009). In-utero nicotine exposure has also been linked to increased irritability in newborns (Stroud et al. 2009).

Longer-term effects have also been found such as hyperactivity at age 8 (Kotimaa et al. 2003), significantly lower IQ scores (Milberger et al. 1998), deficits in verbal learning, design memory, and problem solving; slower responses in hand-eye coordination (Cornelius and Day 2000); symptoms of Attention Deficit Hyperactivity Disorder (e.g. Milberger 1996); and childhood obesity (Gilman, Gardner and Buka 2008, Mendez et al. 2008, Sharma and Kanekar 2007). Smoking is also associated with a number of negative outcomes for the mother including ectopic pregnancy, placental complications, and spontaneous abortion (Adams and Melvin 1998).

The mechanisms behind these effects are related to foetal exposure to large effects of nicotine, carbon monoxide, ammonia, nitrogen oxide, lead and other metals which interfere with the normal function of the placenta; limiting blood flow (Huizink 2006). A number of studies have also highlighted potential mechanisms in altered

neurotransmitter systems (Slotkin 1998), the impact of oxidative stress (Rougemont et al. 2001) and dysregulation of the hypothalamic-pituitary-adrenal axis (Huizink et al. 2004).

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#### 1.8. INCIDENCE OF SMOKING DURING PREGNANCY

Despite consistent and clear information regarding nicotine use during pregnancy, recent prevalence estimates suggest that between one in seven and one in three pregnant women in developed countries smoke at some stage during their pregnancy (Petrou et al. 2005). Data obtained from 26 US states in 2004 suggests that 23% of women smoke before becoming pregnant, of whom 45% quit at some point during pregnancy (Tong et al. 2008). The prevalence of smoking during pregnancy appears to vary by US state; in 2005 prevalence ranged from 5.2%-35.7% over 31 states (Tong et al. 2009). Overall prevalence in the US declined from 15.2% in 2000 to 13.8% in 2005 (Tong et al. 2009). In Europe, the incidence rates are similar. Smoking during pregnancy rates dropped in Denmark from 22% in 1997 to 16% in 2005 (Jensen et al. 2008). In one Finnish study, prevalence in early pregnancy was 25.7% but this dropped to 12.7% at 20 weeks gestation (Raatikainen, Huurinainen and Heinonen 2007). In the UK, around one in five pregnant women smoke at some stage of their pregnancy (Haslam and Lawrence 2004).

The government White paper 'smoking kills' (Department of Health 1998) set out a target to reduce the incidence of smoking in pregnancy to 15% by 2010 but it is unclear whether this target has been met.

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#### 1.9. ANTENATAL CARE IN SCOTLAND

In the UK, DoH guidelines recognise that midwives should take the lead professional role in the care of normal pregnancy and labour (DoH 2004b). The right of the pregnant women to be provided with good information and to be involved in decisions about their own and their babies' care are key principles of midwifery led care (Royal College of Midwives; RCM 2008).

Women are encouraged to contact their midwifery service as soon as they realise they are pregnant and have their first 'booking' visit between weeks 8 to 12 of their pregnancy. If the pregnancy is uncomplicated the main health professional seen by pregnant women is the midwife. Midwives are, therefore, in a unique position to advise pregnant women about health behaviours from an early stage of the pregnancy and to provide support and guidance throughout.

Table1.2: Routine antenatal care for normal pregnancies

<b>Gestation (in weeks)</b>	<b>Health Professional</b>	<b>Content of visit</b>
8-14	Midwife (or exceptionally GP)	Pre-booking screening. Medical history taken. Information given regarding parenting, feeding, lifestyle, health promotion and education, substance misuse, domestic violence, postnatal depression, discussion of birth plan
15-17	Midwife	Discussion regarding screening programme, maternity record notes given
19-20	Sonographer	Information and discussion
22	Midwife	Information and discussion
28	Midwife	Medical tests, screening for depression, screening for Rhesus disease, information and discussion
32	Midwife	Medical tests, information and discussion
34-36	Midwife	Medical tests, review of pregnancy, information and discussion

36-40	Midwife	Medical tests, review of pregnancy, information and discussion
41+	Midwife	Discussion relating to birth, review of pregnancy, induction and examination

In a normal pregnancy a midwife will see the pregnant women 8-9 times, once every few weeks (see table 1.2) providing plenty opportunities for health behaviour advice and review. In Scotland, the current maternity records remain with the woman (NHS Scotland 2008) and include questions relating to alcohol consumption and nicotine use.

#### 1.10. GEOGRAPHICAL CONTEXT OF RESEARCH

This research is conducted within the Grampian region of Scotland. Grampian consists of two local authority areas; Aberdeen city and Aberdeenshire. A map of the area is shown in figure 1.3 below.



Figure 1.3: Map of the Grampian region (Aberdeenshire Council 2009)

The socio-economic profile of Grampian shows that the levels of deprivation are much lower than other areas of Scotland (Aberdeen City Council 2009). Around 4.8% of the area is in the most deprived 15% of Scotland; a relatively low proportion compared to other regions in Scotland (Scottish Government 2009). Most of the Aberdeenshire zones are classed in the least deprived categories (Scottish Government 2009). Further details of the region’s socio-economic profile are displayed below in table 1.3. As shown in the table, both areas of Grampian (Aberdeen City and Aberdeenshire) have a lower percentage of income deprived individuals than the national average, and lower proportions of people renting authority-owned accommodation. The percentage of houses that are owned (as opposed to rented) is slightly lower in Aberdeen city than in Scotland as a whole but is considerably higher in Aberdeenshire.

Table 1.3 Socio-economic profiles of Aberdeen city and Aberdeenshire in comparison to Scotland (Extracted from Scottish Government 2009)

<b>Area</b> <b>SES Variable</b>	<b>Aberdeen City</b>	<b>Aberdeenshire</b>	<b>Scotland</b>
Percentage of population who are income deprived	11%	8%	16%
Percentage of households – social rented	28.74%	19.54%	29.41%
Percentage of households - owned	61.04%	71.27%	62.59%

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### 1.11. EXISTING HEALTH EDUCATION APPROACHES

Health promotion is “the combination of educational and environmental supports for actions and conditions of living conducive to health” (Kok et al. 2004, pp. 86). Health promotion involves health education, resource provision, and regulatory strategies. Over recent years, a number of regulatory strategies have been introduced in the UK that may influence alcohol and nicotine consumption. The Licensing Act (2003) allowed for premises to apply to extend their licensing hours and came into force in September 2005. The Act was passed, in part, to try and bring Britain’s drinking culture away from binge-drinking and more in-line with that of Europe, where drinking sits within more of a café culture. This legislation has met with considerable criticism; “[the] relaxation of licensing laws (Licensing Act 2003) with more flexible opening times, will serve to encourage binge-drinking rather than reduce it” (Van Wersch and Walker 2009 pp. 131). In Scotland, the Alcohol Bill (2009-2010) proposes to introduce minimum pricing, ban ‘irresponsible promotions’, restricted marketing activity in off-sales locations, ensure smaller measures of wine are made available on-sales, considers raising the purchase age to 21, and establish the power to introduce a Social Responsibility Fee. In March 2006, Scotland introduced a ban in smoking in public places, followed by Wales and England in 2007. Following this ban, a decline of around 7% was seen in smoking prevalence; greater than that seen in any previous year (West 2010).

Health promotion activities for pregnant women differ greatly for nicotine and alcohol use. In the UK, the numbers of pregnancies exposed to nicotine are similar (if not slightly lower) than the numbers exposed to alcohol use. This is perhaps surprising given the real differences in support and information services available for pregnant women. There is a dedicated smoking in pregnancy website<sup>2</sup> which covers information on the effects of nicotine exposure, and advice on how to quit. Further support is available from a pregnancy smoking helpline and nurse-led cessation

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<sup>2</sup> <http://smokefree.nhs.uk/smoking-and-pregnancy/>



support services. The DoH publication *'The pregnancy book'* (2009) includes motivational tools to help women quit smoking. In contrast to this, the support and advice available for alcohol use is lacking. There is a page on alcohol in pregnancy on a larger drink awareness website<sup>3</sup>, but no dedicated alcohol in pregnancy website, no alcohol in pregnancy helpline and no NHS support services available for non-alcoholic women who drink during pregnancy. The addictive nature of smoking may in some way explain the discrepancy in support. Smoking cigarettes is likely to develop into an addiction within the first few days and weeks of smoking (DiFranza et al. 2000), whereas for non-alcoholic women, alcohol is consumed without an addiction being present (Saunders et al. 1993). However, this does not necessarily mean that women would not benefit from greater support to change their drinking patterns. For many women, a habitual level of drinking may exist which can be difficult to change. The discrepancy in support services may also be attributed to the fact that smoking during pregnancy has longer been established as harmful and clearer guidelines have existed for longer.

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#### 1.12. SOCIAL COGNITION APPROACH

A social cognition approach to understanding health behaviour examines the interplay of social behaviour and individuals' cognitions or thoughts. Social behaviour is best understood as a function of an individual's perceptions of reality, rather than as an objective description of the environment (Conner and Norman 2005a). Social cognition focuses on individuals' cognitions as processes which intervene between observable stimuli and behavioural responses in real world situations (Fiske and Taylor 1991). Over the past three decades a major focus of health psychology research has been in the design and testing of models of health behaviour based on a social cognition approach. The most common of these models (Ogden 2003) are the Health Belief Model (Becker and Rosenstock 1987), the Theory of Reasoned Action/Theory of Planned Behaviour (Fishbein and Ajzen 1975, Ajzen 1988, 1991), and Protection Motivation Theory (Rogers 1975). The basic premise of these models is that examining

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<sup>3</sup> <http://www.drinking.nhs.uk/health-risk/pregnancy/>

aspects of individuals' cognitions allows for prediction of health-related behaviour and outcomes. The application of social cognition models to health behaviour allows for the determinants of behaviour to be established, the prediction of future behaviours, and the identification of behaviour change targets (Conner and Norman 2005a). Establishing the social cognitive determinants or risk factors of health behaviour provides targets for behaviour change interventions which may be more changeable than socio-demographic risk factors. Furthermore, interventions to change individuals' health behaviours are more likely to be effective when based on theory (Conner and Norman 1996). Despite the potential benefits of applying social cognition models to alcohol and nicotine use during pregnancy, few studies have done so.

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#### 1.13. RATIONALE FOR RESEARCH

A health promotion programme is most likely to be effective when its development includes consideration of theories of health behaviour and health behaviour change (Conner and Norman 1996). Theories of health behaviour and behaviour change are likely to be relevant at the individual, interpersonal, organisational, community and societal levels (Kok et al. 2004). In order for health promotion strategies to be successful, development work needs to be completed in order to establish the relevant determinants of the behaviour and test the appropriateness of social-cognition models. Craig et al. (2008) identify 4 stages in the development of an intervention shown below in figure 1.4.

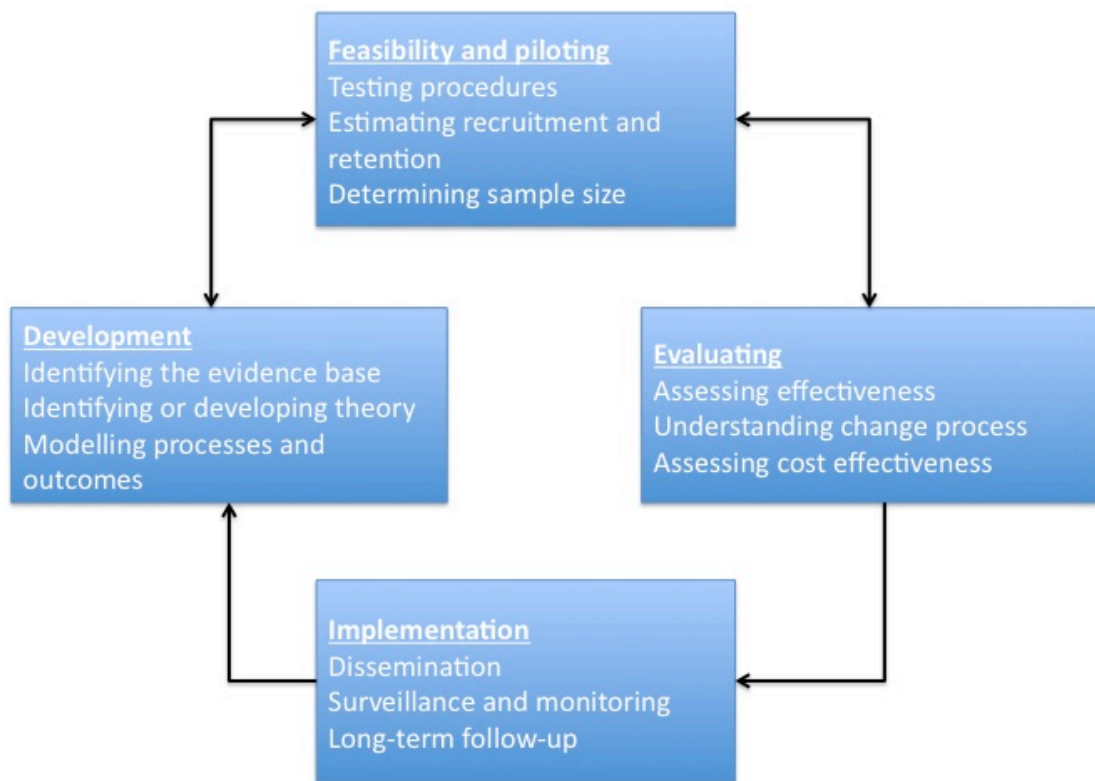


Figure 1.4 Stages in the development of complex interventions

The work in this thesis will add to the development stage; identifying the evidence base, and identifying/developing theory.

A review of the literature in this field highlights a number of important gaps. Little is known about the incidence of alcohol use during pregnancy in Scotland, or what advice pregnant women are receiving from antenatal healthcare professionals. Studies examining risk factors for the behaviours have tended to focus on socio-demographic variables without consideration of social cognitive determinants of behaviour. The majority of research to date has focused on moderate and heavy alcohol use during pregnancy with less attention paid to lower-levels of alcohol use. Furthermore, there is a lack of prospective research examining the effects of low-level prenatal alcohol use in the postpartum period. The research that has been conducted has tended to focus on health outcomes for the newborn without examining wider implications for the mother and infant. This thesis aims to address these gaps and examine the nature, occurrence and consequences of alcohol and nicotine use during

pregnancy. An outline of the three studies that comprise the thesis along with the rationale for each are presented next.

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## STUDY 1: IDENTIFYING THE POPULATION

In order to inform intervention development, the determinants of behaviour need to be identified. The majority of research examining determinants of alcohol and nicotine use during pregnancy has focused on socio-demographic factors and/or attitudes, with few studies examining psychological well-being. Few studies have applied a health psychology theoretical basis. Study 1 pits social cognition models against previously researched variables to determine the best predictors of alcohol and nicotine use during pregnancy. Social cognition models assume that socio-demographic variables are accounted for by the model's constructs. Study 1 tests this empirically to determine whether any socio-demographic variables stand out as independent contributors to understanding the behaviour. Study 1 employs a questionnaire design to a) obtain an estimate of the numbers of women smoking and drinking during pregnancy in Grampian, and b) test socio-demographic, psychological and social cognitive factors in their relation to alcohol use and smoking during pregnancy. As mentioned previously, research (Eckhardt 1998, Konovalov et al. 1997) has highlighted the importance of examining both average weekly alcohol consumption along with episodes of binge-drinking when determining the impact of exposure. This study will examine both average daily/weekly consumption before and after pregnancy recognition and binge drinking. Definitions of binge drinking for women vary; exceeding four units (Olthuis, Zamboanga, Ham and Van Tyne 2011), exceeding five units (Eckardt et al. 1998), or six plus drinks in a single session (DirectGov 2010). For this study, binge drinking follows the UK government's definition; occasions where participants drank 6 or more units of alcohol in one day.

A questionnaire will be employed for a number of reasons. Alcohol and smoking are behaviours which may be seen as socially unacceptable during pregnancy. An anonymous questionnaire format may help participants to feel as though they can be more honest about their behaviour than they could otherwise be in an interview or

focus group setting. Furthermore, an aim of study 1 is to establish an estimate of the incidence of smoking and drinking which is largely unknown in Grampian. A questionnaire format would allow for the best estimate of incidence as a larger sample size could be recruited than would be possible in an interview study. A large sample size was necessary in order to retain a reasonable number of participants for the follow-up study as drop-outs are to be expected in longitudinal research. Research suggests that no differences in reported consumption exist between using questionnaires, interviews or self-report diaries (Kesmodel and Olsen 2001). Moreover, advice from the Scottish Government states that "while questionnaire-based surveys are known to consistently under-record alcohol consumption as many of us under-estimate the amount of alcohol we consume, (and surveys tend to exclude some heavy-drinking groups), they provide the best indication of drinking patterns among population subgroups" (Scottish Government 2008a, pp. 59).

Study 1 will provide an insight into the best predictors of smoking and alcohol use during pregnancy, and help to establish factors useful for intervention development.

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## STUDY 2: INVESTIGATING THE PRACTICE OF MIDWIVES

Little is known about the determinants of midwives' behaviour when it comes to advising women about alcohol and nicotine use during pregnancy. Study 2 employs a questionnaire design to a) obtain a picture of midwives' views and practice, and b) examine the determinants of midwives' attitudes and practice. A questionnaire format was deemed to be the most appropriate in order to obtain a large enough sample size from professionals working across a large geographical area. The nature of the midwives' work meant that an interview study may have drastically cut participation rates. Community midwives tend to work independently and can cover large geographical areas which may well preclude them from participating in an interview. The aim of study 2 was to identify individual midwives' behaviour and attitudes about alcohol and nicotine use during pregnancy. As midwives work autonomously, it was decided that using a focus group format may not be as appropriate. An anonymous questionnaire was felt to be the best way to allow for expression of individual differences that may differ from official guidelines and group norms.

Study 2 will shed light on the determinants of midwives' attitudes and behaviour and provide recommendations for practice improvements.

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## STUDY 3: INVESTIGATING THE IMPACT OF LOW-LEVEL ALCOHOL USE ON NEW MOTHERS AND INFANTS

Study 3 will build on the results of study 1. The participants for this study will be women from study 1, three months after they have given birth. The prospective design of study 3 allows for follow-up of women who reported concurrent drinking patterns during pregnancy. This design has advantages over retrospective design studies where women are asked to report their alcohol consumption for their last pregnancy. The effect of recall bias is minimised by asking about current drinking. Previous research has focused on the effects of low-level alcohol on health outcomes for infants only. This research has not always accounted for the potential confounding factor of prenatal exposure to maternal emotional distress despite overlapping


outcomes. Study 3 therefore aims to examine the impact of alcohol and nicotine use during pregnancy on mothers and infants, whilst controlling for maternal prenatal depression, anxiety and stress. The potential impact of alcohol use during pregnancy on the antenatal health of mothers has attracted little research attention. Furthermore, the impact on maternal and infant well-being has previously been overlooked.

Study 3 will evaluate the impact of nicotine use and low-level alcohol use during pregnancy and examines the often over-looked psychological impact.

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#### MAIN AIMS AND OBJECTIVES

The overall aim of this programme of research is to establish a) the incidence of alcohol and nicotine use during pregnancy in Grampian, b) the determinants of the behaviours, c) the practice of midwives in Grampian, and d) the outcome of alcohol use during pregnancy. Through meeting these aims this thesis will have a number of implications for practice including the identification of relevant behaviour change techniques.



## 2.1. LITERATURE REVIEW

A great deal of research has been carried out to identify the determinants of individuals' health behaviour. This literature review will focus on previous work identifying risk factors for alcohol and nicotine use during pregnancy, before presenting the case for incorporating social cognition approaches to understanding the behaviours.

### 2.1.1. SOCIO-DEMOGRAPHICS

A great deal of research has shown that socio-demographic variables are associated with a range of health behaviours (e.g. Walker, Cooney and Riggs 1999). Socio-demographics are the social characteristics of the population of interest. Research examining the socio-demographic determinants of drinking and smoking during pregnancy has focussed on maternal age, Socio-Economic Status, race, marital status, maternal parity (i.e. the number of existing children) and partner health behaviour and will be discussed below.

#### MATERNAL AGE

In terms of alcohol use during pregnancy, the relationship between maternal age and consumption is far from clear. A number of studies have suggested that older pregnant women are more likely to drink alcohol than younger pregnant women (Alvik 2006; CHOICES 2002; Kelly et al. 2009; Palma et al. 2007; Pirie et al. 2000; Sayal et al. 2007; Testa and Leonard, 1995). However, a few studies suggest that it is younger women who are more likely to drink during pregnancy. For example, women who drank more than 7 standard drinks a week were significantly more likely to be under 21 than those who drank at a lower level or abstained (Stewart and Streiner 1994). Leonardson and Loudenberg (2003) also found that pregnant drinkers were more likely to be younger than pregnant abstainers. Furthermore, research suggests binge-drinking at any stage during pregnancy is most prevalent in younger women aged 21-



29 years-old (Caetano et al. 2006). No clear conclusions on the relationship between maternal age and prenatal alcohol consumption can be drawn.

A similar level of uncertainty exists for the relationship between maternal age and nicotine use during pregnancy. Severson et al. (1995) reported that women who smoked during pregnancy were significantly older than those who had quit. In accord, Zimmer and Zimmer (1998) found that it was the older smokers who were less likely to quit when becoming pregnant. However, in contrast to this, recent research (Linares Scott et al. 2009; Pickett, Wilkinson, and Wakschlag 2009) suggests that it is younger women who are significantly more likely to smoke whilst pregnant. It is therefore questionable whether age is a reliable determinant for drinking or smoking during pregnancy or indeed a useful predictor for intervention work.

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#### SOCIO-ECONOMIC STATUS (SES)

Socio-economic status (SES) is a measure of an individual or family's relative economic and social position. SES is typically based on income, education and occupation and divided into categories (low, medium and high). Lower SES has been associated with heavy drinking (Testa and Leonard 1995) and continued smoking (Haslam and Lawrence 2004) during pregnancy. In fact, merely living in a mainly lower SES neighbourhood increased the risk of smoking during pregnancy for both low SES women and those with higher level SES (Pickett et al. 2002). Pickett et al. (2002) argue that there are a number of health hazards which may explain the relationship between low SES and health compromising behaviours. A low SES neighbourhood is likely to be characterised by 1) high levels of work stress due to low levels of job control and satisfaction, 2) social norms which consider alcohol and smoking to be acceptable and normal and 3) low emphasis on health preventative behaviours (Pickett et al. 2002). The combination of these factors in low SES neighbourhoods is likely to contribute to greater levels of smoking and alcohol in both pregnant and non-pregnant residents.

The relationship between SES and health behaviour is, however, not simple. High SES has also been linked to decreased rates of drinking cessation (Palma et al. 2007). The picture is therefore unclear. A number of studies have focused on one or other of the three variables that make up SES and these will be discussed next.

### *Income*

The effect of income on health behaviour appears to be complicated. Women with a higher income have been reported to have a greater risk of heavy prenatal drinking (Caetano et al. 2006), whilst it is women with lower incomes who appear to be more likely to smoke during pregnancy (Martin et al. 2008). Martin et al. (2008) examined smoking rates at conception, birth and 24-months postpartum and found that women with lower incomes were twice as likely to smoke. Women earning less than \$35,000 per annum were half as likely to quit during pregnancy after controlling for confounding variables (Martin et al. 2008). In the UK, one in five women in poverty smoke during pregnancy compared to one in ten women not in poverty (Pickett et al. 2009).

### *Educational Attainment*

A degree of uncertainty surrounds the concept of educational attainment<sup>4</sup> as a determinant for alcohol use during pregnancy. Some studies suggest that women who drink lightly during pregnancy actually have a higher level of educational attainment than those who abstain (Alvik 2006; Kelly et al. 2009; Sayal et al. 2007). Contrary to these results, Pirie et al. (2000) found no significant differences in the levels of education between drinkers and non-drinkers. Furthermore, additional research suggests that it is women with lower levels of education who are more likely to drink at any level during pregnancy (Palma et al. 2007). Lower education is associated with a greater risk of pre-conception risky drinking. Women deemed to be at risk of an alcohol-exposed pregnancy (i.e. fertile, sexually active, not using contraception and drinking more than 7 drinks a week or more than 5 units a day) were more poorly educated than those not at risk (CHOICES 2002). Lower educational attainment is also associated with drinking at any level around the time of conception and in early pregnancy (Leonardson and Loudenberg 2003), and with alcohol use of more than 7 drinks per week in the second half of pregnancy (Stewart and Streiner 1994).

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<sup>4</sup> *Educational attainment* is defined as the highest level of education successfully completed by the individual (United Nations Economic Commission for Europe, 2008)

The association between lower educational attainment and nicotine use during pregnancy appears to be more robust. Women with lower levels of educational attainment are more likely to continue smoking during pregnancy (Haslam and Lawrence 2004, Lelong et al. 1995, Linares Scott et al. 2009, Martin et al. 2008, Pickett et al. 2009, Severson et al. 1995, Zimmer and Zimmer 1998). However, there is a lack of discussion of the potential mechanisms for an association between lower educational attainment and smoking. It is possible that health messages about smoking during pregnancy are not pitched at the right level for women with lower levels of education. It may also be that the links between educational attainment and smoking are due to an underlying effect of low SES (and the concurrent issues discussed previously). Without knowing the underlying mechanisms of the relationship, little can be done to help aid intervention work, except for targeting those with low levels of educational attainment. Until we know what is behind the associations between health behaviour and educational attainment any intervention work to improve health is likely to be ineffective. There is no way of knowing if the mechanisms behind the relationship are being addressed.

### *Employment Status*

Although a great deal of studies have examined employment status as a risk factor for alcohol use during pregnancy no clear association has been found. Some studies suggest that women employed full-time (out-with the home) appear to be more likely to drink at some level during pregnancy than abstain (Palma et al. 2007, Pirie et al. 2000). Other studies have found the opposite to be true; unemployed women are at greater risk of any alcohol use during pregnancy (CHOICES 2002, Lelong et al. 1995, Leonardson and Loudenberg 2003, Stewart and Streiner 1994).

In terms of nicotine use during pregnancy, unemployed and sick-listed women were found to be at the greatest risk of smoking (Gillies, Madeley and Power 1989), whilst employed smokers were the most likely to quit smoking during pregnancy (Zimmer and Zimmer 1998). Therefore, although employment status may not aid identification of pregnant drinkers it may help to establish risk factors for continued smoking.

However, for intervention work to be effective the factors underlying this association would need to be established.

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## RACE

Race is another potential risk factor for alcohol and nicotine use that has attracted research with varying results. A number of American studies suggest that it is White women who are at the greatest risk of continued drinking (CHOICES 2002; Hanna, Faden and Dufour 1994) and at the greatest risk for binge drinking during pregnancy (Cateano et al. 2006). In one study, only 4% of drinkers during pregnancy were classed as 'non-White' compared to 14% of abstainers (Pirie et al. 2000). However, the sample in Pirie et al.'s study was predominantly white and middle class, limiting the conclusions that can be drawn. In contrast to this, Testa and Leonard (1995) report that heavy drinkers who do not reduce their consumption were the least likely group to be White. Testa and Leonard's study only included women who were drinking at some level and therefore cannot shed light on any potential racial differences between drinkers and abstainers. It is therefore uncertain whether race is a determinant of alcohol use at lower levels.

Studies examining nicotine use mainly suggest that White women are the least likely to quit smoking during pregnancy (Hanna, Faden and Dufour 1994; Martin 2008). However, it was White, Black, and Mixed-race pregnant women who had higher prenatal smoking rates than Indian, Bangladeshi and Pakistani women in a UK study (Pickett et al. 2009). There is further discrepancy; one study suggests that it is Black pregnant women who are the least likely to quit (Zimmer and Zimmer 1998). Although many studies investigating smoking and alcohol use during pregnancy have examined race as a risk factor, there is some doubt over its predictive power. Further research is needed to examine race as a potential determinant of alcohol and nicotine use for pregnant women living in the UK.

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## MATERNAL PARITY

Maternal parity is termed as either primigravida (a woman who is pregnant for the first time) or multigravida (a woman who has been pregnant more than one time). In

terms of drinking during pregnancy, again discrepancies in the literature exist. Some studies suggest that women who have had more prior pregnancies are less likely to reduce their alcohol consumption (Day et al 1993, Testa and Leonard 1995). Contrary to these results, Pirie et al. (2000) found that multigravidae were significantly less likely to drink than primigravidae. Of the women drinking alcohol at any level, 65% had previously been pregnant (Pirie et al. 2000). The reasons behind these results are uncertain and will be discussed later in terms of midwife behaviour.

Smoking during pregnancy appears to be more clearly linked with maternal parity. Multigravidae are more likely to smoke (Lelong et al. 1995, Linares Scott et al. 2009) and are more likely to smoke at a heavier level (Pickett et al. 2009). Furthermore primigravidae showed less urge to smoke than multigravidae (Händel 2009). One potential reason for this link between maternal parity and continued smoking could be that women who have had more previous pregnancies may have had made more attempts to quit in the past. Research suggests that when there is a history of attempting, and failing to quit in the past, smoking during pregnancy is more likely (Peterson et al. 2009). It may be that failing to quit in the past weakens the individual's perceived behavioural control and/or self-efficacy for future attempts (den Boer et al., 1991).

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## MARITAL STATUS

Whether a woman is married, co-habiting, or single may impact indirectly upon her health behaviours. Women who are not married appear to be at the greatest risk for both alcohol use and nicotine use. Eleven percent of non-married women were drinking compared to 6% abstaining (Pirie et al. 2000) and non-married women were at a greater risk of heavier drinking (Caetano et al. 2006, Hanna, Faden and Dufour 1994, Leonardson and Loudenberg 2003). Similarly, women who are unmarried smoke more than those who are married (Hanna, Faden and Dufour 1994), and are more likely to smoke at any level (Haslam and Lawrence 2004, Linares Scott et al. 2009, Martin 2008, Pickett et al. 2009). The potential mechanisms behind this association are unclear. It could be proposed that social support may be greater in non-single women, which may aid abstinence during pregnancy. Research suggests a role for

social support in predicting alcohol consumption during pregnancy (Stephens 2008). However, as discussed next, research suggests that the partner's own negative health behaviour may play a role in determining continued smoking and drinking during pregnancy.

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## PARTNER BEHAVIOUR

A number of studies have investigated whether the drinking behaviour of the pregnant woman's partner is related to her own. Lelong et al. (1995) found a significant association between the level of alcohol use of the father of the child and that of the mother. Leonardson and Loudenberg (2003) found that living with a substance user was linked to drinking during pregnancy. However, in contrast to this Testa and Leonard (1995) reported that women who reduced their alcohol consumption were actually more likely to have a partner who drank alcohol. Perhaps understandably there is a clearer association between partner smoking behaviour and pregnant women's smoking behaviour. For the majority of pregnant drinkers alcohol is not an addiction however, for the majority of pregnant smokers, nicotine will be an addiction. A pregnant woman's attempts to quit smoking are likely to be undermined by the visual and olfactory cues of others smoking. Smoking during pregnancy is indeed related to the smoking status of both the woman's partner (Giglia et al. 2007, Lelong et al. 1995, Lemola and Grob 2008, Severson et al. 1995). Women who continue to smoke during pregnancy are more likely to be living with a smoker than those who quit (Haslam and Lawrence 2004). Furthermore, pregnant women report finding quitting smoking easier if their partner is a non-smoker (Peterson et al. 2009). There is also significant health issues related to secondary smoking. Pregnant women exposed to second-hand smoke may be more likely to experience negative health outcomes including spontaneous abortion (Windham, Swan and Fester 1992) and lower birth weight (Wu et al. 2007). The influence of important females in a pregnant woman's life may also influence her alcohol and nicotine use. Lemola and Grob (2008) found that smoking cessation during pregnancy was related to the smoking status of the pregnant woman's mother and mother-in-law. Important women mothers, grandmothers and sisters are likely to have an impact upon both social norms related to smoking and alcohol use and through informal advice giving. For example,

unrealistic optimism (Weinstein 1980) may play a role; a pregnant woman's risk perception may be impacted by other women in her social network who have smoked or drank during pregnancy and gone on to have apparently health babies.

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### 2.1.2. MENTAL WELL-BEING

Pregnancy is a period of major transition for women. The hormonal, as well as psychological and social, changes that occur may make it more likely for women to experience emotional distress (Teixeira et al. 2009). Alcohol and nicotine may be used as maladaptive coping strategies by individuals experiencing emotional distress to reduce symptoms, or as a response to the symptoms of emotional distress (Littleton, Radecki Breitkopf and Berenson 2007). Alcohol use during pregnancy has been linked with greater psychosocial and interpersonal relationship problems (Pickett et al. 2009). Women drinking more than 7 standard drinks a week were significantly more likely to have emotional problems, be physically abused, and meet psychiatric case status on the General Health Questionnaire (Stewart and Streiner 1994). Examining stress, depression and anxiety may go some way to help explain why some women continue to drink and smoke during pregnancy.

Depression during pregnancy is relatively common, with prevalence rates ranging from 7.4% in the first trimester, 12.8% in the second and 12.0% in the third (Bennett et al. 2004). Depression during pregnancy is related to negative health behaviour practices including smoking and drinking during pregnancy (Lindgren et al. 2003). Smoking during pregnancy is significantly associated with greater symptoms of depression (Linares Scott et al. 2009, Zhu and Valbø 2002) and drinking during pregnancy is associated with low mood (Leonardson and Loudenberg 2003) and depression (Hanna, Faden and Dufour 1994; Lindgren 2003).

Anxiety and stress are also relatively common in pregnancy. The prevalence of anxiety during pregnancy varies according to trimester. Teixeira et al. (2009) report a U-shaped curve with higher rates of anxiety in trimester 1 (15.0%) and 3 (18.2%) than in trimester 2 (12.3%). Elevated anxiety scores are related to both prenatal alcohol use (Alvik 2006) and continued nicotine use (Goedhart 2009, Paarlberg et al. 1999). Smokers report that nicotine use has a positive effect on mood, is relaxing and has a

calming effect (Arborelius and Nyberg 1997). Similarly, in a qualitative study of currently pregnant women, the stress relieving benefits of alcohol use emerged as a theme (Raymond et al. 2009). For some women this reported beneficial aspect of drinking alcohol during pregnancy outweighed the potential risks (Raymond et al. 2009). Women who continued smoking, reported that they faced so many problems during their pregnancy that they could not have managed to quit (Arborelius and Nyberg 1997); thereby supporting the hypothesis that smoking is used as a coping strategy for stress. Furthermore, women who smoke during pregnancy, retrospectively report higher levels of stress than non-smokers and quitters (Bullock et al. 2002). These women reported that the main stressors they faced included financial worries, family problems and domestic violence. Goedhart (2009) also identified high job strain and exposure to physical/sexual violence as significant stressors related to continued smoking in a cross-sectional survey of pregnant women, who smoked before becoming pregnant. Paarlberg et al. (1999) found that currently pregnant women who were current or former smokers reported significantly more daily stressors than never smokers, and rated the stressors as more severe.

It therefore appears as though depression, anxiety and stress may be influential factors in determining which pregnant women continue to smoke and drink. Previous research has tended to focus on only one psychological well-being construct when examining the links with smoking and alcohol use during pregnancy. Prospective, longitudinal studies examining depression, anxiety and stress are required to investigate which are the most influential constructs in determining antenatal alcohol and nicotine use.

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### 2.1.3. ATTITUDES AND BELIEFS

The term 'attitude' was once used to describe spatial orientation of physical objects such as statues but the term has evolved to refer to a hypothetical construct that is not directly observable but which can be inferred through observable responses to stimuli (Pratkanis, Breckler and Greenwald 1989). Research conducted in the 1930s resulted in a number of prominent proposals for the definition of attitude. Allport (1935) reviewed the attitude literature and found considerable diversity in the use of



the term. Allport (1935) therefore offered an integrative definition of attitude as a “mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related” (p810). Allport’s implicit theory assumed that attitudes guide behaviour by orienting and energising the organism to act (Berkowitz 1989).

Thurstone (1931) defined attitude as the “the amount of affect for or against a psychological object” (p261) but did not postulate on the theoretical underpinnings of attitude formation, structure or function (Berkowitz, 1989). Fishbein (author of the Theory of Reasoned Action and later co-author of the Theory of Planned Behaviour see section 2.1.4.) endorsed this unidimensional definition of attitude and viewed attitude as a distinct construct from beliefs and behavioural intentions. Fishbein (1967b) argued that beliefs are the antecedents of behaviour and behavioural intentions as the consequents. He felt that attitudes could be measured by evaluating either beliefs or behavioural intentions. The expectancy value model (Fishbein 1961, 1963, 1967b) proposes that attitudes are a function of salient behavioural beliefs; consisting of the belief that performing the behaviour leads to some consequence, and the evaluation of this consequence. A number of researchers have examined pregnant women’s attitudes and beliefs about alcohol and nicotine use during pregnancy.

Plant (1984) examined Scottish women’s beliefs about alcohol use during pregnancy in the period 1981-1982. At this time, around seventy percent of women reported that they had reduced their consumption since becoming pregnant, and around half of this group reported doing so because they were worried about the effects of drinking alcohol on their babies. The attitudes women hold are likely to be influenced by a number of factors including social norms, media coverage, medical opinion and guidelines, and are therefore likely to evolve over time. Sixty per cent of pregnant women felt 2 drinks per day was a reasonable level of consumption during pregnancy in 1995 and only 6% did not feel that at least 1 drink per day was reasonable (Lelong et al. 1995). The more a woman reported drinking herself, the greater the level of consumption deemed reasonable (Lelong et al. 1995). Despite these apparently positive attitudes towards alcohol use during pregnancy, 83% of these women felt that

alcohol was harmful to their baby's health and 93% believed smoking to be harmful (Lelong et al. 1995). The women also felt that a greater level of beer than wine was deemed reasonable (Lelong et al. 1995). A more recent qualitative study of pregnant women's attitudes to drinking (Raymond et al. 2009) highlighted that variation in attitudes is present. The women in this study varied in their perceptions of the risks of drinking during pregnancy. Some felt that because there was conflicting information the only safe route was abstinence whilst others felt that as long as drinking remained 'sensible' there was no harm (Raymond et al. 2009). Raymond and colleagues (2009) also discovered that the woman's attitudes were influenced by knowledge of previous pregnancies (both her own and within her social circle) exposed to alcohol without apparent negative effects. Attitudes towards the pregnancy itself also appear to be important; more negative attitudes (e.g. "I did not want this pregnancy at this or any time in the future") were linked to both drinking and smoking (Hanna, Faden and Dufour 1994).

It is commonly believed that attitudes determine behaviour however, as Terry and Hogg (1996, pp. 776) state "despite popular opinion to the contrary, attitudes do not have a strong impact on people's behaviour". More complex models than attitude-behaviour are required in order to reliably predict individuals' behaviour.

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#### 2.1.4. KNOWLEDGE AND ADVICE

As discussed in section 1.2, the guidelines for alcohol use during pregnancy are unclear and pregnant women may find them confusing. This confusion is likely to impact both upon the knowledge pregnant women hold and the advice they are given. Lelong et al. (1995) reported that only 7% of women received advice from health professionals about reducing their alcohol consumption, compared to 61% of smokers receiving cessation advice. Although this research is dated, more recent studies suggest that women are still receiving limited, inconsistent, or no advice at all (Elliot et al. 2006, Raymond et al. 2009, Tong et al. 2008). A detailed review of health professionals' practice is given in section 3.1.

Women report that their evaluation of the risk of drinking during pregnancy is hindered by the availability of conflicting advice (Raymond et al. 2009). Women felt

that the guidelines and media coverage regarding alcohol use were confusing, unclear or lacking in detail (Raymond et al. 2009). Although guidelines for nicotine use during pregnancy are clearer, and have been so for some time, research suggests that this does not necessarily lead to true understanding. Being aware of a negative impact did not relate to an understanding of what this means in real terms (Peterson et al. 2009). Furthermore, although women show awareness of the risk of nicotine exposure to the foetus, the experience of having a friend or relative giving birth to a healthy baby after smoking during pregnancy negates the scientific evidence (Arborelius and Nyberg 1997).

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#### 2.1.5. PREVIOUS DRINKING/SMOKING BEHAVIOUR

The pre-pregnancy drinking and smoking habits of women are related to their prenatal consumption behaviour. Pregnant smokers had smoked more cigarettes per day pre-pregnancy and began smoking at a younger age (Linares Scott et al. 2009). Similarly, women “at risk of alcohol-exposed pregnancy” (i.e. those not using birth control methods and drinking) were more likely to have started drinking before 16 years-old (CHOICES, 2002). Drinkers consuming three drinks or less per week were more likely to abstain from drinking when pregnant than women who drank at higher pre-pregnancy levels (Pirie et al. 2000). The pattern of drinking consumption also appears to be important. Palma et al. (2007) report that women engaged in weekday drinking pre-pregnancy were less likely to abstain, whereas this relationship was not seen for women who only drank at weekends. They also found that binge drinking prior to pregnancy decreased the likelihood of abstinence in pregnancy.

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#### 2.1.3. MATERNAL-FOETAL ATTACHMENT

Attachment is the affectionate relationship that develops between child and caregiver. Attachment theory (Bowlby 1969, 1973 and 1980) argues that young children need to develop an attachment relationship (i.e. an emotional bond) with at least one primary caregiver in order to develop normally. The quality of interactions with caregivers results in internal working models that determine affect regulation (Mikulincer and Sheffi 2000). Bowlby’s theory predicts that the quality of the attachment relationship is determined by patterns of early care-giving behaviour and has an important impact

on later socio-emotional development (O'Connor, Kogan and Findlay 2002). Infants become attached to caregivers who are sensitive and responsive to their needs. Work carried out by Ainsworth, Bell and Stayton (1973) defined three main attachment types; secure, avoidant and anxious ambivalent. The characteristics of these types are shown in table 2.1.

Table 2.1 Attachment types and corresponding infant behaviour

<b>Attachment type</b>	<b>Infant behaviour</b>
Secure attachment	No strong distress when mother leaves, greets mother on her return
Avoidant attachment	No particular distress when mother leaves, ignores mother on her return
Anxious ambivalent attachment	Significant distress displayed on mother's departure, rush to her side but inconsolable and angry on mother's return

A large number of research studies have demonstrated robust associations between infant attachment types and later socio-emotional development in early childhood (O'Connor, Kogan and Findlay 2002).

Feelings of attachment begin during pregnancy and show a significant relationship with postnatal attachment (Muller 1996). Maternal-foetal attachment (MFA) was first proposed to link to health behaviours in pregnancy by Reading et al. (1982); whereby more positive attachment feelings were proposed to relate to more optimal health behaviours. In support for this hypothesis, Lindgren et al. (2003) found that low MFA (as measured by the Maternal-Fetal Attachment Scale; MFAS, Cranley 1981) in inner city women was linked to poorer health practices than women living in the same area with higher MFA. It appears, however, that depression may be an important factor to consider in the links between MFA and health behaviour. Lindgren (2001) found that

high MFA was linked to better health practices but only when there were low levels of depression. Research linking MFA and depression is somewhat mixed, with some reports of no differences in MFA between depressed and non-depressed women with gestational diabetes (Chazotte et al. 1995), whilst others found higher levels of depression significantly associated with lower MFA (Condon and Corkindale 1997). The stage of pregnancy under investigation and the measure of MFA employed may help to explain some of the variation in reported results. Many of the studies investigating MFA and depression (e.g. Lindgren et al. 2003, Chazotte et al. 1995) utilise the MFAS (Cranley 1981). However this scale has attracted criticism due to a number of the MFAS items being irrelevant for early pregnancy (Van den Bergh and Simons 2009) and due to the focus not being limited to attachment to the foetus but also to feelings about the pregnancy state and the motherhood role (Condon 1985). A woman may feel extremely attached to her unborn child whilst concurrently feeling negative about being pregnant (e.g. due to physical symptoms or negative body image perceptions). Therefore research investigating links between MFA and health behaviour needs to investigate the potential impact of maternal emotional distress whilst using measures related to feelings about the unborn child.

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#### 2.1.4. SOCIAL COGNITION APPROACH

A social cognition approach (see section 1.11) to determining predictors of health behaviours involves identifying key cognitions and their inter-relationships in the regulation of individuals' behaviour. Applying a social cognition model to alcohol and nicotine use during pregnancy is justified for a number of reasons. Firstly, although alcohol and nicotine use during pregnancy are likely to be determined by a wide range of factors including personality, and social circumstances; these factors are mediated by social cognitive constructs (Conner and Norman 2005b). Furthermore, a focus on the social cognitive determinants of behaviour identifies risk factors that are assumed to be more malleable and therefore useful for informing intervention work in this area (Conner and Norman 2005b). The Theory of Planned Behaviour (TPB; Azjen 1988, 1991) is one such model and has been successfully applied to predicting drinking and smoking behaviour in non-pregnant samples.

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## THE THEORY OF PLANNED BEHAVIOUR

The TPB was developed as an extension to the Theory of Reasoned Action (TRA; Fishbein and Azjen 1975; Azjen and Fishbein 1980). The TRA suggests that volitional behaviour is determined by a person's intention to engage in the behaviour. It proposes that intention is in turn determined by the individual's attitudes towards the behaviour, and their beliefs about what others do and what is expected of them (the subjective norm). The TPB extended the TRA model beyond purely volitional behaviours, to include a role for an individual's beliefs about the ease or difficulty of performing the behaviour (perceived behavioural control, PBC). The TPB predicts that a person's perceived behavioural control will have a direct influence on their intention and their actual behaviour. Under this framework, the more favourable the individual's attitudes and subjective norm, and the greater the perceived behavioural control; the greater the individual's intention to engage in a specific behaviour. Greater intention to engage in a behaviour will subsequently mean a greater likelihood of the individual adopting the behaviour. The model has considerable empirical support (e.g. Armitage and Conner 2001; Godin and Kok 1996). Armitage and Conner (2001) conducted a meta-analysis of 185 studies applying the TPB to a range of behaviours. TPB variables accounted for 27% of the variance in intention and 39% of the variance in behaviour. The model is even more effective when applied to health behaviours. Godin and Kok (1996) conducted a review of 56 studies applying the TPB to 87 different health behaviours. The TPB was able to account for around 41% and 34% of the variance in intentions and future behaviour respectively.

A number of studies have used the TPB to predict and explain nicotine use mainly in non-pregnant participants. A small number of studies have applied the model to smoking during pregnancy. Godin et al. (1992) report that PBC, attitudes and subjective norm explained intention to smoke, and PBC was the most important predictor of smoking in non-pregnant women. For the pregnant women in Godin's study, intention was influenced by PBC and attitude, and behaviour was predicted by PBC only. Bennett and Clatworthy (1999) found that the attitude and the PBC beliefs components of the TPB to be significant predictors of pregnancy smoking status, correctly categorising 95% of their sample.

TPB variables explain 16.7%-76% of the variance in intention to drink alcohol in non-pregnant samples (McMillan and Conner 2003 ; Marcoux and Shope 1997) and around 17-73.4% of the variance in non-pregnancy drinking behaviour (Armitage et al. 1999; Huchting, Lac and LaBrie 2008). Most studies examining the TPB applied to alcohol use are investigating participants' usual drinking patterns. However, pregnant women are likely to have made some changes to drinking patterns and may be attempting to limit their use (Giglia and Binns 2007). A small number of studies have examined the TPB's utility with regard to limiting or reducing drinking. Murgraff, McDermot, and Walsh (2001) examined females' adherence to low risk single occasion drinking guidelines. Attitude, subjective norm and PBC explained 17% of the variance in participants' adherence to the guidelines. Cooke, Sniehotta and Schültz (2007) also examined the model's effectiveness in predicting participants' reduction in binge-drinking behaviour. Cooke et al. (2007) used an extended TPB, and this accounted for 58% of the variance in participants' intentions to limit their drinking. TPB variables explained 37% of the variance in participants' drinking behaviour, and when a measure of past behaviour was added to the model, this increased to 43%.

Although there is evidence to suggest that the TPB is effective in predicting alcohol and nicotine use in non-pregnant populations, a more specific test of the model is required to determine its utility in the context of use during pregnancy. Conner and Sparks (2005, pp.171) argue that in TPB studies:

*"... general attitudes should predict general classes of behaviours and specific attitudes should predict specific behaviours"*

Therefore, a questionnaire based solely on general alcohol and nicotine use is unlikely to be appropriate for a pregnant population. Pregnant women are likely to hold specific attitudes regarding alcohol and nicotine use during pregnancy, that may be very different from their general attitudes to alcohol and nicotine use. Research evidence suggests that examining the subjective norms of pregnant women is likely to be useful. For example, women who did not reduce their drinking (either from heavy to light/abstention or from light to abstention) were more likely to report that at least one 'social unit' (friend or group of friends they socialise with regularly) approved of

drinking during pregnancy (Testa and Leonard 1995). To the best of the researcher's knowledge no previously published studies have applied the TPB specifically to alcohol use during pregnancy.

A number of studies have reported that past health behaviour has a direct influence on future health behaviour (e.g. Norman, Conner, and Bell 2000; Godin, Valois and Lepage 1993; Norman and Smith 1995). This has led some TPB researchers to propose the addition of past behaviour as a predictor variable within the TPB model (e.g. Norman, Conner and Bell 2000). This is a contentious issue within TPB research, with the model's creator arguing that past behaviour has no explanatory value (Ajzen 1980) and instead "leads to the formation of a habitual response that does not require the mediation of the social cognitive variables outlined in the TPB" (Norman et al. 2000 pp. 251).

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#### HEALTH LOCUS OF CONTROL

A great deal of research has examined the controllability dimension of illness attribution using the concept of health locus of control (HLC). HLC has its origins in Social Learning Theory (Rotter 1954), where the likelihood of a behaviour is determined by a) the extent to which the individual believes the behaviour will lead to a particular reinforcement; and b) the value that is placed on the reinforcement. Individuals are classed as 'internals', who believe that events are the consequence of their own actions, or 'externals', who believe that events are unrelated to their own actions (Rotter 1966 cited in Norman et al. 1998). It is assumed that individuals who believe they have a greater control over their health status ('internals') will be more likely to adopt health-enhancing behaviours, and avoid behaviours that would be detrimental to their health (Wallston and Wallston 1978).

The health locus of control questionnaire (Wallston, Wallston and DeVellis 1978) evaluates whether an individual attributes an internal or external locus of control to their health. An internal health locus of control indicates the person believes themselves to be responsible for their health. An external locus of control indicates that the person believes other influences determine their health. These influences can be either powerful others (e.g. doctors or health professionals) or fate/luck.



The HLC concept has its critics (e.g. Calnan 1988, Norman et al. 1998). Norman et al. (1998) argue that the HLC construct is a weak predictor of health behaviour. However, Norman (1995) supports the notion that the construct should be applied to health behaviour at the specific level; rather than applying HLC to health in general, it should be used to examine explicit health situations. One specific application of the HLC concept is the Foetal Health Locus of Control (FHLC; Labs and Wurtele 1978) scale. The FHLC measures a pregnant woman's perceptions about where the causal determinants of her unborn baby's health lie (within herself or out-with her control). The FHLC has some empirical support for use to predict health behaviours during pregnancy. Women drinking more than 7 standard drinks per week score significantly higher on the chance scale than on the internal scale (Stewart and Streiner 1994) of the FHLC. This means that women drinking at this level are more likely to believe that chance rather than their own actions determines the health of their baby. An internal locus of control is associated with pregnant women's smoking behaviour and caffeine consumption (Labs and Wurtele 1986). Continued smokers score significantly lower on the internal scale of the FHLC, and thus feel less personally responsible for the health of their baby (Haslam, Lawrence and Haefeli 2003, Haslam and Lawrence 2004).

As discussed above, research into the predictors of alcohol and nicotine use is clouded with contradiction. Findings differ due to research focusing on different stages of pregnancy, using varying definitions of high, moderate and low consumption whilst also relying on retrospective measures of behaviour. Additionally there is a lack of research based on theory, with few studies examining the predictive power of social cognition models. In particular, research examining the incidence, predictors and consequences of alcohol and nicotine use during pregnancy has received little research attention in Scotland, despite excessive alcohol use being widespread in the general Scottish population (see section 1.1). Previous research examining the behaviours in Scotland has relied on retrospective reports of consumption allowing for recall bias. Further research using different methodologies is warranted to obtain a clearer picture of the behaviours in Scotland. Utilising a social cognition approach to investigate the determinants of alcohol and nicotine use during pregnancy is under-researched but may prove to be merited. Both the TPB and FHLC have research

evidence to suggest that they may help to identify and explain drinking and smoking behaviours during pregnancy. A social cognition approach allows for the identification of relevant factors that may be more useful for intervention work than those identified through research without this focus.

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#### 2.1.5. RESEARCH AIMS

Study 1 aims to determine the incidence of and potential predictors of prenatal smoking and alcohol consumption in order to identify potential avenues for intervention. The intention is to determine levels of smoking and drinking during pregnancy; and to investigate socio-demographic variables, advice, mental well-being, social cognitive variables and maternal-foetal attachment as potential predictors of prenatal smoking and drinking behaviour. The relative importance of each of these factors will be evaluated and discussed in terms of potential avenues for intervention work. Study 1 will also test a specific social cognition model, the TPB model in terms of predictive power for alcohol and nicotine use during pregnancy, and will also determine whether there is evidence for the inclusion of a past behaviour construct in the model.


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#### 2.1.6 HYPOTHESES

Alcohol use:

1. Demographic variables will differ between drinkers and abstainers
2. Drinkers will differ from abstainers on depression, anxiety and stress scores
3. Drinkers and abstainers will differ in their attitudes towards alcohol use
4. Alcohol advice received from health professionals will be associated with alcohol behaviour
5. Previous drinking behaviour will be related to alcohol use during pregnancy
6. Abstainers and drinkers will differ on attachment scores
7. Theory of planned behaviour variables will differ between drinkers and abstainers
8. Health locus of control scores will differ between drinkers and abstainers

## Smoking:

1. Demographic variables will differ between smokers and abstainers
  2. Smokers will differ from abstainers on depression, anxiety and stress scores
  3. Smokers and abstainers will differ in their attitudes towards smoking during pregnancy
  4. Smoking advice received from health professionals will be associated with smoking behaviour
  5. Previous smoking Behaviour will be associated with pregnancy smoking behaviour
  6. Smokers and abstainers will differ on attachment scores
  7. Theory of Planned Behaviour variables will differ between smokers and abstainers
  8. Health Locus of Control scores will differ for smokers and abstainers
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## 2.2 METHOD

### 2.2.1. PILOT STUDY

A pilot study was carried out prior to the main study in order to determine whether the questionnaire was; measuring what was intended to be measured, appropriate for the sample, and comprehensive enough to collect all the information needed to address the purpose and goals of the study. A convenience sample of 12 pregnant or recently pregnant university employees and contacts out-with the university were recruited through word-of-mouth. The questionnaire pack was either emailed or posted to the participants along with an information sheet and comments form. The results of the pilot study resulted in minor changes to the format of the questionnaire. For example, one pilot participant expressed concern that the DASS-21 questionnaire items may be construed as being symptoms that pregnant women may experience. This was remedied by including a statement before this section of the questionnaire indicating that these questions were not specific to pregnancy. A short interview was conducted with one participant to discuss the questionnaire face-to-face. This interview indicated that none of the questions were perceived to be unclear, irrelevant, or upsetting and that completion time was deemed to be acceptable.

### 2.2.2. PARTICIPANTS

Participants were pregnant women attending their 20 week antenatal scan at two ante-natal scanning departments in the Grampian region. Consent was obtained from 204 women, with 130 (63.7% response rate) returning the questionnaire. No information is available for the women who declined to take part in the study. Both a city hospital and community hospital were included as sites for recruitment to ensure participation from women living throughout the region. Participants were eligible for inclusion in the study if they were over the age of 16 and able to give informed consent (as specified by NRES), and near 20-weeks gestation. Participants (N=130) were mainly married (64.1%) or living with a partner (29.8%). The greatest proportion (31.3%) was educated to degree level, while 12.2% were educated to standard grade level only. An even split was found for participants' region of residence; 52.3% lived in Aberdeen city, and 47.7% in Aberdeenshire. Participants tended to be in employment

(74.8%) and the majority were white (83.2%). The mean age of the sample was 29.6 years (SD 5.1) with a minimum age of 16 and maximum of 41. For 62.5% of participants this was their first pregnancy, and the mean gestational age at questionnaire completion was 22.29 weeks (SD= 3.49) range 19 to 38 weeks). Most participants reported that they had first visited their midwife at an average of 8.9 weeks gestation (range 5 to 16 weeks).

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### 2.2.3. QUESTIONNAIRES

A questionnaire design was chosen to investigate the research aims (for justification see section 1.12). The 14-page questionnaire pack (appendix 2) contained the following validated questionnaires:

#### *Depression Anxiety and Stress Scale (DASS-21; Lovibond and Lovibond 1995)*

The DASS-21 was used to give an indication of current levels of stress, depression and anxiety in the sample. The DASS-21 has 21 items and taps into 3 constructs: depression, anxiety and stress. Participants are asked to rate how strongly (0: *does not apply to me at all*, 1: *applies to me in some degree or some of the time*, 2: *applies to me a considerable degree or a good part of the time*, 3: *applies to me very much or most of the time*) each item applied to them in the past month. For example, “I couldn’t seem to experience any positive feelings at all”. Scores for each item of the three constructs are multiplied by 2 and then summed to give a total score for depression, one for anxiety and a third for stress (scores for each subscale can range from a minimum of 0 to a maximum 42). Higher scores indicate a higher level of depression, anxiety or stress. Scores of 8 and above for depression, 5 and above for anxiety and 14 and above for stress are indicative of non-normal scores. The DASS-21 has established reliability and validity (Henry and Crawford 2005) and was used in preference to other measures of depression, anxiety and stress as it is a combined measure for all 3 constructs and is therefore short and quick for participants to complete. In order to achieve the best possible response rates it was important that the questionnaire was kept to a length that was acceptable for participants to complete. It was also chosen as it includes a subscale for stress, not included in other

commonly used measures such as the Hospital Anxiety and Depression scale (Zigmond and Snaith 1983).

*Prenatal Attachment Inventory (PAI; Muller 1993)*

The PAI was included to measure a pregnant woman's attachment to her unborn baby. Participants were asked to rate how often in the last month 21 statements had applied to them. For example, "I get very excited when I think about the baby". Responses are coded on a scale of 1-4 ('almost never' – 'almost always') and summed to give a total score that can range from 21-84, with higher scores indicating greater maternal feelings of attachment to the foetus. The PAI has empirical support shown in its stability across different samples of women and contains items relevant for the stage of pregnancy examined in this study unlike other measures of maternal-foetal attachment (Muller, 1993). The measure has demonstrated reliability and internal consistency (Muller 1993).

*Foetal Health Locus of Control (FHLC; Labs and Wurtele 1978)*

The FHLC is based on the Multi-dimensional Health Locus of Control (Wallston and Wallston 1981) and was included to measure the degree to which pregnant women believe their health is under their own control. Participants are asked to rate how strongly they agree or disagree to 4 statements relating to internal control. For example, one item is "my unborn child's health can be seriously affected by my dietary intake during pregnancy". Participants' responses are coded 1-6 (strongly disagree – strongly agree) and summed to give a total score ranging from 4-28. Higher scores indicate greater strength of belief about locus of control i.e. a person with a high score on the internal scale feels personally responsible for the health of their unborn child, whilst someone with a low score may feel that external influences such as powerful others (medical professionals) or fate plays more of a role. Norman (1995) supports the notion that the construct should be applied to health behaviour at the specific level; rather than applying HLC to health in general, it should be used to examine explicit health situations. The FHLC has been shown to be more reliable and valid than the Multi-dimensional Health Locus of Control in pregnant samples (Stewart and Cecutti 1993) and is the only measure of locus of control specific to foetal health.

The questionnaire pack also included the following non-validated questionnaires:

#### *Socio-demographic Questionnaire*

Information was gathered regarding the woman's age, relationship status, number of children, level of education, employment status, own and partner occupation, and ethnic origin. This was done in order to investigate the relationship between socio-demographic variables and alcohol and nicotine use.

#### *Pregnancy Information*

Participants were asked to report the current gestation of the pregnancy in weeks, the gestation in weeks when they realised they were pregnant and when they first saw their midwife. These questions were asked to ensure that participants were around the same stage in pregnancy (20 weeks) and to determine whether any reported changes to smoking and drinking patterns could be tied in to pregnancy recognition or the commencement of antenatal care.

#### *Alcohol and smoking advice*

Participants were asked if they had received any advice about smoking and drinking during their pregnancy, and, if they had, were also asked to identify who had delivered this advice (GP, midwife, other health professional, other), how it was delivered (face-to-face, booklet, DVD, website), and when it was delivered (in terms of gestational weeks). This information was elicited in order to determine what level of advice was received by pregnant women and in order to make comparisons between the percentages of pregnant women receiving advice based on midwife and patient reports.

#### *Past and Present Nicotine and Alcohol Use and Partner Behaviour*

Participants were asked to answer 8 questions on their past and present alcohol use and 5 questions regarding their nicotine use. The questions in this section were developed based on questions from the Alcohol Use Disorders Identification Test (AUDIT), an alcohol screening tool developed by a World Health Organisation study group (Saunders, et al. 1993). The AUDIT is a reliable and valid screening instrument

to identify at-risk drinkers within primary care and pre- and antenatal settings (Scottish Intercollegiate Guidelines Network, 2004). The AUDIT was used in preference to alcohol screening tools such as TWEAK (Chan et al. 1993) and T-ACE (Sokol, Martier, and Ager 1989) as it includes questions relating to actual consumption rather than merely indicating problem drinking. Participants were provided with examples of what a unit of alcohol related to (e.g. one unit equals a standard measure of spirit) in real terms to aid their reporting.

Participants were asked to rate how often they were consuming a drink containing alcohol (*never, monthly or less, 2 to 4 times a week, 2 or 3 times a week, 4 or more times a week*), how many drinks containing 1 unit they had on a typical drinking day (*1 or 2, 3 or 4, 5 or 6, 7 to 9, 10 or more*), and how often they exceeded 6 or more units in one occasion (*never, monthly or less, 2 to 4 times a week, 2 or 3 times a week, 4 or more times a week*). Similar questions were asked regarding nicotine use; “how often do you have a cigarette”, and “how many cigarettes do you have on days when you smoke”. Participants were also asked to estimate the most alcohol they had drunk in one occasion since becoming pregnant, both before they were aware they were pregnant and after pregnancy recognition.

A further two questions related to whether a change in smoking or drinking habits had occurred since learning of their pregnancy and at what gestational week any change had occurred. This was asked in order to investigate when in early pregnancy changes were made and whether changes occurred around pregnancy recognition or at a point after this. Participants were also asked to report their partner’s behaviour in terms of whether or not they drank or smoked (as a Yes/No response format).

#### *Theory of Planned Behaviour Questionnaire*

The TPB questionnaire has 4 subscales investigating participants’ intention to engage in the behaviour (i.e. smoke or drink), their attitude towards the behaviour, their beliefs about the subjective norm (what they believe other people do), and their perceived behavioural control (the degree to which they can control the behaviour). These questions were developed according to guidance for the construction of TPB questionnaires for health research (Francis et al. 2004).



The 'intention' subscale has 3 items, the 'attitude towards behaviour' subscale has 4 items, the 'subjective norm' subscale has 3 items and the 'perceived behavioural control' subscale has 4. The items consist of statements about alcohol and nicotine use and participants are asked to rate how strongly they agree or disagree with each. For example, one intention item states "I expect (ed) to stop drinking alcohol whilst I am pregnant", a subjective norm item states "It is expected of me that I should stop drinking alcohol whilst I am pregnant", and a perceived behavioural control item states "I am confident I could stop drinking alcohol whilst I am pregnant if I wanted to". The attitude questions states "for me drinking whilst I am pregnant is..." with a number of response formats below (e.g. harmful – beneficial, good-bad). Items are recoded so that high scores consistently reflect stronger agreement towards stopping alcohol during pregnancy, then mean scores are calculated for each of the four subscales.

For the intention subscale, scores can range from 3 to 15 with higher scores indicating greater intention to stop drinking during pregnancy. The attitude subscale scores can range from 4 to 20 with higher scores indicating more positive attitudes towards drinking during pregnancy. The subjective norm subscale has a possible score range from 3 to 15 and higher scores are reflective of greater perceived social pressure to stop drinking. The PBC subscale ranges from 4 to 20 and higher scores show a greater perceived control over quitting drinking alcohol during pregnancy.

Reliability of the TPB questionnaire was assessed through examining Cronbach's alpha co-efficients. The Cronbach's alpha was 0.74, above the minimum recommended level (Nunnally, 1978) and therefore acceptable.

#### *Attitudes towards alcohol and nicotine use during pregnancy*

Participants were asked to complete ten questions relating to attitudes; six items relating to alcohol and four items relating to nicotine use. Each item was framed as a statement and participants were asked how strongly they agreed or disagreed. For example, 'drinking more than one or two units of alcohol on three or four days a week is likely to harm the baby'. In order to establish overall consistency throughout the questionnaire, responses were on a five-point scale; 1 corresponding with strongly disagree and 5 corresponding to strongly agree. Items were re-coded so that higher

scores related to more healthy attitudes (i.e. attitudes in line with abstinence). Each of the alcohol items were summed to give a total alcohol attitude score which had a possible range from 6 to 30. The alcohol attitude scale achieved a Cronbach's alpha was 0.71, above the minimum recommended level (Nunnally, 1978) and therefore acceptable. The four nicotine items were also summed to give a total smoking attitude score which ranged from 4 to 20. The smoking scale achieved a Cronbach's alpha value of 0.77, again above the minimum level recommended (Nunnally, 1978).

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#### 2.2.4. PROCEDURE

Agreement regarding access to potential participants was obtained from the head of midwifery for NHS Grampian. All women were recruited from ultrasound scanning departments during their 20 week scan appointment. Twenty weeks was chosen as the baseline data collection time-point for a number of reasons. Firstly, the aim of this research was to examine alcohol and nicotine use in continuing pregnancies. The patterns of consumption may well be different in women who have terminations. Secondly, by 20 weeks gestation women will usually have been aware of the pregnancy for some time and will have had time to consider making health behaviour changes. Thirdly, a number of items on the PAI relate to foetal movement and therefore require a minimum of 20 weeks gestation. Finally, 20 weeks was chosen for pragmatic reasons as all pregnant women attend an antenatal scan around this time thereby aiding sampling.

All women who met the eligibility criteria were informed by the researcher about the purpose of the study and issued with a participant information sheet (appendix 4) and consent form (appendix 3). If after reading this they were willing to be included in the study they were invited to sign the consent form, their address was recorded (if consent was given to do so) and they were given a questionnaire pack to take home and return by post in a prepaid envelope to the researcher. A two-week deadline was set for return of questionnaires. Participants who had not returned their questionnaires within this timeframe were sent a reminder letter (see appendix 5). Participants were offered entry into a prize draw (with a prize of £50 of Mothercare vouchers) as an incentive to return their questionnaires. After the research had been

completed, a debrief sheet (appendix 6) was sent out to participants who had indicated that they wished to receive one (tick box option in questionnaire).

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#### 2.2.5. ETHICS

This research project was approved by the North of Scotland NHS Research Ethics Committee, The Robert Gordon University School of Applied Social Sciences ethical review panel and was conducted according to the British Psychological Society's code of conduct. Informed consent was obtained from all participants as specified by the North of Scotland NHS Research Ethics Committee. All questionnaires were treated as confidential and anonymised by a participant code. Only the researcher had access to identifiable information (i.e. addresses) which were stored in a secure location separate from the questionnaires.

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#### 2.2.6. DESIGN

A quantitative questionnaire design was used. The research was designed to explore predictors of alcohol and nicotine use during pregnancy and to obtain estimates of the frequency of the behaviours. The questionnaires employed were chosen in order to provide information on a number of factors (i.e. socio-economic status, mental well-being, advice, attitudes, MFA, and social cognition model constructs) that could be tested to investigate if they predict continued use of these substances.

##### *Dependent Variable*

The dependent variable in this study was the participants' alcohol and nicotine use.

##### *Independent Variables*

There were a number of independent variables:

- 1) The participants' socio-demographics
- 2) The participants' mental well-being
- 3) The participants' attitudes towards smoking and drinking alcohol during pregnancy

- 4) Participants' previous drinking/smoking behaviour
- 5) The participants' attachment to the foetus
- 6) The participants' scores on the Theory of Planned Behaviour subscales
- 7) The participants' health locus of control (in relation to their unborn baby)
- 8) Reported advice received from health professionals

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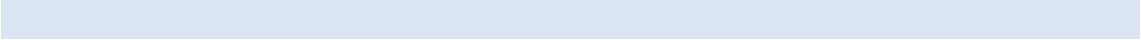
#### 2.2.7. ANALYSIS

Participants who reported that they did not consume any alcohol before becoming pregnant (n=14) were removed from this analysis so that analysis was carried out only on participants who had had the opportunity to change their behaviour during their pregnancy (n=116). One participant reported that they did not consume any alcohol before becoming pregnant but had been consuming alcohol since; this participant was excluded from the analysis as an outlier. It is unknown whether this is a genuine response or it may be that this participant misread the sections and described what they previously drank for the section about current within-pregnancy drinking. Due to this uncertainty they were excluded from the analysis. Of the remaining group, n= 75 (64.7%) reported abstaining from alcohol completely, n=39 (34%) reported drinking alcohol to some level and 1 participant did not answer the question (and was excluded from the analysis). These participants were then grouped, according to their pregnancy drinking behaviour, as abstainers (n=75) or drinkers (n=39).

The majority of participants reported being non-smokers before their current pregnancy n= 97 (76.4%). These participants were removed from the analyses in order to examine only those women who had chosen to stop smoking during their current pregnancy and those who were continuing to smoke. Thirty participants were therefore included in the analysis, 14 (46.7% of smokers, 11.0% of total sample) who were continuing to smoke and 16 (53.3% of smokers, 12.6% of total sample) who reported they had ceased smoking.

Where data were normally distributed with homogeneity of variance, parametric statistical tests were employed. In the event of skewed distributions and/or

heterogeneity of variance, non-parametric methods were used. Independent samples *t*-tests, chi-square and binary logistic regression analyses were carried out in order to examine which variables were influential in determining alcohol and nicotine use during pregnancy.



## 2.3. RESULTS

### 2.3.1. ALCOHOL USE

A number of variables were tested to check their utility in distinguishing between pregnant women who continued to drink during pregnancy and those who abstained. Ninety-two percent of drinking participants (n=34) reported drinking one or two units per drinking occasion, 7.9% (n=3) drank around three or four, and 3 participants did not report number of units typically consumed. Figure 2.1 shows the frequency of current alcohol use in the women drinking during pregnancy.

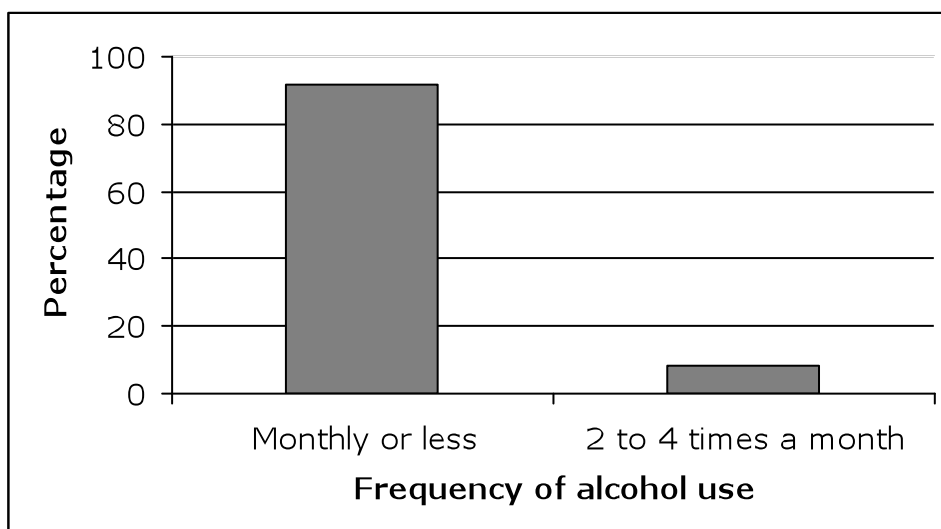


Figure 2.1: Bar chart showing reported frequency of current alcohol use in pregnant drinkers

As can be seen in figure 2.1, 92% of participants (n=34) reported drinking in the monthly or less category, and 2.6% (n=3) in the 2 to 4 times a month category.

Most participants (87.8%, n=101) reported that they had made changes to their drinking habits during their current pregnancy and the mean gestation at which the changes were made was 5.18 weeks (SD=2.09, range 0 to 10 weeks). The mean gestation for pregnancy recognition was 5.32 weeks (SD=1.56, range 4-10 weeks). Before becoming pregnant most participants were drinking two to four times a month (36.5%, n=42) or two or three times a week (34.8%, n=40). The number of units consumed per occasion pre-pregnancy is shown in figure 2.2 below. Most participants

were drinking one or two units per occasion (38.3%, n=44), with 31.3% drinking three or four units (n=36), and 20.0% drinking five or six units (n=23).

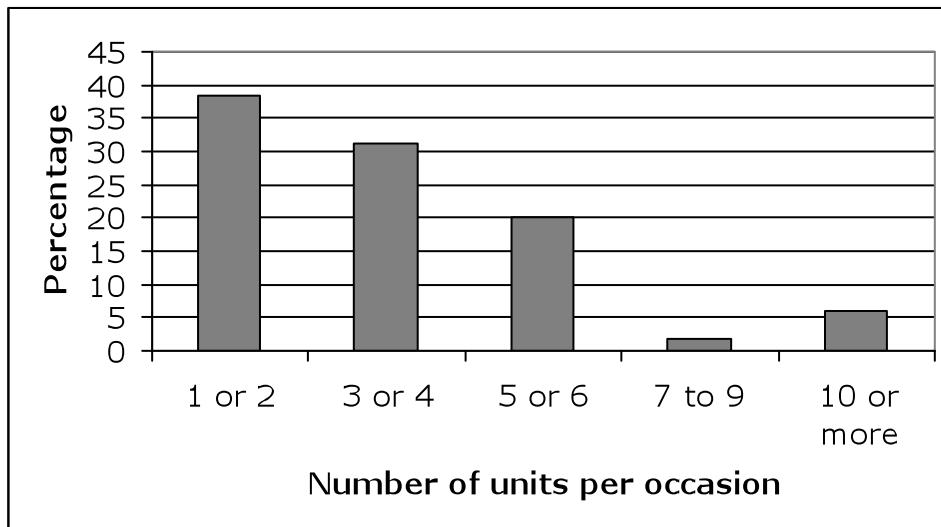


Figure 2.2: Bar chart of the number of units consumed per occasion pre-pregnancy

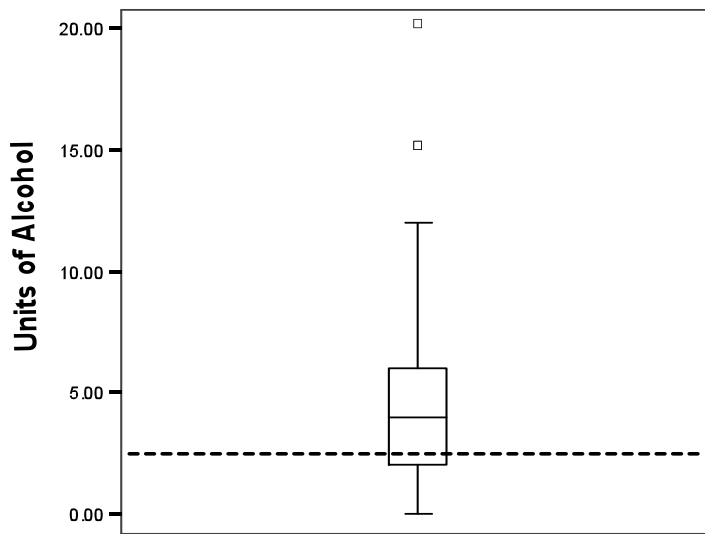


Figure 2.3: Box plot showing the highest number of units consumed in one occasion during pregnancy (before pregnancy recognition)

Participants were asked to report the highest number of units consumed in one occasion both before and after being aware of the pregnancy. Figure 2.3 above, shows the units reported as consumed by participants before realising they were pregnant. The dotted line shows the maximum number of units for non-pregnant women recommended by the department of health (2-3 units). The mean number of units consumed by participants was 4.42 units (SD=3.89), suggesting that the majority of participants were drinking at a higher level than is healthy for any woman during the first weeks of their pregnancy.



### 2.3.2. HYPOTHESIS 1: DEMOGRAPHIC VARIABLES WILL DIFFER BETWEEN DRINKERS AND ABSTAINERS

Pregnant drinkers and abstainers were compared for a number of demographic variables.

#### *Age*

The mean age of pregnant drinkers was marginally older than the mean age for abstainers (31.1 years, SD = 5.12 and 29.5 years, SD = 4.43 respectively). However, an independent samples *t*-test found no statistically significant difference between drinkers and abstainers in terms of age ( $t(112) = -1.63, p = 0.11, ns$ ).

#### *Region of Residence*

Table 2.2: Drinking behaviour by region of residence

<b>Region of Residence</b>	<b>Abstainers *</b>	<b>Drinkers</b>
<b>Aberdeen City</b>	48% (n=36)	44% (n=17)
<b>Aberdeenshire</b>	51% (n=38)	56% (n=22)

\* Missing data for 1 participant

Table 2.2 shows no main difference in the numbers of drinkers and abstainers by region. A chi-square test of independence confirmed that no association existed between drinking behaviour and region of residence  $\chi^2(1) = 0.71, p = 0.71, ns$ .

### *Level of Education*

Table 2.3: Percentage of abstainers and drinkers by level of education

<b>Level of Education</b>	<b>Abstainers (%)*</b>	<b>Drinkers (%)*</b>
<b>Standard Grades</b>	15.1% (n=11)	5.3% (n=2)
<b>Highers</b>	19.2% (n=14)	15.8% (n=6)
<b>College</b>	19.2% (n=14)	26.3% (n=10)
<b>Degree</b>	32.9% (n=24)	26.3% (n=10)
<b>Higher Degree</b>	13.7% (n=10)	26.3% (n=10)

\* Missing data for 2 abstainers and 1 drinker

Table 2.3 shows a greater number of drinkers report higher levels of education than abstainers (26.3% of drinkers reported having obtained a higher degree compared to 13.7% of abstainers). However, a chi-square test of independence analysis showed no statistically significant association between level of education and drinking behaviour ( $\chi^2(4) = 4.94$ ,  $p=0.30$  ns, fisher's exact test).

### *Employment Status*

Eighty percent of participants were currently employed (80.4%,  $n=90$ ). The proportion of drinkers who were unemployed was slightly higher than that of the abstainers (25.6%,  $n=10$  and 17.6%,  $n=13$  respectively). A chi-square test of independence analysis showed no significant association between employment status and drinking behaviour,  $\chi^2(1) = 0.891$ ,  $p = 0.35$ , ns.

### *Occupation – SES ratings*

Socio-Economic Status was assigned to each participant based on criteria set out by the National Statistics Socio-Economic Classification User Manual (NS-SEC, Office for National Statistics 2005) which was based on the Goldthorpe sociological classification schema (Goldthorpe 1987). The Goldthorpe classification system is accepted internationally and has been validated as a measure and as a good predictor of health outcomes but the NS-SEC includes more thorough validation (Office for National Statistics 2005). Participants who also reported their partner's occupation were coded so that a family SES rating was calculated (based on the highest SES rating of either participant or their partner). The rates classed in each of the SES categories (managerial and professional, intermediate, routine and manual, unemployed, student) were similar for the drinkers and abstainers, as shown in table 2.4 below. A chi-square test of independence showed no significant association between SES rating and drinking behaviour,  $\chi^2(4) = 6.584$ ,  $p=0.16$ , ns. Due to the small number of participants describing themselves as unemployed or a student, these categories were removed so that the minimum count per cell was achieved. There remained no association when the unemployed and student categories were removed ( $\chi^2(2) = 4.232$ ,  $p=0.12$ , ns).

Table 2.4: Percentage of abstainers and drinkers falling into each family SES category<sup>5</sup>

SES category	Abstainers*	Drinkers*
Managerial and professional	64.1% (n=41)	67.6%(n=23)
Intermediate occupations	26.6%(n=17)	11.8%(n=4)
Routine and manual	7.8%(n=5)	20.6%(n=7)
Unemployed	0%(n=0)	0%(n=0)
Student	1.6%(n=1)	0%(n=0)

\* Missing data for 11 abstainers and 5 drinkers

#### *Race*

Only 39 (35.8%) participants reported their race as something other than 'White'. For this reason, race was re-coded as White or Other and compared for the drinkers and abstainers. A similar proportion of White participants were drinkers as non-White (65.8% and 61.1% respectively). A chi-square analysis showed no significant association between race and drinking behaviour,  $\chi^2(1) = 0.138$ ,  $p=0.71$ , ns.

#### *Maternal parity*

Sixty-two percent (n=70) of the sample were first-time mothers (primigravidae) and 38.1% (n=43) already had children (multigravidae). In figure 2.4 it can be seen that the majority (74.3%, n=55) of abstainers were primigravidae whilst the majority of drinkers (61.5%, n=24) were multigravidae.

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<sup>5</sup> Percentages have been rounded to one decimal place and therefore do not total 100

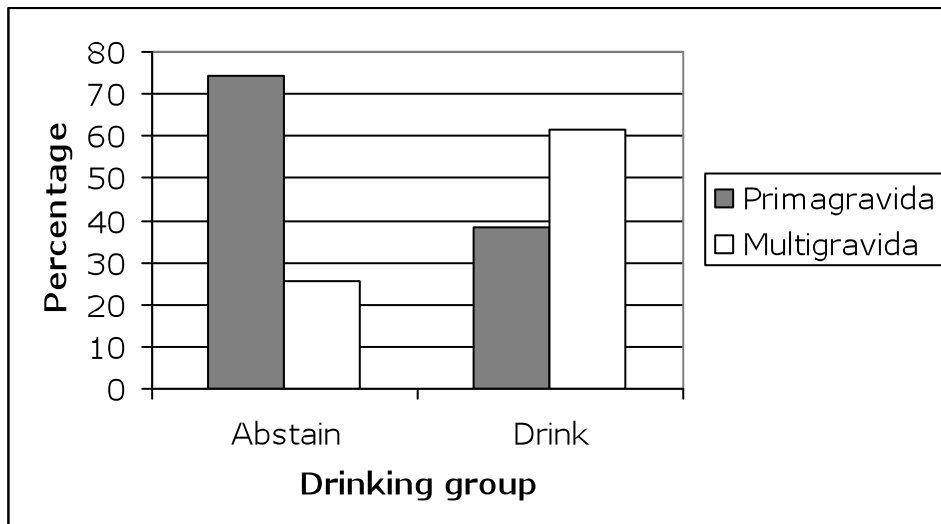


Figure 2.4: Bar chart showing participants' drinking behaviour by maternal parity

A significant association was found between the parity of the mother and alcohol use through chi-square test of independence analysis ( $\chi^2 (1) = 13.02, p < 0.0001$ ).

Therefore, drinking behaviour appears to differ by maternal parity, with first time mothers being less likely to report drinking during pregnancy.

### *Marital Status*

Table 2.5: Percentage of abstainers and drinkers by marital status

<b>Marital Status</b>	<b>Abstainers</b>	<b>Drinkers</b>
<b>Married</b>	64.0% (n=48)	64.1% (n=25)
<b>Living with partner</b>	33.3% (n=25)	28.2% (n=11)
<b>Single</b>	1.3% (n=1)	5.1% (n=2)
<b>Divorced</b>	1.3% (n=1)	0% (n=0)
<b>Other</b>	0	2.6% (n=1)

The majority of both abstainers and drinkers reported being married. Table 2.5 shows little difference between the percentages of abstainers and drinkers for each marital status category. Chi-Square test of independence analysis confirmed that there was no association between marital status and drinking behaviour ( $\chi^2(4) = 3.98, p = 0.37, ns$ , fisher's exact test).

### *Partner behaviour*

Most of the participants reported that their partner drank alcohol (90.2%, n=101)). Of those who had an abstinent partner (n=11), slightly more women reported abstaining (54.4%, n=6)) than drinking (45.5%, n=5)). However, a chi-square test of independence showed no significant association between partner drinking behaviour and participant drinking behaviour  $\chi^2(1) = 0.764, p=0.28, ns$ .

In summary there is little support for hypothesis one, demographic variables will differ between drinkers and abstainers. Age, region of residence, educational attainment,

employment status, SES, race, marital status and partner behaviour did not differ between women who continued to drink alcohol during pregnancy and women who abstained. The only socio-demographic variable that did distinguish drinking behaviour was the woman's parity, with primigravidae more likely to abstain than multigravidae.

### 2.3.3. HYPOTHESIS 2: DRINKERS WILL DIFFER FROM ABSTAINERS ON DEPRESSION, ANXIETY AND STRESS SCORES

Drinkers and abstainers were compared on the depression, anxiety and stress subscales of the DASS-21. Figure 2.5 shows the mean scores for abstainers and drinkers for each of the three subscales. Higher scores on each of the subscales indicate higher levels of distress. The three subscales were non-normally distributed therefore non-parametric tests were carried out.

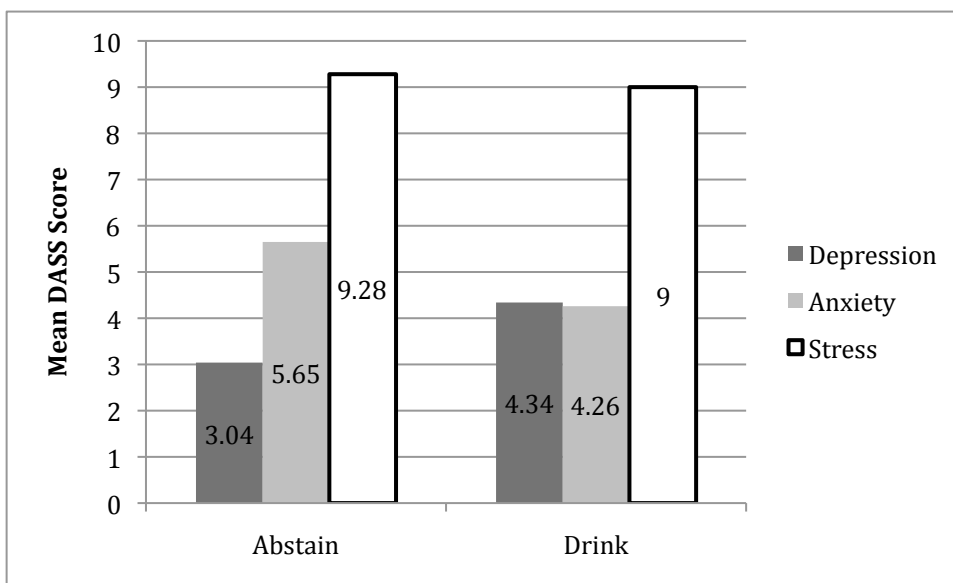


Figure 2.5: Mean depression anxiety and stress scale (DASS-21) scores for drinkers and abstainers

As can be seen in figure 2.5, drinkers have a higher mean score (4.34, SD = 6.20) on the depression scale of the DASS-21 than abstainers (3.04 SD = 4.20). The data was non-normally distributed therefore a Mann-Whitney U test was carried out. However, this showed that the difference was not statistically significant ( $Z = -1.102$ ,  $p = 0.270$  ns). Therefore, pregnant drinkers had similar depression levels as pregnant abstainers.

Both the drinkers and the abstainers had lower depression scores than the reported UK norm of 5.55 (Crawford and Henry 2003).

Figure 2.5, above, shows that abstainers had a higher mean anxiety score (5.65, SD = 4.93) than drinkers (4.26, SD = 5.12). The data were non-normally distributed therefore a Mann-Whitney U test was carried out. This difference was found to be statistically significant ( $Z = -2.198$ ,  $p < 0.05$ ). Pregnant women abstaining from alcohol had significantly higher anxiety levels than those drinking during pregnancy. The mean levels of anxiety for both the drinkers and abstainers are higher than that of the UK norm (3.56; Crawford and Henry 2003).

As can be seen in figure 2.5, mean stress scores did not differ greatly between drinkers (mean = 9.00, SD = 8.90) and abstainers (mean = 9.28, SD = 7.82). The data was non-normally distributed therefore a Mann-Whitney U test was carried out. No statistically significant difference was found,  $Z = -.576$ ,  $p = 0.57$ , ns. Therefore, pregnant drinkers had similar stress levels as pregnant abstainers. The UK norm for stress scores is similar to that found in this sample, 9.27 (Crawford and Henry 2003).

In conclusion hypothesis 2 can partially be supported. Anxiety scores differed between drinkers and abstainers, with drinkers having lower scores, but depression and stress scores did not.

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#### 2.3.4. HYPOTHESIS 3: DRINKERS AND ABSTAINERS WILL DIFFER IN THEIR ATTITUDES TOWARDS ALCOHOL USE

Total scores for the alcohol attitude questions were summed and compared for drinkers and abstainers. The maximum possible score for the alcohol attitude questions was 30 points. Figure 2.6 shows that the mean score for abstainers (24.19, SD = 3.19) was higher than that of drinkers (20.86, SD = 2.88), with higher scores indicating healthier attitudes (i.e. attitudes consistent with lower alcohol use during pregnancy).



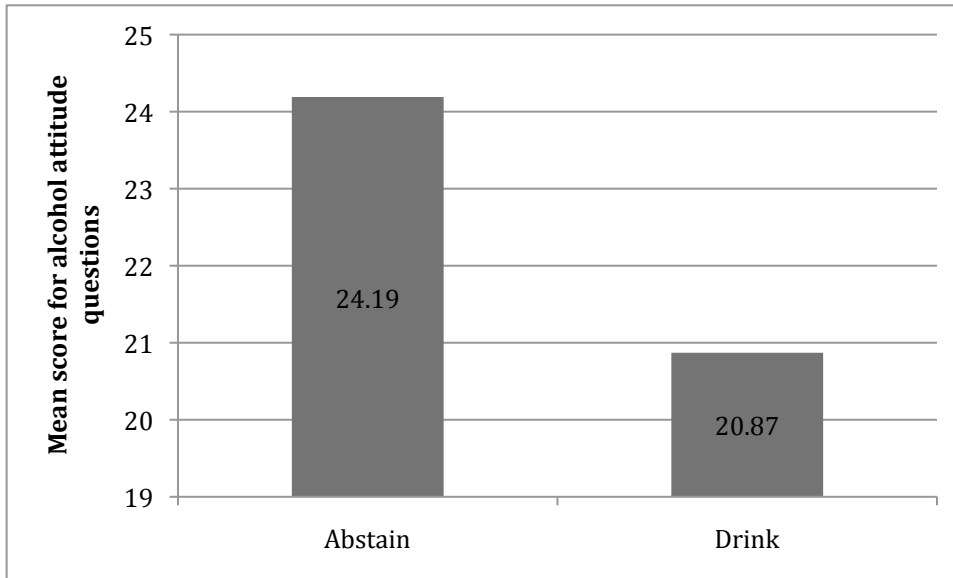


Figure 2.6: Mean scores for attitude questions by alcohol behaviour

The means for the attitude scores for abstainers and drinkers were compared using an independent samples *t*-test. The *t*-test showed a statistically significant difference between abstainers and drinkers for the alcohol attitude questions,  $t(111) = 5.40$ ,  $p < 0.001$ . Therefore hypothesis 3 can be supported; drinkers and abstainers differ in their attitudes towards alcohol use.

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**2.3.5. HYPOTHESIS 4: ALCOHOL ADVICE RECEIVED FROM HEALTH PROFESSIONALS WILL BE ASSOCIATED WITH ALCOHOL BEHAVIOUR**

Participants were asked whether they had received advice about alcohol use during pregnancy from any health professional.

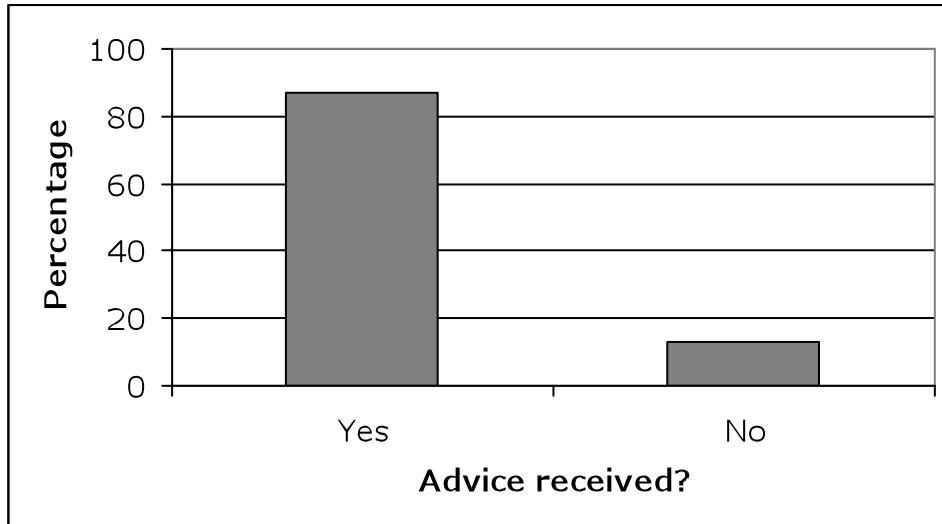


Figure 2.7: Percentage of participants reporting that they have received advice from a health professional about alcohol use during pregnancy

Although the majority of participants (86.8%, n=99) reported that they had received advice from a health professional about alcohol use during pregnancy, 13.2% (n=15) reported that they had received none. This advice was given to most participants around 8.54 weeks gestation (SD=2.41, range 4.00-16.00), approximately three weeks after pregnancy recognition (see section 2.3 above)

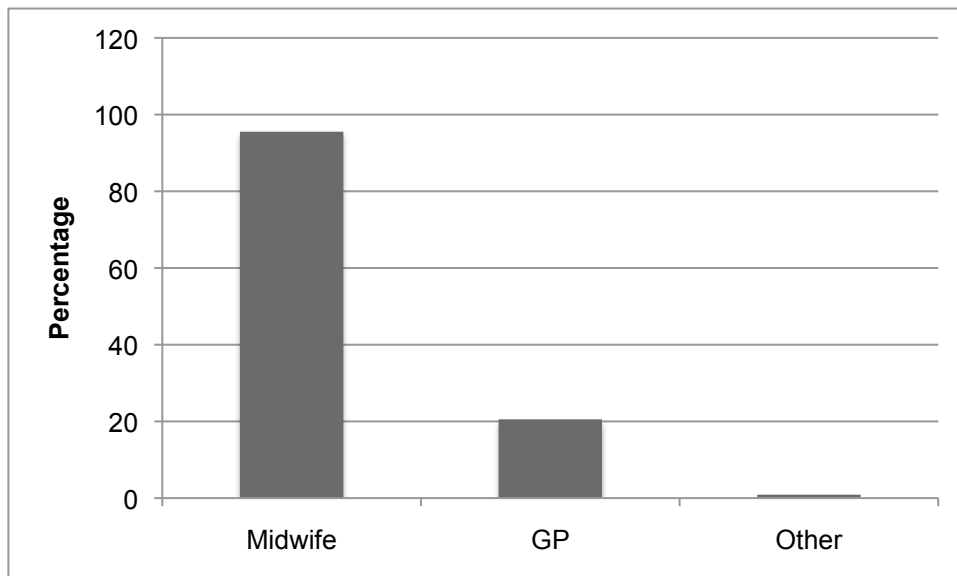


Figure 2.8: Source of alcohol advice

The majority of participants (95.54%, n=107) who had received alcohol advice reported that they had received this from their midwife. Twenty-three participants (20.54%, n=23) had received alcohol advice from their GP and only one (0.89%) had received advice from another undisclosed source.

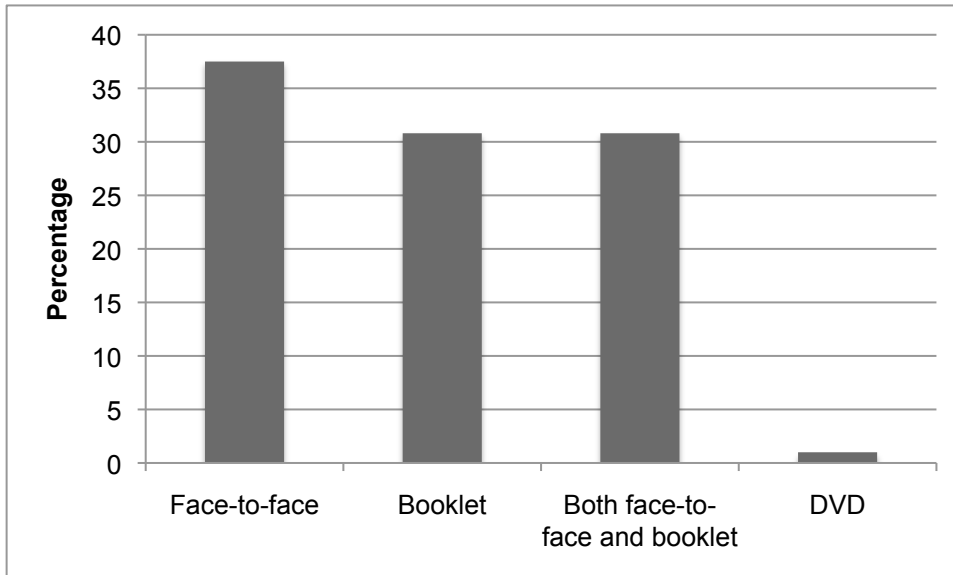


Figure 2.9: Delivery of alcohol advice

The most common delivery of alcohol advice was a face-to-face, verbal method (37.5%, n=39), closely followed by booklet delivery (30.8%, n=32). A number of participants had received both these methods (30.8%, n=32) and one participant (1.0%) reported being given advice through a DVD.

The relationship between advice received and subsequent drinking behaviour was explored with a number of analyses.

*Alcohol behaviour related to whether advice was received or not*

Table 2.6: Alcohol advice and alcohol behaviour

<b>Advice Received?</b>	<b>Abstainers</b>	<b>Drinkers</b>
<b>Yes</b>	84.0% (n=63)	92.3% (n=36)
<b>No</b>	16.0% (n=12)	7.7% (n=3)

A higher percentage of abstainers reported receiving no alcohol advice than drinkers. A chi-square test of association was performed to investigate if an association existed between advice received and whether participants reported abstaining or drinking. No significant association existed between advice and behaviour,  $\chi^2(1) = 1.66$ ,  $p = 0.20$ , ns.

*Advice and alcohol behaviour – maximum number of units consumed by participants per month*

The maximum number of units consumed by participants per month was calculated by multiplying the answers given for the number of occasions per month on which alcohol was consumed, by the answers given for the number of units typically consumed on each drinking occasion. For example, if a participant reported that they drank alcohol 1 to 2 times a month and on each occasion drank 1 or 2 units, the maximum number of units consumed per month would be 4 units.

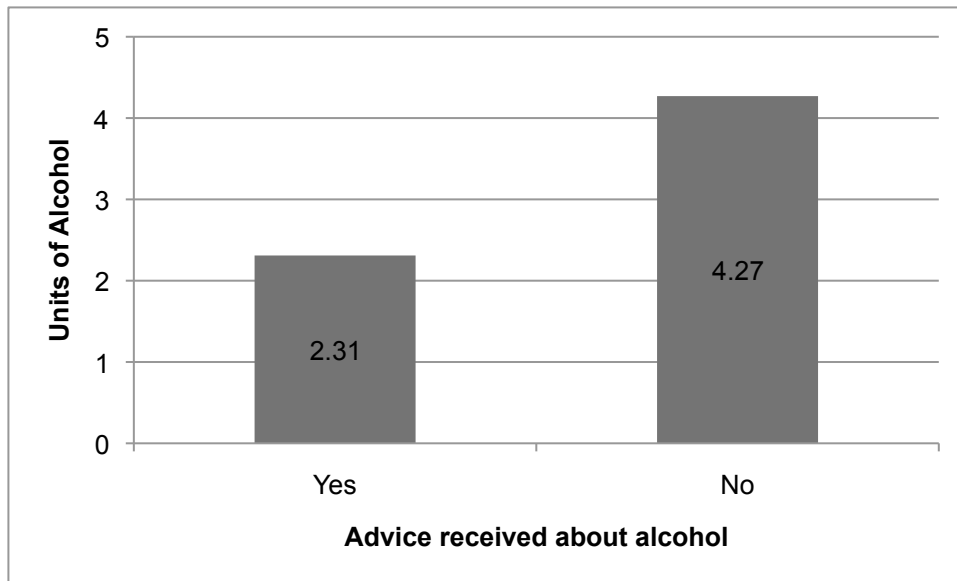


Figure 2.10: The mean maximum number of units consumed by advice category

Figure 2.10, shows the maximum number of units of alcohol consumed per month for each of the advice categories. The mean number of units consumed per month for the participants who reported receiving no advice is around 2 units higher than those who report having received advice. A Mann-Whitney test was conducted due to a non-normal distribution and this showed that the difference in means was not statistically significant ( $Z = -0.86$ ,  $p = 0.39$ , ns).

There is no evidence to support hypothesis 4, whether alcohol advice had been received was not associated with drinking behaviour.

#### 2.3.6. HYPOTHESIS 5: PREVIOUS DRINKING BEHAVIOUR WILL BE RELATED TO ALCOHOL USE DURING PREGNANCY

Consumption rates pre-pregnancy were calculated for participants to reflect how many units were consumed per month. Significant positive correlations existed between the number of units consumed per month pre-pregnancy and both the number of drinking occasions ( $r_s=0.305$ ,  $p<0.01$ ) and the number of units per occasion ( $r_s=0.429$ ,  $p<0.01$ ) consumed during pregnancy. A Spearman correlation was used due to non-normal distribution. Hypothesis 5 can be supported; previous drinking behaviour before pregnancy was positively related to alcohol use during pregnancy.

Women who drank more units per month before becoming pregnant drank more units and on more occasions during pregnancy.

### 2.3.7. HYPOTHESIS 6: ABSTAINERS AND DRINKERS WILL DIFFER ON ATTACHMENT SCORES

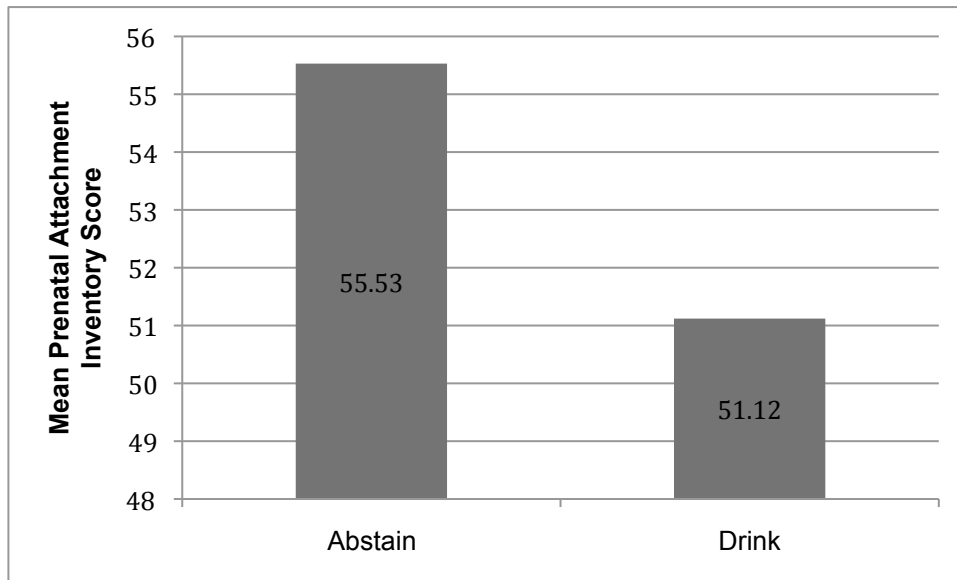


Figure 2.11: Graph showing mean attachment score for drinkers and abstainers

As can be seen in figure 2.11, the pregnant women who abstained from drinking alcohol had higher attachment scores than those who continued to drink alcohol during their pregnancy (with means of 55.53, SD = 10.13 and 51.12, SD = 8.86 respectively). This difference (4.54) was found to be statistically significant,  $t(108) = 2.29, p < 0.05$ . However, when depression, anxiety and stress scores were controlled for, the differences in attachment scores between drinkers and abstainers were no longer statistically significant ( $t(78) = 1.62, p = 0.11, ns$ ). Therefore the differences found in the attachment scores between the drinkers and abstainers can be explained by differences in depression, anxiety and stress. Hypothesis 6 cannot therefore be supported; no real differences existed between abstainers and drinkers in terms of maternal attachment.

2.3.8. HYPOTHESIS 7: THEORY OF PLANNED BEHAVIOUR VARIABLES WILL DIFFER BETWEEN DRINKERS AND ABSTAINERS

Table 2.7: Means, Standard deviations and p-values for TPB constructs for drinking behaviour

TPB construct	Mean (SD) Abstainers	Mean (SD) Drinkers	Z Score
<b>Intention</b>	4.65 (0.72)	3.07 (0.93)	-7.18 *
<b>Attitude</b>	1.62 (0.80)	3.07 (0.65)	-6.82 *
<b>Subjective Norm</b>	4.44 (0.93)	3.72 (0.81)	-4.53*
<b>Perceived Behavioural Control</b>	4.57 (0.55)	4.45 (0.51)	-1.50

NB: \*  $p < 0.05$

The constructs of the TPB were found to be non-normally distributed, therefore Mann-Whitney tests were performed to investigate differences between drinkers and abstainers. Abstainers scored significantly higher on the intention (mean difference = 1.58), and subjective norm (mean difference = 1.58) subscales. Higher scores on the intention scale suggest a greater intention to quit drinking during pregnancy, and higher scores on the subjective norm scale indicate greater perceived pressure to quit drinking from significant others. A statistically significant difference was also found on the attitude scale, with abstainers scoring around 1.45 points lower than the drinkers. Lower scores on the attitude scale indicate a less positive attitude towards drinking during pregnancy. The perceived behavioural control scale did not show any significant differences between drinkers and abstainers. The perceived behavioural control scale measures the strength of participants' perceived ability to change their behaviour. Both groups scored fairly high on this scale indicating that both drinkers and abstainers have high levels of self-efficacy with regard to quitting alcohol use

during pregnancy. In conclusion, hypothesis 7 can be partially accepted. The intention, attitude and subjective norm scales of the TPB differed significantly between pregnant drinkers and abstainers but the perceived behavioural control scale did not.

Multiple regression analysis was conducted to examine the utility of the TPB in predicting intention to drink alcohol during pregnancy. The TPB as a whole was able to explain 59.3% of the variance in intention to drink during pregnancy (adjusted  $R^2$ ), with attitude and subjective norm variables providing statistically significant contributions to the model.

Binary logistic regression was performed to assess the effectiveness of the TPB in predicting and explaining behaviour (alcohol use during pregnancy). Cases where missing values existed for one or more of the variables were excluded giving a total sample for the regression model of  $n=86$ . The full model containing all TPB constructs was statistically significant,  $\chi^2(4, n = 86) = 71.84, p < .001$ , indicating that the TPB can distinguish between drinkers and abstainers. The TPB as a whole explained between 57.1% (Cox and Snell R square) and 77.1% (Nagelkerke R squared) of the variance in drinking status, and correctly classified 91.8% of cases.



Table 2.8 Regression analyses predicting intention and behaviour

<i>Predictor</i>	$R^2$	$\Delta$ <i>Adjusted R<sup>2</sup></i>	<i>Cox &amp; Snell R<sup>2</sup></i>	<i>Nagelk erke R<sup>2</sup></i>	<i>B</i>	<i>SE B</i>	$\beta$
<b>1. Prediction of intention</b>	.61***	.59***					
<b>Attitude</b>					-.70	.09	-.66**
<b>Subjective Norm</b>					.25	.09	.21**
<b>PBC</b>					.05	.15	.02
<b>2. Prediction of behaviour</b>			.57***	.77***			
<b>Intention</b>					- 2.60	.79	.07**
<b>Attitude</b>					1.16	.54	3.19*
<b>Subjective Norm</b>					.75	.84	2.12
<b>PBC</b>					-.60	.87	.55

NB: \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

As shown in table 2.8, only the intention and attitude subscales made a unique statistically significant contribution to the regression model. The strongest predictor of drinking during pregnancy was intention to abstain, with an inverted odds ratio of 13.51 (95% C.I. 2.84, 62.5),  $p < .01$ . This indicates that for each 1 point drop in the intention to abstain score the odds of drinking during pregnancy increases by a factor of 13.51. The TPB model had a positive predictive value of 93.55%.

## THE ROLE OF PAST BEHAVIOUR

The potential role of past behaviour as an additional predictor variable of the TPB was examined. Pre-pregnancy alcohol use (number of units per occasion and number of occasions per month) was included in regression analysis to predict intention and behaviour. Neither of the measures of past behaviour significantly contributed to predicting intention or behaviour (units per occasion- Wald=1.56, p=0.21, ns; and number of occasions- Wald=1.95, p=0.16, ns).

### 2.3.9. HYPOTHESIS 8: HEALTH LOCUS OF CONTROL SCORES WILL DIFFER BETWEEN DRINKERS AND ABSTAINERS

Table 2.9: Means, standard deviations and p-values for the internal foetal health locus of control subscale

<b>Foetal Health Locus Control Subscale</b>	<b>Mean – Abstain (SD)</b>	<b>Mean – Drink (SD)</b>	<b>Test statistic</b>
<b>Internal</b>	33.52 (4.73)	31.22 (5.01)	Z = -2.48 *

NB: \* p < 0.05

Mean scores for drinkers and abstainers on the health locus of control internal subscale are shown in table 2.9. The mean scores appeared to be higher in the abstain group than in the drinking group. The internal subscale had a non-normal distribution therefore a Mann-Whitney U-test was performed.

Participants who were currently abstaining from drinking alcohol scored significantly higher on the internal subscale, around 2.3 points higher than drinkers. Higher scores on the internal subscale indicate a greater belief that the health of the foetus is determined by oneself. Consequently hypothesis 8 was supported; foetal health locus of control scores differed between drinkers and abstainers.

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### 2.3.10. DETERMINANTS OF DRINKING DURING PREGNANCY

A binary logistic regression analysis was carried out on a number of variables in order to find the best predictors of alcohol use. The outcome variable was alcohol behaviour (drink or abstain) and only variables that had been found to differentiate between drinkers and abstainers were included in the analysis (maternal parity; health locus of control – internal scale; attachment; anxiety; theory of planned behaviour – attitude and intention scales; and the alcohol attitude score). The two Theory of Planned Behaviour variables were highly correlated with one another so data centring procedures were performed to reduce the effects of multi-collinearity and an interaction term was included in the analysis.

Only three of the independent variables were included in the final regression equation. These were the two Theory of Planned Behaviour variables (attitude and intention) and the maternal parity variable. The interaction term was not included in the final equation, therefore it can be concluded that multi-collinearity is not likely to influence results. The model containing these 3 variables was statistically significant,  $\chi^2(3) = 71.22, p < 0.001$ , indicating that this model was able to distinguish between participants who reported drinking and abstaining. The model as a whole explained between 53.6% (Cox and Snell R Square) and 72.8% (Nagelkerke R squared) of the variance in drinking behaviour and correctly classified 92.3% of cases. As shown in table 2.10, all 3 of the independent variables made a unique statistically significant contribution to the model.

Table 2.10 Binary logistic regression

Variable	B	S.E	Wald
TPB- Intention	-2.46	0.79	9.77**
Maternal parity	1.24	0.55	9.77*
TPB- Attitude	2.71	1.15	5.00*

NB: \*  $p < 0.05$ , \*\*  $p < 0.01$

To further investigate the determinants of drinking during pregnancy, the interrelationships between each of the 3 regression model components were investigated. The relationships are displayed in figure 2.12 below.

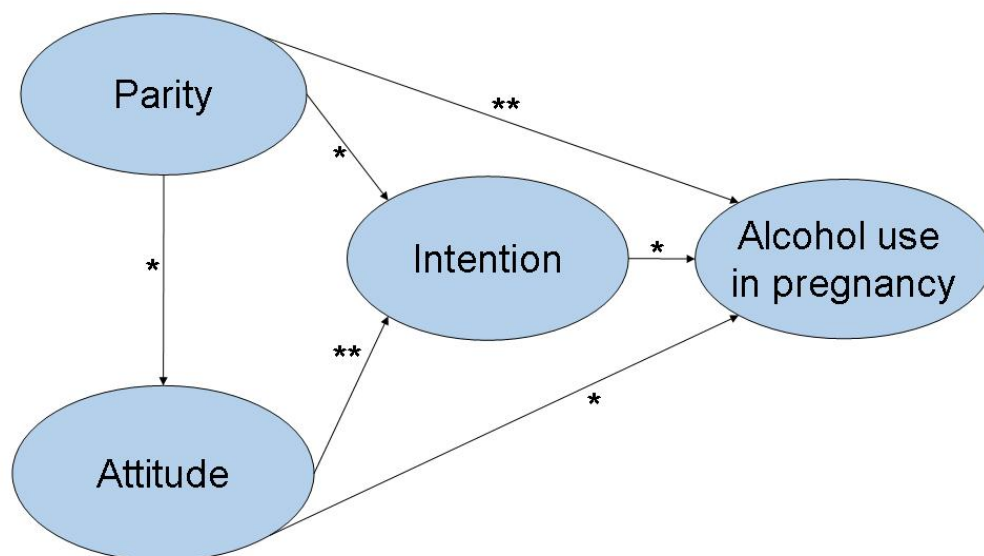



Figure 2.12 Model of the determinants of alcohol use during pregnancy NB: \*  $p < 0.05$ , \*\*  $p < 0.001$

As demonstrated in the regression analysis there are direct associations between parity, intention and attitude and alcohol use during pregnancy. In addition, attitude and intention are strongly negatively correlated ( $r_s = -0.78$ ,  $n=89$ ,  $p<0.001$ ). Therefore greater intention to quit drinking is associated with more negative attitudes towards alcohol use during pregnancy. Further interrelationships exist between parity and attitude and parity and intention. If a woman has children already she has a weaker intention to quit drinking (mean primigravidae = 4.25, SD= 1.03, mean multigravidae = 3.78, SD=1.16,  $t(103)=2.18$ ,  $p<0.05$ ). Similarly, if a woman already has children she has more positive attitudes towards alcohol use during pregnancy (mean primigravidae =2.00, SD=1.00, mean multigravidae = 2.52, SD=1.03,  $t(88) = -2.35$ ,  $p<0.05$ ).



## 2.4. RESULTS NICOTINE USE

### 2.4.1. NICOTINE USE

Almost forty-seven per cent of smokers were continuing to smoke (46.7%, n=14) whilst 53.3% (n=16) reported that they had quit since finding out they were pregnant. The majority of pregnant smokers reported smoking everyday 92.9%. Of the participants who continued smoking, only 4 reported making no change in their smoking habits, with the rest reporting a decrease in cigarette use from an average of 12.48 (SD=8.46) cigarettes per day to around 8.86 (SD=4.76) cigarettes per day. The average gestation at which smokers made changes was 5.88 weeks (SD=1.54).

### 2.4.2. HYPOTHESIS 1: DEMOGRAPHIC VARIABLES WILL DIFFER BETWEEN SMOKERS AND ABSTAINERS

Pregnant smokers were compared on a number of demographic variables to previous smokers who had given up during their current pregnancy.

#### *Age*

The mean age (30 years, SD = 4.58) of the abstainers was 4 years older than that of the smokers (26 years, SD = 6.82), but this difference was not statistically significant ( $t(28)=1.91, p = 0.07, ns$ ). Therefore, age did not appear to differ between continued smokers and smokers who quit during pregnancy.

#### *Region of Residence*

Table 2.11: Smoking behaviour by region of residence

Region of Residence	Abstainers	Smokers
Aberdeen City	62.5% (n=10)	50.0% (n=7)
Aberdeenshire	37.5% (n=6)	50.0% (n=7)

Table 2.11 shows the percentages of smokers and abstainers who live in Aberdeen City and Aberdeenshire. A greater proportion of abstainers lived in the city than in Aberdeenshire, but there was no significant association between region of residence and smoking status ( $\chi^2(1) = 0.475$ ,  $p = 0.49$ , ns).

*Educational Attainment*

Table 2.12: Educational attainment in continued smokers and abstainers

<b>Level of Education</b>	<b>Abstainers</b>	<b>Smokers*</b>
<b>Standard Grades</b>	18.8% (n=3)	45.5% (n=5)
<b>Highers</b>	12.5% (n=2)	27.3% (n=3)
<b>College</b>	37.5% (n=6)	27.3% (n=3)
<b>Degree</b>	12.5% (n=2)	0% (n=0)
<b>Higher Degree</b>	18.8% (n=3)	0% (n=0)

\* Missing data for 3 participants

Table 2.12 shows the highest level of education achieved by the continued smokers and the smokers who have stopped during their pregnancy. It appears as though the majority of the abstainers have a higher level of education than the continued smokers, as the majority (37.5%) have a college education. The majority of the continued smokers (45.45%) have a standard grade education. In order to carry out a chi-square analysis the variable was re-coded to make three categories of educational attainment, school-level education, further education and higher education. The chi-square test of independence analysis showed no significant association between level of education and smoking status ( $\chi^2(1) = 4.51$ ,  $p = 0.11$ , ns).

### *Employment Status*

A greater proportion of the abstainers were employed (86.7%, n=13) than the continued smokers (61.5%, n=8). However, chi-square analysis showed that no significant association existed between employment status and smoking behaviour,  $\chi^2(1) = 2.345$ ,  $p = 0.126$ , ns.

### *Race*

Similar proportions of White participants smoked as non-White (46.7%, n=7 and 45.5%, n=5 respectively). A chi-square test of independence confirmed there was no association between smoking and race ( $\chi^2(1) = 0.004$ ,  $p = 0.95$ , ns).

### *Maternal parity*

There appeared to be little difference in the numbers of smokers and abstainers who were first-time mothers; 56.3% (n=9) of abstainers and 57.1% (n=8) of smokers were expecting their first child. Chi-square analysis confirmed that no association existed between smoking behaviour and maternal parity,  $\chi^2(1) = 0.002$ ,  $p = 0.96$ , ns.

### *Marital Status*

Table 2.13: Percentage of smokers and abstainers by marital status

<b>Marital Status</b>	<b>Abstainers</b>	<b>Smokers</b>
<b>Married</b>	56.25% (n=9)	21.43% (n=3)
<b>Living with partner</b>	43.75% (n=7)	71.43% (n=10)
<b>Single</b>	0% (n=0)	7.1% (n=1)

As can be seen in table 2.13, the majority of smokers who give up during pregnancy are married whilst the majority of continued smokers are living with a partner.



Because of the low numbers of single participants, analysis was only carried out on two categories of marital status; married and living with partner. A chi-square test of independence analysis showed that the association between smoking status and marital status was not significant,  $\chi^2(1) = 3.30$ ,  $p=0.069$ , ns. Despite lower numbers of continued smokers being married, it seems that there is no association between marital status and smoking status.

#### *Partner smoking behaviour*

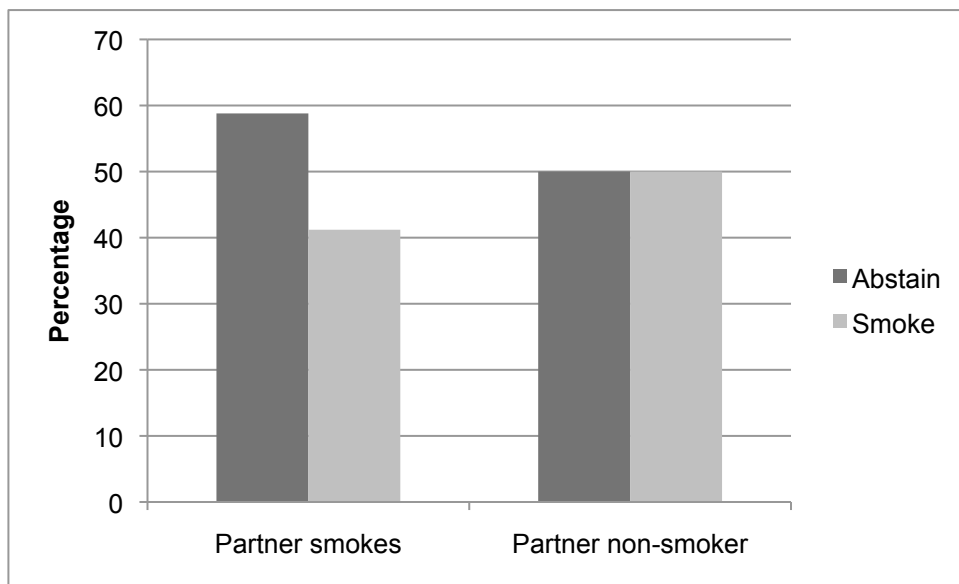


Figure 2.13: Bar chart showing smoking behaviour and partner behaviour

Converse to what might be expected, in participants with a partner who smoked, a greater proportion stopped smoking (58.8%,  $n=10$ ) than continued (41.2%,  $n=7$ ). A chi-square analysis found no significant association between partner smoking behaviour and participants' smoking behaviour,  $\chi^2(1) = 0.22$ ,  $p = 0.64$ , ns.

Therefore, hypothesis 1 cannot be supported. No significant differences were found for any of the socio-demographic variables.

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#### 2.4.3. HYPOTHESIS 2: SMOKERS WILL DIFFER FROM ABSTAINERS ON DEPRESSION, ANXIETY AND STRESS SCORES

Scores on the Depression, Anxiety and Stress scale were compared for continued smokers and stopped smokers. Mean scores, standard deviations and associated p-values are presented in table 2.14.

Table 2.14: Mean scores and associated t-values for smokers and abstainers on DASS-21 subscales

<b>DASS-21 construct</b>	<b>Mean (SD) Abstainers</b>	<b>Mean (SD) Smokers</b>	<b>t-value</b>
<b>Depression</b>	5.01 (7.67)	3.29 (4.61)	0.75
<b>Anxiety</b>	5.60 (5.46)	5.29 (6.78)	1.39
<b>Stress</b>	8.40 (10.37)	11.43 (10.51)	-0.78

As shown in table 2.14, the mean stress scores for the smokers was 3 points higher than that of the abstainers but this was not statistically significant,  $t(27) = -0.781$ ,  $p = 0.442$ . The mean anxiety scores for both groups were over 5, the cut-off point on the DASS-21 score for mild anxiety, but did not significantly differ between the two groups. The scores for depression and stress were below the cut-off scores indicating low levels of depression and stress in the sample as a whole. Therefore, hypothesis 2 is not supported; smokers and abstainers did not differ on depression, anxiety or stress scores.

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#### 2.4.4. HYPOTHESIS 3: SMOKERS AND ABSTAINERS WILL DIFFER IN THEIR ATTITUDES TOWARDS SMOKING DURING PREGNANCY

Total scores for the smoking attitude questions were summed and compared for continued smokers and smokers who had stopped during their pregnancy. The

maximum possible score for the smoking attitude questions was 20 points, with higher scores indicating attitudes consistent with the belief that any level of smoking during pregnancy is harmful.

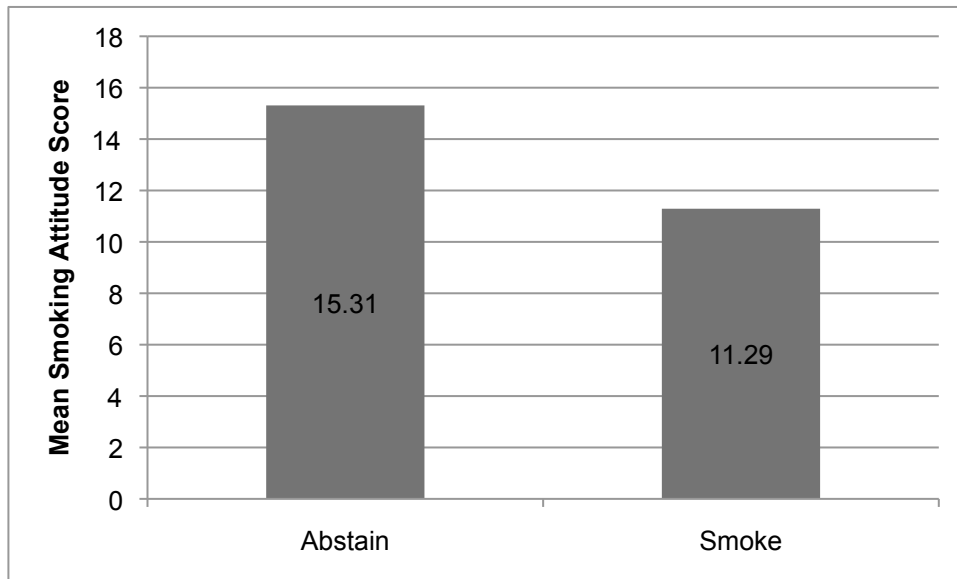


Figure 2.14: Mean smoking attitude scores for smokers and abstainers

The smokers' mean score for the smoking attitude question (11.29, SD = 2.13) was 4.02 points lower than that of the abstainers (15.31, SD = 2.70). This difference in means was shown to be statistically significant,  $t(28) = 4.49$ ,  $p < 0.001$ . A lower score on the smoking attitude questions suggests less healthy attitudes towards smoking during pregnancy, therefore the continued smokers held less healthy attitudes than the smokers who had stopped during pregnancy. Hypothesis 3 is supported, differences exist between smokers and abstainers for the smoking attitude score.

#### 2.4.5. HYPOTHESIS 4: SMOKING ADVICE RECEIVED FROM HEALTH PROFESSIONALS WILL BE ASSOCIATED WITH SMOKING BEHAVIOUR

Of the participants who had smoked before becoming pregnant ( $n=30$ ), only 10% ( $n=3$ ) reported that they had not received advice from any health professional regarding smoking during pregnancy. The average point in pregnancy when smoking advice was received was 8.46 weeks (SD=2.38, range 4.00-16.00 weeks), approximately 3 weeks after pregnancy recognition.

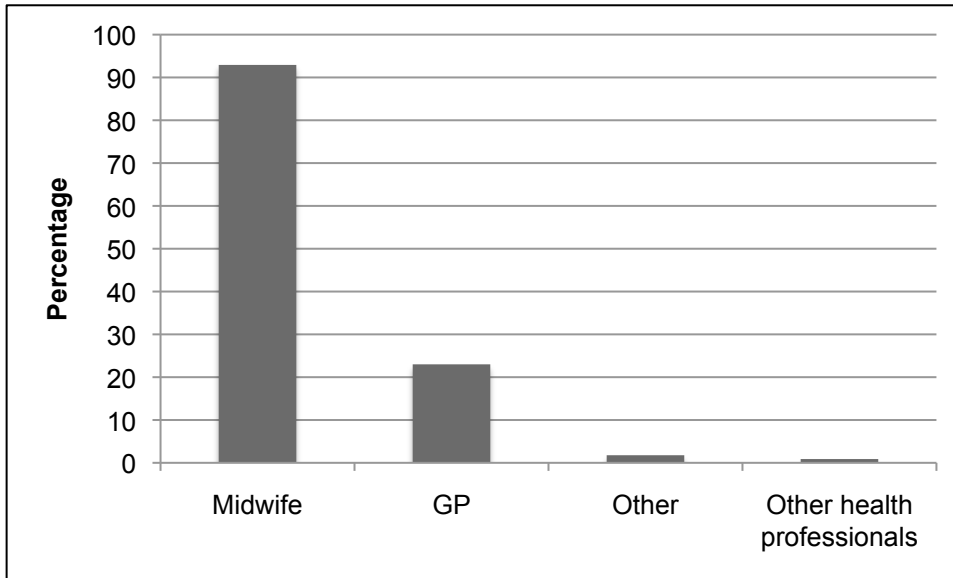


Figure 2.15: Source of advice regarding smoking during pregnancy

Participants were asked to report from whom they had received advice about smoking during pregnancy. The answers are displayed in figure 2.15 above. The most common source was midwives (92.92%, n=105), followed by GPs (23.00%, n=26). Two participants (1.77%) reported receiving advice from another source and one of these participants stated that this was a family member. Only one participant (0.88%) had received smoking advice from another health professional besides midwives or GPs.

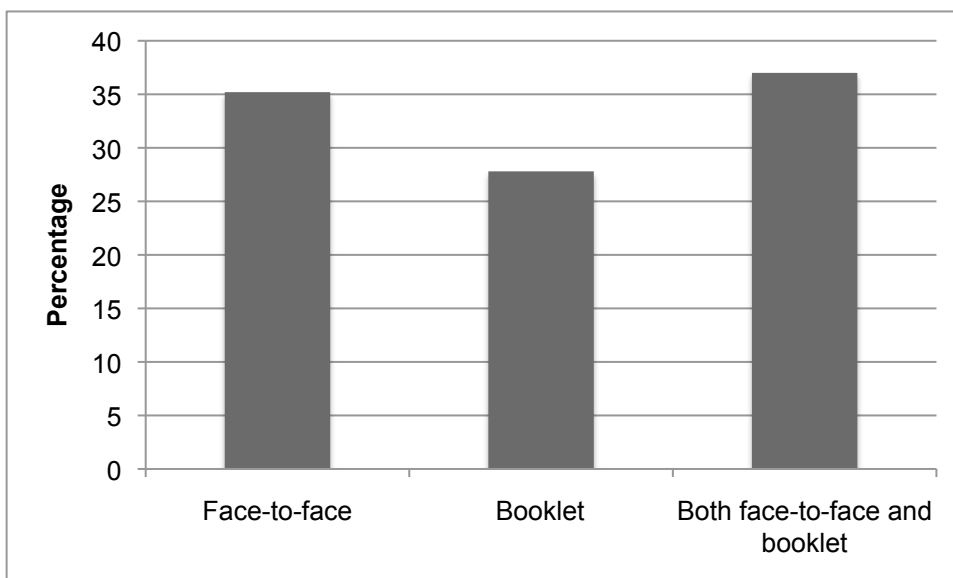


Figure 2.16: Delivery of smoking advice

Participants were asked how smoking advice was delivered to them and their answers are displayed in figure 2.16 above. Smoking advice was most commonly delivered as verbal face-to-face advice (35.2%, n=38), closely followed by advice delivery through a booklet (27.8%, n=30). Forty participants reported that they had received both face-to-face and booklet advice (37.00%).

For the participants who reported receiving no advice regarding smoking during pregnancy, 2 reported continued smoking and 1 reported abstinence. Due to the small numbers of continued and previous smokers reporting receiving no advice, further analyses were not conducted. Therefore hypothesis 4 cannot be tested.

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#### 2.4.6. HYPOTHESIS 5: PREVIOUS SMOKING BEHAVIOUR WILL BE ASSOCIATED WITH PREGNANCY SMOKING BEHAVIOUR

The pre-pregnancy smoking habits of continued smokers and abstainers were examined. Participants who continued to smoke during pregnancy, smoked on significantly more occasions (5.93, SD=0.27) pre-pregnancy, than those who quit (4.44, SD=1.67) smoking ( $t(28) = -3.29, p < 0.01$ ). This indicates that the average answer for continued smokers was close to 6 (i.e. smoking everyday) whilst the abstainers were closer to 4 (i.e. 2 or 3 times a week).

Continued smokers also smoked a greater number of cigarettes per day pre-pregnancy (mean = 17.77 cigarettes, SD=9.04) than those participants who quit (mean = 8.34 cigarettes, SD=8.59). This difference in pre-pregnancy smoking was statistically significant;  $t(27) = -3.47, p < 0.01$ .

Significant associations were also found between previous smoking behaviour and the point in pregnancy when a change in smoking was made. Smoking a greater number of cigarettes per day was significantly related to making a change later in pregnancy ( $r_s = 0.65, n = 28, p < 0.01$ ). A significant and positive relationship was found between the number of cigarettes smoked prior to pregnancy and the number of weeks gestation when behaviour change was made. Smoking on a greater number of occasions was significantly related to making a change later in pregnancy ( $r_s = 0.48, n = 28, p < 0.01$ ).

In summary, hypothesis 5 can be supported; significant relationships were found between previous smoking behaviour and smoking behaviour in pregnancy.

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#### 2.4.7. HYPOTHESIS 6: SMOKERS AND ABSTAINERS WILL DIFFER ON ATTACHMENT SCORES

Attachment scores for continued smokers and for abstainers are shown in figure 2.17 below.

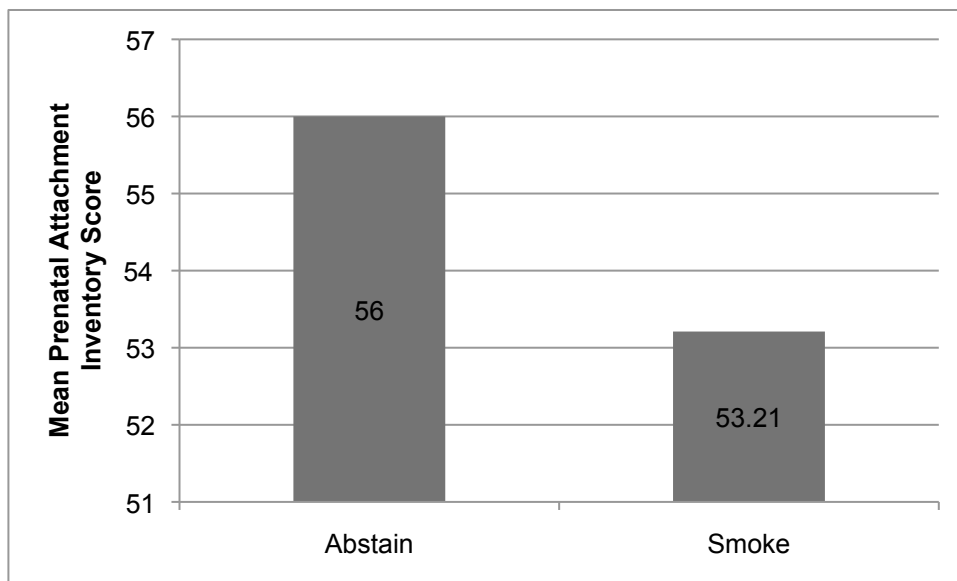


Figure 2.17: Mean attachment scores for smokers and abstainers

The mean attachment score was higher for the abstainers than for the smokers (56.00, SD = 8.49 and 53.21, SD = 9.98 respectively). This suggests that participants who abstained from smoking during pregnancy may have a greater level of attachment than those who continued to smoke. However, an independent samples *t*-test showed that this apparent difference was not statistically significant ( $t(28) = 0.83, p = 0.42, ns$ ). Therefore, hypothesis 6 is not supported, attachment scores did not differ significantly between smokers and abstainers.

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#### 2.4.8. HYPOTHESIS 7: THEORY OF PLANNED BEHAVIOUR VARIABLES WILL DIFFER BETWEEN SMOKERS AND ABSTAINERS

The Intention, Attitude, Subjective Norm, and Behavioural Control subscales of the Theory of Planned Behaviour were examined to assess their utility in distinguishing between pregnant smokers and smokers who had quit during their pregnancy.

Table 2.15: Mean TPB subscale scores for smokers and abstainers with associated t-values

TPB construct	Mean (SD) Abstainers	Mean (SD) Smokers	t-value
<b>Intention</b>	4.50 (0.84)	3.36 (0.68)	3.11 *
<b>Attitude</b>	1.50 (0.55)	2.73 (0.79)	-3.38 *
<b>Subjective Norm</b>	4.50 (0.84)	4.17 (1.03)	0.69
<b>Perceived Behavioural Control</b>	4.33 (0.52)	2.94 (0.64)	4.63 *

NB: \*  $p < 0.05$

Differences in the mean scores are apparent between smokers and abstainers for all the subscales. Abstainers have greater mean scores for the intention construct, suggesting a higher intention to stop smoking during pregnancy. This difference in mean scores was statistically significant,  $t(16) = 3.106$ ,  $p < 0.05$ . Abstainers have a lower mean score on the attitude construct, suggesting a less positive attitude to smoking during pregnancy than the smokers. This difference was also statistically significant,  $t(15) = -3.379$ ,  $p < 0.05$ . Smokers also had lower mean scores on the perceived behavioural control subscale of the TPB suggesting a lower perceived self-efficacy in managing to stop smoking. This difference in mean scores on the perceived behavioural control subscale was also statistically significant,  $t(16) = 4.630$ ,  $p < 0.001$ . Only a small difference was apparent in the mean scores for the subjective norm subscale and this was not statistically significant,  $t(15) = 0.685$ ,  $p = 0.503$ . This suggests that the smokers and the abstainers had a similar concept of what other people would want them to do regarding smoking during pregnancy.

Overall hypothesis 7 is supported. All theory of planned behaviour concepts, except for the subjective norm subscale, differed significantly between smokers and abstainers.

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#### 2.4.9. HYPOTHESIS 8: HEALTH LOCUS OF CONTROL SCORES WILL DIFFER FOR SMOKERS AND ABSTAINERS

Potential differences in FHLC scores between continued smokers and smokers who had quit were examined.

Table 2.16: Means, standard deviations and p-values for the internal foetal health locus of control subscale

<b>Foetal Health Locus Control Subscale</b>	<b>Mean – Abstainers (SD)</b>	<b>Mean – Smokers (SD)</b>	<b>t-value</b>
<b>Internal</b>	32.21 (3.66)	28.62 (4.62)	2.25 *

NB: \*  $p < 0.05$

There was a greater difference between smokers and abstainers on the internal subscale. Smokers scored around 3.5 points lower and this difference was statistically significant ( $t(25) = 2.25, p < 0.05$ ). This suggests that the pregnant smokers believed that they were less personally responsible for the health of their unborn baby than the women who had given up smoking during pregnancy.

Hypothesis 8 is supported, the internal subscale of the health locus of control scale differed significantly between smokers and abstainers.

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#### 2.4.10. DETERMINANTS OF SMOKING DURING PREGNANCY

As reported above, a number of variables successfully distinguished between continued smokers and abstainers (attitudes, previous smoking behaviour, TPB variables and the HLC Internal scale). Due to the small numbers of previous smokers ( $n=30$ ) it was not possible to perform a logistic regression analysis to determine which of these were the most robust determinants of smoking during pregnancy. Targeted



recruitment of smokers would be necessary to produce a model of smoking during pregnancy.



## 2.5. QUALITATIVE RESULTS

Participants were provided the opportunity to provide comments on anything they felt to be important which they did not feel was covered by the questionnaire. Seventeen respondents provided information in this section of the questionnaire booklet (please see appendix 2). The comments given by participants are summarised below.

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### 2.5.1. ALCOHOL AND NICOTINE

Four participants used this section of the questionnaire to provide further comment on alcohol and nicotine use during pregnancy. One participant noted the influence of her pregnancy being planned;

*"...my pregnancy was planned so I hardly had any alcohol in the weeks before. This would not be the case if it was an unplanned pregnancy"* Participant 92

One person used the opportunity to specify that the alcohol they had drunk since becoming pregnant was on two 'special occasions' (Participant 79). One participant expressed their opinion on what constituted a safe level of alcohol use during pregnancy;

*"My opinion of reasonable alcohol intake is that a glass of wine with a meal once a week is neither good nor bad to the health of my baby going on the advice of midwife and doctor"* Participant 30

The final participant who discussed alcohol use in this section discussed their alcohol use early in pregnancy and their feelings about having drunk;

*"I believe that drinking 1-2 units once a week wouldn't do my baby any harm however I feel guilty despite this and therefore drink very infrequently"* Participant 91

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### 2.5.2. QUESTIONNAIRE CONTENT

Seven participants discussed their views of the questionnaire content. Comments from these participants included a perception that the current stage of pregnancy influenced how prenatal attachment questions were answered;

*“I am 21 weeks pregnant and the answers in section 4 would be totally different if I was say 30 weeks gone, or even 35 weeks”* Participant 160

Another participant discussed their perceptions of the FHLOC questions;

*“It is difficult to respond to some of these questions as they don’t form part of my outlook or philosophy e.g. whether ‘God’ will determine the health of my child – I don’t believe in God, so this is an irrelevant question to me!”* Participant 68

Two participants commented that some of the questions felt repetitive;

*“Some of the questions were slightly confusing as it seemed the same question was being asked again in a different form”* Participant 183

One participant reported that they had found completing the questionnaire to be interesting and expressed thanks at being included in the study (Participant 41)

One participant did not like one of the standardised questionnaires (section 7 of the questionnaire, the DASS-21);

*“Section 7 is insulting to anyone with any level of education and badly worded and constructed”* Participant 196

Participant 181 noted that they would have found it interesting to have further questions relating to drinking coffee and caffeine.

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### 2.5.3. COMMENTS REGARDING PARTICIPATION:

Four participants provided comments apologising for a delay in returning the questionnaire

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### 2.5.4. ANTENATAL CARE

Three participants discussed issues relating to their antenatal care in the free text box. One participant felt that they wished more discussion and choice of antenatal testing;

*“I wish more time could be given to discuss results of tests and scans. I wish I could also choose to have more tests if I wanted to”* Participant 228

One participant discussed their views of antenatal care and antenatal healthcare professionals;

*“I will not attend any antenatal classes as they are designed for first time mothers and useless beyond that. My own knowledge is greater than the majority of health visitors I have ever met!”* Participant 96

One further participant discussed issues relating to antenatal care and the emphasis placed on breast-feeding by healthcare professionals;

*“I feel that too much emphasis is placed on breast feeding. I understand it is best for baby – but many of the health professionals are far too pushy [they are the] ‘breast-feeding mafia’. I feel that expectant parents should be given equal info on all types of infant feeding and the health professionals should support parents regardless of choice”* Participant 111



## 2.6. DISCUSSION

### 2.6.1. RATES OF ALCOHOL AND NICOTINE USE DURING PREGNANCY IN GRAMPIAN

The pattern of alcohol use in pregnant women in Aberdeen City and Shire appears to be relatively high. At 20 weeks gestation just over one third of participants reported currently drinking alcohol (34.5%). This is much higher than prevalence figures reported worldwide; 15% of American women (Drews, et al. 2003), 23% of Norwegian women (Alvik, et al. 2006), and 23% of French women (Kaminski, et al. 1995) reported drinking during pregnancy. The overall figures for alcohol consumption in this study appear similar to those found in Sweden by Goransson et al. (2003) who reported 30% of pregnant women continued regular drinking. However, Goransson et al. (2003) reported that only 6% of their participants were drinking two to four times a month. In this study 16.4% of participants reported drinking two to four times a month, over twice the numbers found drinking at these levels in the Swedish study. The prevalence of alcohol use in this sample is similar to that of two recently completed surveys in Scotland (Anderson, et al. 2007; Bolling, et al. 2007). However, it is possible that these numbers are an under-estimation of the actual numbers drinking during pregnancy. Kesmodel and Olsen (2001) compared different methods of data collection and found that self-report questionnaires generated lower levels of alcohol use in pregnant women than diaries. Therefore, the frequency of alcohol use in our sample may be even higher than that reported by participants. The mean number of the most units consumed by participants in one occasion before realising they were pregnant was 4.08 units. This exceeds the NHS guidelines for single occasion drinking for *non-pregnant* women of 2-3 units per day (Drinkaware 2010). Even after pregnancy recognition, 50.4% of participants in this study reported having drunk 3.5 units or more in one occasion since becoming pregnant. This means that half of the participants were drinking at levels that are risky for non-pregnant women in the first few weeks of pregnancy. This behaviour indicates the wider problem of unhealthy drinking that is apparent in Britain. McMillan and Conner (2003) found that 40.7% of non-pregnant women were exceeding healthy drinking limits (defined as 1-14 units per week). Furthermore, Murgraff, McDermot and Walsh (2001) reported 73.6% of

their sample exceeded low risk single occasion drinking guidelines (2 units per day) at least occasionally.

Only around 10.8% of the current sample continued to smoke during pregnancy. US estimates of smoking, range from 14.2% (Carmichael and Ahluwalia 2000) to 19% (Castles 1999). Recent estimates put the rate of smoking at only 10% of all US deliveries (Martin et al. 2006 from Tong et al. 2008), whilst 16% of Danish pregnant women continue to smoke (Jensen et al. 2008). The rates of smokers who quit in this study (53.3%) appear to match fairly closely with previous research, whereby 44.5% of pre-pregnancy smokers quit in Carmichael and Ahluwalia (2000) and 49.8% quit in Tong et al. (2008).

Furthermore, 12% of the current sample reported receiving no advice about drinking alcohol during pregnancy and 10% reportedly failed to receive advice about smoking. This suggests that more could be done in Grampian to highlight the issues surrounding smoking and drinking during pregnancy. Study 1 also showed weak links between receiving advice and pregnant women's behaviour. There were no significant differences in drinking patterns between the women who had received advice and those who had received none. This indicates that a new approach to supporting pregnant women to make behaviour changes may be required. Establishing determinants of the behaviour is the first step to designing effective behaviour change interventions.

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## 2.6.2. DETERMINANTS OF BEHAVIOUR

### *Socio-demographic determinants of behaviour*

Socio-demographic variables were shown to be poor predictors of antenatal alcohol and nicotine use. Research examining socio-demographic variables as predictors of alcohol and nicotine use during pregnancy have produced mixed results. Some studies have suggested that older pregnant women drink more (Alvik 2006, CHOICES 2002, Kelly et al. 2009, Palma et al. 2007, Pirie et al. 2000, Sayal et al. 2007, Testa and Leonard 1995) whilst others have found that younger women drink more (Stewart and Streiner 1994, Leonardson and Loudenberg 2003, Caetano et al. 2006). The same level

of uncertainty surrounds age and nicotine use with some studies suggesting older women smoke more (Severson et al. 1995 Zimmer and Zimmer 1998) and others suggesting that they smoke less (Linares Scott et al. 2009, Pickett, Wilkinson, and Wakschlag 2009). The results of study 1 confirmed that age is not a reliable predictor of either drinking or smoking during pregnancy.

Previous studies examining SES and income have suggested that higher SES and income are linked to increased drinking (Palma et al. 2007, Caetano et al. 2006) but decreased smoking (Testa and Leonard 1995, Haslam and Lawrence 2004, Pickett et al. 2002, Martin et al. 2008). Study 1 found no significant differences based on SES or income between drinkers and abstainers or between smokers and abstainers. In agreement with Pirie et al. (2000) study 1 found no association between educational attainment and drinking. Previous research examining educational attainment and smoking suggested that lower levels of education were associated with continued smoking (Haslam and Lawrence 2004, Lelong et al. 1995, Linares Scott et al. 2009 Martin et al. 2008, Pickett et al. 2009, Severson et al. 1995, Zimmer and Zimmer 1998) however this was not replicated in study 1. Neither SES nor income were associated with alcohol or nicotine use.

A link between employment status and alcohol and nicotine use was not found in this study. A number of previously published papers found that employed women were more likely to drink (Palma et al. 2007, Pirie et al. 2000), whilst others have found that employed women are actually less likely to drink (CHOICES 2002, Lelong et al. 1995, Leonardson and Loudenberg 2003, Stewart and Streiner 1994) and less likely to smoke (Gillies, Madeley and Power 1989, Zimmer and Zimmer 1998). The logistic regression analysis in study 1 suggests that employment status is not a reliable determinant of drinking or smoking behaviour.

Studies examining the links between race and pregnancy health behaviour failed to show consistent relationships. Some suggested that White women are at the greatest risk of continued drinking (CHOICES 2002, Hanna, Faden and Dufour, 1994, Caetano et al. 2006), whilst Testa and Leonard (1995) found them to be the least likely to drink during pregnancy. With regard to nicotine use, a number of studies found White

women to be the least likely to quit smoking during pregnancy (Hanna, Faden and Dufour 1994, Martin 2008), whilst Pickett et al. (2009) and Zimmer and Zimmer (1998) found the converse to be true. Study 1 indicated that race did not determine alcohol or nicotine use but further research with a greater number of non-White participants would be warranted.

Previous research suggests that women who are not married appear to be at the greatest risk for both alcohol use and nicotine use (Pirie et al. 2000, Caetano et al. 2006, Hanna, Faden and Dufour 1994, Leonardson and Loudenberg 2003, Lawrence 2004, Linares Scott et al. 2009, Martin 2008, Pickett et al. 2009). The results of study 1 do not support these findings. This could be due to the low numbers of non-married women in the sample. Perhaps further research in Grampian targeting single pregnant women could determine whether marital status is a significant predictor of alcohol and nicotine use during pregnancy. A related influence on drinking and smoking behaviour is that of partner behaviour. Previous research has suggested that having a partner who drinks makes it more likely for the pregnant woman to drink (Lelong et al. 1995, Leonardson and Loudenberg 2003) and a smoking partner is similarly associated with a greater risk of continued smoking in pregnancy (Giglia et al. 2007, Lelong et al. 1995, Lemola and Grob 2008, Severson et al. 1995). Study 1 failed to find significant associations between partner behaviour and alcohol or nicotine use during pregnancy.

The only demographic variable which proved to differ between drinkers and abstainers was maternal parity. In agreement with Day et al (1993) and Testa and Leonard (1995), primiparous women were significantly less likely to be drinkers than multiparous women. No comparative significant differences existed for nicotine use and maternal parity. Maternal parity emerged as an important factor in explaining the variance in women's drinking behaviour. The reasons behind this association are unclear and further research is needed to examine this. Although a woman's parity is not something that is modifiable; health professionals need to be aware that women who have had children previously are more likely to drink during their current pregnancy. Providing health professionals with this knowledge may allow for better identification of women who may require support or advice. It may be that health professionals are less likely to give alcohol advice to women who have already gone



through pregnancy and birth. Alternatively, it may be that women who have already gone through pregnancy feel less worried than they did for their first pregnancy and thus may be more likely to take some risks. Some health professionals may feel that a woman who has been pregnant before will already know the official guidance. However, as discussed previously, recent changes to the guidelines and conflicting reports in the media may need to be explicitly discussed with all pregnant patients, even those who have been pregnant before, to ensure that women understand the current abstinence advice.

### *Psychological determinants of behaviour*

The rates of depression and stress found in this study are not what might be expected based on previous research. Pregnancy has been found to be associated with increased rates of both depression and anxiety (Condon et al. 2004). However, the mean depression scores for the whole of the sample (3.61, SD=5.27) are actually lower than that of the UK DASS-21 norm of 5.55 (Crawford and Henry 2003). Furthermore, the rates of stress found in this sample (mean 8.77, SD=7.94) are also lower than the UK DASS-21 norm (9.27; Crawford and Henry 2003). However, in accord with Condon et al. (2004) and Teixeira et al. (2009), the levels of anxiety in the sample (mean 5.31, SD=5.04) were greater than that of the general UK population (3.56; Crawford and Henry 2003) suggesting that this sample of pregnant women is more anxious than the general non-pregnant population.

In contrast to previous research (Bullock et al. 2002, Goedhart 2009, Hanna, Faden and Dufour 1994, Linares Scott et al. 2009, Lindgren 2003, Paarlberg et al. 1999, Zhu and Valbø 2002), drinking and smoking during pregnancy was not related to increased levels of depression and/or stress. Considering the lower than expected rates of depression and stress in the sample, this result could perhaps be due to lower response rates from women experiencing depression and stress. Further research targeting depressed and stressed pregnant women and using a variety of screening tools would be warranted to examine this finding further.

Previous research (Alvik 2006) suggests that elevated anxiety is related to drinking during pregnancy. However, in contrast to this, the results of study 1 suggest that it is

actually the women who abstain from drinking during pregnancy who score higher on indices of anxiety. Drinking in non-pregnant samples has been linked to greater levels of emotional distress (Littleton, Radecki Breitkopf and Berenson 2007) and is used by individuals as a way of coping. Why then, is it the abstainers in this sample who report greater levels of anxiety? One hypothesis may be that what is being tapped into here is a pregnancy-related anxiety rather than a general feeling of anxiety. Women who are experiencing more worry and anxiety about their pregnancy and their unborn child may, understandably, be less likely to engage in potentially 'risky' behaviours such as drinking. Indeed research supports the notion of a distinct pregnancy-related anxiety (Huizink et al. 2003). Pregnancy-related anxiety is hypothesised to have 3 aspects; 'fear of giving birth', 'fear of bearing a physically or mentally disabled child', and 'concern about one's appearance' (Huizink et al. 2003). Research is required to examine the links between alcohol use and pregnancy-specific anxiety further.

When examining the attachment results for the whole sample, significant differences existed between the drinkers and the abstainers. Drinkers scored lower on the PAI indicating lower levels of attachment than abstainers. This finding ties in with previous research where lower levels of attachment are linked to increased negative health behaviours (Lindgren et al. 2003, Reading et al. 1982). However, when depression, anxiety and stress were taken into account the differences disappeared. In contrast to Lindgren (2000), study 1 found that for non-distressed pregnant women there was no significant difference in attachment existed between the drinkers and the abstainers. These results suggest that the relationship between attachment to the foetus and alcohol use in pregnancy is complicated by emotional well-being. In contrast to previous research (Lindgren et al. 2003, Reading et al. 1982), no relationship was found between smoking and attachment, although further research employing observational methodologies is necessary before clear conclusions can be drawn. This research does, however, suggest that it is important for health professionals to identify women who are experiencing mental distress and engaging in health compromising behaviours, as these women may be the most likely to experience attachment difficulties.

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### 2.6.3. SOCIAL COGNITIVE DETERMINANTS OF BEHAVIOUR

In order to establish which constructs (social cognitive constructs and socio-demographic variables) were the most useful determinants of pregnant women's drinking behaviour a binary logistic regression analysis was carried out. From all the variables that showed significant differences between drinkers and abstainers, only 3 were included in the final regression model; maternal parity, TPB- attitude and TPB- intention. These 3 variables taken together explained between 53.6-72.8% of the variance in participants' drinking behaviour and each provided a unique and statistically significant contribution. The results of this analysis show that the woman's parity, her attitudes towards drinking during pregnancy and her intention to stop drinking are important factors in explaining drinking during pregnancy. For smoking, only the attitude, intention and PBC components of the TPB and the internal component of the FHLOC differed between smokers and abstainers. Due to the small numbers of continued smokers no regression analysis was conducted.

#### *Theory of Planned Behaviour*

Applying a social cognition approach to investigate alcohol and nicotine use during pregnancy proved to be useful; TPB variables differentiated drinkers and abstainers, and smokers and abstainers in line with previous research. Significant differences were found between abstainers and drinkers for the intention, subjective norm, and attitude subscales of the TPB. Women who drank during pregnancy had lower scores on the intention subscale, indicating a weaker intention to quit drinking during pregnancy. They also scored lower on the subjective norm scale, suggesting that they were less likely to rate significant others as wanting them to abstain from drinking during pregnancy. Drinkers also scored higher on the attitude scale, suggesting that they had more positive attitudes to drinking during pregnancy than the abstainers. The effect sizes for the differences between drinkers and abstainers on the intention and attitude subscales are considered large, and the differences found for the subjective norm subscale are considered medium (Cohen 1988). These findings are in line with previous research examining drinking in non-pregnant samples (e.g. Murgraff, et al. 2001, Cooke et al. 2007).

Interestingly, in contrast to previous studies, the perceived behavioural control component of the TPB was not statistically different for the abstainers group and the drinking group. Other studies (e.g. Norman et al. 2007, Norman & Conner 2006, and Conner et al. 1999) found the PBC component of the TPB to contribute significantly to the prediction of intention to drink alcohol. The implications of this result will be discussed further below.

The TPB also differentiated between smokers and abstainers in accord with previous research examining smoking during pregnancy (Bennet and Clatworthy 1999, Godin et al. 1992). Abstainers scored higher on the intention subscale, indicating a greater intention to quit smoking during pregnancy. Abstainers had a lower mean score on the attitude construct, suggesting less positive attitudes to smoking during pregnancy than smokers. Smokers scored lower on the PBC component, showing a perceived poorer ability to manage to abstain during pregnancy. No significant differences existed on the subjective norm subscale of the TPB, indicating that both smokers and abstainers have a similar notion of what other people would wish them to do. Due to the small numbers of smokers in the sample, no binary logistic regression analysis was carried out to examine the overall power of the TPB when applied to smoking during pregnancy. However, this was carried out for alcohol use and the results are discussed next.

The logistic regression analyses provide support for the application of the TPB to alcohol during pregnancy. The overall model explained around 59% of the variance in intention to drink and between 57.1% and 77.1% of the variance in drinking behaviour during pregnancy. These results are in line with previous research using the TPB to predict alcohol intentions and behaviour in non-pregnant samples. Studies suggest that TPB variables predicted 58-66% of the variance in binge drinking intentions and 22% of the variance in binge drinking behaviour at one-week follow-up (Norman, Armitage and Quigley 2007 and Norman and Conner 2006). Moreover, Conner et al. (1999) report that the TPB explained between 28-40% of the variance in students' intentions to drink and 12-50% of the variability in behaviour.

The attitude and subjective norm variables added a unique contribution to the prediction of intentions, whilst intention and attitude variables contributed significantly to the prediction of behaviour. The attitude component added the greatest statistically significant contribution to predicting intention and also contributed significantly to predicting behaviour, suggesting that this could be an appropriate target for intervention. The PBC did not contribute significantly to the regression model for predicting either intention or behaviour. These results are in contrast to other studies examining the TPB applied to alcohol behaviour. Other studies (e.g. Norman et al. 2007, Norman and Conner 2006, and Conner et al. 1999) found the PBC component of the TPB to contribute significantly to the prediction of intention to drink alcohol. The results of study 1 suggest that the TPB without the PBC component, i.e. the Theory of Reasoned Action (TRA), is a more appropriate model to use for alcohol during pregnancy. Schlegel et al. (2006) compared the explanatory power of the TRA and the TPB in their 12-year longitudinal study of alcohol use. They suggested that the same behaviour could vary in terms of actual volitional control, for example, lower level drinking may be more volitional than problem drinking. Examining the participants' reports of drinking prior to becoming pregnant, it is likely that the majority of participants in our sample do not have drinking problems. It is therefore possible that the participants in this study will have greater perceived behavioural control than individuals who have drinking problems. Schlegel et al (2006) found that the TRA was progressively less predictive of intentions and behaviour as drinking status changed from non-problem to problem drinking. Perhaps for the majority of pregnant women (i.e. non-alcohol dependent) perceptions of control over drinking may be higher than in the general population, possibly due to a greater motivation to limit drinking, and the TRA may prove to be more valuable than the TPB. According to Ajzen and Fishbein (2004), "the relative importance of attitudes, subjective norms, and perceived behavioral [*sic*] control for the prediction of intentions is expected to vary from behavior to behavior and population to population" (p.431). Perhaps for this specific application to alcohol use during pregnancy, the TRA is a more useful model. The application of these results to designing behaviour change interventions will be discussed in section 5.2.1.

### *The role of previous smoking and drinking behaviour*

Both smoking and drinking during pregnancy were significantly associated with pre-pregnancy levels of use. Women who drank during pregnancy drank on more occasions and drank more units per occasion pre-pregnancy. This finding is in line with previous research examining pre-pregnancy drinking habits and levels of drinking during pregnancy (Palma et al. 2007, Pirie et al. 2000). Similarly women who smoked during pregnancy smoked on more occasions per week, and smoked more cigarettes per day than the smokers who abstained during pregnancy (in concordance with Linares Scott et al. 2009). However, in agreement with Ajzen (1988), past behaviour did not significantly contribute to the TPB's explanatory power for alcohol use during pregnancy. Adding a measure of past behaviour to the model did not significantly contribute to improving the percentage variance of alcohol use during pregnancy which is explained by the TPB. It therefore appears as though the role of past behaviour is mediated by the TPB variables for alcohol use during pregnancy. Past behaviour may influence current and future behaviour in an indirect path only, through influencing PBC for example.

### *Foetal Health Locus of Control*

The FHLC questionnaire also differentiated between drinkers and abstainers and smokers and abstainers. Abstainers scored higher on the internal FHLC scale, than either smokers or drinkers. The potential applications of this for intervention work will be discussed in section (5.2.1.). Higher scores on the internal scale indicate a greater sense of personal responsibility for the health of the unborn baby and therefore a greater likelihood of avoiding negative health behaviours. The results from this study map onto previous research examining internal locus of control as a determinant of prenatal smoking (Haslam, Lawrence and Haefeli 2003, Haslam and Lawrence 2004, Stewart and Streiner 1994), and drinking (Stewart and Streiner 1994).

### *Perceived Behavioural Control, Self-efficacy and Locus of Control*

Over recent years there has been debate in the literature surrounding the TPB construct of PBC and its possible overlap with other constructs of control such as self-

efficacy and locus of control (see Armitage and Conner 2006 and Ajzen 2006). Considering firstly PBC and self-efficacy, there is a clear conceptual overlap; both are concerned with an individual's perceived ability to perform a specific behaviour. Self-efficacy is a construct termed by Bandura (1977) and is defined as "beliefs in one's capabilities to organise and execute the courses of action required to produce given levels of attainment s" (Bandura 1998 p.624). The creator of the TPB, Ajzen, acknowledges that the PBC concept "owes its greatest debt" to Bandura's work on self-efficacy (Ajzen 2006 p. 667) and argues that both concepts are concerned with perceived ability to perform a behaviour. For this reason, no separate measure of self-efficacy was included in the questionnaire to participants in order to maintain an acceptable length of questionnaire.

With respect to the potential overlap between PBC and perceived locus of control, Ajzen (2006) argues that the factors are conceptually distinct. Perceived locus of control (Rotter 1996) pertains to attributions about the external-internal nature of factors responsible for behaviour whereas PBC relates to perceived ability to perform a behaviour. Taking the example of smoking, an individual may believe that 'it is difficult for me to quit smoking' (PBC) and this belief is different to that of 'I smoke because my job is stressful' (external locus of control). Ajzen (2006) argues that perceived control over an outcome is independent of the internal or external locus of factors responsible for it. Although not directly related to the main focus of the study, this theoretical independence was examined by exploring correlations between the PBC and FHLC measures. No significant correlations between PBC and HLC were found for smoking or alcohol use.

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#### 2.6.2. WHERE THIS STUDY ADDS NEW INSIGHT, LIMITATIONS AND FUTURE DIRECTIONS

Study 1 highlights that there is a need for a greater focus on alcohol and nicotine use during pregnancy in the antenatal care provided in the Grampian region. Significant numbers of pregnant women are drinking and smoking during pregnancy regardless of age, race, SES, partner behaviour or marital status. Although the majority of women did make changes to their behaviour, more should be done to ensure that all women

are receiving clear advice from antenatal health professionals; especially those in their second or subsequent pregnancy. The results indicate a number of social-cognitive determinants (namely the intention, attitude and subjective norm constructs from the TPB and internal locus of control of foetal health) of the behaviours; which could form the basis for developing effective behaviour change interventions as discussed further in section 5.2.1.

There are a number of potential limitations in this study to note. Firstly, alcohol and nicotine use were assessed using self-report measures which may influence results. Armitage and Conner (2001) found that the TPB was more predictive of self-reported rather than observable behaviours. Perhaps future studies could also obtain estimates of alcohol use from women's partners or from alcohol use diaries. The generalisability of this study may also be affected by the sample being taken from only one geographic area. However, the rates of alcohol use reported in this sample are similar to previous studies with a wider geographical spread (Anderson, et al. 2007, Bolling et al. 2007). Furthermore, relatively small numbers of participants reported being smokers before becoming pregnant. This meant that analyses of the smoking data were limited by sample size. Future research targeting pregnant smokers may shed further light on the determinants of smoking during pregnancy. However, recruitment of women who continue to smoke may prove to be difficult. With such a sensitive issue, many pregnant smokers may feel threatened by research on this topic and particular attention would need to be paid to alleviate this possibility. Finally, further research applying qualitative methodology could provide additional information important to understanding and influencing pregnant women's alcohol and nicotine use.

A common criticism of the TPB is that little attention is paid to the role of emotion in determining behaviours (Conner and Norman 2005). However, Ajzen and Fishbein (2005) argue that emotion impacts upon behaviour indirectly, through influencing beliefs and attitudes. Although this study examined the impact of negative emotions (depression, anxiety and stress) on drinking habits of pregnant women, it did not investigate the role that positive emotions may play. Cooper et al (1995) highlight the role that positive emotions play in motivating people to drink. Their study distinguished two groups of drinkers, 'copers' and 'enhancers'. 'Copers' were found to



be significantly more depressed, whilst 'enhancers' reported higher levels of positive affect, and held stronger positive expectancies of the impact alcohol had on social and emotional factors. Further research is required to examine the role of positive emotions as a motivating factor for drinking during pregnancy and whether this adds to the TPB's predictive power.

Despite these potential limitations, the results of this study have important implications for antenatal care and health promotion. This study provides an estimate of the numbers of pregnant women continuing to drink during pregnancy in Grampian. It also suggests that the TPB and FHLC are useful tools for exploring the reasons behind these behaviours and could be of benefit to antenatal health care professionals. Targeting pregnant women's attitudes towards alcohol and nicotine use during pregnancy, as well as their perceptions of what other pregnant women drink/smoke and what is expected of them, may be an effective avenue for health professionals supporting behaviour change. There is also the potential to use the results of the study to target women 'at-risk' of alcohol and/or nicotine use during pregnancy for further education or intervention work. Furthermore, interventions designed to increase pregnant women's beliefs about their own personal control over the health of their unborn baby could prove useful. Further research would have to address the acceptability of these types of interventions for pregnant women as any intervention would need to be sensitively framed and appropriately tailored for the woman's stage of pregnancy and levels of drinking. Individually-tailored, sensitive approaches would be necessary to ensure that potentially harmful guilt or worry was not caused to pregnant women. Developments in TRA/TPB research indicate that perceptions of anticipated regret are an important moderator of the intention-behaviour relationship (Conner and Sparks 2005). It could prove an interesting avenue for future research to investigate if the inclusion of variables such as this would improve the overall predictive power of the model for alcohol use during pregnancy. It could also prove useful for future research to further investigate the aspects that make up internal control. Research suggests that the construct is made up of a number of variables including anticipated self-blame (Marshall 1991). Further

research could tease out the factors that make up internal control and examine their overlap with existing social-cognitive constructs.



#### 3.1.1. PRACTICE OF ANTENATAL CARE PROVIDERS

A central aim of this research was to investigate the practice of midwives working in Grampian regarding the advice given on alcohol and nicotine use during pregnancy. By gaining a clearer picture of midwives' attitudes and practice towards alcohol and nicotine use this research may help to explain the incidence of the behaviours in pregnancy. One way that the incidence could be reduced is through changing the practice of midwives. Research tells us that health professionals' behaviour is determined by many more factors than purely what the current guidelines state. Around 30-40% of patients do not receive care according to current scientific guidance (Bonetti et al. 2006) and around 20-25% of the care that is provided is either not necessary or is potentially detrimental (Schuster, McGlynn and Brook 1998).

As mentioned previously, American policy advised women to abstain from drinking during pregnancy over two decades earlier than the UK (US Public Health Service 1981). However, recent studies investigating the practice of health professionals in the US and Canada show that, despite clear guidelines, health professionals' behaviour varies. A Canadian survey of physicians in 1991 concluded that there was no routine elicitation of alcohol use (Donovan 1991). In 1996 Health Canada<sup>6</sup> released a statement recommending that health professionals counsel women that the prudent choice is to abstain from alcohol completely during pregnancy (Health Canada 1996). However, a study carried out in 2002 suggests that although around 75% of physicians reported counselling pregnant women about alcohol use, only 65% recommended complete abstinence (Nevin 2002).

Diekman et al. (2000) surveyed American obstetrician-gynaecologists and almost all (97%) reported routinely asking pregnant patients about alcohol use, 48% elicit information themselves, 41% have a non-physician obtain it, and 19% use a patient-

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<sup>6</sup> Health Canada is the Federal department responsible for maintaining and improving health

administered questionnaire. Half of the obstetrician-gynaecologists advised and educated all pregnant patients about the consequences of drinking, whilst the other half only did so when drinking was suspected or further risk factors were present (e.g. smoking). In contrast to this, Chang (2000) found that only 34% of women in Boston were routinely screened for alcohol use during antenatal care, a much lower proportion than that suggested in Diekman et al.'s study. The studies from America and Canada show that, despite a clear abstinence message being advocated by the government since the early 1980s and 1990s (US Public Health Service 1981, Health Canada 1996), significant numbers of health professionals are not routinely addressing alcohol use with their pregnant patients.

Australian research depicts similar findings regarding health professional's use of guidelines. Only 11.4% of doctors in Western Australia had read the current Australian national health guidelines (National Health and Medical Research Council 2001) about alcohol use during pregnancy, and only 9.1% provided advice that was in line with such guidelines (Elliot, Payne, Haan and Bower 2006). A further study examining the practice of Obstetricians in Western Australia in 2001-2003 (Payne, Elliot, D'Antoine et al. 2005) reported that 42.9% did not routinely ask pregnant patients about alcohol use and only 4.8% gave advice that concurred with the existing guidelines at the time (National Health and Medical Research Council 2001).

The picture for guidance regarding smoking during pregnancy is also mixed. Only 56.7% of pregnant women in a New Jersey study reported that any health professional had advised them to stop smoking (Tong et al. 2008). A German study of midwives reported that 77% assessed patients' smoking habits (Thyrian et al. 2006). Almost all of the obstetrician/gynaecologists surveyed by Jordan, Dake and Price (2006) in Ohio reported that they routinely asked pregnant patients about their smoking habits. Despite this, only 62% documented their status in medical records, 13% reported always arranging support for the patient to quit, 6% made a referral, and only 2% prescribed NRT (Nicotine Replacement Therapy). In the UK, research suggests that although only 6% of midwives, GPs and obstetricians report using guidelines, 96% routinely assess and record patients' smoking at the first pregnancy consultation (Clasper and White 1995). Although this is, in part, encouraging, the same study also

reported that less than 50% of the health professionals in the study monitored smoking throughout the pregnancy and only 67% gave advice on how to stop (Clasper and White 1995), suggesting that routine clinical practice could be significantly improved.

The practice of health professionals in the UK is far from clear. Little research has been conducted investigating routine practice of midwives and antenatal health care providers regarding alcohol or nicotine use during pregnancy. Given the recent change in guidelines for alcohol consumption during pregnancy guidelines, more research is required to establish if the advice currently being given to pregnant women regarding alcohol use is in line with the most recent guidance.

The content of what health professionals say is likely to impact upon patients' behaviour, but the approach used by the professional and the way in which they say it, is also important. A qualitative Swedish study (Abrahamsson et al. 2005) interviewed midwives about their approaches to smoking cessation. Four main types of approach were identified in interviews; 'avoiding', 'friend-making', 'informing', and 'co-operating'. Midwives classed as using an avoiding approach did not consciously raise smoking habits with patients due to negative experiences of doing so in the past or through a lack of confidence. The informing approach used by some midwives reflected a more health-professional centred approach where the midwife's role was that of expert. In contrast to this, the friend-making and co-operating approaches were more patient-centred, where building a mutual relationship was seen to be an important tool in aiding cessation (Abrahamsson et al. 2005). Whether links exist between the different approaches midwives use to discuss smoking and alcohol use during pregnancy and actual patient behaviour is uncertain.

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### 3.1.2. INFLUENCES ON PRACTICE

The delivery of health care can be influenced by a range of factors including local policy, organisational and resource issues. The organisational culture is likely to be an important influence on practice and is postulated to be transmitted and maintained through the process of organisational socialisation. Organisational socialisation is "the process by which an individual comes to appreciate the values, abilities, expected

behaviors, and social knowledge essential for assuming an organisational role and for participating as an organizational member” (Louis 1980, pp.229-230). When an individual enters an organisation, they learn the organisational norms, and their role and responsibilities (Ashforth, Sluss and Harrison 2007). This process may therefore impact upon midwives’ views and practice regarding alcohol and nicotine. However, the effects of these influences on clinical practice tend to be mediated through individual health professionals’ behaviour (Bonnetti, Pitts, Eccles, Grimshaw, Johnston et al, 2006). It is the individual midwife who decides whether to read the policies, interprets the guidelines, and decides whether to elicit information from pregnant patients about their alcohol and nicotine use. The maternity records currently in use in Scotland (NHS Scotland 2008) include questions on smoking and alcohol use but women may be encouraged to complete these prior to the appointment. There are no guarantees that alcohol and nicotine use will be discussed with the midwife, that pregnant women will be given face-to-face advice, nor is it clear what advice might be given. A central aim of this research was to explore potential influences on midwives’ practice in order to inform understanding of the determinants of what health advice is given.

A recent survey in Aberdeen found that around 20% of primary health care professionals advised pregnant women that “a glass of wine or beer in moderation was OK” with the majority advising against any alcohol use (Mayorga-Braunholtz, Tucker, van Teijlingen 2006). However, only 11 community midwives completed this survey and it is community midwives who are likely to be the lead clinician for the majority of pregnant women. Therefore, further research is required to investigate the practice of community midwives throughout Grampian and to explore potential influences on practice.

The knowledge and attitudes that midwives hold are likely to impact upon the content and delivery of health advice to patients whether consciously or unconsciously. Diekman et al. (2000) report that 13% of American health professionals were unsure of the levels of alcohol use associated with adverse pregnancy outcomes, only 20% felt that abstinence was the safest approach, and 4% believed that drinking 8 or more alcoholic drinks a week posed no risk for adverse pregnancy outcomes (spontaneous

abortion, central nervous system impairment, birth defects and foetal alcohol syndrome). Health professionals working in obstetrics and paediatrics community health clinics; and in a nutritional programme for women, infants and children in Boston were surveyed to determine levels of knowledge regarding the effects of smoking during pregnancy (Bonollo et al. 2002). Health professionals working in these clinics answered questions designed to test their knowledge of the effects of antenatal smoking on pregnant and postpartum women, and their foetuses/infants. Around 42-44% of these questions were correctly answered suggesting relatively low health professional awareness of the impact of nicotine exposure. Prior training, greater confidence, greater motivation, and the belief that women want counselling were significantly associated with greater levels of knowledge.

The attitudes midwives hold towards providing alcohol and smoking health advice to patients may also play a role in determining whether and how information is given. How confident a health professional feels about giving advice regarding alcohol use during pregnancy is likely to influence their clinical behaviour. Only 23% of prenatal health care providers in Kentucky felt confident in their ability to screen pregnant patients for alcohol use and only 40% agreed that they were comfortable addressing alcohol use with their last patient (Logan et al. 2003). The professionals surveyed in Logan et al.'s study identified that a lack of local resources, lack of adequate screening tools, time pressures and the potential for clients to be dishonest were important barriers to their ability to screen for alcohol use. Research suggests that midwives agree that they have a professional responsibility to tackle smoking during pregnancy and that midwives and health visitors are the 'right' health professionals to be giving smoking cessation advice (Bull 2007). McLeod et al (2003) found that, although midwives acknowledged that addressing smoking was integral to providing health care, challenges were felt to exist in knowing how to solicit information and in supporting women to make changes. The midwives in McLeod et al's (2003) study reported difficulty in identifying patients who would be receptive to advice and support, and some midwives reported doubts about whether they could make a difference. They were also concerned that discussing smoking with pregnant smokers could make it difficult to establish a good relationship and could make women feel

guilty. Thyrian et al. (2006) reported that 81% of midwives felt there was a low chance of succeeding to aid behaviour change and believed that only around one in five women would stop smoking after being given advice. Further barriers identified by Clasper and White (1995) included a perceived lack of training, lack of interest on behalf of the patients, and the potential for harm in terms of increasing anxiety and guilt.

The tension between establishing a good relationship with patients and addressing potentially sensitive topics was also found to be important in Wood's (2008) study of Aboriginal health workers. The health workers saw their role as one of support and were conscious of the need to maintain positive relationships. As a result, they were often uncomfortable with raising the issue of smoking cessation with pregnant women. Midwives who view their role as supportive and caring may be less likely to address topics which they feel could damage the patient-professional relationship. Furthermore, varying perceptions about who is responsible for addressing alcohol use during pregnancy are likely to influence clinical practice. Tough et al (2004) found that health care providers who believed it was their role to address alcohol use during pregnancy were significantly more likely to recommend abstinence to pregnant women than those who were unsure or did not believe it was part of their role.

Personal characteristics of midwives may also influence the attitudes they hold and the advice they give. Health professionals' own levels of alcohol use has been found to be an important factor in determining advice given to patients, despite 87% of physicians disagreeing that this influenced their ability to diagnose problem drinking (Brewster et al. 1990). Further reported influences on practice include gender and year of graduation (Diekman et al. 2000); with males being less likely to advise patients to abstain completely and pre-1973 graduates being less likely to discuss the adverse effects of drinking, advise abstinence or advise a reduction in consumption during pregnancy.

Little is known regarding the practice of midwives following the change in recommendations for alcohol use during pregnancy. Furthermore, the practice of midwives in Grampian has not been extensively investigated to date therefore



research is warranted. Research is required to establish whether this change in policy is reflected by a change in practice. Midwives are the obvious healthcare professional group to deliver any alcohol and nicotine reduction strategies therefore research is needed to establish their current practice and what determines their behaviour and attitudes.

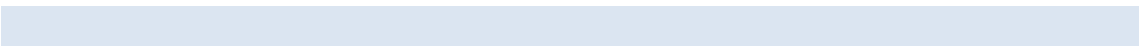
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### 3.1.3. RESEARCH AIMS

The central aims of this study were to investigate the attitudes of midwives in Grampian with regard to alcohol and nicotine use during pregnancy; and to establish the practice of community midwives in terms of addressing alcohol use with pregnant patients. Study 2 focuses on establishing alcohol practice because, as discussed in section 1.6, the provision for smoking cessation in pregnancy is better established. Study 2 also aimed to explore potential influences on practice, identify training needs and to unearth midwives' perceived barriers to providing advice and support to pregnant patients.

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### 3.1.4. HYPOTHESES

1. Midwives' attitudes towards alcohol use will differ based on demographic factors (such as age, length of clinical practice, parity and own alcohol use)
  2. Midwives' clinical behaviour, as measured by self-reported practice, will differ according to demographic variables (such as age, length of clinical practice, parity and own alcohol use) and attitudes towards alcohol use during pregnancy and the provision of alcohol-related advice to pregnant women.
  3. Midwives' attitudes towards nicotine use will differ based on demographic factors (such as age, length of clinical practice, parity and own nicotine use)
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## 3.2. METHOD

### 3.2.1. PILOT STUDY

In order to identify any misunderstandings or difficulties with the administration or scoring of the questionnaire a pilot study was carried out using a sample of 7 undergraduate midwifery students from The Robert Gordon University, Aberdeen. The questionnaire was handed out after lectures and the pilot participants were asked to provide their comments and views on the questionnaire. Pilot participants reported no concerns with questionnaire coverage or content and felt that the length was acceptable. No major changes were made to the questionnaire after the pilot study.

### 3.2.2. PARTICIPANTS

Six maternity units in the Grampian region participated in this study. A total of 120 questionnaires were distributed to practising midwives. In total, 52 midwives completed and returned the questionnaire. It was not possible to establish how many midwives were working at each maternity unit therefore an overall response rate cannot be calculated. Reminder letters and further questionnaires were sent only to maternity units from which no responses were received. The only inclusion criterion was that participants had to be a qualified midwife working in Grampian.

The midwife participants (N= 52) had a mean age of 44.29 years (SD=8.38, ranging from a minimum of 21 years to a maximum of 62 years). The majority worked in the community (78.8%, n=41) and on average participants had been practising as midwives for 17.46 years (SD= 9.65, ranging from a minimum length of practice of 4 months to a maximum of 38 years). Most participants had had their own children (76.5%, n=39) with the majority having had 2 children (41.2%, n=21). Only one midwife (3.8%) was a smoker, and almost all drank alcohol (92.3%, n=48). The smoker consumed on average around 20 cigarettes a day and the drinkers drank on average 5.7 units a week (SD=4.78).

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### 3.2.3. QUESTIONNAIRES

A postal survey methodology was chosen to investigate the research aims (for justification of this method please see section 1.12). The 14–page questionnaire pack (see appendix 7) was developed according to guidelines published in Robson (1993) and contained the following non-validated questionnaires:

#### *Section 1 – Demographics, current nicotine and alcohol use*

Information was obtained regarding the individual's age, length of time in practice, number of own children and current alcohol and nicotine consumption. This was done to investigate the relationship between demographic variables and midwives' attitudes towards providing advice.

#### *Section 2 – Attitudes to smoking and drinking during pregnancy*

Questions relating to attitudes regarding smoking and drinking during pregnancy were identical to those distributed to pregnant women in study 1 (see section 2.2.3). Higher scores indicate more positive attitudes towards smoking and drinking alcohol during pregnancy.

Additional questions were included which asked midwives to define what they believe to be an acceptable level of alcohol use during pregnancy, and what they believed to be light, moderate and heavy alcohol use during pregnancy in terms of units.

#### *Section 3 – Current practice regarding patients and alcohol use*

Six closed-option questions were included to establish midwives' current practice regarding alcohol advice. Midwives were asked how often they ask patients about alcohol use, when they ask, what method they use to determine alcohol use (i.e. questionnaire, ask verbally, screening tool), if they record alcohol use, and what they do if alcohol use is discussed. Space was provided for any extra comments, and responses were coded into categorical variables.

#### *Section 4 – Attitudes to giving patients advice about alcohol use*

Two closed-option questions were included to investigate midwives' attitudes towards giving patients advice about alcohol use. Items related to perceptions about whose

responsibility it is for giving pregnant women information about alcohol and barriers to providing advice. Space was provided for additional comments, and responses were coded into categorical variables.

#### *Section 5 – Training received about alcohol use*

Four closed-option questions were included to determine the training needs of midwives regarding discussing alcohol use with patients and supporting behaviour change attempts of pregnancy women.

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#### 3.2.4. PROCEDURE

Permission was granted from the Head of Midwifery for Grampian to approach a representative sample of practising midwives across the region. Following this a letter, information sheets (appendix 8) and questionnaire packs were sent to six maternity units. A two-week deadline was set for return of questionnaires. An estimate of the number of midwives based at each centre was given by colleagues at the maternity hospital, therefore reminder letters and further questionnaires were sent out to the two centres that had returned no questionnaires. A summary of findings was presented at a departmental symposium for antenatal healthcare professionals at Aberdeen maternity hospital.

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#### 3.2.5. ETHICS

This research project was approved by the Robert Gordon University ethics review panel, Grampian NHS Research Ethics Committee and was conducted according to the British Psychological Society's code of conduct. Participants' responses were anonymous and were stored according to confidentiality and data protection guidelines.

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#### 3.2.6. DESIGN

This postal survey study was designed to explore midwives' attitudes towards nicotine and alcohol use during pregnancy, their current practice regarding patients and alcohol advice, and their attitudes towards providing pregnant women with advice about alcohol use.

### *Dependent Variable*

The dependent variables in this study are the attitudes towards, and advice about, alcohol and nicotine use and midwives' current practice

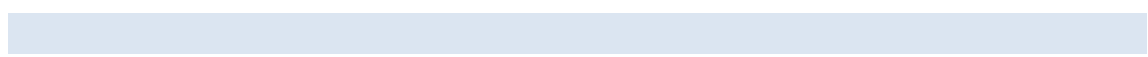
### *Independent Variables*

The independent variables were demographic variables (i.e. age, length of time as a midwife, own alcohol and nicotine use)

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#### 3.2.7. ANALYSES

Data were analysed using SPSS 15 to determine relationships between midwives' attitudes, and practice and demographic variables. Where data were normally distributed with homogeneity of variance, parametric statistical tests were conducted. In the event of skewed distributions and/or heterogeneity of variance, non-parametric methods were used. Correlations and independent-samples *t*-test analyses were carried out to explore the relationships between attitudes/practice and demographic variables.



### 3.3. RESULTS

#### 3.3.1. ATTITUDES TOWARDS ALCOHOL AND NICOTINE USE DURING PREGNANCY

Midwives were asked to define what they believed to be an acceptable level of alcohol use during pregnancy. Just over two thirds of participants (see table 3.1) felt that zero units of alcohol per week was appropriate for pregnant women, in line with current government guidelines. Almost 20% felt that 1-2 units per week were acceptable, whilst the remaining 9.6% agreed with weekly consumption of above these levels.

Table 3.1: Midwives' definitions of an acceptable number of units of alcohol per week during pregnancy

Number of Units	Percentage of Participants*
0	67.3 (n=35)
1	9.6 (n=5)
2	9.6 (n=5)
2.5	1.9 (n=1)
3	5.8 (n=3)
4	1.9 (n=1)

\* Missing data for 2 participants

Participants were asked to define what they considered to be heavy, moderate and light alcohol use during pregnancy. Definitions of light alcohol use ranged from 1 unit per month to 40 units, with a mean of 7.31 units a month (SD=8.04). Moderate alcohol use was thought to be around 5.85 units a week (SD=4.90), with answers

ranging from 1 unit per week to 21 units per week. High alcohol consumption was defined as between 4 units and 28 units per week, mean 11.10 units (SD=6.37).

Table 3.2: Answers given for the statement “drinking 1 or 2 units once or twice a week is not likely to harm baby”

<b>Answer Given</b>	<b>Percentage of Participants</b>
<b>Strongly disagree</b>	11.5% (n=6)
<b>Disagree</b>	42.3 (n=22)
<b>Unsure</b>	26.9 (n=14)
<b>Agree</b>	19.2 (n=10)
<b>Strongly agree</b>	0

Table 3.2 above shows the spread of answers given by participants to a question based upon the recent guidelines used by the government until 2006. Over half of the midwives (53.8%) disagreed or strongly disagreed with the previous guidelines used by the government, that 1 or 2 units once or twice a week is not likely to harm the baby.

Scores for the alcohol attitudes questions were summed to give a total alcohol attitude score. The total scores ranged from a minimum of 15.0 to a maximum of 30.0 with a mean of 22.8 (SD=2.9), indicating generally healthy attitudes towards drinking alcohol in pregnancy (i.e. attitudes in line with abstention). Scores for the smoking attitudes questions were also summed and ranged from a minimum of 11 to a maximum of 20. The mean score for the smoking attitude questions was 15.2 (SD=2.5), indicating generally healthy attitudes towards smoking in pregnancy (i.e. attitudes in line with abstention).

### 3.3.2. PRACTICE OF COMMUNITY MIDWIVES

The current practice of community midwives (n=41) was investigated, as these are the midwives who have the most interaction with pregnant women. The community midwives were asked if they routinely asked their patients about their alcohol use.

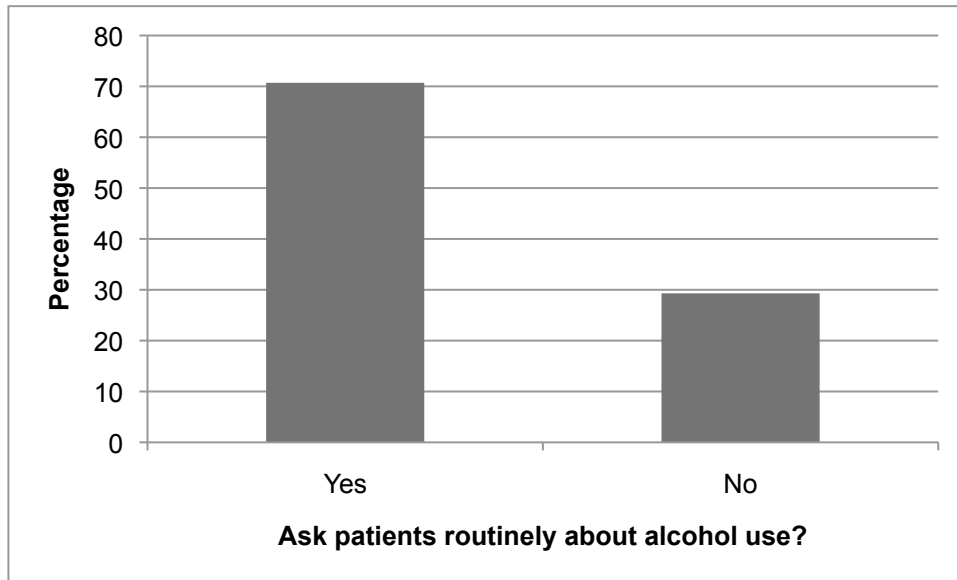


Figure 3.1: Percentage of participants routinely asking about alcohol use

Figure 3.1 shows the percentages of participants who report that they routinely ask their pregnant patients about their alcohol use. Around one third (32.7%, n=17) of midwives reported that they did not routinely ask patients if they were drinking alcohol during pregnancy.

Participants were also asked if they routinely recorded a patient's alcohol use. Around thirty percent (30.8%, n=16) of the midwives reported that they did not, as shown in figure 3.2 below.



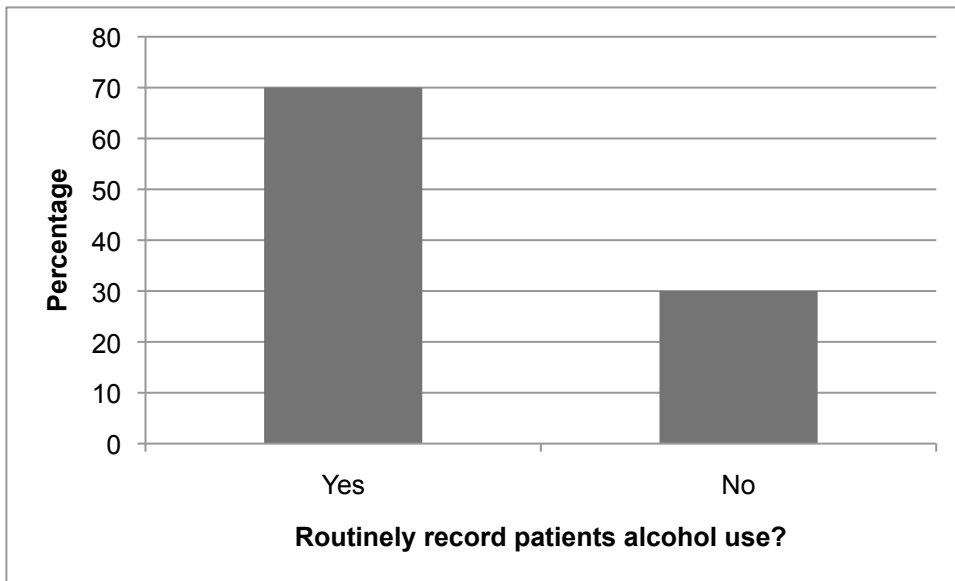


Figure 3.2: Percentage of participants routinely recording patients' alcohol use

Figure 3.3 (below) shows the ways in which those community midwives who routinely ask (n=17) determine alcohol use in their patients. The majority (89.7%, n=15) do not use a questionnaire or screening tool to help determine alcohol use, and instead ask patients directly.

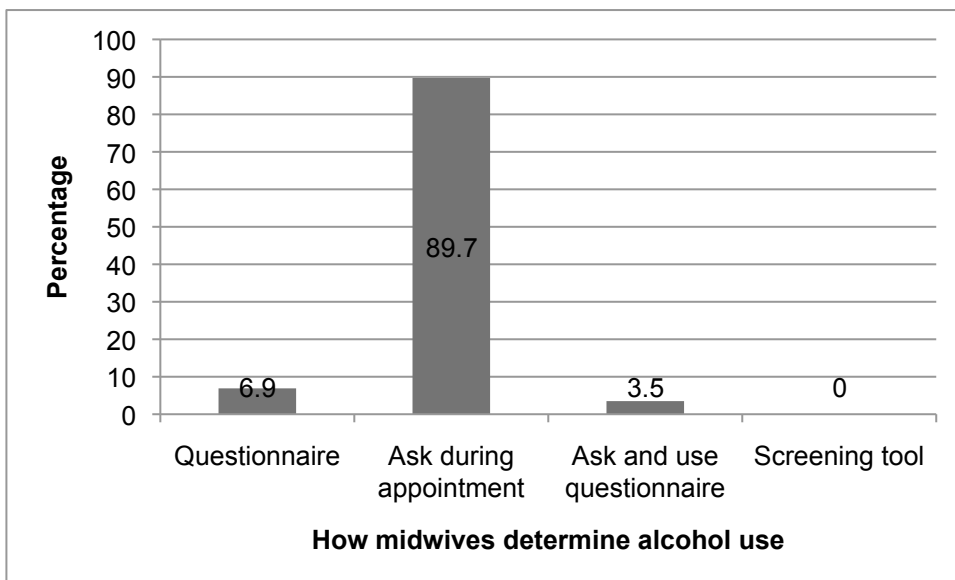


Figure 3.3: How community midwives determine patients' alcohol use

Midwives (from across all specialties) were asked at which point in pregnancy they were likely to discuss alcohol use with patients; their answers are shown in table 3.3.

Almost all (90.2%) reported that they were likely to do this at the first antenatal appointment (the booking visit).

Table 3.3: Point in pregnancy when midwives discuss alcohol

<b>When in pregnancy alcohol is discussed (if asked)</b>	<b>Proportion of Participants who report discussing alcohol*</b>
<b>Booking appointment</b>	90.2% (n=37)
<b>7-week scan</b>	2.4% (n=1)
<b>Pre-conception</b>	2.4% (n=1)
<b>After miscarriage (when giving advice about reducing risk)</b>	2.4% (n=1)
<b>Postnatal</b>	2.4% (n=1)

\* Missing data for 11 participants

Midwives were asked to report what they do when alcohol is brought up in an antenatal appointment. Table 3.4 below shows the answers given.

Table 3.4 Midwives' practice when alcohol is brought up in appointment

Practice when alcohol is brought up	Proportion of Participants
<b>Discuss the adverse effects</b>	94.2% (n=49)
<b>Advise abstinence</b>	75% (n=39)
<b>Give out information</b>	59.6% (n=31)
<b>Refer patient to another health professional/service</b>	44.2% (n=23)
<b>Advise moderation</b>	1.9% (n=1)
<b>Advise patient to consume wine only</b>	1.9% (n=1)

NB: Some participants report more than one behaviour

The majority of participants (94.2%) reported that they discuss the adverse effects of alcohol use when alcohol is discussed in an appointment. Three quarters of the sample report that they advise abstinence, with only one midwife advising moderation and one advising patients to limit their alcohol to wine. Less than two thirds (59.6%) of midwives reported that they would give out information regarding alcohol consumption, and 44.2% report that they would refer the patient onto another health professional or service.

### 3.3.3. TRAINING – ALCOHOL

Approximately 96% of midwives (96.1%, n=50) reported receiving no training in ways to broach talking to patients about alcohol use during pregnancy. The majority of

participants (86.5%, n=45) felt that they required training in how to talk to patients about alcohol and pregnancy.

Training in the ways to try and help change a patient's drinking habits had not been offered to 90.4% (n=47) of participants. Almost all (94.2%, n=49) participants felt that they required training in this area.

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#### 3.3.4. TRAINING - SMOKING

Just over half of the midwives (51.9%, n=27) reported that they had received training about the best ways to broach talking to patients about smoking during pregnancy. Around 67% (n=35) felt that they still required training in this area.

Training in the best ways to attempt to change patients' smoking habits had been received by 50% (n=26) of the participants. Over 65% (n=34) felt that they still required training in ways to help patients change smoking habits.

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#### 3.3.5. ATTITUDES TOWARDS GIVING ADVICE TO PATIENTS ABOUT ALCOHOL USE

Despite the reported lack of training, most of the participants had positive attitudes towards giving patients advice about alcohol use during pregnancy. Participants were given eight statements and were asked to rate how strongly they agreed or disagreed with each.

Table 3.5: Summary of midwives' answers to questions about their attitudes to giving patients advice about alcohol use.

Statements	Summary of Answers given
<p><b>1. Women are receptive to advice about alcohol</b></p>	<p>The majority of participants agreed (67.3%, n=35) with this statement; 9.6%, (n=5) strongly agreed, 7.7% (n=4) were unsure, and 15.4% (n=8) disagreed. No participants strongly disagreed.</p>
<p><b>2. Giving patients advice about alcohol consumption during pregnancy is likely to make women feel guilty</b></p>	<p>Participants were fairly evenly split in their attitudes to this statement. The largest proportion of participants agreed with this statement (42.3%, n=22), whilst 34.6% (n=18) disagreed and 21.2% (n=11) were unsure (missing data for 1 participant)</p>
<p><b>3. I feel confident giving patients advice about alcohol consumption during pregnancy</b></p>	<p>Most participants agreed that they felt confident giving patients advice (46.2%, n=24), 23.1% (n=12) were unsure, and 19.2% (n=10) disagreed (missing data for 6 participants)</p>
<p><b>4. Alcohol use is a private matter and should not be brought up with patients</b></p>	<p>No participants agreed with this statement. They disagreed (51.9%, n=27) or strongly disagreed (48.1%, n=25).</p>
<p><b>5. I am unlikely to make a difference to a</b></p>	<p>The majority of participants (57.7%, n=30)</p>

<p><b>pregnant women's alcohol consumption</b></p>	<p>disagreed with this statement. Only a small number agreed (3.8%, n=2), 26.9% (n=14) were unsure and 11.5% (n=6) strongly disagreed that they were unlikely to make a difference to patients' alcohol consumption.</p>
<p><b>6. Pregnant women are not interested in talking about alcohol use during pregnancy</b></p>	<p>Only 1 participant (1.9%) agreed with this statement. Most disagreed (65.4%, n=34) that women were uninterested in talking about alcohol use, 13.5% (n=7) strongly disagreed and 19.2% (n=10) were unsure.</p>
<p><b>7. Asking a woman about her alcohol consumption is likely to damage my relationship with her</b></p>	<p>Most participants (73.1%, n=38) disagreed that asking patients about alcohol use would likely damage their relationship. Only a small number of participants agreed (5.8%, n=3), 15.4% (n=8) were unsure and 5.8% (n=3) strongly disagreed.</p>
<p><b>8. There are more important things to discuss with patients than their alcohol use</b></p>	<p>The majority of midwives disagreed (69.2%, n=36) or strongly disagreed (17.3%, n=9) with this statement. Only 3.8% (n=2) agreed that there were more important things to discuss with patients than alcohol use and 9.6% (n=5) were unsure if this was the case.</p>

Participants were asked who they believe to be responsible for giving pregnant women advice about alcohol use. The midwives' answers are displayed in figure 3.4 below.

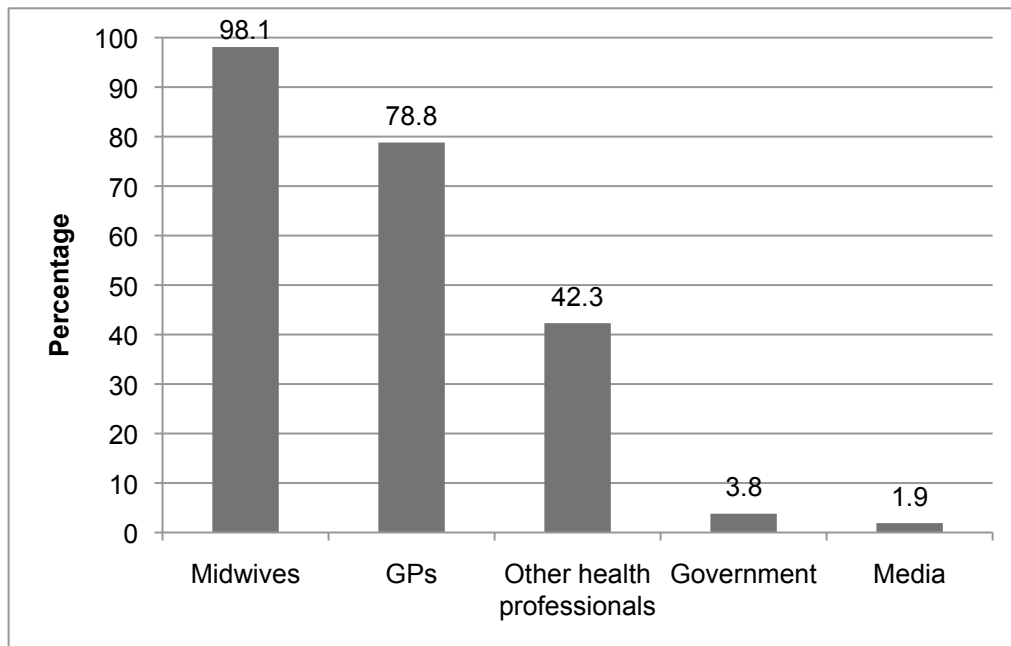


Figure 3.4 Who is responsible for advising pregnant women about alcohol use? (participants may have chosen more than one category)

Only 1 participant (1.9%) did not believe that midwives were, at least partly, responsible for providing alcohol advice to pregnant women. Almost 80% (n=41) felt that GPs held some responsibility for providing alcohol advice. A substantial proportion of participants (42.3%, n=22) felt that other health professionals also share the responsibility. Further exploration of the 'other health professional' category revealed that only eight participants named who this health professional group were. Answers provided were obstetricians (5.8%, n=3), sonographers (1.9%, n=1), substance misuse professionals (1.9%, n=1), health visitors (1.9%, n=1) and practice nurses (1.9%, n=1).

### 3.3.6. BARRIERS TO ADVISING PATIENTS ABOUT ALCOHOL USE

Participants were asked what barriers (if any) existed to giving advice about alcohol use to patients.

Table 3.6: Barriers towards advising patients about alcohol use during pregnancy

<b>Answer Given</b>	<b>Percentage of Participants*</b>
<b>Lack of training</b>	60.7% (n=17)
<b>Lack of time</b>	42.9% (n=12)
<b>None</b>	28.6% (n=8)
<b>Ill at ease</b>	21.4% (n=6)
<b>Patients don't expect advice</b>	7.2% (n=2)
<b>Culture</b>	3.6% (n=1)
<b>Nationality</b>	3.6% (n=1)
<b>Conflicting advice about safe levels</b>	3.6% (n=1)
<b>Patients may feel guilty</b>	3.6% (n=1)

\*Participants may have chosen more than one category

Participants reported that a lack of training, time, and feeling ill at ease were the main barriers to giving patients advice about alcohol use during pregnancy. Around 28% of



participants reported that no barriers existed to prevent them giving pregnant women advice about drinking.

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### 3.3.7. WHAT DETERMINES MIDWIVES' ATTITUDES TOWARDS ALCOHOL USE DURING PREGNANCY?

Analyses were carried out to investigate potential factors that may be associated with midwives' attitudes towards alcohol use during pregnancy. Alcohol attitude questions from section 3 of the questionnaire (appendix 7) were scored and summed to give a total attitude score that could range from 6 – 30, with higher scores indicating more healthy attitudes towards alcohol use during pregnancy (i.e. attitudes in line with current government guidelines of abstinence). The mean score for the alcohol attitudes questions was 22.8 (SD=2.9); indicating a generally positive attitude towards abstinence. Three participants did not complete all the alcohol attitude questions therefore no total scores could be calculated and analysis were carried out on the remaining 49 participants.

#### *Age*

The relationship between age and alcohol attitude score was linear therefore a Pearson correlation was used. One participant did not give their age and was excluded from the analysis. No significant correlation existed between midwives' age and their attitudes towards alcohol use  $r = -0.090$ ,  $n = 48$ ,  $p = 0.543$  ns. Therefore participants' age was not associated with attitudes towards alcohol use during pregnancy.

#### *Length of time as practising midwife*

The relationship between the length of time participants had been practising as a midwife and their attitudes towards alcohol use was linear therefore a Pearson correlation was used. Three participants did not report their length of time in practice. No significant correlation existed between the two variables,  $r = -0.120$ ,  $n = 46$ ,  $p = 0.427$  ns.

### *Own alcohol use*

The relationship between the number of units midwives consumed per week and their attitudes towards alcohol use during pregnancy was also linear. Three participants did not report their own alcohol consumption. The results of the Pearson correlation,  $r = -0.313$ ,  $n = 46$ ,  $p < 0.05$ , showed a significant association between participants own alcohol use and their attitudes about safe levels of alcohol use during pregnancy. These results show that there is a medium negative correlation between the two variables, with higher levels of drinking being associated with less healthy attitudes towards alcohol use during pregnancy.

A further correlation was carried out to determine if the midwives' own alcohol use determined what they believed to be an acceptable level of alcohol use during pregnancy. The association between the 2 variables was non-linear therefore a Spearman's correlation was carried out. A medium positive correlation was found between weekly alcohol use and number of units acceptable during pregnancy,  $r = 0.369$ ,  $n = 48$ ,  $p < 0.05$ , with higher levels of own alcohol use associated with higher levels of perceived acceptable use for pregnant women.

### *Maternal parity*

The hypothesis that midwives who had their own children would differ in their attitudes than those who had no children was examined with a series of independent samples *t*-tests. As mentioned previously, 75% ( $n=39$ ) of participants had had their own children.

Table 3.7: Maternal parity and alcohol definitions and attitude scores

Variable	Mean (SD) Mothers	Mean (SD) No children	t-value
Acceptable level of alcohol use during pregnancy (units per week)	0.58 (1.07)	0.72 (1.10)	0.41
Definition of light alcohol use during pregnancy (units per month)	7.14 (7.85)	7.90 (9.11)	0.26
Definition of moderate alcohol use during pregnancy (units per week)	5.91 (4.97)	5.65 (4.90)	-0.15
Definition of heavy alcohol use during pregnancy (units per week)	11.53 (6.68)	9.70 (5.31)	-0.79
Total alcohol attitudes score	24.09 (2.59)	22.38 (2.95)	1.74

NB: \*  $p < 0.05$

Comparing the means shown in table 3.7, the midwives who do not have children gave a greater number of units as being acceptable for use during pregnancy and had a greater number of units as their definition of light use during pregnancy than the midwives who had children. However, the mean number of units for the definitions of moderate and heavy alcohol use was lower for the participants who had not had children. The alcohol attitude scores were 2.29 points higher in the midwives who had

had children, suggesting slightly more healthy attitudes in this group than in the midwives who were not mothers. Despite these differences, results indicated that no significant differences existed between the two groups of participants.

Hypothesis one (midwives' attitudes towards alcohol use will differ based on demographic factors) can therefore only partially be supported. The midwives' own alcohol use was related to their attitudes about alcohol use during pregnancy but no further demographic variables showed significant associations.

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### 3.3.8. WHAT DETERMINES MIDWIVES BEHAVIOUR TOWARDS ASKING ABOUT ALCOHOL USE DURING PREGNANCY?

In order to investigate which factors determine midwives' behaviour, participants were divided into two groups; midwives who routinely ask pregnant women about alcohol use (the 'ask group,' n= 34) and those who do not (the 'not ask', group n=17). Potential differences between the two groups were explored using a series of Mann-Whitney U tests (the assumption of normal distribution could not be upheld).

#### *Age*

The mean age of the ask group (44.7, SD=8.2) was higher than the mean age of the not ask group (43.5, SD=8.9), however this difference was not statistically significant ( $z = -0.82$ ,  $p=0.41$ , ns).

#### *Length of time as practising midwife*

The mean length of time in practice as a midwife was slightly higher in the ask group (18.5, SD=9.3) than in the not ask group (15.4, SD=10.3), but this was not a statistically significant difference ( $z = -1.2$ ,  $p=0.24$ , ns).

#### *Maternal parity*

The potential influence of maternal parity on midwives' behaviour was examined using chi-square analysis. The proportion of mothers who routinely asked (69.2%, n=27) was similar to the proportion of non-mothers who routinely asked (58.3%, n=7). No significant association was found between maternal parity and asking behaviour ( $\chi^2(1) = 0.49$ ,  $p=0.48$ , ns).

### *Own alcohol use*

The mean number of units consumed by the ask group was slightly higher (6.3, SD=5.3) than that of the not ask group (4.5, SD=3.5) but this was not statistically significant ( $z=-0.73$ ,  $p=0.47$ , ns).

### *Perceptions about drinking levels during pregnancy*

Midwives' perceptions about what was considered to be light, moderate and heavy alcohol consumption during pregnancy were compared between the two groups. As shown in table 3.8 below, no significant differences existed.

Table 3.8 Perceptions about drinking levels by clinical behaviour

<b>Variable</b>	<b>Ask group mean (SD)</b>	<b>Not ask group mean (SD)</b>	<b>Z-value</b>
<b>Acceptable level of alcohol use during pregnancy (units per week)</b>	0.7 (1.2)	0.4 (0.9)	-0.82
<b>Definition of light alcohol use during pregnancy (units per month)</b>	8.3 (9.0)	5.3 (5.2)	-0.98
<b>Definition of moderate alcohol use during pregnancy (units per week)</b>	6.5 (5.3)	4.6 (3.7)	-0.85
<b>Definition of heavy alcohol use during pregnancy (units per week)</b>	10.7 (6.2)	11.9 (6.9)	-0.55

NB: \*  $p < 0.05$

### *Attitudes towards alcohol use during pregnancy*

The alcohol attitudes questions were compared between the midwives who reported routinely asking pregnant women about alcohol use and those who did not. The attitude questions and corresponding means and z values are shown in table 3.9 below.

Table 3.9 Mean alcohol attitude scores for each group of midwives

<b>Attitude item</b>	<b>Ask group mean (SD)</b>	<b>Do not ask group mean (SD)</b>	<b>Z-value</b>
<b>Drinking when pregnant is not likely to harm baby</b>	1.8 (0.7)	1.7 (1.0)	-1.22
<b>Drinking more than 1 or 2 units on 3 or 4 days a week is likely to harm baby</b>	3.8 (0.9)	4.4 (0.5)	-2.54*
<b>Drinking more than 2 units of alcohol a day is likely to harm baby</b>	4.3 (0.6)	4.4 (1.0)	-1.29
<b>Drinking 1 or 2 units occasionally (i.e. once a month) is likely to harm baby</b>	2.5 (1.0)	2.4 (0.7)	-0.05
<b>Drinking 1 or 2 units once or twice a week is not likely to harm baby</b>	2.6 (1.0)	2.4 (0.9)	-0.64

<b>Drinking 1 or 2 units a day is not likely to harm baby</b>	1.9 (0.8)	1.5 (0.5)	-1.76
<b>Total alcohol attitude score</b>	22.4 (3.2)	23.6 (2.2)	-1.60

NB: \*p<0.05

Only one alcohol attitude question differed between the two groups of midwives; 'drinking more than 1 or 2 units on 3 or 4 days a week is likely to harm baby'. The mean scores are lower in the ask group (3.8) than in the not ask group (4.4). Lower scores indicate greater disagreement with the item, therefore midwives who were not asking patients about alcohol use agreed more strongly with the item.

*Attitudes towards giving advice to pregnant women*

Table 3.10 Attitudes towards giving advice to patients for each group of midwives

<b>Attitude item</b>	<b>Ask group mean (SD)</b>	<b>Do not ask group mean (SD)</b>	<b>Z-value</b>
<b>1. Women are receptive to advice about alcohol</b>	4.1 (0.5)	3.0 (0.9)	-4.17***
<b>2. Giving patients advice about alcohol consumption during pregnancy is likely to make women feel guilty</b>	3.1 (1.0)	3.2 (0.8)	-0.66
<b>3. I feel confident giving patients advice about alcohol consumption during pregnancy</b>	3.6 (0.9)	3.3 (1.0)	-0.85

<b>4. Alcohol use is a private matter and should not be brought up with patients</b>	1.5 (0.5)	1.6 (0.5)	-0.69
<b>5. I am unlikely to make a difference to a pregnant women's alcohol consumption</b>	2.1 (0.6)	2.4 (0.9)	-1.08
<b>6. Pregnant women are not interested in talking about alcohol use during pregnancy</b>	1.9 (0.5)	2.5 (0.7)	-3.45**
<b>7. Asking a woman about her alcohol consumption is likely to damage my relationship with her</b>	2.1 (0.4)	2.5 (0.9)	-2.23*
<b>8. There are more important things to discuss with patients than their alcohol consumption</b>	1.9 (0.5)	2.2 (0.9)	-0.92

NB: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Three of the items relating to attitudes towards providing advice differed between the two groups of midwives. The ask group had higher scores for the item relating to women's receptivity to advice, indicating that the ask group have a stronger belief that women are receptive to receiving advice. The ask group also had significantly lower scores for the item relating to pregnant women's levels of interest, indicating that they felt women were more interested in receiving advice about alcohol use. The third item that differed significantly between the two groups was the item relating to whether asking about alcohol use would damage the patient-midwife relationship. The mean score for the not ask group (2.53, SD=0.87) is slightly higher than that of the ask group



(2.06, SD=0.42), indicating that the not ask group feel asking could be more detrimental to their relationship than the ask group.

Hypothesis two (midwives' clinical behaviour will differ according to demographic variables and attitudes) cannot be fully supported. None of the demographic variables examined (age, length of clinical practice, maternal status, and own alcohol consumption) distinguished between midwives who asked pregnant patients routinely about their alcohol use and those who did not. However, one attitude item (*'drinking on more than 1 or 2 units on 3 or 4 days a week is likely to harm baby'*) differed between the ask group and the do not ask group. Furthermore, three items regarding attitudes towards providing advice differed between the two groups; one concerning the receptivity of women to receiving advice, a second relating to perceptions regarding women's interest, and a third relating to beliefs about alcohol discussions damaging relationships with patients. There is, therefore, partial support for hypothesis two.

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#### 3.3.10. WHAT DETERMINES MIDWIVES' ATTITUDES TOWARDS SMOKING DURING PREGNANCY?

Analyses were carried out to investigate potential factors that may be associated with midwives' attitudes towards smoking during pregnancy. Smoking questions from section 3 of the questionnaire (appendix 7) were scored and summed to give a total attitude score that could range from 4 to 20, with higher scores indicating more healthy attitudes towards smoking during pregnancy (i.e. attitudes in line with smoking cessation). The mean score for the smoking attitudes questions was 15.18, SD = 2.54, indicating generally favourable attitudes towards smoking abstinence during pregnancy.

##### *Age*

A Pearson correlation showed no association between participants age and their smoking attitude score,  $r = -0.024$ ,  $n = 50$ ,  $p = 0.87$ , ns. Therefore, midwives' attitudes towards smoking during pregnancy were not associated with their age.

### *Length of time as practising midwife*

A Pearson correlation showed no association between the two variables  $r = -0.091$ ,  $n = 48$ ,  $p = 0.54$ , ns. Therefore the smoking attitude scores were not associated with the length of time participants had been working as midwives.

### *Own smoking status*

Only 1 midwife participant reported currently smoking therefore the potential influence of own smoking on attitudes towards smoking during pregnancy could not be examined.

### *Maternal parity*

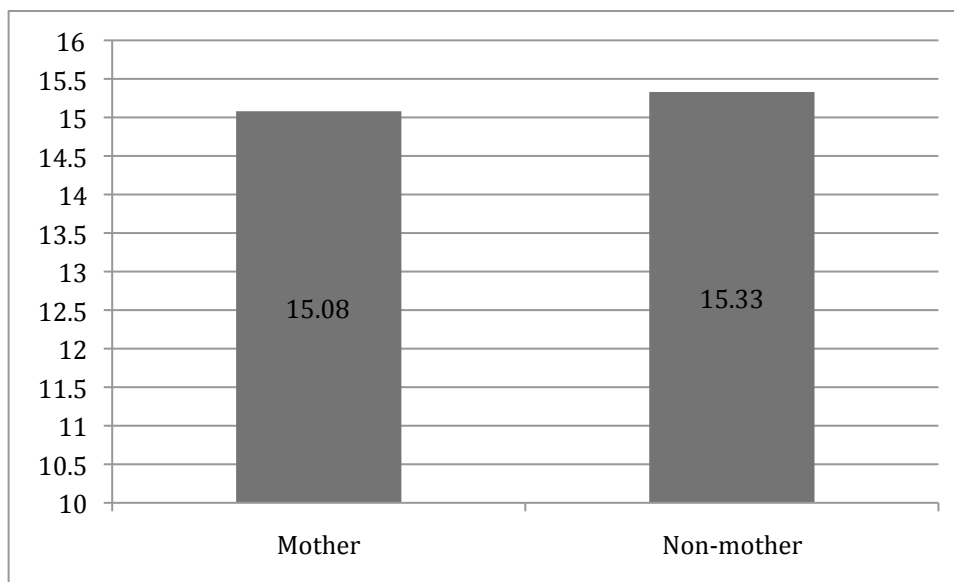


Figure 3.5: Mean smoking attitude scores for mothers and non-mothers

As shown in figure 3.5, very little difference exists between the mean smoking attitude scores for the midwives who had children (15.33,  $SD = 2.27$ ) and those did not (15.08,  $SD = 2.66$ ). An independent samples  $t$ -test found no statistically significant difference between the two groups on smoking attitude scores,  $t(48) = 0.30$ ,  $p = 0.77$ , ns.

Hypothesis three cannot be accepted. Midwives' attitudes towards nicotine use during pregnancy did not differ based on any of the demographic variables investigated.

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### 3.3.11. QUALITATIVE RESULTS

Only one midwife provided comments in the free text box at the end of the questionnaire. This participant discussed the change in guidelines to abstinence;

*“Current advice regarding abstinence has not been backed up by giving MW solid facts. I worry that pregnant women are being singled out for health advice that is not based on solid evidence at a time when they very vulnerable and can be identified by their bump when out in public”* Participant 110

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## 3.4. DISCUSSION

### 3.4.1. CURRENT PRACTICE IN GRAMPIAN – MEETING GOVERNMENT GUIDELINES?

The results of this study suggest that practice regarding alcohol and smoking during pregnancy varies greatly among Grampian midwives. Midwives' definitions of what constituted light drinking varied from 1 unit a month to 40 units per month, and definitions of moderate alcohol ranged from 1 unit a week up to 21 units a week. If this type of variation in perceptions exists among health professionals it highlights the importance of discussing alcohol guidelines with patients in terms of units of alcohol rather than in terms of light or moderate alcohol use. It also suggests that it is unlikely that there is a clear message regarding when referral to support services may be required. This study also showed that variation existed in terms of what alcohol message was given by midwives. In line with current guidelines, just over two thirds of the midwives felt that there was no acceptable level of alcohol use during pregnancy and that abstinence was the best policy. Around 19% of the midwives in this study held attitudes in line with the previous guidance (1 or 2 units once or twice a week was acceptable) and almost 10% agreed that over 2 units per week was acceptable. This figure is in line with that of previous surveys in Aberdeen City; Mayorga-Braunholtz et al. (2006) reported that 20% of midwives felt that 1 or 2 units of alcohol a week was acceptable. Furthermore, almost 30% of midwives working in the community failed to routinely ask every patient about their alcohol use and 30% did not record patients' alcohol use, despite this being part of the standard maternity record notes. No participants in this study reported using a screening questionnaire. Considering these findings as a whole, it seems unlikely that current practice in Grampian is meeting government guidelines. These results will be discussed further in terms of possible reasons for variation in practice and suggestions to improve practice and uptake of guidelines.

### 3.4.2. ATTITUDES TOWARDS PROVIDING ALCOHOL AND NICOTINE USE GUIDANCE

The variation in practice described above may be understood in part through examining midwives' attitudes towards providing advice. Less than half of the midwives questioned in this study felt confident giving advice to pregnant women

about alcohol use. In addition around 30% of midwives were unsure or agreed that they were unlikely to be able to make a difference to pregnant women's alcohol use. A lack of self-confidence and a perception that making a difference is doubtful, are likely to be important influences on midwives' clinical practice; indeed beliefs about capabilities have been found to be an important predictor of health professionals' behaviour (Godin et al. 2008). Practice variation may also be attributed to the tension between maintaining a positive relationship with patients and providing advice. Around 40% of the midwives in this study felt that giving advice about alcohol and nicotine use to pregnant women was likely to make women feel guilty and 21% were unsure or agreed that discussing alcohol use was likely to damage the midwife-patient relationship. Attitudes towards alcohol and nicotine use during pregnancy were not found to be impacted upon by midwives' age or maternal parity. Further, in contrast to previous research (Diekman et al. 2000), there was no influence of the length of time in clinical practice in contrast to previous research. Attitudes were, however, influenced by midwives own use of alcohol and nicotine in accord with Brewster et al. (1990). Greater levels of alcohol consumed by midwives were associated with less healthy attitudes towards alcohol use during pregnancy and higher perceived acceptable levels of use during pregnancy.

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#### 3.4.3. DETERMINANTS OF MIDWIVES BEHAVIOUR

A number of variables were analysed to examine as potential determinants of midwives' behaviour, in terms of whether they routinely ask patients about alcohol use or not. Demographic variables (age, length of time as a midwife and maternal parity) did not differ between the two groups. Only one attitude item showed a statistically significant difference, 'drinking one or two units of alcohol on three or four days a week is likely to harm baby'. Three items relating to attitudes towards providing advice differed between the two groups of midwives. These items related to whether women are receptive to receiving alcohol advice, whether they are interested and whether the midwife-patient relationship may be damaged by discussing alcohol use. Midwives who were not routinely asking patients about alcohol use were less likely to believe that women are receptive to and interested in alcohol advice. They

also agreed more strongly that the relationship may be damaged by discussing alcohol as did midwives in McLeod et al.'s study (2003).

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#### 3.4.3. BARRIERS TOWARDS ADDRESSING ALCOHOL WITH PREGNANT PATIENTS

Only 29% of midwives felt that there were no barriers to discussing alcohol use with pregnant patients. The most frequently mentioned barriers were a lack of training (61%), lack of time (43%), and feeling ill at ease (21%). A perceived lack of time and feeling uncomfortable, were identified as important barriers to providing alcohol advice to pregnant patients in previous research (Logan et al. 2003). Very few midwives (only 8-10%) reported receiving training in approaching the topic of alcohol use with pregnant patients and ways to aid patients to change their drinking habits. A large proportion of midwives (65-68%) also reported a desire for training in approaching and aiding patients to stop smoking. This issue of a lack of training has appeared as an important barrier in previous research (e.g. Clasper and White 1995). It therefore appears as though midwives in Grampian could benefit from training on these topics. Evidence-based training may lead to improved perceptions of confidence, attitudes towards alcohol and nicotine use during pregnancy, and greater numbers of midwives routinely asking and recording pregnant patients' alcohol use. Potential avenues to fill this training gap will be discussed next.

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#### 3.4.4. RECOMMENDATIONS FOR TRAINING

Routine enquiry about alcohol use during pregnancy is necessary in order to identify women in need of advice and support. Midwives' training in this area should highlight the importance of using real world examples of alcohol use. As shown in this study, definitions of what constitutes light drinking varies a great deal, therefore any discussions about alcohol use with patients require further prompting to elicit a more accurate picture of use. Research has also highlighted the variation in understanding of what constitutes a unit. Kaskutas and Graves (2001) found that when pregnant women demonstrated the size of the drinks they were consuming, they were drinking 49-307% more alcohol than they believed they were. Midwives could address this potential confusion with practical examples of what constitutes a unit.

An important barrier to addressing smoking and alcohol use for some midwives is the possibility that doing so would damage relationships with patients. The approach midwives use to discuss potentially sensitive topics is likely to be crucial. The more intense the anti-smoking environment, the more likely women are to report non-smoking and to report lower levels of smoking at their first antenatal appointment than they do at later ones (Lawrence, Aveyard and Croghan 2003). Furthermore, an insensitive approach is likely to be a barrier to effective relationships (McLeod, et al. 2003). However, studies suggest that women expect to be asked about smoking and want information (Lendahls, et al. 2002, McCurry, et al. 2002). Training should encourage effective ways of communicating with patients based on power-sharing relationships and behaviour change principles. This approach will be discussed further in section 5.2.1. Ebert, van der Reit and Fahy (2009) recommend that midwives gain permission before discussing sensitive topics; working within the midwifery policy of partnership working, building trust and maintaining relationships; and approaching patient interactions as a dialogue rather than a monologue. The use of a salutogenic perspective, i.e. one that emphasises health benefits rather than risks, may also be an appropriate approach in aiding pregnant women to change their behaviour (Abrahamsson and Ejlertsson 2002). Evidence-based training in the ways to approach discussing sensitive topics is likely to improve midwives' perceptions of self-efficacy and improve working relationships with patients.

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#### 3.4.5. WHERE THIS STUDY ADDS NEW INSIGHT, LIMITATIONS AND FUTURE DIRECTIONS

This study highlights the variation in practice of midwives and identifies important avenues for improvements in clinical practice. It highlights local midwives' strong desire for further training regarding smoking and alcohol use during pregnancy.

There are a number of limitations that should be addressed in future research. The study relies on questionnaire data and as such is exposed to self-report bias. Although the questionnaire was completely anonymous, answers may have been given so that participants framed themselves in a more positive light. The study also made use of a convenience sample of midwives working in Grampian. This means that only

participants who were motivated to take part responded. This motivation to take part may mean that this sample is in some way different to those who did not respond to the invitation to take part. These limitations need to be acknowledged before any generalisations can be made. Only one participant responded to the free text comment box, future research may benefit from applying a qualitative or observational approach to more thoroughly investigate clinical practice and add to understanding midwives' views and behaviour. A qualitative approach could also shed light on the influence of organisational socialisation (Louis 1980) on midwives' views and behaviour. Interviews with midwives could explore perceptions surrounding organisational norms, midwives' role and responsibilities and the transmission of knowledge and information within organisations and the influence on behaviour.

The aim of this study was to identify midwives' attitudes and practice regarding addressing alcohol and smoking use. Future research could identify what type of support is given. In the US the National Cancer Institute (Manley et al. 1991) recommends that clinicians incorporate the "four As" of smoking cessation into their everyday practice. These four As are 1) ask if the patient is a smoker, 2) advise the patient to quit, 3) assist with quitting, and 4) arrange for follow-up to discuss progress. Gebauer and colleagues examined the efficacy of this approach for pregnant women and found that the pregnant smokers who received nurse-managed intervention based on the four As had 15% greater cessation than those of a control group (Gebauer et al. 1998). This research highlights the importance of not only asking, and providing information to patients but also supporting patients to change their behaviour throughout their pregnancy. Future research could investigate whether this type of approach was effective for alcohol use during pregnancy.





### 4.1. LITERATURE REVIEW

The third overall aim of this thesis was to examine potential consequences of prenatal exposure to alcohol and nicotine use. Studies investigating the impact of alcohol use during pregnancy have tended to examine the outcomes of moderate and heavy alcohol exposure whilst the effects of lower-level use remain unclear (Day and Willford 2007). Furthermore, research published to date, has focussed on the impact in terms of infant health, with less coverage of the potential effects for the mother or in terms of social and behavioural outcomes. The central aim of this study, therefore, was to examine the potential impact of low-level alcohol use on both infant and maternal health, along with further reaching outcomes such as maternal well-being and maternal-infant attachment. The low numbers of smokers taking part in study 1 (n=14) made any follow-up analysis on the effects of nicotine use during pregnancy unfeasible. The follow-up study was therefore focussed on the potential effects of alcohol use alone. Relevant literature related to these aims will be discussed next.

#### 4.1.1. OUTCOME OF LOW-LEVEL ALCOHOL EXPOSURE DURING PREGNANCY FOR INFANTS

Heavy alcohol use during pregnancy is associated with a number of negative outcomes for the foetuses and neonates of drinkers. Research has demonstrated the impact of heavy drinking in terms of greater risk of spontaneous abortion (Sokol, Miller and Reid 1980, Windham et al. 1997), lower birth weight (Abel and Hannigan 1995, Mariscal et al. 2006), and greater risk for preterm birth (Lundsberg, Bracken and Saftlas 1997). Studies investigating the impact of lower levels of alcohol exposure on outcomes for neonates, however, have reported mixed results.

The current government guidelines (DoH 2007, NICE 2008) state that, although abstinence is recommended, one or two units of alcohol once or twice a week is deemed unlikely to cause harm. A number of studies have examined alcohol use at this level in terms of infant outcomes. Some research has reported no apparent effect of low-level alcohol use on preterm delivery (O'Leary et al. 2009) nor on birth

weight, head circumference at birth or weight at age 5 (O'Callaghan et al. 2003). However, researchers from the Fetal Behaviour Research Centre in Belfast have conducted a number of studies examining foetal startle behaviour as a means of assessing prenatal neural functioning. Low level alcohol use (based on sample means) of 4 units per week resulted in delays to the natural maturation of spontaneous startle behaviour (Hepper, Dornan and Little 2005). A further study showed that a mean of 2.4 units per week was associated with a lesser likelihood of exhibiting normal startle behaviour. The researchers concluded that alcohol use results in impaired central nervous system functioning, which may be an early indication of later neurobehavioural dysfunction and developmental delay (Little, Hepper, and Dornan 2002).

There are a number of studies which support the hypothesis that low-level alcohol exposure can result in negative cognitive and behavioural outcomes. Sood et al., (2001) found an effect of low-levels of alcohol exposure on children's behaviour from as little as 1 drink per week, and argued that the best advice for pregnant women is abstinence from alcohol. Sayal et al. (2007) found an association between light drinking (less than one drink per week) and later clinically significant mental health problems in girls aged 47 months. A strength of Sayal et al.'s study is that a number of confounding variables were controlled for (maternal age, parity, smoking, drug use, maternal education, maternal postnatal depression, postnatal alcohol use and marital status). A further strength was that data on the children's mental health status was gained from both parent and teacher reports and was consistent through two later time-points. However, Sayal and colleagues (2007) report no dose-response relationship (i.e. alcohol at heavier levels of consumption was not associated with worse outcomes), no relationship for males, and no relationship below the clinical cut-off scores for mental health problems. This suggests that it is perhaps a minority of children who might be vulnerable to negative outcomes at low-levels of exposure. Indeed, Sayal et al. (2007) conclude that the findings are preliminary and require further replication. In terms of long-term outcomes, Day et al. (1999) report significant reductions in weight and height of ten-year-olds with prenatal alcohol exposure of 1 drink per day in the first, second and third trimesters, and significant

reductions in head circumference for prenatal alcohol exposure of 1 drink per day in the first and third trimesters. Furthermore, Day et al. (2002) reported that the offspring of women who drank lightly during pregnancy in the first and second trimesters weighed less at age fourteen than those who abstained. These results remained significant after several confounding variables were controlled for (Day et al. 2002).

In terms of birth outcomes, a number of studies have investigated low-level effects. Lundsberg, Bracken and Saftlas (1997) found that both moderate- and low-level alcohol use during month 7 of pregnancy increased the risk of preterm delivery. Low-level alcohol exposure, in fact, produced a threefold increase in the risk of premature birth (Lundsberg et al. 1997). However, the study also reported that the same level of light alcohol use during the first month actually showed a protective effect for the odds of developing intrauterine growth restriction. Further studies have also suggested a protective effect of low-level alcohol use. Mariscal et al. (2006) found that infants of women drinking less than 6g of absolute alcohol per day (for comparison, one UK unit is equivalent to 8g) were less likely to be classed as low birth weight. Kelly et al. (2009) evaluated a number of cognitive outcomes and reported slightly better scores for the low-level alcohol exposure group compared to the abstinence group. However, none of these studies took into account the potentially confounding factor of maternal mental well-being during pregnancy.

Depression, stress and anxiety during pregnancy impact upon infant developmental outcomes (Hedegaard et al. 1993). Taking the example of Kelly et al. (2009), the low-level alcohol exposure group fared better on cognitive outcomes compared to that of the abstinence group. It seems possible, that women who have higher levels of pregnancy-anxiety are also women who are less likely to drink during pregnancy. Women who are already more anxious about their pregnancy may be less likely to take part in 'risky' behaviours such as drinking during pregnancy which may carry detrimental effects for their babies. The results of study 1 (see section 2.3.3) and further research supports this proposal. A number of researchers have reported a 'U-shaped curve' when examining the relationship between anxiety and alcohol consumption, whereby both abstinence/low levels and high levels of consumption are

related to increased anxiety (Alati et al. 2005, Power, Rodgers and Hope 1998) whilst moderate levels of use are not. Therefore, the 'protective alcohol effects' suggested by Kelly et al.'s (2009) study may instead reflect the absence of the detrimental effect of prenatal exposure to anxiety on children's cognitive outcomes in the light-drinking group. Preliminary research in this field suggests that prenatal exposure to anxiety is associated with infant behavioural outcomes (Wadhwa 2005) and has a detrimental effect on infant mental development (Brouwers, van Baar, and Pop 2001, Davids et al. 1963, Glover and O'Connor 2002). Brouwers et al. (2001) propose that prenatal exposure to anxiety may result in biological changes in the maternal-foetal blood flow, including altered levels of oxygen, nutrients and hormones.

Further research highlights the importance of assessing maternal mental health when investigating the potential impact of alcohol use (Huizink et al. 2003, Jacobson et al. 1993). Psychological distress has been found to be associated with a greater risk of preterm delivery (Hedegaard et al. 1993), lesser foetal growth in lower SES women (Hoffman and Hatch 2000), and lower maternal health-related functioning and perceived well-being (McKee et al. 2001). Indeed, Jacobson et al. (1993) propose that controlling for maternal depression can eliminate significant associations between alcohol exposure and infant behaviour. Further research is required which examines the impact of prenatal alcohol exposure whilst controlling for maternal psychological distress.

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#### 4.1.2. OUTCOME OF LOW-LEVEL ALCOHOL USE DURING PREGNANCY FOR WOMEN

The majority of research investigating the impact of prenatal alcohol use has focused on infant outcomes and pregnancy complications. Few studies have been carried out to investigate the impact of drinking during pregnancy on the mother, and those that have, have focused on heavy alcohol use. A number of studies have suggested a link between FAS and greater risk of maternal mortality (May et al. 1983, Mena et al. 1986). However, looking solely at maternal-child pairs where a diagnosis of FAS exists may result in a sample containing a high number of alcoholic mothers. Long-term excessive use of alcohol is related to a wide range of health problems, including damage to the liver and brain, cancers, stroke and heart disease (NHS 2009). These

research studies do not, however, provide information about whether alcohol use amongst the general population of women in pregnancy (i.e. not alcohol dependent) carries risks for maternal health. Berg et al. (2008) examined the effect of alcohol use on the mortality of mothers who drank at least one ounce of absolute alcohol per week during pregnancy. Berg et al. (2008) found significantly greater mortality rates for drinkers than abstainers at twenty year follow up. This finding was also present for women who drank during the first trimester only and then stopped for the remainder of the pregnancy. Berg et al. (2008) conclude that “drinking at any level during pregnancy should be considered a risk factor for the mother as well as for offspring” (pp. 603). However, over 80% of the sample of women in this study were African-American, and the majority were single and on low income. This limits the generalisability of the findings. Furthermore, no analysis was carried out to examine the effects of different levels of alcohol use present in the sample and only mortality was examined as an outcome. There is a significant lack of research in this area and further studies are required to examine lower levels of alcohol use and additional measures of maternal health outcomes.

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#### 4.1.3. ALCOHOL USE WHILST BREAST-FEEDING

In previous generations, breastfeeding women were advised that consuming alcohol, in particular beer, increased milk supply, and strengthened both mother and infant (Menella and Beauchamp 1993). A further commonly-held popular belief was that a small amount of alcohol transferred to breast milk would help infants to sleep (Mennella and Gerrish 1998). However, research suggests that alcohol exposure through breast milk affects sleep in a negative way, by decreasing duration (Menella and Gerrish 1998). The current UK guidelines for new mothers state that:

*“... research shows that occasional drinking, such as one or two units once or twice a week, is not harmful to your baby while you are breastfeeding. Drinking any more than this can cause problems ... Moderation is key – drinking any more than a couple of units at a time can affect the baby’s development and reduce your milk supply”* (NHS Choices online, 2009b)

Research suggests that the effects of alcohol exposure through breast milk include alterations to infants' motor development from only 1 drink per day (Little et al. 1989). Alcohol also impacts upon breast feeding success by altering the taste of breast milk (Mennella and Beauchamp 1991), and having a detrimental impact upon milk production (Mennella, Pepino and Teff 2005). Very little, however, is known about the current frequency of alcohol consumption in breast-feeding women.

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#### 4.1.4 IMPACT OF ALCOHOL USE ON INFANT SOCIAL BEHAVIOUR

Studies that have examined the impact of alcohol use during pregnancy on infants' social behaviour have generally focussed on moderate to heavy levels of alcohol exposure. Associations have been found for a number of behavioural outcomes such as abnormal sleep state organisation (Coles 1996, Scher, et al. 1988), abnormal suckling behaviour (Streissguth 1986), and significantly more restlessness and inconsolable crying (Martin, et al. 1977). The impact of moderate-heavy alcohol use appears to overlap with behavioural outcomes which are crucial in determining maternal-infant attachment (see section 2.1.3). Goldsmith and Alansky (1987) reported that infant characteristics such as difficultness, proneness to distress, and negative affect, are often implicated as impacting upon the attachment relationship. Furthermore, as previously discussed, light prenatal alcohol exposure of less than one drink per week was associated with clinically significant mental health problems (based on scores on a validated questionnaire measuring hyperactivity/inattention, conduct problems, emotional symptoms and peer relationships) in girls at 47 months (Sayal et al. 2007).

There is, therefore, the potential for alcohol use during pregnancy to have a detrimental effect upon the maternal-infant attachment. Evidence for a link between alcohol use and attachment difficulties is also reported from animal studies. Kelly, Day and Streissguth (2000) reviewed evidence from studies where prenatally exposed rat pups were cross-fostered in order to examine the behavioural effects of alcohol use without the confounding influence of postnatal environment. Kelly et al. (2000) concluded that cascade-like effects were likely to exist where deficits in infant

behaviour resulted in altered maternal behaviour which, in turn, further disrupted infant behaviour.

A number of studies based on retrospective reports of alcohol use also, suggest a direct association between alcohol use and attachment type. O'Connor, Sigman and Brill (1987) found an association between maternal alcohol use during pregnancy and disorganised attachment behaviour. O'Connor, Sigman and Kasari (1992) used structural equation modelling to further examine the processes involved in this association. They found higher rates of negative affect, and insecure attachment behaviour in prenatally exposed 1-year olds. O'Connor, Sigman and Kasari (1992) also reported that mothers of infants who displayed greater negative affect were less responsive to the child. However, this study was based on retrospective reports of drinking and was carried out with a sample of older first-time mothers. As discussed in section 1.11, studies which ask participants to retrospectively report their alcohol use have limitations. O'Connor, Kogan and Findlay (2002) found that 36% of 4-5 year-olds exposed to light or no alcohol were classified as being insecurely attached, compared to 80% of the moderate-high exposure group. O'Connor, Kogan and Findlay (2002) used a causal modelling procedure that suggested the primary influence on attachment was the direct effect of prenatal alcohol exposure on the infants' temperament. However, these studies were based on retrospective reports of alcohol use and research employing longitudinal analysis is warranted.

There is a lack of research focused on examining the potential effects of low-level alcohol exposure on infants and new mothers. Previous research applying retrospective or cross-sectional designs is open to greater recall bias. A longitudinal study design allows for both in-pregnancy alcohol consumption to be reported and postnatal outcomes to be assessed. The papers published in this area to date have had a focus on infant health outcomes, with the potential effects on mothers being largely ignored. Alcohol use during pregnancy is associated with a number of pregnancy complications (such as spontaneous abortion; Windham et al. 1997 and preterm delivery; Lundsberg et al. 1997) but is it also associated with health outcomes after birth? A further limit of the existing literature is that few studies have examined low-level alcohol effects on outcome variables other than health. Further research is

necessary to establish whether prenatal alcohol use has an impact on psychological indices of well-being and maternal-infant attachment.

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#### 4.1.5 RESEARCH AIMS

Study 3 aims to address the gaps in the research field by investigating low-level prenatal alcohol exposure in terms of both infant and maternal health and well-being. This study also examines the impact of alcohol whilst controlling for prenatal maternal emotional distress and nicotine exposure.

The central aims of this study are to: investigate the impact of low-level antenatal alcohol use on the health of infants in terms of birth weight, gestational age, and general health; to investigate the impact of low-level prenatal alcohol use on mothers in terms of pregnancy and labour outcomes (complications, delivery type), postnatal health (including length of time spent in hospital after birth), and well-being (depression, anxiety and stress); to assess the impact of low-level prenatal alcohol use on maternal-infant attachment relationships, and the drinking behaviour of women who exclusively breast-feed their infants in the postnatal period.

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#### 4.1.6 HYPOTHESES

- 1) Infants of prenatal drinkers will have lower birth weight, gestational age and a greater frequency of reported health problems than infants of prenatal abstainers
  - 2) Prenatal drinkers will have a greater frequency of pregnancy and labour complications, spend longer in hospital after birth, and will have greater levels of postnatal depression, anxiety and stress
  - 3) Prenatal drinker will report lower levels of postnatal attachment with their infants
-



## 4.2.1 PARTICIPANTS

Participants for study 3 were the 110 participants of study 1 (see section 2.2.2) who agreed to be followed up after giving birth (n=57). Participants mean age was 31.60 years (SD=3.82) and the majority were married (64.9%). Almost all participants (91.2%) were employed before giving birth and 75% reported obtaining education past the minimum school leaving age. A similar proportion of participants lived in Aberdeen City (42.9%) as lived in Aberdeenshire (57.1%). Most participants (90.9%) reported being white or British with 3.5% (n=2) African, 1.8% (n=1) French, 1.8% Irish and 1.8% Arabian.

There was a 51.8% response rate. Participants who took part in the follow-up study (n=57) were compared to those who did not respond (n=53). A significant association existed between participation in the follow-up study and education,  $\chi^2(1) = 4.25$ ,  $p < 0.05$ . Participants with further education responded more than those with school-level qualifications (60% versus 40% respectively). A significant association was also found between employment status and participation,  $\chi^2(1) = 16.95$ ,  $p < 0.01$ .

Employed participants had a higher response rate (64.2%) than unemployed (18.5%). A further significant association existed between participation and region of residence,  $\chi^2(1) = 4.11$ ,  $p < 0.05$ . Participants living in Aberdeenshire had a higher response rate, 61.5%, than those living in the City, 42.1%. A statistically significant difference was also found between responders and non-responders for participant's age. Responders to the follow-up questionnaire were older (mean age 31.60 years, SD=3.82) than non-responders (mean age 27.25 years, SD=5.65),  $t(90.38) = -4.70$ ,  $p < 0.05$ . No significant differences were found for alcohol or nicotine use between the participants who took part in the follow-up and those who did not. In summary those who responded were older, more educated, more likely to be employed and living in Aberdeenshire. These findings will impact upon the generalisability of the follow-up study and should be taken into account when examining the results.

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#### 4.2.2 QUESTIONNAIRES

A questionnaire format was chosen to for pragmatic reasons in order to obtain the greatest number of responses possible from women adjusting to life with a new baby. Participants were sent a 10-page questionnaire booklet containing the following validated questionnaires (see appendix 9):

*Depression, Anxiety and Stress Scale (DASS-21; Lovibond and Lovibond 1995)*

The DASS was included to measure postnatal depression, anxiety and stress in the women. Please see section 1.4.1 for scoring information. The DASS-21 has established reliability and validity (Henry and Crawford 2005) and was used in preference to other measures of depression, anxiety and stress as it is a combined measure for all 3 constructs and is therefore likely to be an acceptable length for participants to complete. It was also chosen as it includes a subscale for stress, not included in other commonly used measures such as the Hospital Anxiety and Depression scale (Zigmond and Snaith 1983) and is widely used in research investigating perinatal wellbeing (e.g. Gamble, Creedy, Moyle, Webster, McAllister, Dickson 2005; Miller, Pallant and Negri 2006) and is validated as a routine clinical outcome measure (Ng, Trauer, Dodd, Callay, Campbell, Berk 2007).

*Maternal Attachment Inventory (MAI; Muller 1994)*

The MAI was developed as a measure of maternal activities and feelings that indicate attachment. The MAI was included in order to provide a measure of maternal affectionate attachment to the new baby. The MAI consists of 26 items which participants' rate in terms of how often their feelings match the statement. Items are scored from 1 (almost never) to 4 (almost always) with a possible range of 26-104, with higher scores indicating greater maternal attachment to infant. A questionnaire method was employed in order to obtain a direct measurement of maternal feelings and therefore avoiding validity concerns of interpreting maternal-infant behaviours. The MAI was chosen as a comparable measure to the prenatal questionnaire (PAI) used in study 1 in order to examine potential changes from pre- to post-natal. The MAI has demonstrated reliability and validity (Cranley 1981).

### *Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden and Sagovsky 1987)*

The EPDS is a 10-item questionnaire developed to identify women at risk of postnatal depression. Participants are asked to rate their answers based on how they have felt in the past week. Items are scored from 0 to 3 with items 3, and 5-10 reversed scored. Scores can range from 0 to 30 with scores of over 10 indicative of possible depression. This questionnaire was included as this is the standard screening tool used by midwives and health visitors to assess for postnatal depression.

The booklet also contained questions relating to:

#### *Infant Health Measures*

Birth weight was converted into weight in ounces before analysis. An indicator of gestational age at birth was calculated by comparing participants reported due date (at 20 weeks) with the infants' actual date of birth. The infants' gestational age was calculated to the nearest week. Infant health problems were coded into a categorical variable (presence of health problems, no reported health problems).

#### *Maternal Health Measures*

Length of time spent in hospital after giving birth was recorded as days and part-days. Pregnancy or labour complications and health problems after giving birth were all coded into categorical variables (presence of problems, no reported problems). Delivery type was coded according to whether the participant reported having a normal vaginal delivery or an assisted delivery (e.g. ventouse, forceps, or caesarean section).

#### *Alcohol consumption (postnatal)*

Participants were asked to answer 4 questions on their present alcohol use. The questions in this section were identical to those in study 1 (please see section 2.3.3). Participants were provided with examples of what a unit of alcohol related to (e.g. one unit equals a standard measure of spirit) in real terms, to aid their reporting.

Participants were asked to rate how often they were consuming a drink containing alcohol (*never, monthly or less, 2 to 4 times a week, 2 or 3 times a week, 4 or more times a week*), how many drinks containing 1 unit they had on a typical drinking day (*1 or 2, 3 or 4, 5 or 6, 7 to 9, 10 or more*), and how often they exceeded 6 or more units in one occasion (*never, monthly or less, 2 to 4 times a week, 2 or 3 times a week, 4 or more times a week*).

#### *Breast-feeding behaviour*

Participants were asked to report what method they used to feed their baby (breast, bottle or combination feeding).

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#### 4.2.3. PROCEDURE

Questionnaires were posted to the home addresses of 110 participants 3 months after their due date, along with a covering letter (appendix 10) and information sheet (appendix 11). Three months was as the earliest date a questionnaire could be sent out without jeopardising response rates. Any earlier than this and new mothers may be feeling too overwhelmed with the changes associated with a new baby to take part in a research survey. Furthermore, a standard medical check is carried out six weeks after labour and a three-month post labour survey would allow participants to report any health issues identified at this check. The potential risk for causing distress by posting the follow-up questionnaire to any women whose pregnancy had not resulted in a health baby was carefully considered. Whilst it was acknowledged that there was the potential for distress, steps were taken to minimise this as much as possible. No reminder letters were distributed and participants were provided with an opt-out form, which allowed them to contact the research team with any comments. No opt-out forms were sent back. Furthermore the risk of miscarriage after 20 weeks gestation is considerably lower than earlier in pregnancy. Fifty-three participants did not respond to the follow-up questionnaire, however where possible, information was extracted from birth records. Information regarding infant's birth date and sex was taken from birth records for 27 participants. This data was included in the analysis to investigate the influence of alcohol exposure on gestational age at birth in order to achieve as large a sample as possible. Birth records were not found for twenty-six

participants. Potential reasons for these missing birth records include moving out-with Scotland prior to birth, change of mother's surname, or pregnancy loss after 20 weeks.

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#### 4.2.4. ETHICS

Ethical approval was granted by The Robert Gordon University, School of Applied Social Studies Research Ethical review panel and research was conducted following the British Psychological Society code of conduct. Responses to the questionnaires were received in an anonymised format and were stored according to confidentiality and data protection guidelines. In order to protect participants who may be clinically depressed, all participants were asked to give consent for their results to be shared with their health care provider. None of the participants objected to their details being shared with health professionals for this purpose. The ten participants who scored above the cut-off for postnatal depression were sent a copy of an NHS information sheet with information about postnatal depression and sources for help, and their details were passed in confidence to the head of the Health Visitor service for Grampian. This allowed for identification of any woman who may need further screening for depression or further support. A summary of findings (appendix 6) was sent out to interested participants (those who indicated they wished to receive one on a tick box option on the questionnaire).

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#### 4.2.5. DESIGN

A longitudinal survey design was employed to investigate the impact of alcohol and nicotine use during pregnancy on the health and well-being of infants and mothers in the postpartum period. Data relating to frequency and volume of alcohol use during pregnancy was collected as part of study one and used to create 2 participant groups, alcohol-exposed pregnancies and non-alcohol exposed pregnancies. The independent variable was therefore alcohol exposure in pregnancy and the dependent variables were:

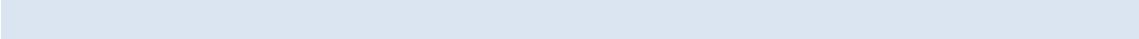
- 1) Infant health (as measured by self-report of any health problems/illness since birth)

- 2) Maternal health (pregnancy and labour complications and post-birth health) and well-being (depression, anxiety and stress scores)
- 3) Postnatal alcohol use.

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#### 4.2.6. ANALYSIS

Data was analysed using SPSS 15. Analysis was conducted to examine the effect of alcohol; nicotine exposure was taken into account by only looking at the non-smoking drinkers and abstainers. A series of independent samples *t*-tests were carried out to examine prenatal alcohol use without the potential confounders of depression, anxiety and stress on health and well-being of mother and infant. However, excluding depressed, anxious and stressed participants did not change any of the results, except for maternal attachment. Due to this, and in order to examine the largest number of respondents, results are presented for the whole sample controlling only for smoking. Where data were normally distributed with homogeneity of variance, parametric statistical tests were conducted. In the event of skewed distributions and/or heterogeneity of variance, non-parametric methods were used. Correlations, chi-square and independent-samples *t*-test analyses were carried out to explore the relationships between prenatal alcohol and infant and mother health and well-being variables.



## 4.3. RESULTS

### 4.3.1. ALCOHOL EXPOSURE

#### *Frequency of alcohol use*

Follow-up participants reported their prenatal alcohol use during pregnancy as part of the prenatal questionnaire completed at 20 weeks gestation (see section 2.2.3). The frequency of alcohol use for the follow-up participants is shown in figure 4.1 below.

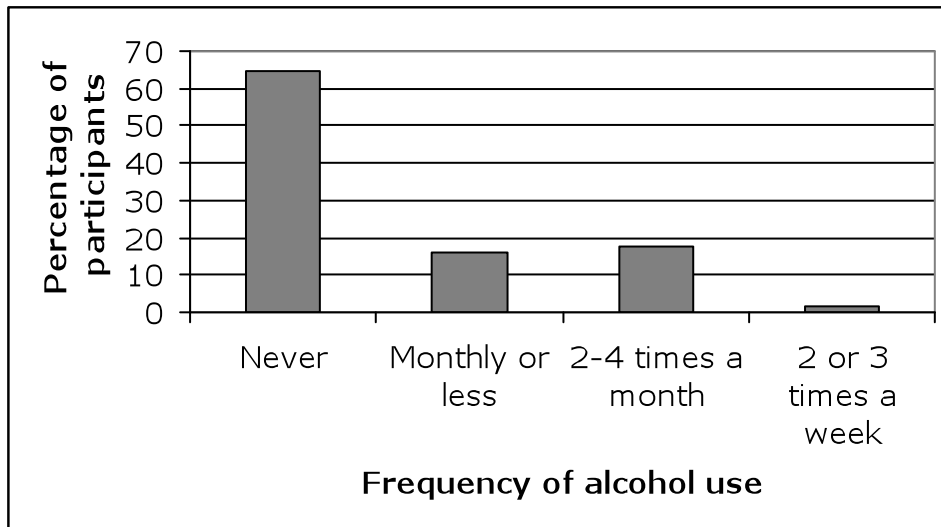


Figure 4.1: Frequency of alcohol use at 20 weeks gestation

Approximately 35% of participants drank during their pregnancy (n=20), 15.8% (n=9) monthly or less, 17.5% (n=10) 2 to 4 times a month and 1.8% (n=1) 2 or 3 times a week. Most participants (89.5%, n=17) drank 1 or 2 units per drinking occasion (as shown in figure 4.2), 5.3% (n=1) drank 3 or 4 units and 5.3% (n=1) drank 5 or 6 units per drinking occasion.

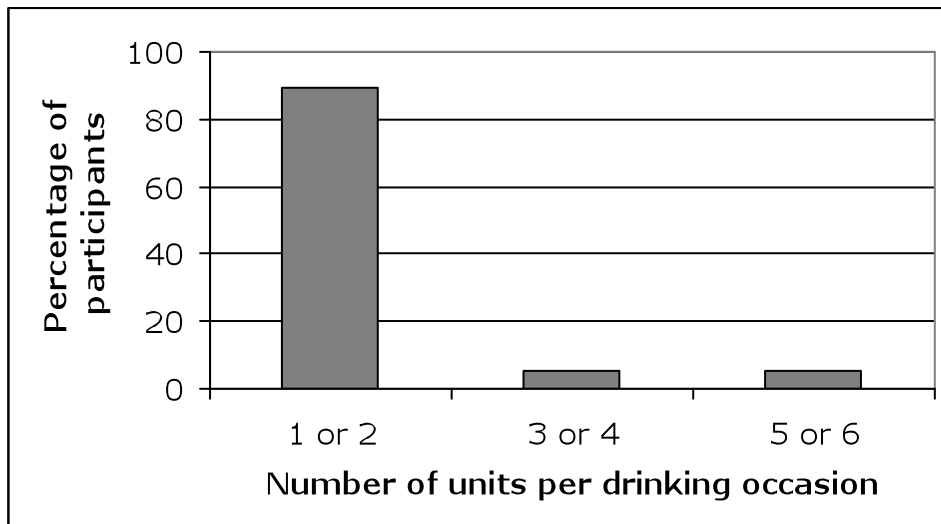


Figure 4.2: Units of alcohol per drinking occasion in women who drank during pregnancy

Follow-up participants were grouped according to their reported alcohol use at 20 weeks, into an alcohol group (n=20) and an abstinence group (n=37). The participant who reported drinking 5 or 6 units per drinking occasion was excluded from the analysis so that a low-level drinking group was analysed. No significant differences were found between the two groups for age ( $t(55) = -1.55, p=0.13, ns$ ), years of education ( $t(54) = -1.38, p=0.17, ns$ ), marital status ( $\chi^2(1)=1.33, p=0.25, ns$ ), or ethnic origin ( $\chi^2(1)=0.52, p=0.47$ ). The alcohol and abstinence groups were then compared for a number of infant and maternal health outcomes.

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#### 4.3.2. INFANT HEALTH

Infants of the prenatal drinkers were compared to infants of the abstainers for gestational age at birth, birth weight and health problems since birth.

The mean gestational age for the abstainers' infants (39.79 weeks, SD=1.35) was greater than that of the alcohol-exposed infants (38.48 weeks, SD=6.14) but this trend was not statistically significant ( $z=-0.41, p=0.68, ns$ ). This remained non-significant when exposure to nicotine was taken into account ( $z=-0.54, p=0.59, ns$ ).

Birth weight was compared in the alcohol-exposed pregnancies and the non-alcohol exposed pregnancies as shown in figure 4.3 below.



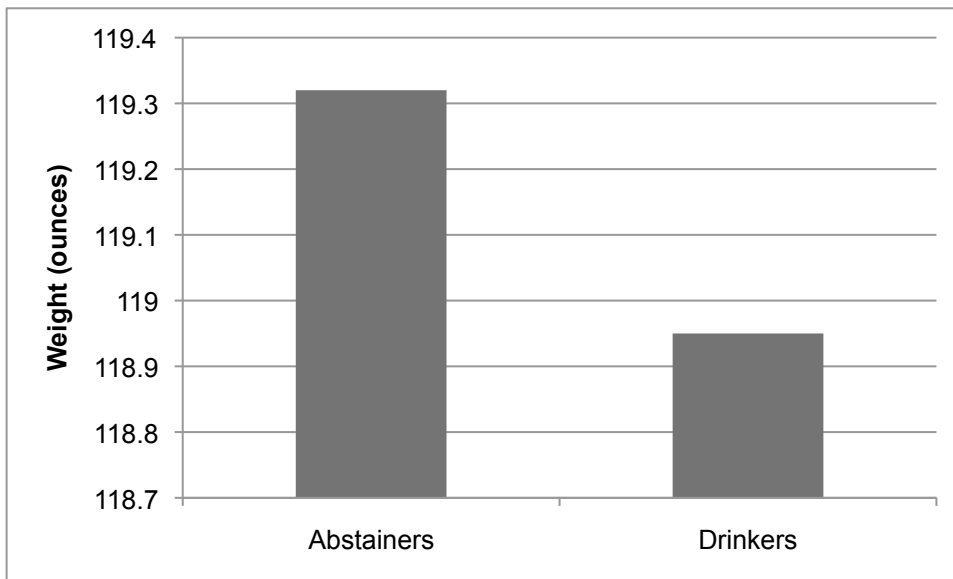


Figure 4.3: Birth weight of infants born to drinkers and abstainers

The mean birth weight for the abstainers' infants (119.32 ounces, SD=15.78) was slightly heavier than that of the drinker's infants (118.95 ounces, SD=27.47) but this difference was not statistically significant ( $t(25.95) = 0.06$ ,  $p=0.96$ , ns). Again this remained non-significant when nicotine exposure was taken into account ( $t(22.32) = -0.11$ ,  $p=0.91$ , ns).

Sixteen participants reported infant health problems since birth, summarised in table 4.1.

Table 4.1 Infant health problems by drinking group

<b>Infant health problem</b>	<b>Drinking Group</b>
Hip problems (n=3)	2 abstainers, 1 drinker
Birth trauma (n=1)	1 abstainer
Laryngomalacia (n=1)	1 abstainer
Stomach muscle abnormality (n=1)	1 drinker
Jaundice (n=1)	1 abstainer
Breathing difficulties (n=1)	1 drinker
Colic (n=1)	1 drinker
Eczema (n=2)	2 abstainers
Oral thrush (n=1)	1 abstainer
Viral infection/cold (n=2)	1 abstainer, 1 drinker

The percentage of alcohol exposed pregnancies reporting infant health problems is slightly higher (75.0%, n=15) than the percentage of non-alcohol exposed pregnancies reporting health problems 70.3%, n=26), as shown in figure 4.4.

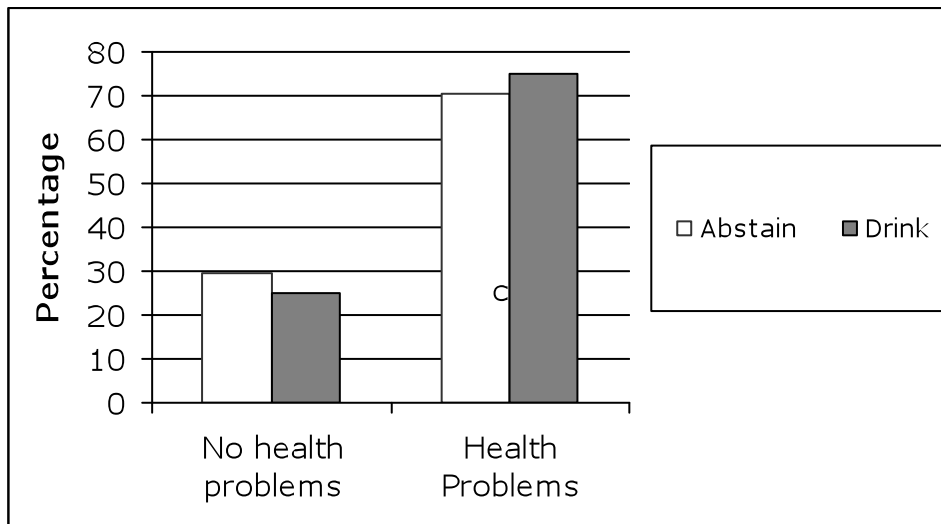


Figure 4.4: Percentage of participants reporting infant health problems by alcohol group

A chi-square test of independence found no association between infant health problems and alcohol exposure ( $\chi^2(1) = 0.14, p=0.70, ns$ ). This remained non-significant when nicotine exposure was taken into account ( $\chi^2(1) = 0.59, p=0.44, ns$ ).

Hypothesis 1 cannot be supported; no significant differences existed between the infants of prenatal drinkers and abstainers for any of the measured infant health outcomes.

#### 4.3.3. MATERNAL HEALTH

Women who reported drinking at 20 weeks gestation were compared to those who abstained from alcohol for the presence of any pregnancy or labour complications, type of delivery, length of stay in hospital after giving birth, presence of any health problems since giving birth, and scores on the EPDS. This was examined controlling for the potential confounding factor of nicotine use.

A similar proportion of women who drank alcohol during pregnancy reported pregnancy and labour complications (61.1%, n=12) as the women who abstained (62.9%, n=16). A summary of the most common pregnancy and labour complications experienced by participants is shown in table 4.2

Table 4.2: Summary of participant’s pregnancy and labour complications

<b>Pregnancy/Labour Complication</b>	<b>Number of Participants and drinking group</b>
Prolonged Labour (n=4)	3 abstainers, 1 drinker
Abnormal presentation (e.g. breech; n=7)	3 abstainers, 4 drinkers
Blood Loss (n=5)	3 abstainers, 2 drinkers
Hyperemesis (excessive morning sickness; n=2)	2 abstainers
Placenta complications (n=4)	3 abstainers, 1 drinker

NB: Some participants reported experiencing more than one complication

A chi-square test of independence showed that there was no association between pregnancy and labour complications and alcohol use ( $\chi^2 (1) = 0.015$ ,  $p=0.90$ , ns).

The percentages of drinkers and abstainers requiring intervention during delivery were similar (55.0%,  $n=11$  and 56.8%,  $n=21$  respectively). A break down of the intervention methods required by drinking group is shown in figure 4.5. A chi-square test of independence confirmed that there was no association between delivery intervention and alcohol use ( $\chi^2 (1) = 0.05$ ,  $p=0.82$ , ns).

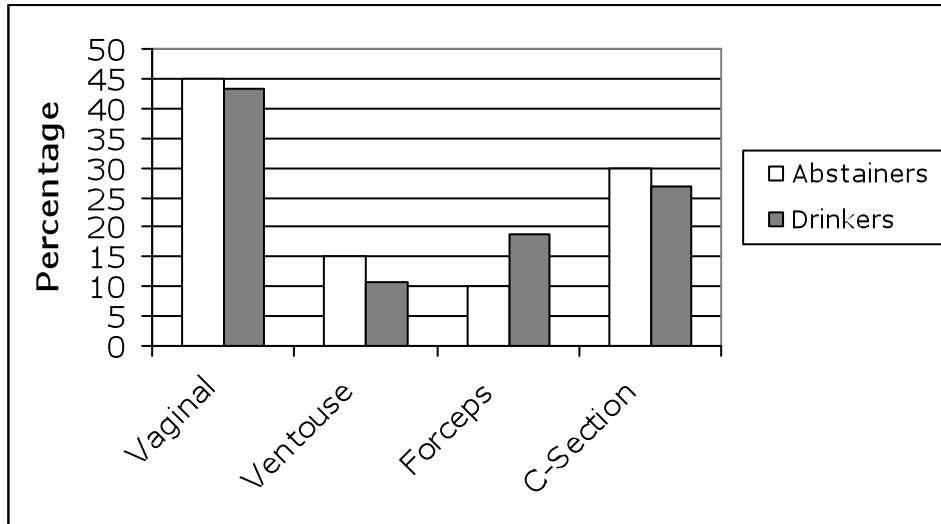


Figure 4.5 Percentages of participants experiencing each birth type

The two groups of participants were compared on the length of time spent in hospital after having given birth. For this analysis both smoking status and parity were controlled. Only first-time mothers (n=38) were included in the analysis to control for the likely differences in hospital stay between women who have given birth previously and for those who had not. Multiparous women may receive less hospital care, are less likely to have a hospital delivery and spend less time on postnatal wards after delivery than primiparous women (Mistry et al. 2007).

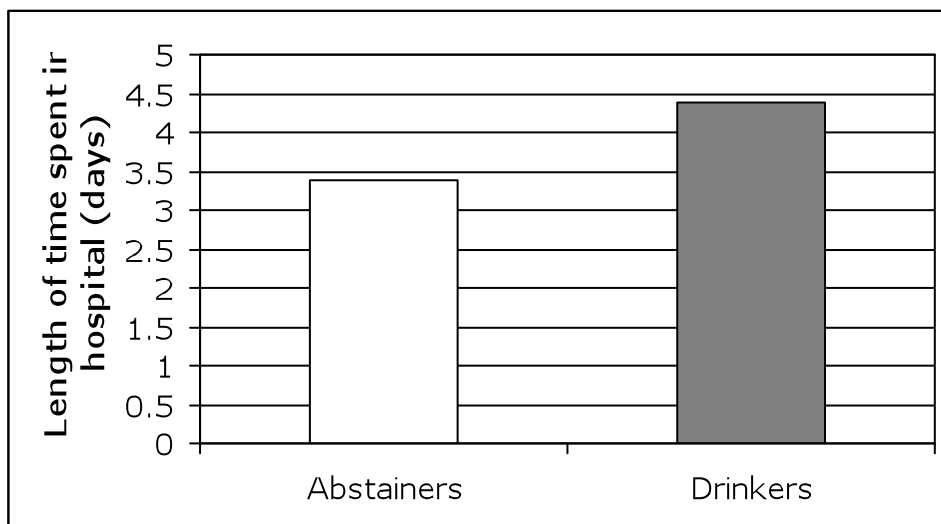


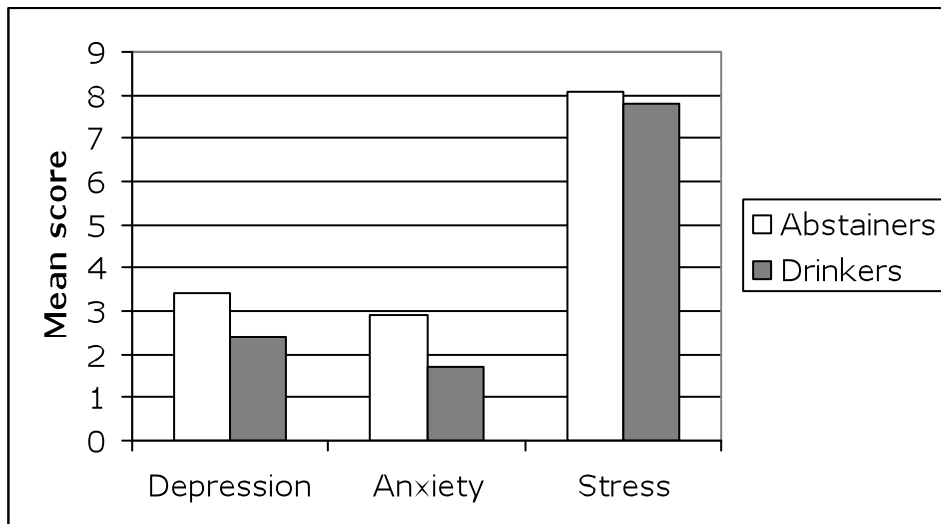
Figure 4.6: Mean length of time spent in hospital after giving birth in days by alcohol group

As can be seen in figure 4.6, the women who drank during their pregnancy spent longer in hospital than the women who abstained from alcohol (mean 3.38 days, SD=1.93 and 4.38, SD=1.30 respectively). This difference of 1 day was statistically significant ( $z=-2.02$ ,  $p<0.05$ ,  $n=26$ ) with a medium effect size ( $r=0.34$ ). The potential influence of alcohol on maternal health after pregnancy was examined by comparing the presence of any health problems since birth between the two groups. Slightly more women in the drinking group (38.9%) reported health problems since giving birth than those in the abstinence group (35.3%), however, a chi-square test of association showed no association between maternal health problems and alcohol use ( $\chi^2(1) = 0.07$ ,  $p=0.80$ , ns).

#### *Maternal postnatal psychological well-being*

Scores on the EPDS were compared between the two groups and mean scores were slightly higher in the abstinence group (mean abstinence group=5.19, SD=4.41, mean alcohol group=4.10, SD=3.98). This difference in the means was not found to be statistically significant ( $Z=-0.94$ ,  $p=0.35$ , ns). Of the abstainers, a greater proportion, 22.9% ( $n=8$ ), scored above the cut off for clinical depression than that of the drinkers (10%,  $n=2$ ) but this was not statistically significant ( $\chi^2(1) = 1.24$ ,  $p=0.27$ , ns).

Postnatal DASS-21 scores were also compared for the drinkers and the abstainers and are presented in figure 4.7 below. As can be seen in the graph, the mean depression scores are slightly higher among the abstainers (3.4, SD=5.4) than the drinkers (2.4, SD=3.9). The mean anxiety scores are also slightly higher in the abstainers than in the drinkers (2.9, SD= 3.8 and 1.7, SD=3.0 respectively). There is very little difference apparent in the mean stress scores between the two groups (mean abstainers= 8.1, SD 7.3, mean drinkers = 7.8, SD=8.1). Independent samples  $t$ -tests showed no significant differences between drinkers and abstainers for any of the three subscales (depression:  $t(54) = 0.70$ ,  $p=0.48$ , ns; anxiety:  $t(54) = 1.18$ ,  $p=2.4$ , ns; stress:  $t(54) = 0.15$ ,  $p=0.88$ , ns).



**Figure 4.7: Mean postnatal DASS-21 scores for drinkers and abstainers**

Hypothesis 2 can only be partially supported. Women who drank during pregnancy were no more likely to experience pregnancy or labour complications nor did they differ on postnatal depression, anxiety and stress scales compared to abstainers. There were differences found, however, in the length of time women spent in hospital after giving birth; the women who drank during pregnancy were discharged later than those who abstained.

#### 4.3.4. MOTHER-INFANT ATTACHMENT

The potential influence of alcohol use during pregnancy on mother-infant attachment was examined by comparing the scores on the MAI between the two alcohol groups whilst controlling for the potential confounding factors of depression, anxiety and stress. The MAI scores were lower for the alcohol-exposed pregnancies (mean 99.13, SD=6.69) than for the non-alcohol exposed pregnancies (mean 102.37, SD=3.20) and this difference was statistically significant ( $z=-2.11$ ,  $p<0.05$ ). Therefore the alcohol-exposed pregnancies had significantly lower reported scores on the attachment measure, the MAI, than the women who had abstained during pregnancy. Therefore, hypothesis 3 is supported; women who drank alcohol when pregnant reported lower levels of postnatal attachment with their infants.

#### 4.3.5. ALCOHOL USE AFTER PREGNANCY

Alcohol use after pregnancy was compared between the prenatal alcohol group and the abstinence group (as reported at 20 weeks gestation). The mean number of units of alcohol consumed per month was higher in those who had drunk during pregnancy as shown in figure 4.8. The mean number of units drunk after pregnancy for the prenatal drinkers group was 16.78 units (SD=14.75) and the mean number of units drunk for the abstinence group was 10.82 units (SD=20.55, mean difference 5.96 units). This difference was statistically significant ( $Z=-2.51$ ,  $p<0.05$ ).

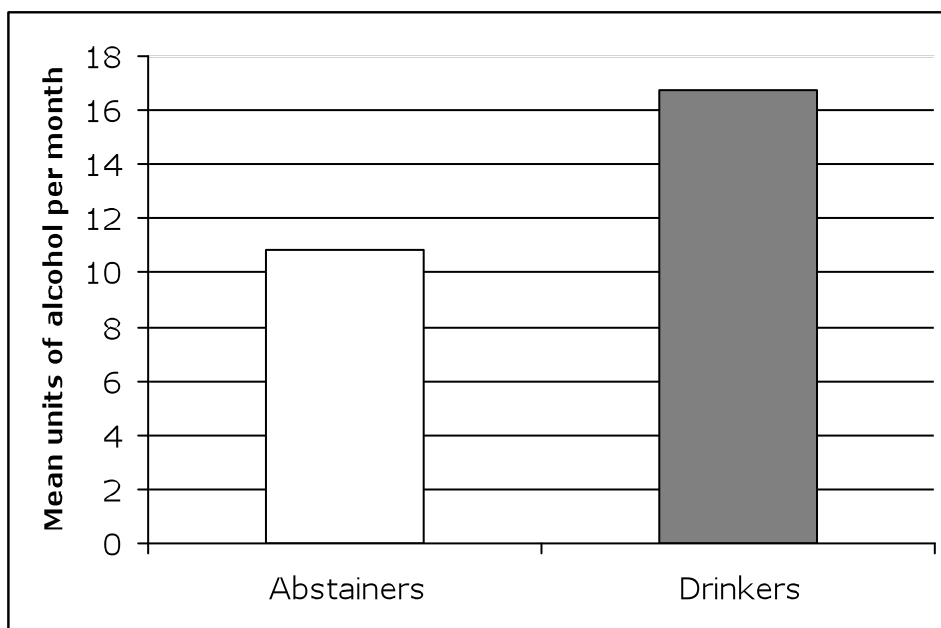


Figure 4.8: Mean units of alcohol consumed per month after giving birth

Participants pre-pregnancy and postnatal drinking was examined using a paired samples *t*-test analysis for the participants who provided consumption rates before and after being pregnant ( $n=50$ ). The mean number of units consumed per month before and after being pregnant are displayed in figure 4.9 below.



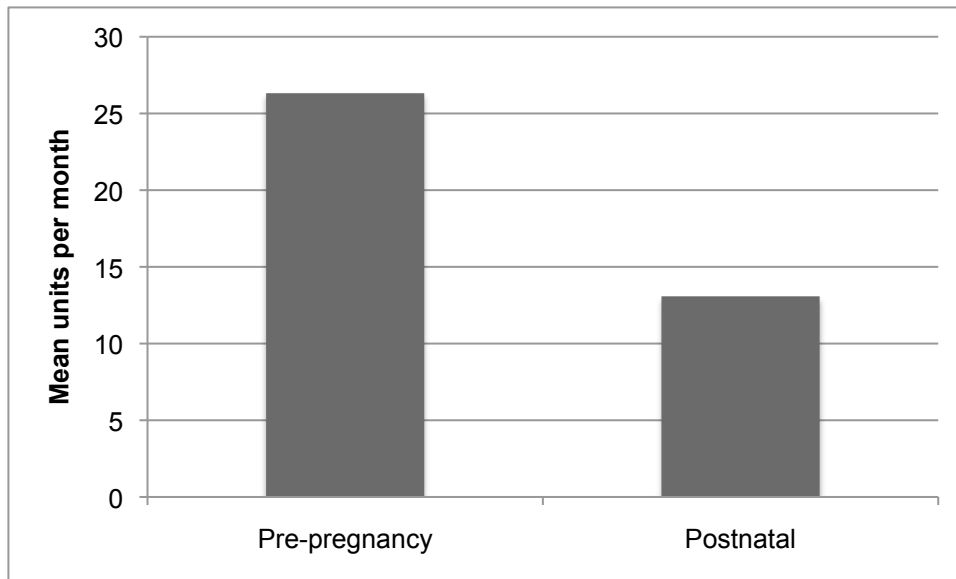


Figure 4.9: Mean units of alcohol consumed per month before and after becoming pregnant

The mean number of units consumed per month after birth (mean 13.08, SD=27.12) was significantly lower than that reported before becoming pregnant (mean 26.32, SD=19.10;  $t(49) = 3.45, p < 0.001$ ).

Alcohol use after having given birth was also examined in women who reported themselves as currently breast-feeding ( $n=17$ ). As shown in figure 4.10 below, fifty-three percent of women ( $n=9$ ) who were currently breast-feeding reported that they never drank alcohol. Significant proportions of women were drinking; monthly or less (17.6%,  $n=3$ ), two to four times a month (17.6%,  $n=3$ ), two or three times a week (5.9%,  $n=1$ ), or four or more times a week (5.9%,  $n=1$ )

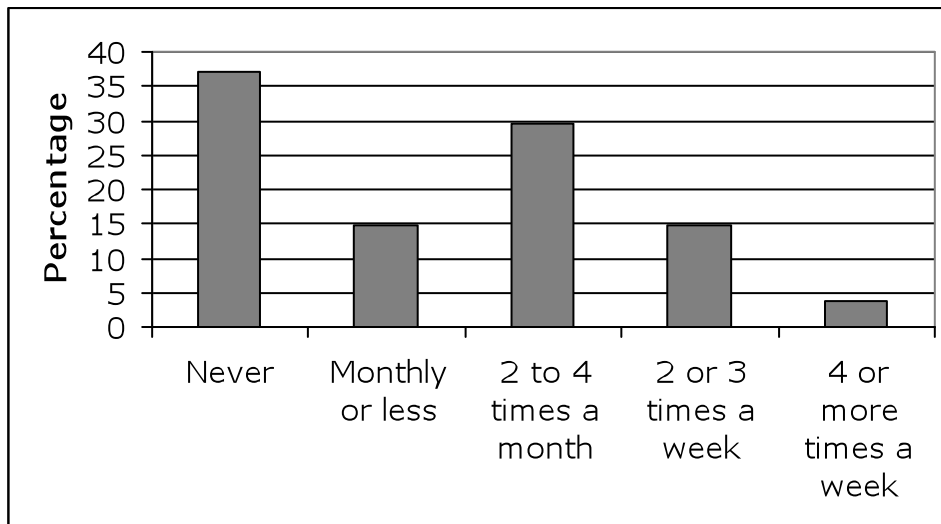


Figure 4.10: Frequency of drinking in breast-feeding women

Figure 4.11 below, shows the mean number of units of alcohol consumed per day when drinking and per month (amongst the breastfeeding drinkers n= 9). The mean number of units drank per day drinking was 1.12 (SD=0.33), and the mean number of units drank in a month was 8.59 (SD=12.06).

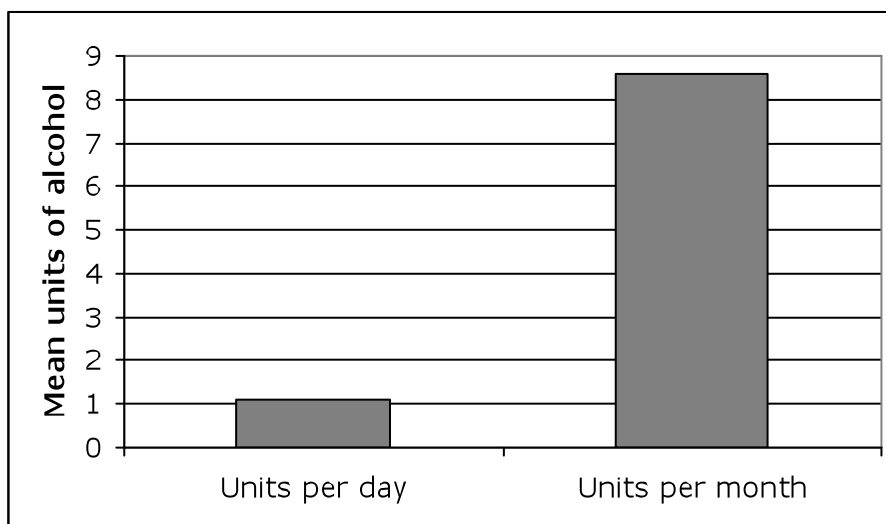


Figure 4.11: Mean units of alcohol consumed by women breast-feeding, per day and per month

Participants were also asked to report how often they drank 6 or more units of alcohol in one occasion. One woman (5.9%) reported drinking at this level monthly or less, and one woman (5.9%) was binge-drinking two to four times a month.

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#### 4.3.6. QUALITATIVE RESULTS

Six participants provided information in the free text box included at the end of the questionnaire to provide participants with the opportunity to comment on issues they felt to be important and not already covered by the questions.

Four of these participants commented on the antenatal care they had received, with three of the four perceiving their post-labour care to be inadequate.

*“The hospital maternity ward was awful. Unbearably hot, cramped and uncomfortable. Push to breastfeed tantamount to bullying. Hospital could've been much cleaner. Some very good nurses but some that were very unfriendly particularly after having c-section. Bedding only changed once after having asked”* Participant 61

*“I would like to see better treatment of patients in hospital. I am lucky I did not catch an infection laying in my blood for days, lucky my baby was well as well, he laid in my blood so I could breastfeed him. Better mother postnatal care would be nice, in other countries new mothers can go to exercise classes and guided on how to feel better. Here all attention on baby, forget about mother! Shame”* Participant 158

*“I would like to highlight that having a smear test too soon after giving birth will come back positive and cause a lot of worry, I would like more women to be told to wait until at least 6 months after giving birth. I had a very unpleasant smear which came back negative and was told on further tests this was due to my body still healing”*  
Participant 163

One participant commented on the positive experience they had of antenatal support;

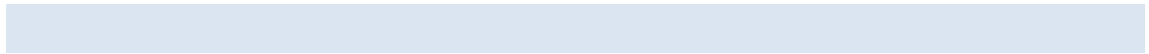
*“Motherhood has been very hard this first 4 months but getting easier and more enjoyable, without the support of the health visitor and team I may not have coped as well as I have”* Participant 141

The other comments provided in this section of the questionnaire related to the experience of motherhood. One participant discussed their experience of postnatal depression;

*“When baby six-weeks old had 'baby blues' but support of family and church this was very short-lived”* Participant 47

A further participant discussed how the postpartum experience is affected by other factors.

*“Very much depends on how many children you have and experience”* Participant 147



## 4.4. DISCUSSION

Significant differences existed between the pregnancies exposed to low-levels of alcohol use and those exposed to none; the length of time women spent in hospital after giving birth was longer and maternal-infant attachment scores were lower in the drinkers. No significant differences were found for a number of maternal and infant health outcomes. No differences were found between the two groups for gestational age, birth weight, pregnancy and labour complications, delivery type, health problems after birth or for maternal well-being. Important results were also found in terms of the levels of alcohol use in women exclusively breast feeding their infants. These findings and their potential implications will be discussed in more detail below.

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### 4.4.1. THE INFLUENCE OF MATERNAL PSYCHOLOGICAL WELL-BEING

This study aimed to examine the impact of alcohol use during pregnancy whilst controlling for the potentially confounding influence of maternal mental well-being. Previous research (Hedegaard et al. 1993, Hoffman and Hatch 2000, Huizink et al. 2003, Jacobson et al. 1993, McKee et al. 2000, Wadwha 2005) indicated that depression, anxiety and stress impact upon infant and maternal health outcomes and, therefore, could confound the relationship between alcohol use and outcomes (Jacobson et al. 1993). In contrast to the research mentioned above, controlling for depression, anxiety and stress did not result in any differences in the analyses examining the impact of alcohol use on infants and mothers. However, relatively low numbers of women in this study were classified as being depressed (n=7) or anxious (n=11) with only slightly more women grouped as feeling stressed (n=28). Further research with distressed pregnant women is warranted to examine whether depression, anxiety and stress influence the relationship between alcohol and maternal and infant health.

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### 4.4.2. THE IMPACT OF LOW LEVEL ALCOHOL USE ON INFANTS

This study found no evidence of an association between low levels of alcohol exposure and a number of birth outcomes. In agreement with Walpole, Zubrick and Pontré (1990), there were no significant differences between the groups of infants for birth

weight. No significant differences were found for gestational age in this study in concordance with previous research (O'Leary et al. 2009). Furthermore maternal reports of infant health after birth did not differ between the two groups. These results suggest that low-levels of alcohol use may not have a large effect on these specific birth outcomes or on maternal-reported measures of general health. However, it cannot be concluded that there is no harm to infants at this low level of exposure. There are a number of limitations which may affect the generalisability of the study discussed in section 4.4.5 below. Furthermore, an underlying negative impact may in fact be present for the alcohol-exposed infants in terms of maternal-infant attachment; these findings are discussed further next.

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#### 4.4.3. THE IMPACT OF LOW LEVEL ALCOHOL USE ON MATERNAL-INFANT ATTACHMENT

Women who drank alcohol during pregnancy scored lower on the measure of postnatal maternal-infant attachment. The Maternal Attachment Inventory (Muller 1994) is designed to measure mothers' feelings of affectionate attachment to their infant. Although maternal feelings are not enough on their own to quantify the complex attachment relationship, they are thought to indicate the probable presence of attachment. Therefore, lower scores on the MAI indicate a potentially less positive attachment relationship. A number of potential reasons for these differences will now be discussed.

It may be argued that a woman who drinks during her pregnancy is fundamentally less attached to her foetus and would therefore be less attached to her newborn infant. Indeed research shows that prenatal attachment and postnatal attachment are correlated (Muller 1996). However, as reported in study 1, no differences were found between the drinkers and the abstainers in terms of prenatal attachment scores. This adds strength to the argument that the attachment differences found postnatally were not the consequence of inherent underlying environmental or maternal characteristics concurrently linked to drinking. As discussed in section 4.1.3., determinants of attachment include both maternal sensitiveness and infant behavioural characteristics. Perhaps the lower scores in the drinkers are due to the effects of low-level alcohol

exposure on infant characteristics crucial for attachment. As discussed previously, moderate to heavy alcohol exposure is related to behavioural effects (such as difficultness, proneness to distress, and negative affect) which are likely to have an important impact on maternal-infant attachment (Goldsmith and Alansky 1987). It is possible that the differences found in this study show low-level alcohol exposure effects. However, the results of this study are based solely on self-report and show only associations, therefore, do not allow for any firm conclusions to be made.

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#### 4.4.4. THE IMPACT OF LOW LEVEL ALCOHOL USE ON NEW MOTHERS

Despite finding no evidence for an effect of low-level alcohol use on pregnancy or labour complications, women who drank during their pregnancy reported staying around a day longer in hospital after giving birth, for 4.38 days compared to 3.38 days for the drinkers. A number of potential reasons for a longer stay are possible. The length of postnatal stay depends on a number of factors including the health and well-being of the new mother and infant, and the levels of support available following discharge (NICE 2006). Women who drink during pregnancy may be generally less healthy than women who abstain (Berg et al. 2008), and for that reason take longer to recover from giving birth. A second potential reason for a longer discharge could be infant feeding difficulties; women who are having difficulties with feeding their newborns report low readiness for hospital discharge (Dato, Saraiya, and Ziskin 2000). Research shows that rat pups prenatally exposed to alcohol display difficulties in latching on, and suckling (Kelly et al. 2000). One possible reason for the longer postnatal hospital stay found in the drinking group could be, therefore, due to differences in infant behaviours important for feeding. Further research is required to examine these potential mediating factors. The impact of drinkers staying a day longer than abstainers is likely to have a significant impact upon maternity costs for the NHS. An estimate of the potential extra expense per patient based on analysis reported in Mistry et al. (2009), suggests that each drinker may cost around £281.90<sup>7</sup> more than an abstainer. When this is extrapolated out to the 35% of women

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<sup>7</sup> Daily cost of postnatal maternity bed 2001-2002

estimated to be continuing to drink during pregnancy, the costs are likely to be considerable.

No difference was found between the drinkers and abstainers for indices of maternal mental well-being after birth. Contrary to hypotheses and previous research (e.g. Pajulo et al. 2001), drinkers were no more likely to experience postnatal depression, anxiety or stress than women who abstained. However, women drinking during pregnancy were more likely to be drinking at follow-up. Women who reported drinking whilst exclusively breast-feeding were analysed separately to investigate alcohol use in this group, discussed below.

#### *Alcohol use of breast-feeding women*

Alcohol use was reported in 47% of women who were exclusively breast-feeding their infants. Mean consumption in the drinking breast-feeders was 1.12 units per occasion and 8.59 units per month. The majority of drinking breast-feeding women in this sample were drinking in concordance with current guidelines (DoH 2006b) suggesting they are adhering to current advice. Just under 12% of drinkers reported consuming at levels above current guidelines, and 11.8% drank 6 or more units in one occasion either monthly or less or two to four times a month. As mentioned previously, there are very few published papers that examine the incidence of alcohol use in breast feeding women making any comparisons with this study difficult. Further research is required to establish the incidence and impact of alcohol use in this population.

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#### 4.4.5. WHERE THIS STUDY ADDS NEW INSIGHT, LIMITATIONS AND FUTURE DIRECTIONS

A number of limitations for study 3 exist. Participants in this study were lost to follow-up which impacts on the generalisability of the results. It may be that participation in the follow-up study was affected by negative birth outcomes. Perhaps women who had drunk during pregnancy and gone on to give birth to low weight or preterm infants were in some way less likely to take part in a research study investigating these outcomes. Lower birth weight was one characteristic associated with drop-out in previous research examining alcohol use and child development (Robinson et al. 2010). Both the prenatal and postnatal questionnaires contained a number of



questionnaire items relating to a wide variety of topics partly in order to widen the focus. This was done to attempt to ensure that participants felt able to discuss alcohol use without feeling that this was under close scrutiny. It was beyond the scope of this study to examine cognitive outcomes in older infants but it would be important for future research to do this whilst controlling for maternal mental well-being (as discussed previously 4.1.1.). Despite these limitations, study 3 provides important directions for future research and highlights the need for greater focus on determining the relationship between alcohol use and wider outcomes than merely infant health. A further limitation of this study is the absence of qualitative methodology. Future research applying interview methodology could add to the understanding of the impact of alcohol and nicotine use on infants and mothers.

This study suggests that there are a number of outcomes that may be affected by low-level alcohol use during pregnancy. The impact of alcohol use on maternal health is an area of little research attention. Although this study suggests that low-level alcohol use may not negatively impact upon a number of maternal health outcomes, further research in this area is necessary. Further studies investigating which factors mediate the relationship between low-level drinking and length of postnatal stay in hospital is also necessary. The lower attachment scores in the drinking group also require further research to investigate causative factors. Future studies should examine whether these potential low-level alcohol exposure effects relate to observable differences in attachment type (i.e. in terms of secure, disorganised or insecure attachment), and whether such differences exist into the longer term. If these findings are replicated, informing pregnant women of these links could assist efforts to reduce alcohol consumption during pregnancy.

Although the greatest proportion of breast-feeding participants in this study were drinking at levels in concordance with current guidelines, the results of the research suggest that perhaps more could be done to highlight the importance of limiting alcohol intake whilst breast-feeding. A number of women were drinking at levels that may be harmful. Perhaps health education strategies and the practice of health professionals in Grampian could be directed to reducing higher levels of alcohol use in breast-feeding women. Any approach would have to be carefully managed to weigh

up the potential benefits from increasing women's knowledge with the potential for putting women off breast-feeding (if they were advised against drinking any alcohol).



The overall aim of this PhD was to investigate alcohol and nicotine use during pregnancy and to examine the nature, occurrence and consequences of such behaviours. The work comprises three individual studies, each addressing aspects of this overall aim. Study 1 investigated the determinants of alcohol and nicotine use during pregnancy and established an estimate of the numbers of pregnant women engaging in these behaviours. Study 2 investigated the practice of midwives in Grampian in order to identify the nature of alcohol and nicotine advice being provided to pregnant women. Whilst study 3, explored the potential impact of alcohol use during pregnancy in terms of the consequences for infants and mothers post birth. Further discussion of the results, including implications for future research and practice, will be discussed next and will be structured around each aspect of the overall aim.

### 5.1.1. INVESTIGATING THE OCCURRENCE OF ALCOHOL AND NICOTINE USE DURING PREGNANCY

In order to establish whether intervention efforts are necessary, an estimate of the number of pregnant women drinking and smoking during pregnancy needs to be established. Few studies have been conducted in Scotland to determine this and recent Scottish prevalence studies (Anderson et al. 2007, Bolling et al. 2007) have employed retrospective methods of reporting alcohol use using an interview methodology. As discussed in section 1.4, these methods have a number of methodological weaknesses and incidence rates from a variety of methodologies are required to build up a more precise picture of use in Scotland. The results of study 1 indicate that a relatively high proportion of women in Grampian continue to drink during pregnancy, 34.5%, compared to figures of prenatal drinking worldwide (e.g. Alvik, et al. 2006, Drews, et al. 2003, Kaminski, et al. 1995). Furthermore, study 1 indicates that significant numbers of women in Scotland drink at levels exceeding healthy drinking guidelines before recognising that they are pregnant. The mean alcohol consumption per occasion for the sample as a whole was 4.08 units a day.

A smaller proportion of the total sample continued to smoke, 10.8%. Study 1 and previous research (e.g. suggests that the incidence of alcohol use during pregnancy is, therefore, around three times that of nicotine use, whilst the provision of care and support in Scotland remains far greater for the latter.

Furthermore, findings from study 3 indicate that postnatal alcohol use in women exclusively breast-feeding was prevalent; 47% consuming at some level. There is a lack of previous research investigating the incidence of alcohol use during breast-feeding. Whilst the mean consumption of the sample in study 3 was around 8 units per month, around 12% reported binge drinking at least occasionally. Although these results are based on small numbers of women drinking and breastfeeding, it indicates that further research is warranted to establish the number of women in Scotland who are exceeding NHS guidelines for alcohol use whilst breast-feeding (1 or 2 units once or twice a week; NHS, 2006b).

Taken together, the results from this programme of research indicate that a substantial number of pregnant women are continuing to drink during pregnancy. The numbers who are continuing to smoke are somewhat smaller but still represent a significant minority of pregnancies. Given that self-report measures are likely to be an under-estimate of the actual consumption (Scottish Government 2008a), it seems likely that these figures are an under-estimation of the incidence of alcohol and nicotine use during pregnancy in Scotland. Intervention work to reduce consumption during pregnancy is therefore warranted and reductions of alcohol and nicotine use during pregnancy have been declared as important government targets (DoH 1998, Scottish Government 2007). For interventions to be effective, development work is needed to provide an understanding of the nature of the behaviour. The elements of this research that adds to the understanding of alcohol and nicotine use during pregnancy are discussed next.

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#### 5.1.2. ESTABLISHING THE NATURE OF ALCOHOL AND NICOTINE USE DURING PREGNANCY

Establishing the determinants of alcohol and nicotine use during pregnancy allows for the identification of targets for behaviour change interventions. Few studies

investigating the determinants of alcohol and nicotine use during pregnancy have incorporated social cognition models or examined psychological well-being or attachment. The majority of previous research has examined socio-demographic variables (e.g. Alvik 2006, CHOICES 2002, Kelly et al. 2009, Palma et al. 2007, Pirie et al. 2000, Sayal et al. 2007, Testa and Leonard 1995). However, study 1 found that only one socio-demographic variable was predictive of alcohol use during pregnancy; the woman's parity, with multigravidae being more likely to use alcohol. Parity may influence alcohol consumption in a number of ways. Midwives may be less likely to provide information about alcohol if a woman is on their second or later pregnancy. Alternatively, women may feel less worried about a later pregnancy and therefore be more permissive in their behaviour. Future research, could interview women to examine this association further.

The finding that socio-demographic variables are not, on the whole, reliable indicators of behaviour highlights a need for research to focus on more robust determinants of behaviour. Social-cognition models not only provide reliable determinants of behaviour, but also provide targets for intervention work (Conner and Norman 2005a). There is a lack of previous research applying social cognitive models to alcohol and nicotine use during pregnancy. Study 1 included the application of a pregnancy-specific health locus of control measure. Abstaining women scored significantly higher than drinkers and smokers for the internal health locus of control subscale in concordance with previous research (Haslam, Lawrence and Haefeli 2003, Haslam and Lawrence 2004, Stewart and Streiner 1994). Higher scores indicate a greater sense of personal responsibility in determining the health of the foetus.

Study 1 also provides evidence that the TPB/TRA model is a useful application to both alcohol and nicotine use during pregnancy. Interventions with a theoretical grounding in models such as the TPB/TRA are more likely to be effective (Connor and Norman 1996). The TPB model predicted 59.3% of the variance in intention to drink alcohol during pregnancy and between 57.1% and 77.1% of the variance in actual drinking behaviour. Attitude, intention, and subjective norm variables of the TPB distinguished between drinkers and abstainers. Perceived behavioural control did not distinguish pregnant drinkers from abstainers, perhaps this is because of the relatively high levels

of volitional control underlying alcohol use during pregnancy for this sample of non-alcoholic women (as suggested by Schlegel et al. 2006). There were insufficient numbers of smokers in the sample to perform analysis to examine the percentage variance explained by the TPB variables. However, attitude, intention and perceived behavioural control distinguished between smokers and abstainers. The implications of these findings for future intervention development will be discussed in section 5.2.1 below. Both previous drinking and smoking habits before pregnancy were related to prenatal alcohol and nicotine consumption however, the inclusion of past behaviour did not significantly enhance the predictive power of the TPB model. It therefore appears as though the role of past behaviour is mediated by the TPB variables for alcohol use during pregnancy.

Study 1 investigated whether maternal mental well-being determined who drank alcohol and who smoked during pregnancy. In contrast to previous research (Hanna, Faden and Dufour 1994, Lindgren et al. 2003, Littleton, Radecki Breitkopf and Berenson 2007, Linares Scott et al. 2009, Leonardson and Loudenberg 2003, Zhu and Valbø 2002) no significant relationship was found between depression and stress and health behaviour. However, anxiety was related to alcohol use, with higher levels of anxiety in the abstaining women than in the women drinking alcohol. Further research is needed to replicate this finding and to explore whether this result relates to a pregnancy-specific anxiety (Huizink et al. 2003), whereby greater worry about the pregnancy may be related to more protective health behaviour. Maternal mental well-being was also found to impact upon the relationship between prenatal attachment and alcohol use during pregnancy. For the sample as a whole, lower attachment was related to drinking. However, when depression, anxiety and stress were accounted for, no significant differences existed between drinkers and abstainers. It, therefore, appears that the relationship between attachment and alcohol use is complicated by maternal mental well-being. Further research applying structural equation modeling techniques could explore this relationship further.

Another important aspect in establishing the nature of alcohol and nicotine use during pregnancy is to understand current health professionals' practice. Intervention work may also be needed to change health professionals' behaviour and attitudes in order

to bring about changes to the advice and support provided to pregnant women. Recent changes to the alcohol guidelines have been made (DoH 2007) but little is known about midwives' views and practice regarding alcohol and nicotine use during pregnancy. Study 2 sheds light on the determinants of midwives' attitudes and behaviour and provides useful recommendations for service improvement. The results of study 2 suggest that practice varies greatly even across a single health board. This is in line with previous research conducted within the UK (Clasper and White 1995) and worldwide (Chang 2000, Payne et al. 2005). Perceptions of what constitutes light drinking varied substantially among midwives. Definitions of light drinking during pregnancy varied from 1 unit to 40 units per month, and moderate drinking was defined as anything between 1 unit to 21 units a week. It is, therefore, unlikely that there is a clear indicator for when patients require referral or further support. Furthermore, midwives' attitudes regarding what was an acceptable level of alcohol use during pregnancy also varied. One third of midwives believed that some alcohol during pregnancy was acceptable. Nineteen percent of midwives had beliefs that were in line with previous guidance (1-2 units once or twice a week; DoH 2006), and 10% believed that a greater number of units than this was still acceptable. With regard to actual practice, almost a third of midwives working in the community did not routinely ask every patient about alcohol use and no participants reported using screening tools. A significant minority of pregnant women reported receiving no advice about alcohol or smoking during pregnancy from any health professional (12% for alcohol use, and 10% for smoking use). It may be that women had received advice but were unable to recall this when asked in the questionnaire, or it may be that they truly did not receive advice. Steps should be taken to address this gap and ensure that all women receive memorable advice. Midwives are in a key position to be able to do this and suggestions for changes to clinical practice will be discussed in section 5.2.2.

The variation found in opinions and practice may, in part, be explained by midwives' attitudes to providing advice. As in previous research (Godin et al. 2008), beliefs about capabilities were an important barrier; less than half of the midwife sample in this study felt confident giving advice to pregnant women about alcohol use. Tensions existed around maintaining a positive relationship with the patient whilst discussing

sensitive topics such as alcohol use. A number of midwives believed that providing alcohol advice may make women feel guilty (in agreement with McLeod et al. 2003; Clasper and White 1995). Midwives who were not routinely asking patients about alcohol use, were less likely to believe that women are receptive to, and interested in alcohol advice. They also agreed more strongly that the relationship may be damaged by discussing alcohol, as in previous research (McLeod et al. 2003). However, research conducted with pregnant women suggests they both expect discussions surrounding health behaviour with their midwife, and desire this information (Lendahls, et al. 2002, McCurry, et al. 2002).

Further variation in attitudes can be attributed to midwives' own drinking patterns. Midwives who drank more units of alcohol themselves, felt that a higher level of use within pregnancy was acceptable. This ties in with previous research indicating that healthcare professionals' clinical practice regarding alcohol use was affected by their own levels of alcohol use (Brewster et al. 1990). Additional barriers to providing alcohol advice to pregnant patients included a lack of training, lack of time and feeling ill at ease. Very few midwives had received training on talking to patients about alcohol use or in supporting behaviour change and almost all desired further training. Previous research in this area has tended to focus on barriers towards providing smoking cessation but similarities can be drawn. Important barriers, for discussions of smoking cessation from previous research, include confidence in one's own ability (Logan et al. 2003) lack of training (Clasper and White 1995) and the desire to maintain a good relationship (Wood et al. 2008). Study 2 identifies the potential barriers for midwives providing advice about alcohol use and establishes clinical practice in Grampian. For any practice-wide intervention effort to be effective, groundwork would need to be carried out to address these barriers to midwives providing advice and support.

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### 5.1.3. EXPLORING THE POTENTIAL CONSEQUENCES OF ALCOHOL AND NICOTINE USE DURING PREGNANCY

The consequences of nicotine use during pregnancy are well documented. In-utero exposure to smoke is linked to reduction in birth weight (Adams and Melvin 1998,



Blake et al. 2000, Lumley 1987), small head circumference (Kallen 2000, Lindley et al. 2000), premature birth (Floyd et al. 1993), small for gestational age (Fantuzzi et al. 2008, Figueras et al. 2008) and sudden infant death syndrome (Adams and Melvin 1998). The evidence for these consequences is robust enough to justify intervention efforts to help pregnant women to abstain from smoking during their pregnancy. Research examining the consequences of alcohol use to date, has tended to focus on the consequences of moderate and heavy levels of alcohol use. The majority of the woman in this sample, and in the general population of pregnant women (Anderson et al. 2007, Bolling et al. 2007), however, drink at lower levels during pregnancy. In order to determine if intervention efforts are necessary for these women, research is needed to establish if there are any negative consequences from low-level alcohol use during pregnancy. Study 3, followed-up participants from study 1 post birth in order to examine the potential consequences of low-level alcohol use during pregnancy. There is a high level of uncertainty in the field over whether a safe level of alcohol use exists during pregnancy (O'Brian 2008).

In accord with previous research (O'Leary et al. 2009 and O'Callaghan et al. 2003), no significant differences were found for infant birth weight, or gestational age at birth in the prenatally exposed group. However, it cannot be concluded that low-level alcohol use during pregnancy is risk free; study 3 highlighted negative consequences in terms of attachment and length of hospital postnatal stay. In agreement with previous research examining higher levels of alcohol use (Kelly, Day and Streissguth 2000; O'Connor, Sigman and Brill 1987; O'Connor, Sigman and Kasari 1992; O'Connor, Kogan and Findlay 2002) the woman who drank during pregnancy reported significantly lower levels of attachment to their babies. This occurred despite low-level drinking and despite no significant differences being present in prenatal attachment. One potential explanation of this result could be that, the lower scores in the drinkers are due to the effects of low-level alcohol exposure on infant characteristics crucial for attachment. The results of this study show associations and not causative relationships, therefore this finding warrants further investigation. Future research could help to determine whether these differences in self-reported attachment

related to observable differences in the attachment relationship, and any differences in infant behaviour.

Despite finding no evidence for an effect of low-level alcohol use on pregnancy or labour complications, the prenatal drinkers who were first-time mothers spent on average one day longer in hospital before being discharged than the abstainers, costing an estimated £281 extra per patient. Explanations for a longer hospital stay include the possibility that pregnant women who drink may be generally less healthy than women who abstain (Berg et al. 2008) or could be related to potential feeding difficulties (Dato, Saraiya, and Ziskin 2000) in alcohol-exposed newborns (Kelly et al. 2000). However, this finding may be explained by factors other than alcohol use during pregnancy and further research is needed. If further studies were to replicate these findings, tackling low-level alcohol use during pregnancy is likely to have both health and financial incentives for the NHS. This estimated cost may help to justify any intervention development and professional training.

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#### 5.1.4. KEY THEORETICAL FINDINGS

A number of theoretical findings emerged from the three studies. Study 1 highlights that social cognition models of alcohol and nicotine use are an effective avenue for understanding pregnancy health behaviour. The Foetal Health Locus of Control (Labs and Wurtele 1978) internal subscale proved useful for distinguishing between smokers and abstainers and between drinkers and abstainers but was not as powerful a predictor of behaviour as the TPB variables (intention, attitude and subjective norm). Further research is needed to identify whether any other social cognitive variables could be important determinants of alcohol and nicotine use during pregnancy. Study 1 also tested the theoretical framework of the Theory of Planned Behaviour to examine whether including a variable of 'past behaviour' contributed to the model's explanatory power. The results of this analysis suggest that past behaviour does not add anything to the predictive power of the TPB for alcohol use during pregnancy. As discussed in section 2.5.3, the role of past behaviour in determining future behaviour is, therefore, likely to be mediated by the existing TPB variables.

## 5.2. IMPLICATIONS OF RESEARCH FINDINGS

The findings of this programme of research suggest that a greater focus on alcohol in pregnancy and in the postpartum period is needed by antenatal health care services. A significant number of women drink during pregnancy and whilst breast-feeding, and work is needed so that the support available for alcohol reduction is equitable to that currently available for nicotine use. The results of the three studies hold a number of implications for the development of behaviour change interventions and recommendations for changes to antenatal health care practice.

### 5.2.1. INTERVENTION DEVELOPMENT

The results of study 1 indicate that variables from the Theory of Planned Behaviour are important determinants of alcohol and nicotine use during pregnancy. Recent work by Michie and colleagues (2008) highlights how theoretical findings such as these can be used to design behaviour change interventions.

Michie et al. (2008) used a consensus approach with an expert panel of health and clinical psychologists to produce a taxonomy of behaviour change techniques. The behaviour change techniques in the taxonomy are grouped by theoretical domain; building on previous work (Michie et al. 2005). The findings of study 1 were mapped onto theoretical domains according to the specification in Michie et al (2005), before relevant behaviour change techniques were identified. Table 5.1 and 5.2 below indicate the relevant theoretical constructs (from the results of study 1), the underlying theoretical domain (Michie et al. 2005), and the behaviour change technique recommended by Michie et al. (2008) to target each construct. Table 5.1 suggests relevant behaviour change techniques to reduce alcohol consumption during pregnancy, and table 5.2 relates to smoking reduction/cessation behaviour change techniques.

Table 5.1: Theoretical constructs relevant for drinking during pregnancy mapped onto behaviour change techniques

Theoretical Construct	Theoretical Domain (Michie et al. 2005)	Behaviour Change Techniques (BCT; Michie et al. 2008)	Description of BCT
TPB- Attitude	Beliefs about consequences	Self-monitoring	Recording specific behaviour (e.g. diary)
		Persuasive communication	Credible source presents arguments in favour of the behaviour
		Information regarding behaviour, outcome	Provide information about antecedents or consequences of the behaviour, or connections between them, or behaviour change techniques
		Feedback	Provide feedback of monitored (including self-monitored) behaviour
TPB- Intention	Motivation and goals	Goal/target specification: Behaviour or outcome	Set behavioural goal or decide target standard of behaviour (specified and observable)
		Contract	Construct contract of agreed performance of target behaviour with at least one other person, written and signed
		Rewards, incentives	Provide contingent valued consequence, i.e. if and only if behaviour is performed

		Graded tasks, starting with easy tasks	Set easy tasks to perform, making them increasingly more difficult until target behaviour performed
		Increasing skills: problem-solving, decision-making, goal setting	Setting problem-solving, goal setting, and decision making tasks
		Social processes of encouragement, pressure, support	Others listening, empathising, and giving generalised positive feedback, other people performing tasks that would compete with the behaviour (e.g. childcare)
		Persuasive communication	(as above)
		Information regarding behaviour, outcomes	(as above)
		Motivational Interviewing	(see section below on p225)
TPB- Subjective Norm	Social Influences	Social processes of encouragement, pressure, support	(as above)
		Modelling/demonstration of behaviour by others	Observing the behaviour of other people

Table 5.2: Theoretical constructs relevant for smoking during pregnancy mapped onto behaviour change techniques

Theoretical Construct	Theoretical Domain (Michie et al. 2005)	Behaviour Change Techniques (BCT; Michie et al. 2008)	Description of BCT
TPB- Attitude	Beliefs about consequences	Self-monitoring	Recording specific behaviour (e.g. diary)
		Persuasive communication	Credible source presents arguments in favour of the behaviour
		Information regarding behaviour, outcome	Provide information about antecedents or consequences of the behaviour, or connections between them, or behaviour change techniques
		Feedback	Provide feedback of monitored (including self-monitored) behaviour
TPB- Intention	Motivation and goals	Goal/target specification: Behaviour or outcome	Set behavioural goal or decide target standard of behaviour (specified and observable)
		Contract	Construct contract of agreed performance of target behaviour with at least one other person, written and signed
		Rewards, incentives	Provide contingent valued consequence, i.e. if and only if behaviour is performed

		Graded tasks	Set easy tasks to perform, making them increasingly more difficult until target behaviour performed
		Increasing skills: problem-solving, decision-making, goal setting	Setting problem-solving, goal setting, and decision making tasks
		Social processes of encouragement, pressure, support	Others listening, empathising, and giving generalised positive feedback, other people performing tasks that would compete with the behaviour (e.g. childcare)
		Persuasive communication	(as above)
		Information regarding behaviour, outcomes	(as above)
		Motivational Interviewing	(see section below on p225)
TPB- Perceived Behavioural Control	Beliefs about capabilities	Self-monitoring	(as above)
		Graded tasks	(as above)
		Increasing skills: problem-solving, decision-making, goal setting	(as above)
		Coping skills	Identify and plan ways of overcoming barriers

		Rehearsal of relevant skills	Perform behaviour repeatedly, imagine performing the behaviour repeatedly, perform same behaviour in same context, perform behaviour in simulated situation
		Social processes of encouragement, pressure, support	(as above)
		Feedback	(as above)
		Self-talk	Plan self-statements (aloud or silent) to implement behaviour change techniques
		Motivational Interviewing	(see section below on p225)



Firstly, examining the proposed intervention techniques for alcohol consumption during pregnancy (table 5.1); targeting attitudes would involve techniques such as providing information regarding the consequences of drinking during pregnancy, providing arguments in favour of abstinence/reduction, asking pregnant women to monitor and record their alcohol intake and providing feedback on this information. In order to target pregnant women's intention to drink during pregnancy a number of techniques are likely to be effective. Techniques could include goal setting, perhaps starting initially with the goal of reducing alcohol consumption (and then later abstinence), asking the woman to develop and sign a contract for her behaviour change targets, and providing rewards (such as financial rewards) if alcohol reduction targets are met. Similar techniques would be relevant for supporting smoking cessation during pregnancy (please see table 5.2) with the addition of interventions to strengthen beliefs about capabilities; covering the PBC-based domain. These additional interventions include helping pregnant women to identify barriers to change and to come up with strategies to overcome these, rehearsing of relevant skills (e.g. turning down offers of cigarettes), the use of self-talk (stating behaviour change goals), and motivational interviewing. Motivational interviewing is an existing method originally designed for use with addictions. It incorporates a range of techniques described further below.

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#### MI PRINCIPLES

Motivational interviewing (MI) was first described by Miller (1983) as an intervention for problem drinking but has since been applied to a variety of health behaviours including smoking cessation, drug addiction, and safe sex behaviour. The main aim of MI is to direct clients to explore their ambivalence to making changes and to help them to resolve this ambivalence. MI is conducted within a collaborative setting that acknowledges patient autonomy, utilising a client-centred or patient-centred approach (see section 5.3). Therefore, shared decision-making exists and the patient's right to choose and be responsible for his or her own health is recognised. MI emphasises that clients are responsible for their own progress.

Many people working in a health setting have chosen their career due to a desire to help people. Due to this inherent drive to help people, the urge to correct another's behaviour can become reflexive. When conducting MI it is necessary to resist this automatic response (termed by Rollnick and Miller 1995 as 'the righting reflex') because often it can have the opposite effect to what was desired because of an individual's tendency to resist persuasion. A principal goal of MI is resisting the righting reflex and instead getting the patient to voice the benefits of change themselves. The relationship between client and counsellor is extremely important to MI. The relationship should be collaborative and friendly where change is reinforced by genuine positive reinforcement (i.e. praise). The counsellor aims to increase clients' self-efficacy; their belief that they are capable of making changes to their behaviour (Bandura 1995).

A principal goal of MI for the health professional is to demonstrate empathic listening (i.e. demonstrating a caring attitude and ensuring they understand). Taking time to ensure accurate and thorough understanding is seen as vital for success as a patient's reasons for change are highly individual and determined by a variety of inter-personal and situational factors. MI principles form the basis of a recently developed intervention for alcohol use, Alcohol Brief Interventions (ABIs). This approach will be discussed further in the next section.

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#### ALCOHOL BRIEF INTERVENTIONS (ABIs)

ABIs have become increasingly popular in the management of individuals with alcohol-related problems due to their low cost and their effectiveness across a spectrum of alcohol problems (Babor and Higgins-Biddle 2001). ABIs are designed to address the gap between primary prevention work and referral for more intensive treatment. ABIs are short (5-15 minutes), simple and effective, and are viewed as an acceptable intervention by patients (Babor and Higgins-Biddle 2001). The introduction of ABIs to antenatal care settings is being rolled out in Scotland in 2010 (McAuley 2009). ABIs are delivered according to the level of risk for each individual (see table 5.3 below). WHO guidance recommends using the AUDIT screening tool to determine which risk level and intervention is appropriate (Babor and Higgins-Biddle 2001).

Table 5.3: ABI risk levels and intervention components

Risk Level (Audit score)	Intervention	Components
Level 1 (0-7)	Alcohol education	Provide feedback on screening test results, educate about low-risk levels and the dangers of exceeding them, congratulate for sticking to limits. “Guide to Low-Risk Drinking” Educational leaflet: Information regarding: what constitutes a standard drink, the effects of high-risk drinking, indications for stopping drinking or cutting down, what constitutes low-risk drinking
Level 2 (8-15)	Simple advice	Provide feedback on screening test results, introduce discussion, present “Guide to Low-Risk Drinking” (see above), and conclude with encouragement and invitation to talk again if needed. Approach: Be empathic, non-judgemental, authoritative, deflect denial, facilitate involvement in process, periodic follow-up
Level 3 (16-19)	Simple advice plus brief counselling and continued monitoring	As above, but with focus on providing patients with tools to change basic attitudes and handle a variety of underlying problems. Includes assessment of patient’s ‘readiness to change’ and provision of a self-help booklet “How to prevent alcohol-related problems”. Intervention at this level includes continued support and feedback during the behaviour change attempts and for some time after goal achievement.

Level 4 (20-40)	Referral to specialist for diagnostic evaluation and treatment	If a person scores over 20, has a prior history of dependence, has co-morbid mental illness or has previously failed to achieve goals referral to specialist is warranted. Clinician provides feedback, advice, information and encouragement to attend referral site. Follow-up monitoring is also stressed as important.
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Although both ABIs and MI are popular techniques, neither is based on theory. There is an argument that any intervention designed to tackle alcohol and nicotine use during pregnancy should be theory-based. For instance, Michie et al (2008) advocate that behaviour change interventions should be theory-based as this allows for an explicit causal pathway and facilitates an understanding of what works; allowing for better development across contexts, populations and behaviours. Furthermore, the UK Medical Research Council’s guidance for the development of interventions (Craig et al. 2008) specifically recommends the incorporation of a theoretical framework. The purpose of this guidance is to maximise the likelihood of resulting interventions being effective. This suggests that interventions based on the findings of studies such as study 1, may be more effective than non-theory-based interventions such as ABIs. Future research applying a randomised control trial design is needed to identify the most effective behaviour change interventions to reduce alcohol and nicotine use during pregnancy.

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#### 5.2.2. RECOMMENDATIONS FOR ANTENATAL HEALTH CARE PROVIDERS

The findings from this series of studies suggest that a number of antenatal service changes should be made. The first of these is that routine enquiry of alcohol use should be made by antenatal health care providers. Given the existing structure of antenatal care provision (see section 1.9), it would be sensible for enquiry of drinking habits to be carried out by the community midwife at the first ‘booking’ appointment. Routine enquiry about alcohol use should also be made by any health professional

seeing patients seeking pre-conception advice or by the first healthcare professional visited after pregnancy recognition (for some women this may be their GP). Study 1 also highlighted that there was no relationship between receiving advice from a health professional and actual drinking behaviour indicating that changes to current practice are necessary. As discussed in the previous section (5.2), a number of intervention strategies may prove useful to aid antenatal health care providers to provide both memorable and effective strategies for behaviour change.

Although alcohol questions are included in the current version of the SWHMR (Scottish Women Held Maternity Records version 4, NHS Scotland 2008), study 1 suggests that not all pregnant women receive advice. Health professionals' behaviour is determined by many more factors than merely the current guidance for practice. Indeed, study 2 indicated that routine enquiry about alcohol use was less likely for midwives who believe that women are not receptive to receiving or interested in advice, and who felt the relationship may be damaged by discussing alcohol use. However, as mentioned previously, pregnant women both expect and welcome discussions about health behaviour in pregnancy (Lendahls, et al. 2002; McCurry, et al. 2002). In order for the latest evidence and guidance to be translated into practice, research should explore further determinants of midwives' giving alcohol advice and varying methods of delivering advice. The findings from this PhD suggest that a significant minority of women are not receiving advice from any health professional about smoking during pregnancy. Clear support and guidance is available for pregnant smokers to help them to quit (as discussed in section 1.?), so it is unclear why women do not receive, or recall receiving any advice or support. Further research should explore antenatal health care providers' practice regarding referral for smoking services and establish determinants of this behaviour. A framework such as the Theoretical Construct Domains (Michie et al. 2005) may prove a useful avenue for this research. Michie et al. (2005) argue determinants of health professionals' behaviour cluster around twelve theoretical construct domains (shown in table 5.4 below).

#### 5.4 Theoretical construct domains relevant for health professional behaviour

<b>Theoretical Construct Domain</b>	<b>Definition</b>
<b>Beliefs about capabilities</b>	Perceptions about ability to perform the behaviour
<b>Beliefs about consequences</b>	Perceptions about short and long-term, positive and negative consequences of the behaviour
<b>Social role and identity</b>	Perceptions about self- and group- identity
<b>Motivation and goals</b>	The individual's motivation and commitment to a course of action, readiness to change
<b>Environmental context and resources</b>	The availability and management of resources, environmental stressors, facilitating and interfering physical or resource factors
<b>Emotion</b>	The individual's affect; positive/negative, anxiety, depression and stress, fear, burn-out
<b>Memory, attention and decision-making processes</b>	Memory, attention control and decision-making factors affecting the individual
<b>Knowledge</b>	The individual's knowledge about the specific behaviour, procedural knowledge, illness representations etc.
<b>Skills</b>	The individual's competence in carrying out the behaviour

<b>Social influences</b>	The influence of social factors (i.e. support, norms, conformity, pressure)
<b>Behavioural regulation</b>	Procedures and ways of doing things that encourage the behaviour
<b>Nature of the behaviour</b>	The behaviour itself; what changing the behaviour involves, whether it is habit, the influence of past behaviour

Research applying the theoretical construct domains framework, could identify further barriers to alcohol and smoking in pregnancy guidance implementation for midwives. Identifying these barriers would be crucial for the implementation of any intervention in antenatal care.

Study 2 identified that midwives had significant training needs surrounding alcohol and nicotine use during pregnancy. Around half of the midwives had received advice on how to discuss and support smoking cessation in pregnancy but over two thirds felt they still required training. In sharp contrast, only 4% of midwives had received training in how to discuss alcohol use during pregnancy with women, and only around 10% had received training on supporting women to make changes to their alcohol consumption. The majority of midwives wanted further training specific to alcohol use in pregnancy. Suggestions of training content will be presented next.

One avenue for professional training, which could benefit both midwives and pregnant women, is enhancing patient control and power through improving patient-midwife interactions. The traditional model for patient-health professional interaction was that of a one-way transfer of knowledge from an expert health professional to a layperson (Marteau and Johnston 1990). This model has obvious weaknesses. It does not take into account the influence of both the health professional's and the patient's health beliefs. Nor does it take into account the fact that patients hold a great deal of information and knowledge about their own lifestyle and needs that must be taken

into account for successful treatment to take place. A more recent model for patient-health professional relationships is patient centeredness. Patient centeredness was first developed by Byrne and Long (1976) and emphasises negotiation between doctor and patient and shared decision-making. If this interaction fails, and doctor and patient continue to hold different beliefs about health and illness, the consequences to compliance may be serious. For example, if a patient does not hold the belief that the health of their unborn baby is determined by themselves, they may be less likely to try and change any drinking or smoking habits and may view any behaviour change as unimportant (as suggested by the FHLOC results of study 1). In this circumstance, careful negotiation would need to take place between health professional and patient to try and address health behaviour change.

An integrated patient-centred and doctor-centred approach may lead to the ideal relationship (Ong et al. 1995). This approach allows patients to lead in their areas of expertise; for instance, symptoms, preferences and concerns, and the health professional to lead in theirs; for example, details of disease or possible treatment options (Smith and Hoppe 1991). Shared decision making is likely to increase a patient's sense of self-efficacy and control over their own health. Self-efficacy, control and equality of power in relationships have been shown to have substantial benefits for health and well-being and will be discussed next.

The distribution of power and control within health professional-patient relationships is an important issue. The traditional perception of health professionals as experts, leads some patients to be intimidated and consequently exercise little control over their own health decisions. Langer and Rodin (1980) demonstrated the benefits of encouraging a sense of control in patients in their study of institutionalised elderly people. They showed that providing participants with a sense of control was associated with better mental health. Gibson and Kenrick (1998) describe powerlessness in patients as a response to the perceived greater power of health professionals and the health care system. In their study, Gibson and Kenrick interviewed patients suffering from a chronic condition and found that true power sharing between these patients and their doctors appeared rare. Providing patients with a choice of treatment options (even when no real choice exists) and the



information needed to make that choice is one way to foster a sense of control and enable the patient to manage his or her own condition. The potential benefits of relationships that empower patients in this way include better adherence, better mental well-being and a greater sense of self-esteem. Whitehead and Tones (1991) suggest that interventions to improve empowerment and self-control should also result in the acquisition of changes in knowledge and understanding, evidence of the development of decision-making skills, enhanced self-esteem and sense of personal control and the development of various social, health and life skills.

Studies examining what women want from patient-health professional relationships highlight the importance of a caring relationship. Burkitt-Wright, Holcombe and Salmon (2004) interviewed 39 women with breast cancer and discovered that it was important to them that their doctor demonstrated expertise and showed them respect. They also expressed a desire for relationships that transcend traditional doctor-patient boundaries and acknowledge both parties as individuals. Burkitt-Wright et al suggest ways in which doctors may develop this type of relationship. Non-verbal cues such as smiling, touching and eye contact can convey the message that patients are regarded as individuals. Verbal cues like simply having a brief conversation about something other than the patient's condition can also help to establish a better relationship. Burkitt-Wright et al also stress the importance of the doctor also being viewed as an individual. This can be achieved by using humour, and taking the time to do something that 'they didn't have to do'.

Peterson et al (2009) found that smoking pregnant women reported feeling overwhelmed at their first visit. This visit was seen as a 'procedure' where there were a number of tests to be performed and tasks set by midwives, not a visit where they were able to ask questions. The pregnant smokers understood that smoking was harmful to their baby, but did not understand the impact smoking would have in real terms. Women who felt a high level of guilt about their smoking were less likely to talk openly with their midwife and some became worried about their visits to their antenatal clinic. More than half of the participants reported that they had not divulged the true nature of their smoking to their midwife. A number of reasons for this were discussed by the participants. Women reported that they did not feel able

to take an active role in a discussion about the effects of smoking during pregnancy and viewed the midwife as an authority figure. The guilt and embarrassment that they felt about smoking was a significant obstacle. A further barrier to open communication for the women in this study was the perception that the midwife had little time to spend with them. The participants in Peterson and colleagues' study wanted a relationship with their midwife where they were acknowledged as a person, where both their strengths and their weaknesses are recognised, and one where there is ongoing support throughout their pregnancy.

Arborelius and Nyberg (1997) examined how women with low educational attainment in Sweden felt about smoking and how they felt about discussing the issue with midwives. The participants reported that midwives had helped to reduce their smoking when they employed a friendly, neutral attitude and routinely asked about and recorded their smoking. Arborelius and Nyberg (1997) suggest that relieving the feelings of guilt and the corresponding self-image of the bad mother/person, may lead women to have greater self-efficacy and aid her cessation attempts. They also recommend understanding the role social norms can play in reinforcing smoking behaviour, providing further support for the inclusion of social norm-related behaviour change techniques. They suggest that an important task in cessation programmes for pregnant smokers should be in verifying and strengthening the women's perception of their roles as mothers-to-be.

Patients appear to want a caring relationship with their health professional and one that acknowledges them as an individual. They want to have plenty of information that is explained to them appropriately and to feel as though they are being really listened to. A number of studies support the use of this type of patient engagement in smoking cessation programmes (Curry, Wagner and Grothaus 1990, Ockene et al. 1990, Williams et al. 1991). Russel and Roter (1993) compared patient-centred and traditional smoking cessation groups for pregnant women. The pregnant women in the traditional care group smoked significantly more during their pregnancies than the women in the patient-centred group. Not all patients may want to take an active role in decision-making and have a patient-centred relationship with their health professional but shared-decision making should be encouraged (whilst individual

differences acknowledged) due to the potential benefits to adherence, health and well-being. Disappointingly, despite these benefits, most professionals acknowledge the potential value of patient participation in care but generally prefer patients to be passive recipients (Cahil 1998). Therefore, although the model patient-health professional relationship is one that includes shared decision-making, patient empowerment and patient participation in care, many relationships may still not meet this ideal. Further research is needed to examine whether training midwives to foster patient-centred approaches is effective in aiding pregnant women to abstain from alcohol and nicotine use.

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## SUMMARY OF RECOMMENDATIONS FOR ANTENATAL HEALTHCARE SERVICES

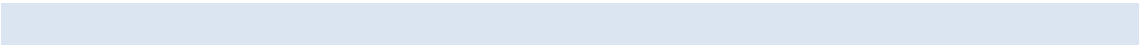
### Study 1: Recommendations for service/practice

- Greater focus on alcohol use by midwives and antenatal health care providers
- Better provision of support for women to make changes to their drinking habits
- Theory-based intervention strategies

### Study2: Recommendations for service/practice

- Routine enquiry/screening for alcohol use
- Training for midwives in power-sharing/patient-centred approach
- Evidence-based training in ways to address potentially sensitive topics

### Study 3: Recommendations for service/practice

- Greater focus on postnatal drinking
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### 5.3. LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

There are a number of limitations worthy of note. Firstly, alcohol and nicotine use were measured using self-report methods only. Although this method was chosen for a number of reasons, the incidence rates should be examined with this in mind. Furthermore, the research was conducted in one geographical area only, Grampian, thereby limiting the generalisability of the findings to other areas. Only a small number of smokers took part in the research study resulting in the research aims being adapted as analysis being limited by the small sample size. Future research may need to target this population and address the potential reluctance of pregnant smokers to take part in research. A further limitation of the questionnaire methodology used in this research, is that only women and midwives who were motivated to take part returned the questionnaires. This may make the sample somewhat less generalisable to the population as a whole. A longitudinal design was applied to allow for drinking during pregnancy to be followed up after birth, however, this design is limited by participant drop-out rates. The participants who dropped out before returning the follow-up questionnaire may have been qualitatively different from those who did. Although no differences existed between the drop-out participants and those who participated in the follow-up in terms of prenatal drinking and smoking behaviour, there were a number of significant differences in terms of socio-demographic variables.

A number of recommendations for further research emerge from the findings of these studies. Further work could be required to determine if any other social cognitive determinants of behaviour are relevant for alcohol and nicotine use during pregnancy. Perhaps a Theoretical Construct Domains (Michie et al. 2008; see section 5.2.2) approach could prove to be a useful avenue for research. Section 5.2.1 of this chapter details a number of possibilities for interventions to reduce alcohol and nicotine use during pregnancy. Further work would be required to amalgamate these behaviour change techniques into an intervention in pregnancy. Once this was established, the effectiveness and feasibility of the intervention would need to be tested. This work would need to establish the best healthcare professional to deliver any intervention to pregnant women. For example, whether this would be existing midwives as part of

routine practice or specialist midwives trained in behaviour change support. In terms of the outcomes of low-level alcohol, the length of postnatal hospital stay and attachment findings require replication through further research. Perhaps observational research in maternity wards could shed light on the reasons why prenatal drinkers may spend longer before being discharged. Observational research could also prove useful to further explore the differences in attachment found in the women who drank during pregnancy. It would be useful to determine if differences in the MAI self-report measure related to observable differences in attachment. Furthermore, research examining whether there are behavioural differences in infants prenatally exposed to alcohol use would be warranted. Finally, the findings regarding alcohol use in women who are breast feeding suggest that it would be useful to both establish the incidence of alcohol use in women who breast feed, and determine antenatal and postnatal healthcare professionals advice regarding drinking alcohol when breast feeding.

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## SUMMARY OF RECOMMENDATIONS FOR FUTURE RESEARCH

### Study 1: Research recommendations

- Identification of any further social cognitive determinants relevant to alcohol and nicotine use during pregnancy
- Design and testing of theory-based complex interventions to reduce alcohol and nicotine use

### Study 2: Recommendations for research


- Development and testing of training package for midwives specific to behaviour change in an antenatal setting

### Study 3: Recommendations for research

- Further investigation of the length of postnatal stay results
- Further investigation of the attachment results – are there observable differences in attachment between antenatal drinkers and abstainers, are there behavioural differences in infants exposed to low-level alcohol use?

- Investigate the effects of alcohol use during breast-feeding – in terms of breast-feeding success/complications, infant health/developmental outcomes
- Determine the practice of midwives/health visitors regarding providing information about alcohol use during breast feeding

A significant number of pregnant women continue to smoke and drink alcohol during their pregnancy, potentially resulting in negative consequences for themselves and their children. This research has shown that a number of social cognitive variables are important determinants of these behaviours, thereby, highlighting avenues for intervention and identifying 'at-risk' characteristics. Additionally, the behaviour, attitudes and knowledge of midwives in Grampian was shown to vary considerably. Midwives are key healthcare professionals during pregnancy who could provide interventions and advice supportive of behaviour change. The incidence of the behaviours during pregnancy could be improved through further professional training of midwives and other antenatal healthcare professionals. This programme of work provided an insight into the incidence and determinants of alcohol and nicotine use during pregnancy and shed light on midwives' practice and barriers to providing advice to pregnant patients. The results yielded strategies for intervention work and recommendations for practice and further research.



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## APPENDICES

<b>Appendix 1</b>	Recruitment flow-chart
<b>Appendix 2</b>	Study 1 - prenatal questionnaire booklet
<b>Appendix 3</b>	Consent form for pregnant women
<b>Appendix 4</b>	Study 1 - information sheet
<b>Appendix 5</b>	Study 1 - reminder letter
<b>Appendix 6</b>	Debrief letter
<b>Appendix 7</b>	Study 2 - midwife questionnaire
<b>Appendix 8</b>	Study 2 – information sheet
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<b>Appendix 10</b>	Study 3 – covering letter
<b>Appendix 11</b>	Study 3 – information sheet

DASS-21  
PAI  
FHLC  
Socio-demographics  
Pregnancy questions  
Alcohol & smoking advice  
Past and present alcohol & nicotine use  
TPB  
Attitudes

204 Pregnant women consented to take part

130 questionnaires returned

Study 1

120 questionnaires distributed to midwives

52 questionnaires returned

Study 2

Demographics  
Alcohol & nicotine use  
Attitudes  
Current practice  
Training

DASS-21  
MAI  
EPDS  
Infant health  
Maternal health  
Alcohol & nicotine consumption  
Breast feeding

110 Mothers consented to follow-up

53 questionnaires returned

Study 3



THE  
ROBERT GORDON  
UNIVERSITY  
ABERDEEN

**School of Applied Social Studies**

Faculty of Health and Social Care  
The Robert Gordon University  
Garthdee Road  
Aberdeen  
AB10 7QG  
Tel: 01224 263292  
www.rgu.ac.uk

**[Date]**

Dear **[name]**,

I am writing to invite you to take part in an important follow-up study to the *Health and Well-Being During Pregnancy* questionnaire you kindly completed some months ago. The follow-up study is investigating Health and Well-Being in Motherhood and it is important that as many participants from the first study complete this second questionnaire as possible. I hope you will consider taking part. The study aims to investigate the relationship between antenatal care and health behaviour during pregnancy, and the health and well-being of new mothers and their infants. Ethical approval for this follow-up study has been granted by Robert Gordon University.

Participation would involve completing the enclosed questionnaire and returning it in the pre-paid envelope provided. It includes questions asking about your health and your baby's health and should take no longer than 30 minutes to complete. Please be assured that your name or any family member's name will not be disclosed in any research report. I have enclosed an information sheet giving you more information. If you would like to discuss the study with me or my supervisors please contact us by phone or email (details below).

If you no longer wish to or are unable to take part in this study please tick the box on the next page and return the questionnaire pack in the prepaid envelope provided. It is entirely your choice if you wish to take part, withdrawal from the study will not affect your ongoing health care.

If you have requested a results summary for the first questionnaire study we will be sending this out along with the results of the second sometime in the next few months.

Yours sincerely,

Eilidh Duncan (PhD student)  
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## Participant Information Sheet

### Research Project on Health and Well-being in Motherhood

You are invited to take part in a research project which follows on from the previous study “*Health and Well-Being in Pregnancy*”. This study aims to look at the health and well-being of new mothers and their infants. Before you decide if you wish to take part it is important for you to understand what is involved and why the research is being carried out.

Please take time to read the following information carefully. Talk to others about the study if you wish.

#### **Why do this study?**

It is important to follow-up as many participants from the first questionnaire as possible in order to investigate influences on the health of mothers and infants. Your answers may show that current health care provision needs to be changed.

#### **Why have I been approached?**

Because you completed the *Health and Well-Being in Pregnancy* questionnaire and you agreed to be contacted about future studies.

#### **Do I have to take part?**

No. It is totally up to you whether you take part or not. Withdrawal will not affect your ongoing health care.

#### **What is involved?**

Completing a questionnaire and returning it (in the prepaid envelope provided) within 2 weeks. The questionnaire will take around 30 minutes to complete.

#### **Will my answers be kept confidential?**

Yes. Any information you provide will remain confidential, as such, your name or any family member's name will not be disclosed in any research report or publication.

#### **What if I want to withdraw from the research?**

You can choose not to take part in this research study but once you have returned your questionnaire it will no longer be possible to withdraw from the study due to the anonymous nature of the questionnaire

#### **Will my details be used for any other purpose?**

Your name and address will be used for research purposes only. They will not be passed onto any third party at any time without us contacting you.

**If you have any questions, concerns or complaints about the research project please contact:**

Eilidh Duncan  
School of Applied Social Studies  
Faculty of Health and Social Care  
The Robert Gordon University  
Garthdee Road  
Aberdeen  
AB25 7QS

Email: [e.m.duncan@rgu.ac.uk](mailto:e.m.duncan@rgu.ac.uk)

Telephone: 01224 263068

**Or alternatively contact my supervisors:**

Dr Katrina Forbes-McKay  
[k.e.forbes-mckay@rgu.ac.uk](mailto:k.e.forbes-mckay@rgu.ac.uk)  
01224 263211

Dr Sarah Henderson  
[s.e.Henderson@rgu.ac.uk](mailto:s.e.Henderson@rgu.ac.uk)  
01224 263241

**If you have any medical-related questions or concerns please contact:**

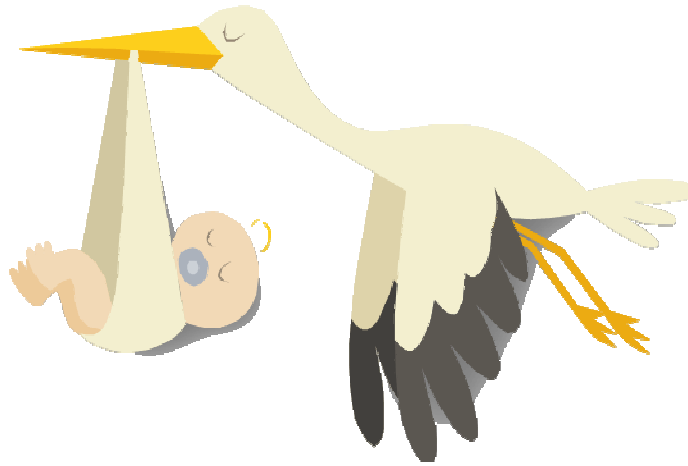
NHS 24: 08454 242424

**If you have any non-medical, health information requests (i.e. local services and support) please contact:**

NHS Healthpoint: 0500 202030

**Thank you for taking the time to read this and considering taking part**

This research project has been approved by the Robert Gordon University School of Applied Social Studies Ethics Committee and is funded by the Research Development Initiative.



## Health and Well-Being in Pregnancy

Participant Number: \_\_\_\_\_



**School of Applied Social Studies**

**The Robert Gordon University**

## Section 1

1. Age \_\_\_\_\_

2. Marital Status:

Married

Living with partner

Single

Divorced

Other

3. What is the highest level of education you have gained?

Standard Grades/ GCSE

Highers/ 'o' levels

College (i.e. HNC/HND)

Degree

Higher Degree

4. In what region do you live? (e.g. Aberdeen city, Aberdeenshire) \_\_\_\_\_

5. How many children do you have? \_\_\_\_\_

6. How many previous pregnancies have you had? \_\_\_\_\_

7. a) Are you currently in employment? YES/NO  
 b) Current or previous occupation? \_\_\_\_\_  
 c) Partner/Spouse occupation (if applicable) \_\_\_\_\_

8. What is your ethnic origin? \_\_\_\_\_

9. At what stage is your pregnancy? \_\_\_\_\_ weeks

10. At what stage of your pregnancy did you realise you were pregnant? \_\_\_\_\_ weeks

11. At what stage in your pregnancy did you first see your midwife? \_\_\_\_\_ weeks

12. Have you received any advice about smoking during your pregnancy? YES/NO  
 If YES,

a. Who did you receive this from?

GP

Midwife

Other Health Professional

Other (please state): \_\_\_\_\_

b. How was it given?

Face-to-face

Booklet

DVD

Website

c. When were you given this information? \_\_\_\_\_ weeks

13. Have you received any advice about drinking alcohol during your pregnancy? YES/NO  
 If YES,

a. Who did you receive this from?

GP

Midwife

Other Health Professional

Other (please state): \_\_\_\_\_

b. How was it given?

Face-to-face

Booklet

DVD

Website

c. When were you given this information? \_\_\_\_\_ weeks

## **Section 2**

**For the following questions please choose the answer that best describes you and draw a circle round the answer.**

### **1. Please answer the following questions for your smoking habits at the moment**

#### **a. How often do you have a cigarette?**

Never (go to question 2)      Once a month or less      2 to 4 times a month      2 or 3 times a week      4 to 6 times a week      Everyday

#### **b. How many cigarettes do you have on days when you do smoke?**

\_\_\_\_\_ Cigarettes per day

### **2. Please answer for your drinking habits at the moment**

#### **a. How often do you have a drink containing alcohol?**

Never (go to question 3)      monthly Or less      2 to 4 times a month      2 or 3 times a week      4 or more times a week

For the following question please use the following definition; **1 unit** equals:

- $\frac{1}{2}$  Pint of ordinary strength beer, lager or cider
- A single measure of spirit (gin, vermouth, Bacardi, vodka etc)
- A small glass (125ml) of wine or (50ml) of sherry or port

**A bottle of Alcopops or premium beer or lager is equivalent to 1.5 units**

#### **b. How many drinks containing 1 unit of alcohol do you have on a typical day when you are drinking?**

1 or 2      3 or 4      5 or 6      7 to 9      10 or more

#### **c. How often do you have 6 or more units on one occasion?**

Never      monthly or less      2 to 4 times a month      2 or 3 times a week      4 or more times a week

### **3. Please answer the following questions for your smoking habits before realising you were pregnant**

#### **a. How often did you have a cigarette?**

Never (go to question 4)      Once a month or less      2 to 4 times a month      2 or 3 times a week      4 to 6 times a week      Everyday

**b. How many cigarettes did you have on days when you smoked?**

\_\_\_\_\_ Cigarettes per day

**4. Please answer the following questions for your drinking habits before realising you were pregnant**

**a. How often did you have a drink containing alcohol?**

Never (go to question 5)      monthly Or less      2 to 4 times a month      2 or 3 times a week      4 or more times a week

For the following question please use the following definition; **1 unit** equals:

- ½ Pint of ordinary strength beer, lager or cider
  - A single measure of spirit (gin, vermouth, Bacardi, vodka etc)
  - A small glass (125ml) of wine or (50ml) of sherry or port

**A bottle of Alcopops or premium beer or lager is equivalent to 1.5 units**

**b. How many drinks containing 1 unit of alcohol did you have on a typical day when you were drinking?**

1 or 2      3 or 4      5 or 6      7 to 9      10 or more

**c. How often did you have 6 or more units on one occasion?**

Never      less than monthly      monthly      weekly      daily or almost daily

**5. What is the most alcohol you have drunk in one occasion since becoming pregnant?**

\_\_\_\_\_ units before realising pregnant

\_\_\_\_\_ units after realising pregnant

**6. Since learning you were pregnant have your smoking habits changed? YES/NO**

- If yes when in your pregnancy did they change? \_\_\_\_\_ weeks

**7. Have your drinking habits changed since realising you were pregnant? YES/NO**

- If yes, when in your pregnancy did they change? \_\_\_\_\_ weeks

**8. Does your partner smoke?**

Yes   
No   
Not in relationship

**9. Does your partner drink?**

Yes   
No   
Not in relationship

### Section 3

For the following question please use the following definition; **1 unit** equals:

- ½ Pint of ordinary strength beer, lager or cider
  - A single measure of spirit (gin, vermouth, Bacardi, vodka etc)
  - A small glass (125ml) of wine or (50ml) of sherry or port

A bottle of Alcopops or premium beer or lager is equivalent to **1.5 units**

Please rate how much you agree or disagree with the following statements by drawing a line through the most appropriate response.

**1. Drinking alcohol whilst pregnant is not likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**2. Drinking more than 1 or 2 units of alcohol on 3 or 4 days a week is likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**3. Drinking more than 2 units of alcohol a day is likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**4. Smoking 1 or 2 cigarettes a week when pregnant is not likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**5. Drinking 1 or 2 units of alcohol occasionally (i.e. less than once a month) is likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**6. Smoking 9 or less cigarettes a day when pregnant is not likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**7. Drinking 1 or 2 units of alcohol once or twice a week is not likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**8. Smoking 1 or 2 cigarettes occasionally (i.e. less than once a month) when pregnant is likely to harm the baby**

strongly  
disagree

disagree

unsure

agree

strongly  
agree

**9. Smoking 10 or more cigarettes a day when pregnant is likely to harm the baby**

strongly  
disagree

disagree

unsure

agree

strongly  
agree

**10. Drinking 1 or 2 alcoholic drinks a day is not likely to harm the baby**

strongly  
disagree

disagree

unsure

agree

strongly  
agree



### Section 4

The following sentences describe thoughts, feelings, and situations women may experience during pregnancy.

We are interested in your experiences during the **past month**.

Please read each sentence then tick the box that best describes how you feel.

	Almost Never	Sometimes	Often	Almost Always
1. I wonder what the baby looks like now				
2. I imagine calling the baby by name,				
3. I enjoy feeling the baby move.				
4. I think that my baby already has a personality.				
5. I let other people put their hands on my tummy to feel the baby move.				
6. I know things I will do make a difference to the baby.				
7. I plan the things I will do with my baby.				
8. I tell others what the baby does inside me.				
9. I imagine what part of the baby I'm touching.				
10. I know when the baby is asleep.				
11. I can make my baby move.				
12. I buy/make things for the baby.				
13. I feel love for the baby.				
14. I try to imagine what the baby is doing in there.				
15. I like to sit with my arms around my tummy.				
16. I dream about the baby.				
17. I know why the baby is moving.				
18. I stroke the baby through my tummy.				
19. I share secrets with the baby.				
20. I know the baby hears me,				
21. I get very excited when I think about the baby				

**Section 5**

1. **Do you drink alcohol?** YES/NO
2. **If no, did you drink alcohol before becoming pregnant?** YES/NO (if NO, go to section 7)
3. **How often do you have a drink containing alcohol at present?**

Monthly or less	2 to 4 times a month	2 or 3 times a week	4 or more times a week
--------------------	-------------------------	------------------------	---------------------------

**A. Please circle a answer to show how much you agree or disagree with the following statements**

**1) I expect(ed) to stop drinking alcohol whilst I am pregnant**

Strongly disagree	disagree	unsure	agree	strongly agree
----------------------	----------	--------	-------	-------------------

**2) I want to drink alcohol whilst I am pregnant**

Strongly disagree	disagree	unsure	agree	strongly agree
----------------------	----------	--------	-------	-------------------

**3) I intend to drink alcohol whilst I am pregnant**

Strongly disagree	disagree	unsure	agree	strongly agree
----------------------	----------	--------	-------	-------------------

**B. For the next statement please circle an answer to indicate which word best describes how you feel and how strongly this describes how you feel.**

**For me drinking whilst I am pregnant is:**

1)      **harmful**      **somewhat harmful**      **unsure**      **somewhat beneficial**      **beneficial**

2)      **good**      **somewhat good**      **unsure**      **somewhat bad**      **bad**

3)      **pleasant**      **somewhat pleasant**      **unsure**      **somewhat unpleasant**      **unpleasant**

4)      **worthless**      **somewhat worthless**      **unsure**      **somewhat useful**      **Useful**

**C. Please draw a circle around an answer to indicate how much you agree or disagree with the following statements**

**1) Most people who are important to me think that I should drink alcohol whilst I am pregnant**

Strongly disagree      disagree      unsure      agree      strongly agree

**2) It is expected of me that I should stop drinking alcohol whilst I am pregnant**

strongly disagree      disagree      unsure      agree      strongly agree

**3) I feel under social pressure to drink alcohol whilst I am pregnant**

strongly disagree      disagree      unsure      agree      strongly agree

**D. Please circle an answer to indicate how much you agree or disagree with the following statements**

**1) I am confident that I could stop drinking alcohol whilst I am pregnant if I wanted to**

strongly disagree      disagree      unsure      agree      strongly agree

**2) For me to stop drinking alcohol whilst I am pregnant is difficult**

strongly disagree      disagree      unsure      agree      strongly agree

**3) The decision about drinking alcohol during pregnancy is beyond my control**

strongly disagree      disagree      unsure      agree      strongly agree

**4) Whether I drink alcohol during pregnancy is entirely up to me**

strongly disagree      disagree      unsure      agree      strongly agree

**Section 6**

1. Are you a smoker? YES/NO

2. If no, have you smoked since becoming pregnant? YES/NO (if NO, go to section 8)

**A. Please circle an answer to indicate how much you agree or disagree with the following statements. There are no right or wrong answers.**

**1) I expect(ed) to stop smoking whilst I am pregnant**

strongly disagree	disagree	unsure	agree	strongly agree
----------------------	----------	--------	-------	-------------------

**2) I want to smoke whilst I am pregnant**

strongly disagree	disagree	unsure	agree	strongly agree
----------------------	----------	--------	-------	-------------------

**3) I intend to smoke whilst I am pregnant**

strongly disagree	disagree	unsure	agree	strongly agree
----------------------	----------	--------	-------	-------------------

**B. For the next statement please draw a circle to indicate which word best describes how you feel and how strongly this describes how you feel.**

**For me smoking whilst I am pregnant is:**

1)	harmful	somewhat harmful	unsure	somewhat beneficial	beneficial
----	---------	---------------------	--------	------------------------	------------

2)	good	somewhat good	unsure	somewhat bad	bad
----	------	------------------	--------	-----------------	-----

3)	pleasant	somewhat pleasant	unsure	somewhat unpleasant	unpleasant
----	----------	----------------------	--------	------------------------	------------

4)	worthless	somewhat worthless	unsure	somewhat useful	useful
----	-----------	-----------------------	--------	--------------------	--------

**C. Please circle the answer that best describes how much you agree or disagree with the following statements**

**1) Most people who are important to me think that I should smoke whilst I am pregnant**

strongly disagree      disagree      unsure      agree      strongly agree

**2) It is expected of me that I should stop smoking whilst I am pregnant**

strongly disagree      disagree      unsure      agree      strongly agree

**3) I feel under social pressure to smoke whilst I am pregnant**

strongly disagree      disagree      unsure      agree      strongly agree

**D. Please draw a circle to indicate how much you agree or disagree with the following statements**

**1) I am confident that I could stop smoking whilst I am pregnant if I wanted to**

strongly disagree      disagree      unsure      agree      strongly agree

**2) For me to stop smoking whilst I am pregnant is difficult**

strongly disagree      disagree      unsure      agree      strongly agree

**3) The decision about whether to smoke during pregnancy or not is beyond my control**

strongly disagree      disagree      unsure      agree      strongly agree

**4) Whether I smoke during pregnancy or not is entirely up to me**

strongly disagree      disagree      unsure      agree      strongly agree

## Section 7

The following statements are not specific to pregnancy but please answer for how you feel at the moment.

Please read each of the following statements and indicate how much you feel the statement applies to you **over the past month**. There are no right or wrong answers. Please do not spend too long on any 1 statement.

Please place a **tick** in the box that best describes how you feel.

	Does not apply to me at all	Applies to me in some degree or some of the time	Applies to me a considerable degree or a good part of the time	Applies to me very much or most of the time
I was aware of a dryness of my mouth				
I couldn't seem to experience any positive feelings at all				
I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)				
I tended to over-react to situations				
I found it difficult to relax				
I felt I had nothing to look forward to				
I felt I was using a lot of nervous energy				
I felt I wasn't worth much as a person				
I felt that I was rather touchy				
I felt scared without good reason				
I found it hard to wind down				

Appendix 2: Study 1 – prenatal questionnaire

	Does not apply to me at all	Applies to me in some degree or some of the time	Applies to me a considerable degree or a good part of the time	Applies to me very much or most of the time
I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)				
I felt down-hearted and blue				
I felt I was close to panic				
I was unable to become enthusiastic about anything				
I was intolerant of anything that kept me from getting on with what I was doing				
I felt that life was meaningless				
I found myself getting agitated				
I was worried about situations in which I might panic and make a fool of myself				
I experienced trembling (e.g. in the hands)				
I found it difficult to work up the initiative to do things				

## Section 8

**1. By attending prenatal classes taught by competent health professionals, I can greatly increase the odds of having a healthy, normal baby**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**2. Even if I take excellent care of myself when I am pregnant, fate will determine whether my child will be normal or abnormal**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**3. My baby will only be born healthy if I do everything my doctor tells me to do during pregnancy**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**4. If my baby is born unhealthy or abnormal, nature intended it to be that way**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**5. The care I receive from health professionals is what is responsible for the health of my unborn baby**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**6. My unborn child's health can seriously be affected by my dietary intake during pregnancy**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**7. Health professionals are responsible for the health of my unborn child**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**8. If I get sick during pregnancy, consulting my doctor is the best thing I can do to protect the health of my unborn child**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**9. No matter what I do when I am pregnant, the laws of nature determine whether or not my child will be normal**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------



**10. Doctors and nurses are the only ones who are competent to give me advice concerning my behaviour during pregnancy**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**11. God will determine the health of my child**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**12. Learning how to care for myself before I become pregnant helps my child to be born healthy**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**13. My baby’s health is in the hands of health professionals**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**14. Fate determines the health of my unborn child**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**15. What I do right up to the time that my baby is born can affect my baby’s health**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**16. Having a miscarriage means to me that my baby was not destined to live**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**17. Before becoming pregnant, I would learn what specific things I should do and not do during the pregnancy in order to have a healthy, normal pregnancy**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**18. Only qualified health professionals can tell me what I should and should not do when I am pregnant**

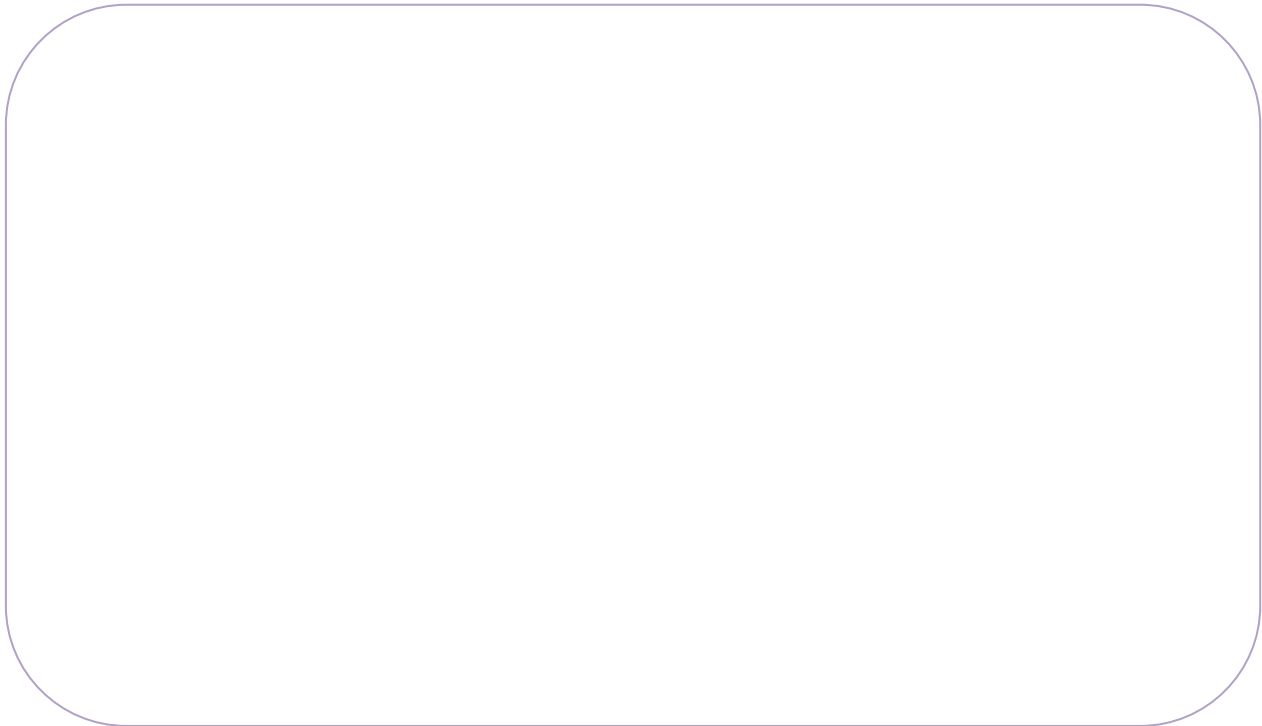
Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

**19. I intend to breast feed my baby**

Strongly disagree	Disagree somewhat	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree somewhat	Strongly agree
-------------------	-------------------	-------------------	----------------------------	----------------	----------------	----------------

## Thank you very much for your help

Please use the space below if there is anything else you feel is important not already covered



**It may be useful to go back through your answers to make sure you haven't accidentally missed any questions out.**

**Please return the questionnaire in the envelope provided as soon as you can and within 2 weeks.**

If you do not wish for your name to be entered into a prize draw to win £50 of Mothercare vouchers please tick this box. (Your details will not be used for any other purpose or passed on to any third party)

If you would like a summary of the research results to be sent to you when they are available please tick this box

Any questions or concerns please contact:

Eilidh Sanachan  
School of Applied Social Studies  
Faculty of Health and Social Care  
The Robert Gordon University  
Garthdee Road  
Aberdeen  
AB25 7QS

Email: [e.sanachan@rgu.ac.uk](mailto:e.sanachan@rgu.ac.uk)

Telephone: 01224 263068



## CONSENT FORM

### Research Project – Health and Well-Being in Pregnancy

Please initial boxes

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

3. I agree to take part in the above study

4. I agree to my data being used for research purposes only

5. I agree to being contacted for a follow-up interview if required

\_\_\_\_\_  
Name of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

Eilidh Sanachan

\_\_\_\_\_  
Researcher

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

## Participant Information Sheet

### Research Project on Health and Well-being in Pregnancy

You are invited to take part in a research project looking at the health and well-being of pregnant women. Before you decide if you wish to take part it is important for you to understand what is involved and why it is important.

Please take time to read the following information carefully. Talk to others about the study if you wish.

#### **Why do this study?**

The health and well-being of pregnant women is important because it can have an effect on the health of the unborn child. The information you provide could show if current health care provision needs to be changed.

#### **Why have I been approached?**

Because you are attending the antenatal scan clinic and are 20+ weeks pregnant. Questionnaires are being given out to 200 other pregnant women in Grampian.

#### **Do I have to take part?**

No. It is totally up to you whether you take part or not. There are no consequences of refusing to take part.

#### **What is involved?**

Completing a questionnaire and returning it (in the prepaid envelope provided) within 2 weeks. The questionnaire will take around 25 – 40 minutes to complete.

#### **Will my answers be kept confidential?**

Yes. Any information you provide will remain confidential (none of your answers will be reported to your midwife or anyone else). Your answers will be used for research purposes only. If this study is published none of your answers will be identifiable as yours – they will remain anonymous.

#### **What if I want to withdraw from the research?**

You can do so at any time.

#### **Will my details be used for any other purpose?**

Your name and address will be used for research purposes only. They will not be passed onto any third party at any time.

#### **If you have any questions, concerns or complaints about the research project please contact:**

Eilidh Sanachan  
School of Applied Social Studies

Appendix 4: Study 1 – information sheet

Faculty of Health and Social Care  
The Robert Gordon University  
Garthdee Road  
Aberdeen  
AB25 7QS

Email: [e.sanachan@rgu.ac.uk](mailto:e.sanachan@rgu.ac.uk)

Telephone: 01224 263068

**Or alternatively contact my supervisors:**

Dr Katrina Forbes-McKay  
[k.e.forbes-mckay@rgu.ac.uk](mailto:k.e.forbes-mckay@rgu.ac.uk)  
01224 263211

Dr Sarah Henderson  
[s.e.Henderson@rgu.ac.uk](mailto:s.e.Henderson@rgu.ac.uk)  
01224 263241

**If you have any health-related questions or concerns please contact:**

NHS 24: 08454 242424

**Thank you for taking the time to read this and considering taking part**

This research project has been reviewed by the Grampian Research Ethics Committee and is funded by the Research Development Initiative.



**School of Applied Social  
Studies  
Faculty of Health and  
Social Care**  
Garthdee Road  
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AB10 7QG  
Tel: 01224 263292  
[www.rgu.ac.uk](http://www.rgu.ac.uk)

**[Date]**

Dear **[name]**,

I recently invited you to take part in an important research project that is being carried out in Grampian. I am a PhD student from Robert Gordon University investigating the health and well-being of pregnant women in Grampian. When I last spoke to you at the hospital you were willing to take part but over two weeks have passed without hearing back from you.

To remind you, participation in this project would involve completing the enclosed questionnaire (covering different aspects of your health and well-being) and returning it in the pre-paid envelope provided. It should take around 25 minutes to complete. Your answers will remain completely confidential -none of your answers will be shown to anyone else. You have the right to withdraw from the study whenever you wish.

When you return your questionnaire you will have the option to be entered into a prize draw with the chance of winning £50 of Mothercare vouchers.

Your help would be greatly appreciated. Please contact me or my supervisors (see below) if you require more information about the study.

If you no longer wish to take part or have recently returned the questionnaire please ignore this letter with my apologies.

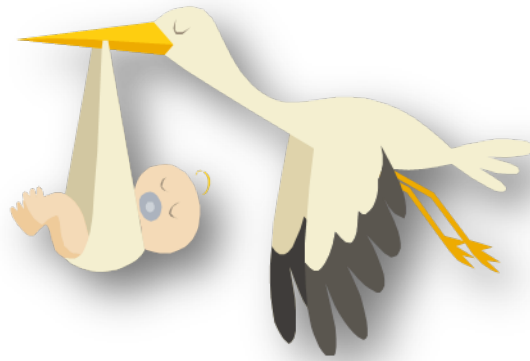
Yours sincerely,

Eilidh Sanachan (PhD student)  
[e.m.sanachan@rgu.ac.uk](mailto:e.m.sanachan@rgu.ac.uk)  
01224 263065

Dr Katrina Forbes-Mckay  
[k.e.forbes-mckay@rgu.ac.uk](mailto:k.e.forbes-mckay@rgu.ac.uk)  
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Dr Sarah Henderson  
[s.e.Henderson@rgu.ac.uk](mailto:s.e.Henderson@rgu.ac.uk)  
01224 263241

August 2009 Research Update:  
Health and Well-Being in Pregnancy  
Questionnaire



Study 1

Two-hundred and ninety questionnaires have been distributed to pregnant women visiting Aberdeen Maternity Hospital for their 20 week scan. One hundred and thirty-seven questionnaires were returned.

- For 63% of women in this study this was their first pregnancy
- The age of participants ranged from 16-41 and the average age was 30.
- 52% lived in Aberdeen city and 47% in Aberdeenshire
- 74% were non-smokers
- 65% were not drinking any alcohol during their pregnancy
- Women were more likely to drink alcohol during their pregnancy if they already had children
- 12% reported that they had not been given any advice from health professionals about alcohol use during pregnancy

Study 2

One hundred and ten participants from study 1 agreed to be followed up after they had given birth. Fifty-seven of these women returned a second questionnaire around 3 months after labour which covered health and well-being in early motherhood.

- Your participation in this follow-up study would be greatly appreciated please look out for the new questionnaire coming your way soon.

**Thank-you very much for your participation in this research study**

**Please contact me if you have any questions or comments**

**Eilidh Duncan**

School of Applied Social Studies  
Faculty of Health and Social Care  
Robert Gordon University  
Garthdee Rd  
Aberdeen  
AB10 7QS  
01224 263065  
[e.m.duncan@rgu.ac.uk](mailto:e.m.duncan@rgu.ac.uk)





## Health and Well-Being during Pregnancy

Participant Number: \_\_\_\_\_



School of Applied Social Studies  
The Robert Gordon University

### Section 1

1. What is your age? \_\_\_\_\_
2. How long have you been practicing as a midwife? \_\_\_\_\_
3. In what area of midwifery do you work? \_\_\_\_\_
4. How many children do you have? \_\_\_\_\_
5. Are you a smoker? YES/NO (please delete as appropriate)
  - a. If yes, how many cigarettes do you smoke a day? \_\_\_\_\_
6. Do you drink alcohol? YES/NO
  - a. If yes, please estimate your average weekly intake \_\_\_\_\_ units (see table below)

### Section 2

For the following questions please use the following definition; **1 unit** equals:

- ½ Pint of ordinary strength beer, lager or cider
- A single measure of spirit (gin, vermouth, Bacardi, vodka etc)
- A small glass (125ml) of wine or (50ml) of sherry or port

A bottle of Alcopops or premium beer or lager is equivalent to **1.5 units**

1. What do you believe to be an acceptable level of alcohol use during pregnancy?

\_\_\_\_\_ units per week

2. Please define below what you believe to be heavy, moderate and light alcohol intake for pregnant women.

	Units	Frequency (delete as appropriate)
a. Heavy	_____	per day/ week/month/less than monthly
b. Moderate	_____	per day/week/month/less than monthly
c. Light	_____	per day/week/month/less than monthly

### **Section 3**

Please rate how much you agree or disagree with the following statements by circling the most appropriate response.

**1. Drinking alcohol whilst pregnant is not likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**2. Drinking more than 1 or 2 units of alcohol on 3 or 4 days a week is likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**3. Drinking more than 2 units of alcohol a day is likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**4. Smoking 1 or 2 cigarettes a week when pregnant is not likely to harm the baby**

Strongly disagree      disagree      unsure      agree      strongly agree

**5. Drinking 1 or 2 units of alcohol occasionally (i.e. less than once a month) is likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**6. Smoking 9 or less cigarettes a day when pregnant is not likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**7. Drinking 1 or 2 units of alcohol once or twice a week is not likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**8. Smoking 1 or 2 cigarettes occasionally (i.e. less than once a month) when pregnant is likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**9. Smoking 10 or more cigarettes a day when pregnant is likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**10. Drinking 1 or 2 alcoholic drinks a day is not likely to harm the baby**

strongly disagree      disagree      unsure      agree      strongly agree

**Section 4**

**1a. Do you automatically ask pregnant patients about their alcohol use?**

No  (go to question 2) Only when I feel it is necessary  Yes, everyone

**b. When do you ask?** \_\_\_\_\_

**c. How do you determine a patient's alcohol use?**

Questionnaire  Ask during appointment  Screening tool   
(please specify)

Other \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**2. If a woman reports drinking alcohol do you question her about the levels of alcohol she is consuming?**

Yes  No  Sometimes

**3. Do you routinely record patients' alcohol use?**

Yes  No  Only if information volunteered

**4. If alcohol is brought up (either by yourself or by the patient) which of the following apply: Tick all that apply**

- I discuss the adverse effects
- I advise abstinence
- I give information (i.e. leaflets/booklets)
- I refer the patient to another health professional/service
- Other \_\_\_\_\_

**5. Who do you believe should be responsible for giving information about alcohol use to pregnant women?**

Midwives   
GP   
Other health Professional

No-one

Other: \_\_\_\_\_

**6. What do you believe are the barriers to giving women advice about drinking alcohol during pregnancy?**

Time   
Feel ill at ease   
Patients don't expect   
Lack of training advice   
None

Other(s): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### **Section 5**

**1a. Have you received any training in the best ways to broach talking to patients about smoking during pregnancy?**

Not been offered any       Not required       Yes

**b. If such training was available would you be interested?**

Yes       No

**2a. Have you received any training in the best ways to attempt to change a patient's smoking habits during pregnancy?**

Not been offered any       Not required       Yes

**b. If such training was available would you be interested?**

Yes       No

**3a. Have you received any training in the best ways to broach talking to patients about alcohol consumption during pregnancy?**

Not been offered any       Not required       Yes

**b. If such training was available would you be interested?**

Yes       No

**4a. Have you received any training in the best ways to attempt to change a patient's alcohol consumption during pregnancy?**

Not been offered any       Not required       Yes

**b. If such training was available would you be interested?**

Yes       No

**5. Are there any other types of training regarding smoking and alcohol use in pregnancy you would be interested in? Please provide details in space below**

## Section 6

Please read each of the following statements and indicate how strongly you agree or disagree by circling the most appropriate response. There are no right or wrong answers.

### **1. Women are receptive to advice about alcohol**

strongly disagree      disagree      unsure      agree      strongly agree

### **2. Giving patients advice about alcohol consumption during pregnancy is likely to make women feel guilty**

strongly disagree      disagree      unsure      agree      strongly agree

### **3. I feel confident giving patients advice about alcohol consumption during pregnancy**

strongly disagree      disagree      unsure      agree      strongly agree

### **4. Alcohol use during pregnancy is a private matter and should not be brought up with patients**

strongly disagree      disagree      unsure      agree      strongly agree

### **5. I am unlikely to be able to make a difference to a pregnant woman's alcohol consumption**

strongly disagree      disagree      unsure      agree      strongly agree

### **6. Pregnant women are not interested in talking about alcohol use during pregnancy**

strongly disagree      disagree      unsure      agree      strongly agree

### **7. Asking a pregnant woman about her alcohol consumption is likely to damage my relationship with her**

strongly disagree      disagree      unsure      agree      strongly agree

### **8. There are more important things to discuss with patients than their alcohol consumption**

strongly disagree      disagree      unsure      agree      strongly agree

## Thank you very much for your help

Please use the space below if there is anything else you feel is important that has not already covered



**It may be useful to go back through your answers to make sure you haven't accidentally missed any questions out.**

**Please return the questionnaire in the envelope provided as soon as you can and within 2 weeks.**

If you would like a summary of the research results sent to you when they are available please provide your details below

Email: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Any questions or concerns please contact:

Eilidh Sanachan  
School of Applied Social Studies  
Faculty of Health and Social Care  
The Robert Gordon University  
Garthdee Road  
Aberdeen  
AB25 7QS

Email: [e.sanachan@rgu.ac.uk](mailto:e.sanachan@rgu.ac.uk) Telephone: 01224 263068

## Participant Information Sheet

### Research Project – Health and Well-Being in Pregnancy

You are invited to take part in a research project exploring the topic of alcohol and nicotine use during pregnancy. Before you decide if you wish to take part it is important for you to understand what is involved and why it is important.

Please take time to read the following information carefully. Talk to others about the study if you wish.

#### **Why do this study?**

This is a doctoral research project. Alcohol and nicotine use during pregnancy is an important research area and the answers you give could prove useful in developing interventions and health promotion strategies.

#### **Why have I been approached?**

You have been approached because you are a midwife currently working in Grampian.

#### **Do I have to take part?**

No. It is totally up to you whether you take part or not. There are no consequences of refusing to take part.

#### **What is involved?**

Completing a questionnaire and returning it within 2 weeks (in the prepaid envelope provided). The questionnaire will take around 10 minutes to complete.

#### **Will my answers be kept confidential?**

Yes. Any information you provide will remain confidential (none of your answers will be reported to anyone). Your answers will be used for research purposes only. If this study is published none of your answers will be identifiable as yours – they will remain anonymous.

#### **What if I want to withdraw from the research?**

You can do so at any time.

#### **Will my details be used for any other purpose?**

Your name and address will be used for this research project only. They will not be passed onto any third party at any time.



**If you have any questions, concerns or complaints about the research project please contact:**

Eilidh Sanachan  
School of Applied Social Studies  
Faculty of Health and Social Care  
The Robert Gordon University  
Garthdee Road  
Aberdeen  
AB25 7QS

Email: [e.sanachan@rgu.ac.uk](mailto:e.sanachan@rgu.ac.uk)

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**Or alternatively contact my supervisors:**

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01224 263211

Dr Sarah Henderson  
[s.e.Henderson@rgu.ac.uk](mailto:s.e.Henderson@rgu.ac.uk)  
01224 263241

**Thank you for taking the time to read this and considering taking part**

This research project has been reviewed by the Grampian Research Ethics Committee and is funded by the Research Development Initiative.



## Health and Well-Being in Motherhood

Participant Number: \_\_\_\_\_



School of Applied Social Studies

The Robert Gordon University

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**Please complete all questions in each section, most involve ticking a box or circling a response, and some involve writing a short answer.**

**There are no right or wrong answers**

The research team will deal with all responses and may get back in touch with you if there are any matters which arise from your questionnaire or require further clarification

## **Section 1**

1. What date was your baby born? \_\_\_\_\_
2. What was your expected delivery date? \_\_\_\_\_
3. What sex is your baby? \_\_\_\_\_
4. What was your baby's birthweight? \_\_\_\_\_
5. How long after you gave birth did you stay in hospital? \_\_\_\_\_
6. If your baby stayed in hospital longer than you, please specify the length of his/her stay \_\_\_\_\_
7. What type of delivery did you have? \_\_\_\_\_
  - a. Was this your preferred method of delivery? YES/NO
  - b. If you had a Caesarean section, was this planned or emergency?  
PLANNED/EMERGENCY
8. Can you tell us your baby's Apgar score? \_\_\_\_\_
9. Can you provide details of any complications you experienced during your pregnancy or during labour



## Section 2

Please read each of the following statements and indicate how much you feel the statement applies to you **over the past month**. There are no right or wrong answers. Please do not spend too long on any 1 statement.

Please place a **tick** in the box that best describes how you feel.

	Does not apply to me at all	Applies to me in some degree or some of the time	Applies to me a considerable degree or a good part of the time	Applies to me very much or most of the time
I was aware of a dryness of my mouth				
I couldn't seem to experience any positive feelings at all				
I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)				
I tended to over-react to situations				
I found it difficult to relax				
I felt I had nothing to look forward to				
I felt I was using a lot of nervous energy				
I felt I wasn't worth much as a person				
I felt that I was rather touchy				
I felt scared without good reason				
I found it hard to wind down				

Appendix 9: Study 3 – postnatal questionnaire

	Does not apply to me at all	Applies to me in some degree or some of the time	Applies to me a considerable degree or a good part of the time	Applies to me very much or most of the time
I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)				
I felt down-hearted and blue				
I felt I was close to panic				
I was unable to become enthusiastic about anything				
I was intolerant of anything that kept me from getting on with what I was doing				
I felt that life was meaningless				
I found myself getting agitated				
I was worried about situations in which I might panic and make a fool of myself				
I experienced trembling (e.g. in the hands)				
I found it difficult to work up the initiative to do things				

### Section 3

We are interested in your experiences during the **past month**.

Please read each sentence then tick the box that best describes how you feel.

	Almost Never	Sometimes	Often	Almost Always
1. I feel love for my baby				
2. I feel warm and happy with my baby				
3. I want to spend special time with my baby				
4. I look forward to being with my baby				
5. Just seeing my baby makes me feel good				
6. I know my baby needs me				
7. I think my baby is cute				
8. I'm glad this baby is mine				
9. I feel special when my baby smiles				
10. I like to look into my baby's eyes				
11. I enjoy holding my baby				
12. I watch my baby sleep				
13. I want my baby near me				
14. I tell others about my baby				
15. It's fun being with my baby				
16. I enjoy having my baby cuddle with me				

	Almost Never	Sometimes	Often	Almost Always
17. I'm proud of my baby				
18. I like to see my baby do new things				
19. My thoughts are full of my baby				
20. I know my baby's personality				
21. I want my baby to trust me				
22. I know I am important to my baby				
23. I understand my baby's signals				
24. I give my baby special attention				
25. I comfort my baby when he/she is crying				
26. Loving my baby is easy				

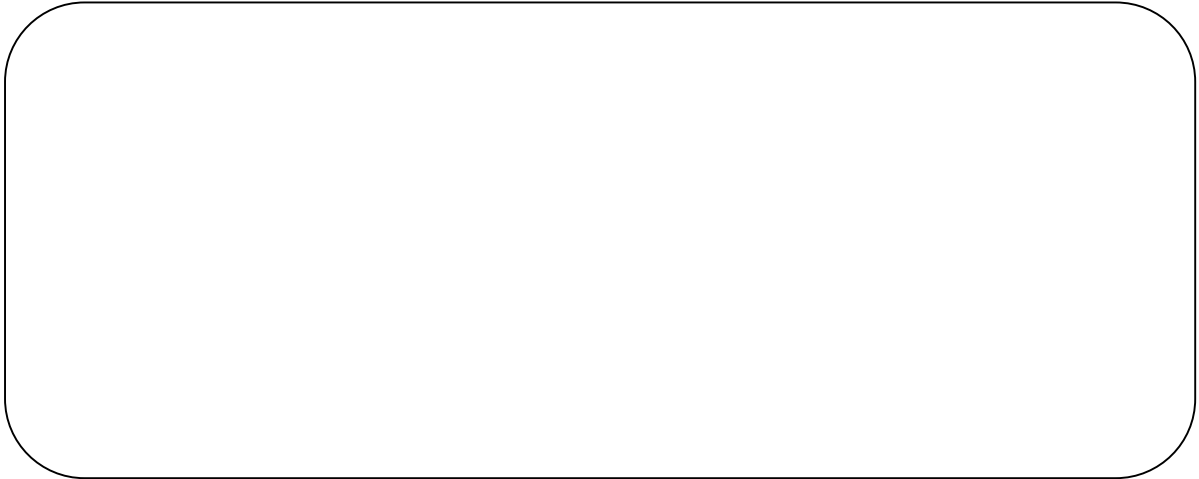
Please use the space below if you have any other comments



## **Section 4**

### **Your own health**

- 1. Have you had your 6 week post-birth GP check-up? YES/NO**
- 2. a. Have you experienced any health problems since giving birth? YES/NO**  
**b. If yes please provide details below**



### **Baby's Health and Development**

- 3. a. Has your baby experienced any health problems? YES/NO**  
**b. If yes please provide details below**



## **Section 5**

In this section please tick the answer that comes closest to how you have felt **IN THE PAST 7 DAYS**, not just how you feel today.

**1. I have been able to laugh and see the funny side of things**

- As much as I always could
- Not quite so much now
- Definitely not so much now
- Not at all

**2. I have looked forward with enjoyment to things**

- As much as I ever did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

**3. I have blamed myself unnecessarily when things went wrong**

- Yes, most of the time
- Yes, some of the time
- Not very often
- No, never

**4. I have been anxious or worried for no good reason**

- No, not at all
- Hardly ever
- Yes, sometimes
- Yes, very often

**5. I have felt scared or panicky for no good reason**

- Yes, quite a lot
- Yes, sometimes
- No, not much
- No, not at all

## **Section 6**

**1. Can you tell us how you are currently feeding your baby:**

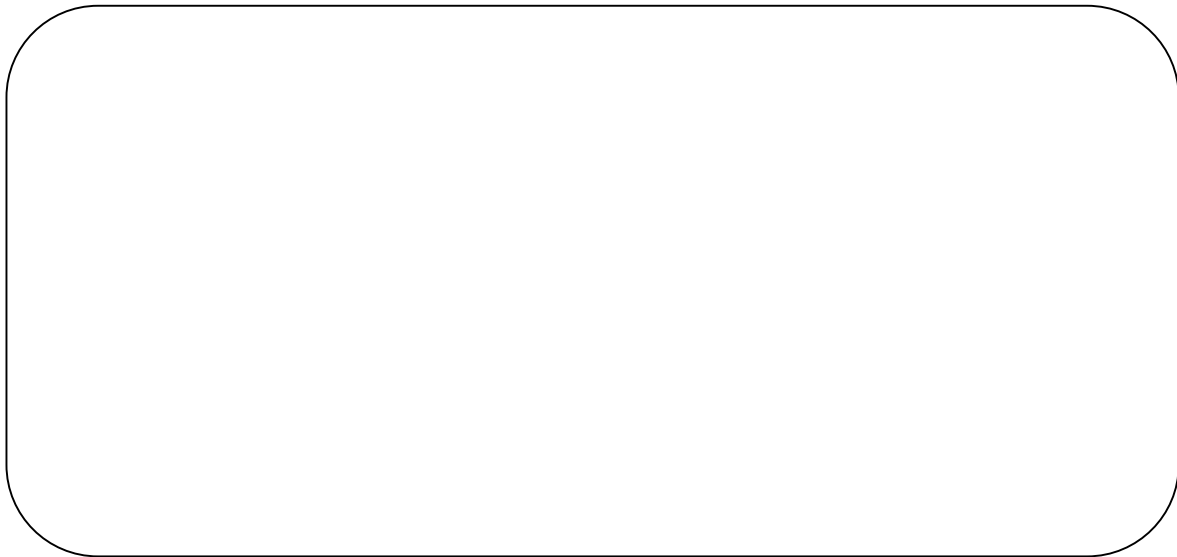
**Exclusively formula**  (please go to **question 2**)

**Exclusively breast-milk**  (please go to **section 7**)

**Combination of both**  (please go to **section 7**)

**2. a. Have you previously tried any other form of feeding your baby? YES/NO**

**b. If yes, in the space below please tell us your reasons for changing your feeding method**



**c. If no, can you please tell in the space below us why you chose not to breast feed**



## **Section 7**

**For the following questions please choose the answer that best describes you and draw a circle round the answer**

### **1. Please answer the following questions about your smoking habits at the moment**

#### **a. How often do you have a cigarette?**

Never (go to question 2)	Once a month or less	2 to 4 times a month	2 or 3 times a week	4 to 6 times a week	Everyday
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#### **b. How many cigarettes do you have on days when you do smoke?**

\_\_\_\_\_ Cigarettes per day

### **2. Please answer about your drinking habits at the moment**

#### **a. How often do you have a drink containing alcohol?**

Never (go to question 3)	monthly Or less	2 to 4 times a month	2 or 3 times a week	4 or more times a week
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For the following question please use the following definition; **1 unit** equals:

- **½ Pint of ordinary strength beer, lager or cider**
  - **A single measure of spirit (gin, vermouth, Bacardi, vodka etc)**
  - **A small glass (125ml) of wine or (50ml) of sherry or port**

**A bottle of Alcopops or premium beer or lager is equivalent to 1.5 units**

#### **b. How many drinks containing 1 unit of alcohol do you have on a typical day when you are drinking?**

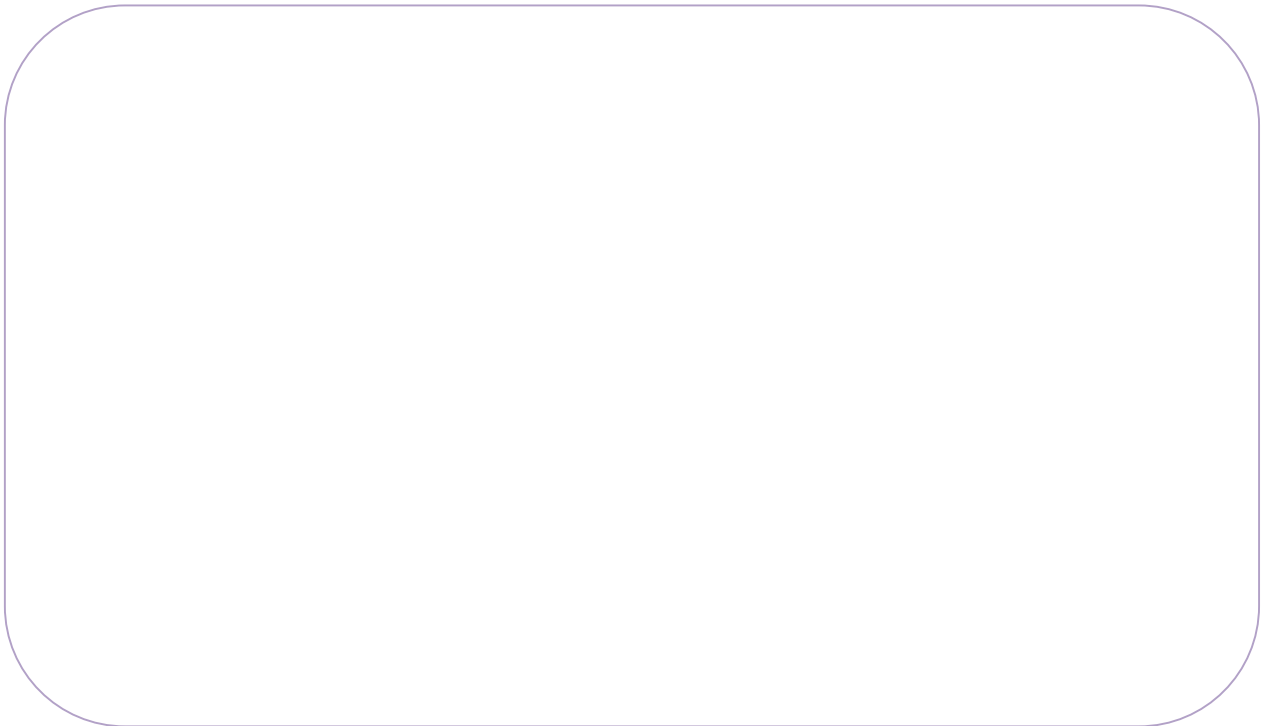
1 or 2	3 or 4	5 or 6	7 to 9	10 or more
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#### **c. How often do you have 6 or more units on one occasion?**

Never	monthly or less	2 to 4 times a month	2 or 3 times a week	4 or more times a week
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**Thank you very much for your help**

Please use the space below if there is anything else you feel is important not already covered



**It may be useful to go back through your answers to make sure you haven't accidentally missed any questions out.**

**Please return the questionnaire in the envelope provided as soon as you can and within 2 weeks.**

If you do not wish to be contacted about future research studies please tick this box

If you would like a summary of the research results to be sent to you when they are available please tick this box

Any questions or concerns please contact:

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