

Alcohol consumption, smoking and breastfeeding in the first six months after delivery

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Abstract

Aim: To study alcohol use and smoking after delivery, and to relate this to breastfeeding. **Methods:** A longitudinal questionnaire study, representative of pregnant women in Oslo. Ninety-two per cent agreed to join the study. Non-Norwegian speaking and/or immigrants from non-western countries were not invited. Questionnaires were answered at 17 (T1) and 30 (T2) wk of pregnancy, and 6 mo after term (T3). They were completed by 93% (1749 women) at T1, 82% at T2, and 92% at T3. **Results:** Six months after delivery, 80% reported alcohol use. The mean alcohol consumption per week was less than half compared to the last 6 mo before pregnancy. The women with the highest pre-pregnancy use reduced the most. Binge drinking (≥ 5 drinks) was also reported by half as many women (29%). However, 6% reported 12 or more drinks per occasion at least once. No demographic or mental health variables predicted binge drinking after pregnancy. Smoking 6 mo after pregnancy was reported by 18%, a reduction of 50% from before pregnancy. Women breastfeeding for at least 6 mo had higher education, less frequently reported binge drinking after delivery and less frequently suffered postnatal depression.

Conclusion: In this population-based sample were 86% breastfed for at least 6 mo, the level of binge drinking is concerning.

Key Words: Alcohol drinking, breastfeeding, postpartum period, questionnaires, smoking

Introduction

There are two main reasons to be cautious with alcohol and especially binge drinking after delivery: the mother's reduced ability to respond to the baby, and alcohol conveyed to the baby via breast milk.

It is well established that alcohol consumption during pregnancy can harm the fetus, the effects on the CNS being the most devastating. Less is known about possible harmful effects to the baby from alcohol conveyed through breast milk. The small infant detoxifies alcohol slowly. The rapid brain development during the last half of the pregnancy continues during the first year after birth. Therefore, any agent interfering with this development could potentially have long-term effects. One study found a significantly lower score on motor development, measured by the Psychomotor Development Index (PDI), in infants regularly exposed to alcohol through breast milk with a dose-response relation (after alcohol exposure during pregnancy was controlled

for) [1]. However, these results could not be replicated in another study with 18-mo-old children [2].

The consumption of alcohol decreases sharply at recognition of pregnancy. Consumption after delivery has been less studied, and findings have been contradictory. Few studies have linked such consumption to breastfeeding.

Two studies found postpartum alcohol consumption to be increased compared to the level before pregnancy and to continue to increase for 12 mo after delivery [3,4]. One of them found that, at 12 mo, pre-pregnancy drinking patterns had been re-established. An exception was continued lower consumption in women characterized as heavy social drinkers prior to pregnancy [3]. The other study found the level of consumption to remain at a lower level than before pregnancy, and with no further increase over the following 6 mo [4]. A third study also found a lower level of consumption 18 mo after delivery [5]. Only one study found a higher level of use after delivery

compared to before pregnancy (13 mo after) [6]. However, this study compared with the use at conception, which was probably lower than that for the preceding months. Women who breastfed at least 3 mo were less likely to report binge drinking compared to those who had weaned early or never breastfed [7].

Many women stop smoking during pregnancy, but in a population-based study in Sweden, more than half of the women who smoked at the time of conception were smokers a few months after delivery [8]. Both prenatal maternal smoking and children's exposure to smoke are associated with increased rates of respiratory infections, otitis media and childhood asthma [9]. Maternal smoking is now the major suspected risk factor for sudden infant death syndrome (SIDS) [9].

The initiation rate of breastfeeding has increased over the past 20 years, but most mothers wean before the recommended 6 mo due to perceived difficulties with breastfeeding rather than maternal choice [10]. Breastfeeding has a protective effect on respiratory tract infections, also after controlling for smoking and socio-economic status [11], and against sudden infant death syndrome [12] and leukaemia [13].

For decades, women have been advised to drink alcohol to relax, to aid the letdown reflex, or to help the baby sleep better. In a recent study, 35% were advised by a health professional to drink alcohol during lactation in order to facilitate lactation, help their baby sleep better, or both [14]. Such recommendations seem counterproductive, as alcohol consumption disrupts the hormonal milieu underlying lactational performance [15]. Babies drinking breast milk containing alcohol consume less milk and may have an altered sleep/wake pattern [14,16].

Smokers are likely to produce less breast milk [17] and are more likely to wean early [18]. In a national survey of 24 434 Norwegian women, non-smokers were twice as likely as smokers to breastfeed for at least 6 mo [19].

Aims of the study:

- 1) To investigate reported alcohol consumption during the first 6 mo after delivery, to compare this with pre-pregnancy drinking habits, and to identify predictive factors for binge drinking after delivery;
- 2) To investigate reported smoking after delivery, and to compare this with pre-pregnancy smoking habits;
- 3) To investigate reported breastfeeding for at least 6 mo after delivery, and to identify predictive factors for this.

Methods

Study sample

The study is a longitudinal, population-based questionnaire study conducted in Oslo. In Norway, all pregnant women attend free antenatal visits, including a routine ultrasound screening at 17–18 wk of pregnancy. At Ullevål University Hospital, from June 2000 to May 2001, this included 3235 women. Of these, 808 women were not included (non-Norwegian speaking and/or immigrants from non-western countries), 364 were not asked (forgotten), and 21 could not be accounted for and were considered not invited. Of the remaining 2042 asked to participate, 169 declined to attend. Thus, 1873 women (92%) were asked to complete a questionnaire. They had received an information letter about the study, emphasizing full confidentiality, also towards their own doctor and midwife. The first questionnaire was filled out at the antenatal clinic, where the women could sit privately. It was completed by 1749 women (i.e. 93% of those who joined and 86% of those invited to join the study) and placed in a sealed envelope in a locked box. All participants returning the first questionnaire (T1), except eight women who had a miscarriage, received a new one by mail at 30 wk of pregnancy (T2). This was returned by 1424 (82%, representing 81% of the original cohort of 1749 women). Those returning the second questionnaire (T2), except six women who had stillbirths, received a new one by mail 6 mo after term (T3). This was returned by 1303 (92%, representing 75% of the original cohort of 1749 women).

The mean age of the sample at T1 was 30.8 y (SD 4.4). The majority, 98%, were of Scandinavian ethnicity; 10% had higher income and 66% had qualified from or studied at a university or college. One previous pregnancy was reported by 27%, two by 14% and three or more by 9%.

The Regional Committee for Medical Research Ethics and the Norwegian Data Inspectorate approved the study. All women provided written informed consent.

Questionnaires

The questionnaires included items about civil status, education and income for both the mother and her partner, smoking habits and alcohol use, mental health, concerns about abnormalities in the child, and whether the child was problematic to handle.

The indirect questions concerning alcohol use included T-ACE (tolerance, annoyed, cut down, eye-opener), a screening tool designed to detect risk drinking during pregnancy [20]. The missing items were recoded as 0 (tolerance 4.5%, annoyed 2.4%, cut down 1.8% and eye-opener 1.7%). The tolerance

question was considered positive if more than 2 standard units (SU) were reported (scoring 2 in the sum score), and the other questions when a yes response was given (scoring 1). The sum score of the four items was considered positive if ≥ 2 .

The direct alcohol questions included items on binge drinking (5–7 SU per occasion (po) and ≥ 8 SU po at T1, added by ≥ 12 SU po at T3) and usual quantity and frequency consumed. The direct questions had columns for the following time periods: at T1, the 6 mo prior to pregnancy, pregnancy weeks 0–6, 7–12 and 13+ (until answering the questionnaire), and at T3, pregnancy weeks 0–12, 13–24 and 25–40, and 0–3 and 3–6 mo after pregnancy.

There were questions about daily and occasional smoking, and cigarettes smoked per day for daily smokers; at T1 this was for both “the last 3 mo before pregnancy” and “currently”, and at T2 and T3 it was for “currently”.

The questions regarding mental health at T3 were a 13-item version of the Hopkins Symptom Checklist (H-SCL) [21] and the Edinburgh Postnatal Depression Scale (EPDS) [22]. In the H-SCL, measuring anxiety and depression, each item ranged from 1–4 (“not at all” to “extremely”), creating a mean score ranging from 1 to 4, including anxiety (five items) and depression (eight items) subscales. Missing items were replaced by the item sample mean. Cases with more than two missing items in the five-item and three missing in the eight-item versions were regarded as missing. The EPDS, designed to identify postnatal depression, has been translated into Norwegian and validated [23]. We used a short version: six items with sum score ranges 0–18 and cut-off ≥ 7 , giving 13% positive answers.

The question “Is there something about the child that worries you?” had two options, yes and no (88 women, 6.8%, confirmed worry). The statement “The child is very demanding and would represent a problem for most parents” had seven options (47 women, 2.7%, agreed totally to a little, or neither agreed nor disagreed).

Some questions were unanswered at T1, T2 and T3.

Definitions

One standard unit (SU) was defined as approximately 12–13 g of absolute alcohol: 1/3 l of beer, a wineglass of wine or a liquor glass of liquor. “SU/week” was calculated by multiplying the usual frequency with the usual amount per occasion (po). All options except “never” from the frequency of drinking item were registered as “any use”. Binge drinking was defined as at least 5 SU po on at least one occasion. If there was a non-response on one of the binge-drinking items

combined with “never” on the other(s), binge drinking was treated as missing.

The start of the pregnancy was defined from the first day of the last menstrual cycle.

Higher income was defined as more than NOK 400 000 (equals approximately EUR 51 000 or USD 60 500).

Statistical methods

SPSS version 11 was used for all statistical analyses. When comparing alcohol and tobacco use before and 3–6 mo after pregnancy, continuous variables were analysed using the paired *t*-test and categorical variables using the McNemar test, selecting those who answered both questionnaires. When comparing the women who breastfed for at least 6 mo with those who weaned earlier or never breastfed in univariate analysis, the Student’s *t*-test for independent groups was used for continuous and Pearson’s χ^2 for categorical variables.

Multivariable binary logistic regression analyses were used to identify predictive factors for any reported binge drinking half a year after term, and factors associated with breastfeeding for at least 6 mo. The following covariate variables were dichotomized: binge drinking before pregnancy, and smoking before pregnancy and after, all three: “never” versus all other options; T-ACE positive or not; breastfeeding at least 6 mo or not; married and cohabitants versus other options; studied at university or college or not; and higher income or not. With binge drinking 3–6 mo after delivery as the outcome variable, H-SCL depression violated the rule of linearity of continuous variables in the logistic regression. Therefore, the H-SCL variables were analysed as three categorical variables: no symptoms < 1.20 , some symptoms 1.20–1.75, and symptomatic > 1.75 . Multivariable binary logistic regression analyses were also used to identify factors associated with causes of early weaning. In these analyses, reported alcohol use and smoking 0–3 mo after delivery were used as covariates.

All variables with a significance level $p < 0.25$ were brought into the model, and the least significant variable was excluded until all remaining factors were significant at the 0.05 level. The final model was evaluated using the Hosmer and Lemeshow goodness-of-fit test. In the multivariable analysis with breastfeeding at least 6 mo as the outcome variable, both H-SCL depression (continuous) and EPDS (continuous) should be brought into the model. They had a Pearson correlation of 0.74. With both present in the analysis, H-SCL depression reached the final model, but not EPDS. The analysis was also conducted with one depression measure at a time. When EPDS was replaced with H-SCL

Table I. Alcohol and tobacco use the last 6 mo before and the first 6 mo after pregnancy (selecting those who answered both questionnaires).

	Before		0–3 mo after		3–6 mo after	
	Yes	n	Yes	n	Yes	n
Any alcohol (%)	90.7	1290	50.8	1279	80.3***	1292
SU/wk						
No (%)	9.4	1283	49.3	1275	19.8***	1283
<3.5 (%)	65.4	”	47.1	”	72.0	”
3.5–6.9 (%)	18.8	”	2.9	”	6.5	”
7–13.9 (%)	6.0	”	0.6	”	1.5	”
≥ 14 (%)	0.4	”	–	”	0.2	”
Binge drinking ^a (%)	59.5	1303	9.9	1303	28.5***	1303
≥ 12 SU po (%)	–	–	3.0	”	6.4	”
8–11 SU po ^b (%)	39.8	1303	2.5	”	9.0	”
5–7 SU po (%)	54.7	”	8.3	”	26.2	”
Smoke daily (%)	23.6	1294	7.0	1273	9.2***	1277
” occasionally (%)	12.3	”	3.8	”	8.5	”
Cigarettes/day, mean (SD)	11.7 (6.0)	298	7.7 (4.7)	89	8.6 (4.7)	116

^a Binge: at least 5 SU per occasion.

^b For before pregnancy (T1): ≥ 8 SU po.

*** *p* < 0.001, comparing use before and 3–6 mo after pregnancy.

depression, this variable reached significance in the final model.

Results

Alcohol use was reported by 51% during the first 3 mo after delivery; 50% were light drinkers (<7 SU/wk), increasing to 79% in the following 3 mo (Table I). The mean SU/week 3–6 mo after delivery was 1.04 (SD 1.76), less than half of the pre-pregnancy level of 2.19 (SD 2.65). The women with the highest level of use before pregnancy consumed the most after pregnancy, but they also had the highest reduction (Figure 1). Binge drinking, reported by very few during pregnancy, was reported by 29% 6 mo after delivery. Six per cent reported 12 SU po on at least one occasion, and 2% reported this amount at least once a month (Figure 2 and Table I).

Factors associated with reported binge drinking 3–6 mo after delivery were: more SU/week before pregnancy, binge drinking before pregnancy and smoking 3–6 mo after delivery, while factors associated with less binge drinking were higher age and breastfeeding for at least 6 mo (Table II). Being T-ACE positive or not had no predictive value.

The percentage of smokers, which was markedly reduced during the first part of the pregnancy, was 12% in late pregnancy and 18% 3–6 mo after delivery (half of the pre-pregnancy level) (Figure 3 and Table I). Compared to before the pregnancy, the percentage of smokers 3–6 mo after delivery was reduced by 51%; the percentage of daily smokers was reduced by 61%, and the mean number of cigarettes per day for the daily smokers was reduced by 27%.

Eighty-six per cent breastfed totally or partially for at least 6 mo. These women had higher education, a partner with higher education, higher income and tended to have a partner with a higher income than those who had weaned earlier or never breastfed (Table III). The frequency of alcohol use did not differ. However, those who had weaned early or never breastfed consumed more alcohol per occasion 3–6

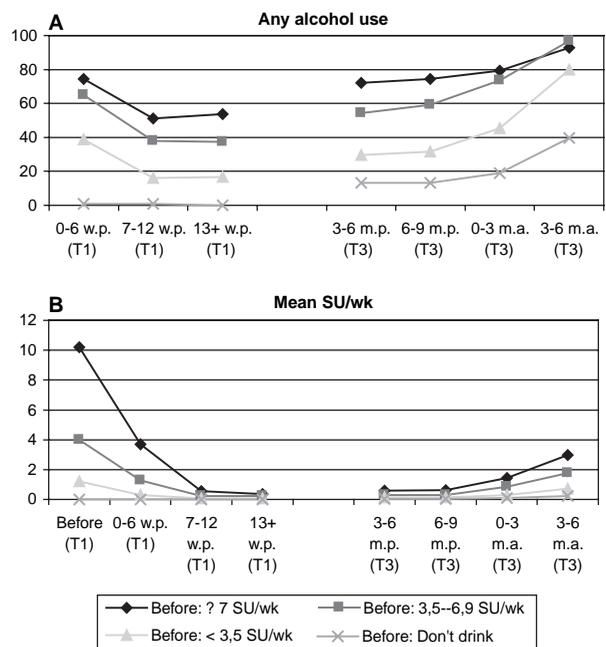


Figure 1. A) Any alcohol use (in per cent) and B) mean standard units of alcohol per week (SU/wk), during and after pregnancy. Grouped by levels of reported SU/week before pregnancy, reported at T1 and at T3. w.p.: week of pregnancy; m.p.: month of pregnancy; m.a.: month after pregnancy.

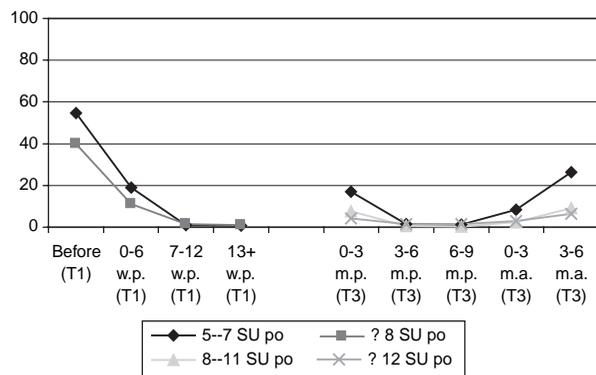


Figure 2. Binge drinking before, during and after pregnancy, reported at T1 and at T3 (in per cent). SU po: standard units of alcohol per occasion; w.p.: week of pregnancy; m.p.: month of pregnancy; m.a.: month after pregnancy.

mo after delivery. Twice as many of them reported binge drinking, and 15% reported using 12 SU po or more on at least one occasion. They were smokers twice as often, daily smokers more than three times as often, and tended to smoke more cigarettes per day. Mental health problems were more frequent among those who had weaned earlier or never breastfed. They were more often anxious, and about twice as many scored above the symptom cut-off on the H-SCL depression and the EPDS depression scales. Twice as often, they regarded the child as being problematic to handle, compared to those breastfeeding for at least 6 mo.

In a multivariable logistic regression model, breastfeeding at least 6 mo was associated with higher education and inversely associated with binge drinking 3–6 mo after delivery and postnatal depression (EPDS) (Table II). Causes of early weaning, when using a combined outcome measure consisting of poor sucking/long time needed during meals/refusing the breast, was associated with the same three factors but in an inverse relationship. Early weaning due to little milk was likewise associated with these three

factors, but with this outcome “smoking 0–3 mo after delivery” (OR 1.7, 95% CI 1.1–2.8) was also a significant factor.

Discussion

In this population-based study the reported use of alcohol, including binge drinking, and tobacco use 6 mo after delivery was approximately half of the pre-pregnancy level.

The majority used alcohol 6 mo after delivery. At this time, alcohol use was reported by nearly half of the women who were abstinent the last 6 mo prior to pregnancy. Many of these women probably changed their drinking pattern when planning pregnancy. The mean alcohol consumption was less than half of the pre-pregnancy level, which is a larger reduction than has previously been reported [3,4]. In accordance with other studies, those with the highest consumption pre-pregnancy reduced the most [3]. Although about half as many women reported binge drinking postnatally, 29% reported this 3–6 mo after delivery. In another population-based sample from the UK, 37% reported binge drinking 18 mo postpartum [2]. Taking into account the possible further increase in consumption until 1 y after delivery, as found by others [3,4], this is comparable to our results. The fact that 6% of the sample in our study reported having had 12 SU on one drinking occasion 3–6 mo after delivery, and that 2% consumed this amount at least once a month, is cause for concern. After having consumed approximately two bottles of wine or the equivalent of other alcoholic beverages, one cannot exhibit the concern and responsiveness needed to take care of an infant. Also, women have reported lower tolerance to alcohol while breastfeeding. This is due to both low oestrogen levels during amenorrhoeic lactation leading to higher blood alcohol levels [24], and the reduced alcohol use during pregnancy for most women. Considering the possible harmful ef-

Table II. Factors associated with binge drinking (≥ 5 standard units, SU, per occasion) 3–6 mo after delivery and of breastfeeding totally or partially for at least 6 mo (multivariable logistic regression).

		Binge OR (95% CI), <i>p</i>	Breastfeeding OR (95% CI), <i>p</i>
Age	T1	0.96 (0.92–0.99)**	–
Higher education, mother	”	–	3.2 (2.3–4.5)***
SU/wk before	”	1.1 (1.1–1.2)***	–
Binge before	”	3.7 (2.6–5.2)***	–
Smoking 3–6 mo after	T3	2.8 (2.0–3.9)***	–
Binge 3–6 mo after	”	–	0.33 (0.24–0.47)***
Breastfeeding ≥ 6 mo	”	0.35 (0.24–0.51)***	–
EPDS	”	–	0.46 (0.30–0.70)***

T1: questionnaire answered at 17–18 wk of pregnancy; T3: questionnaire answered 6 mo after term; EPDS: Edinburgh Postnatal Depression Scale.

***p**/*p* < 0.01.

****p**/*p* < 0.001

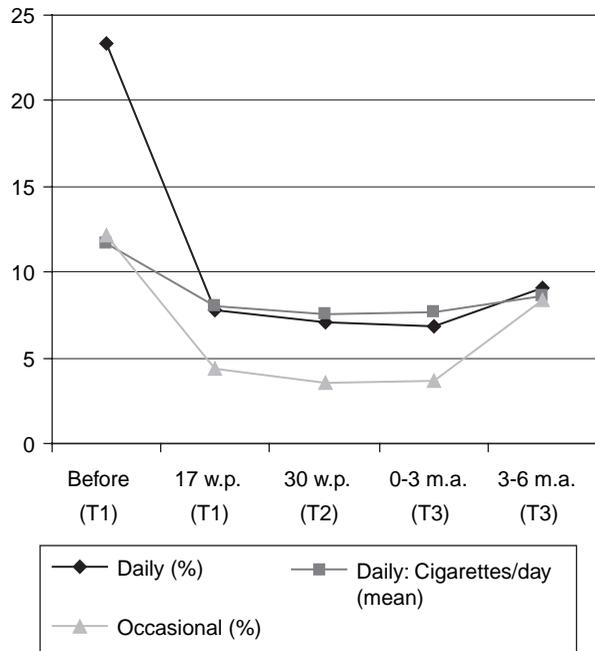


Figure 3. Smoking before, during and after pregnancy, reported at T1, T2 and T3. Grouped by reported smoking before pregnancy. w.p.: week of pregnancy; m.a.: month after pregnancy.

facts of alcohol conveyed to the baby via the breast milk [1,2], it is also of concern that about one in every fourth woman still nursing half a year after delivery reported binge drinking, and that 5% of them reported having had 12 SU po.

The proportion of smokers still smoking half a year after delivery was 51% in our study. This was 56% about 3 mo after pregnancy in a Swedish study with data collection 7 y before ours [8]. In our study, the proportion of daily smokers was reduced more than the proportion smoking “occasionally”. However, the mean number of cigarettes smoked per day by the daily smokers was reduced the least.

In Norway, a very high proportion of women breastfeed their babies. The proportion breastfeeding 6 mo or more, totally or partially, increased continuously from 24% in 1970 to 65% in 1991 [19]. This increase has continued until 2000/2001, and was 86% in our sample. The percentage who breastfed for 6 mo or more is higher than in Denmark, Sweden, Australia, the United States and Canada [19,25]. Our finding that the women who breastfed for at least 6 mo reported less binge drinking is in conjunction with earlier findings from Little et al. [7]. They also found that usual drinking did not differ, while we found that frequency of alcohol use did not differ. Daily smoking was three times more frequent among the women who had weaned early in our study. This is in line with Little et al.’s study. They also found a difference in the mean number of cigarettes per day between those who weaned early and those who did not, but this did not reach significance in our study. Nicotine as well as alcohol use in the postpartum period may cause reduced milk production, thereby causing the mother

Table III. Differences between women who breastfed, totally or partially, for 6 mo or more and those who weaned earlier or never breastfed.

	≥6 mo	<6 mo	n
Total number	1115	180	–
Married/cohabitant + (%)	96.5	94.0*	1292
University/college + woman (%)	72.8	45.0***	1291
University/college + partner (%)	70.3	54.3***	1257
High-income mother (%)	11.8	5.1**	1276
High-income partner (%)	33.6	26.2*	1252
Any alcohol use 3–6 mo after (%)	79.9	82.7	1288
Frequency/wk 3–6 mo after, mean (SD)	0.49 (0.60)	0.41 (0.42)	”
Amount SU po 3–6 mo after, mean (SD)	1.68 (1.40)	2.47 (1.98)***	1283
SU/wk 3–6 mo after, mean (SD)	1.01 (1.79)	1.21 (1.62)	1279
Binge 3–6 mo after (%)	25.1	50.6***	1295
” ≥12 SU po (%)	5.0	15.0***	”
” 8–11 SU po (%)	7.4	18.9***	”
” 5–7 SU po (%)	23.4	44.4***	”
Smoking 3–6 mo after (%)	15.2	33.3***	1273
” daily (%)	7.0	23.3	–
” occasionally (%)	8.2	10.0	–
” daily cigarettes/day, mean (SD)	7.95 (4.84)	9.58 (4.24)*	–
H-SCL anxiety (%)	8.3	14.5**	1288
H-SCL depression (%)	9.9	17.3**	1290
EPDS (%)	11.4	23.7***	1276
Worry abnormality in child T3 (%)	6.3	9.6	1285
Child problematic T3 (%)	3.1	6.7*	1295

SU po: standard units per occasion; H-SCL: Hopkins Symptom Checklist; EPDS: Edinburgh Postnatal Depression Scale. Pearson’s χ^2 or independent Student’s *t*-test: * $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

to wean earlier than intended. Unfortunately, we do not have data about intention to breastfeed.

Our finding that the women who breastfed longer are more resourceful, report less binge drinking [25] and have relatively few mental health problems is in accordance with other studies. Postnatal depression has previously been found to have a significant negative impact on breastfeeding duration [26]. In our study, close to twice as many scored above the symptom cut-off for anxiety and depression among those who weaned early. Also, these women more often perceived their child as being difficult to handle. Smoking 0–3 mo after delivery was a factor associated with early weaning due to little milk, but not due to poor sucking, long time needed during meals or refusing the breast.

There are several strengths to the current study. First, it is a population-based study with a relatively high response rate. Also, at T1, we had the opportunity to compare the confidential questionnaire with an identical anonymous questionnaire [27]. We have also compared concurrent and retrospective reports for reported alcohol and nicotine use [28]. The direct alcohol questions included separate binge drinking questions, and offered several alternatives of high level of use listed prior to the low levels or no consumption alternatives, to increase the validity of the answers. Also, the indirect questions came before the direct questions. We made efforts to maximize the perceived anonymity; the only identification on the questionnaires was a unique code.

The study also has some limitations. At T1, the questionnaire was answered in the outpatient clinic, where most women were accompanied by their husband/partner. Many women chose to fill out the questionnaire with their partner at their side. However, the presence of a husband/partner has been shown to have no influence on reported alcohol use [29]. The fact that there was a high item non-response on some of the key items may also be considered a limitation. The item non-response for risk behaviour items is higher when using self-administered questionnaires during an interview, compared to telephone interviews [30]. The lower response rate of sensitive questions in questionnaire studies may, however, indicate higher validity on the responses given compared to in interview studies, were a socially acceptable answer may be preferred to a non-response.

Conclusion

The reduction of about 50% in alcohol consumption and tobacco use postnatally compared to the last 6 mo before pregnancy is encouraging. However, the postnatal reported frequency of binge drinking is a matter of concern. This may interfere with caretaking of the baby, and the alcohol conveyed through the breast

milk might have possible damaging effects on the baby. The study also showed that women breastfeeding for at least 6 mo have a higher level of education, less frequently report binge drinking after delivery and less often suffer postnatal depression.

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