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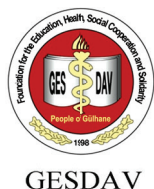
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Social patterning of alcohol consumption among mothers with infants in the UK

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ABSTRACT

Background: We examined patterns of alcohol use among mothers with infants in the UK focusing on (i) common ("majority") patterns of alcohol use (frequency and quantity) and (ii) associated social factors. **Methods:** We analyzed data from 15,510 mothers who took part in waves 1 and 2 of the millennium cohort study in 2000/1. Nine months after birth, mothers reported their frequency and quantity of alcohol use, along with information on social circumstances. Logistic regression, carried out in 2011, helped identify the social factors associated with majority patterns of alcohol use. **Results:** Majority patterns of alcohol use were: Infrequent drinking (never/<1/week), infrequent light drinking (1 unit/day, <1/week), and frequent light drinking (<14 units/week). In mutually adjusted models, infrequent drinking was associated with childhood, educational, and income disadvantage, and younger age at first birth. Infrequent light drinking was associated with educational and income disadvantage, economic inactivity, and marriage. Frequent light drinking was associated with marriage and fewer children in the household. **Conclusions:** Among mothers in the UK, the majority drank infrequent small quantities. Positive social gradients were evident for frequency of alcohol use among socially advantaged mothers.

KEY WORDS: Alcohol, motherhood, social circumstances, social patterning

INTRODUCTION

Alcohol is measured in units and "One unit is 10 ml or 8 g of pure alcohol" [1]. The maximum recommended intake of alcohol for women in the UK is 2-3 units/day; these have remained unchanged since 1995 when recommendations based on weekly quantities (units) were dropped in favour of daily quantities (units). The recommendations are comparable to international standards [2].

The majority of adults in the UK report that they drink alcohol and for most adults, alcohol consumption is not considered to be health-damaging [3]. However, research has focused on the minority of the population whose patterns of consumption are associated with a range of health and social problems [4,5]. As a result, more is known about "risky" alcohol use than about the drinking patterns of the majority of the population. In contrast, this paper takes a population perspective that examines the underlying social determinants of alcohol use rather than focusing on a small proportion of "risky" drinking individuals in order to identify potential areas for widespread public health intervention [6].

UK surveys provide important information on majority drinking patterns among women. They indicate that alcohol use is more common among white British women; women from minority ethnic groups are more likely to report never drinking or drinking less than once per week. They point, too, to positive gradients in the frequency, and negative gradients in the quantity, of alcohol use among socially advantaged groups [7-10]. Similarly, studies in other high-income countries report more frequent alcohol use among employed women with higher educational levels and living in higher income households [11,12]. The opposite has been found for drinking quantity. Women who are advantaged with respect to education, employment status, occupational class and household income consume smaller quantities of alcohol on drinking occasions than women from more disadvantaged backgrounds [11-13].

Domestic circumstances are also associated with women's patterns of alcohol use. Compared with non-married women, married women report lower alcohol consumption in terms of both frequency and quantity [12]. Having children in the household is also associated with alcohol use, with decreased alcohol consumption among parents [4,12]. In addition, there

is evidence that the timing and circumstances of entry into motherhood are related to patterns of alcohol use [14-18].

However, few studies have looked specifically at women living with children [16]; in consequence, little is known about the frequency and quantity of alcohol use among mothers. This is despite the fact that most women become mothers, and the home is the primary location in which children are introduced to alcohol [3,19]. As with other health-related behaviours, children's subsequent drinking patterns are associated with the drinking behaviours of their parents [15,20].

The millennium cohort study (MCS) is a unique source of UK data on the social circumstances and lifestyles of mothers and has a sample size that permits analysis of the social patterning of the frequency and quantity of alcohol use among mothers. We focus on alcohol use 9 months after birth (wave 1). Although questions on frequency of alcohol use were also asked at wave 2 (3 years after birth), questions on quantity were only asked of a sub-sample of mothers.

METHODS

Participants

The MCS is a survey based on a sample of children born in the UK in 2000/01, disproportionately sampled in favour of disadvantaged groups. The cohort was recruited when the child was 9 months old (UK response rate 68%; $n = 18,552$), with a pre-school follow-up at 3 years (UK response rate 78% of original sample; $n = 15,590$) [21,22]. At first contact, mothers reported their ethnicity and natural mothers from a white British ethnic background [23] who were resident in the house in which the cohort baby lived were considered eligible for inclusion. Preliminary analysis pointed to marked ethnic differences in alcohol use. Compared to white British mothers, a much larger proportion of mothers from ethnic minorities never drank or drank less than once per week, but the small numbers prevented ethnic-group specific analyses.

We included eligible mothers who participated in interviews wave 1 (9 months) and wave 2 (3 years), when a question on childhood social circumstances was asked ($n = 15,510$).

Ethics

This study was approved by the University of York's Department of Health Sciences Research Governance Committee, York, UK.

Outcome Measures

Frequency of alcohol consumption was measured by a single item ("which of these best describes how often you drink?") with fixed categorical responses. We combined the lowest two frequency categories (never and <1 week) because preliminary analyses indicated that they had the same socio-economic distribution (data not shown). We also combined the highest two categories (5/6 days a week and everyday) because of small

Table 1: Alcohol use amongst mothers

| Alcohol use | N | Weighted % |
|------------------------------------|-------|------------|
| A) Frequency | | |
| Never/<1/week | 9086 | 59 |
| 1-2/week | 4285 | 28 |
| 3-4/week | 1379 | 9 |
| 5-6/everyday/week | 757 | 5 |
| Missing | 3 | |
| | 15510 | 100 |
| B) Quantity (if frequency <1/week) | | |
| 1 unit/day on each occasion | 3595 | 40 |
| 2-3 units/day on each occasion | 2542 | 28 |
| >3 units/day on each occasion | 2949 | 33 |
| | 9086 | 100 |
| C) Quantity (if frequency >1/week) | | |
| <14 units/week | 5868 | 91 |
| 14-21 units/week | 454 | 7 |
| >21 units/week | 99 | 2 |
| | 6421 | 100 |

numbers in the latter category. The distribution of mothers across these groups is given in Table 1 (Block A).

For quantity of consumption, mothers drinking <1/week were asked about the average number of units they consumed on each drinking occasion; those drinking ≥1/week were asked about the average number of units they drank a week.

Mothers who drank infrequently (<1/week) were grouped into those who drank under (1 unit/day), within (2-3 units/day) and over (>3 units/day) the daily recommendations (Table 1 Block B). We examined the social patterning of units within these categories (e.g. 2 units and 3 units in the 2-3 units category) to check that social variations in the quantity of alcohol use were not being obscured by the 3-fold categorization (data not shown).

Mothers who frequently drank (>1/week) were categorized into those who drank under (<14 units/week), within (14-21 units/week) and over (>22 units/week) the weekly recommendations (Table 1 Block C).

The analysis focused on these three most commonly reported patterns: Drinking infrequently (never/<1/week), infrequent light quantities (1 unit/day, <1/week) and frequent light quantities (<14 units/week).

Socio-demographic Factors

The mother's childhood circumstances were measured at wave 2 by her father's occupational class when she was aged 14, using the collapsed 3-category NS-SEC classification (managerial/professional, intermediate and routine/manual) [24]. Fathers who were not working were included in the routine/manual category because of small numbers. In addition, "unknown" category was constructed for women who did not know what job their father did. All other measures were derived from wave 1 data. Educational level was measured by age of leaving full-time education and employment status was split into two categories (economically active/inactive). Equivalised household income was based on MCS income bands, with "unknown" category for women who

did not know their household income. Along with these standard socioeconomic measures, we included maternal age at first birth, current cohabitation status (married, cohabiting, lone) and the number of children in the household, including the cohort child.

Statistical Analysis

The analysis, carried out in 2011, was conducted using the statistical software package STATA version 10.1 [25], with survey commands to account for the sample design, and survey weights to correct for disproportionate sampling in favour of disadvantaged groups.

Using logistic regression, bivariate analyses of mother's alcohol use were undertaken for each social factor adjusted only for age. Those predictors found to be significant were included in a mutually adjusted model. Odds ratios were calculated for the three outcomes of interest: Infrequent drinking (never/dinking <1/week), infrequent light drinking (1 unit/day, <1/week), and frequent light drinking (<14 units/week).

RESULTS

Table 2 describes the social profile of mothers. Table 3 describes the associations between social circumstances and the majority

patterns of alcohol use: Infrequent drinking (never/<1/week), infrequent light quantities (1 unit/day, <1/week), and frequent light quantities (<14 units/week).

Infrequent drinking (never/<1/week) was associated in the bivariate analyses with all measures of disadvantage, as well as with having more children in the household. In a multivariate analysis, disadvantaged childhood circumstances, educational disadvantage, income disadvantage, and younger age at first birth remained significant predictors.

Infrequent light drinking (1 unit/day, <1/week) was also associated with disadvantage. In the bivariate analyses, educational disadvantage, economic inactivity and income disadvantage increased the odds of being an infrequent light drinker, as did being married and having more children in the household. In a multivariate analysis, number of children in the household was no longer a significant predictor.

Frequent light drinking (<14 units/week) was associated with younger age at first birth in the bivariate analyses, as was being married and having fewer children living in the household in both the bivariate and multivariate analyses.

Strengths and Limitations

The MCS relies on self-reported levels of alcohol use and includes only a limited set of measures. Self-reports underestimate consumption when compared with the sale of taxed alcohol [26], but provide a reliable means of comparing drinking within population groups [27]. Studies have found that women are more likely than men to under-report their alcohol use and mothers represent a group who may be more inclined to report conservative estimates of alcohol consumption [28]. Moreover, it is likely that mothers who are problematic drinkers will be under-represented in the MCS, as has been found to be the case in the general population surveys [29]. Nevertheless, self-reported measures of alcohol use are the only option for large scale population surveys [30].

Quantity was measured in units of alcohol in line with UK recommendations. Studies indicate that people do not understand how many units of alcohol relate to everyday measures like glass size and pints or what the recommendations are. For example, a British study indicated that, of the 75% of individuals who had heard of daily limits, only 44% and 52% knew the correct daily limits for men and women respectively. Furthermore, of these individuals, only 12% of men and 14% of women kept track of the number of units they consumed [31]. Unit-based measures are, therefore, likely to lack precision; our use of broad-based categories of consumption accommodates this.

In addition, data from the MCS were collected over a decade ago and may not reflect contemporary patterns of alcohol use. However, more recent studies suggest that the patterns uncovered in our analyses remain valid [11,13]. The demography of motherhood has also changed over time. Nevertheless, evidence suggests that levels of employment and household income have increased at a modest rate [32,33]. Similarly,

Table 2: Social profile of the sample

| Social profile of the sample (n=15510) | N | Weighted % |
|--|------|------------|
| Childhood circumstances | | |
| Managerial/prof | 3138 | 20.2 |
| Intermediate | 2659 | 17.1 |
| Economically inactive/lowest | 5480 | 35.3 |
| Unknown | 4233 | 27.3 |
| Age left education | | |
| >22 | 1443 | 9.3 |
| 19-21 | 1739 | 11.2 |
| 17-18 | 4498 | 29.0 |
| <16 | 7830 | 50.5 |
| Employment status | | |
| Economically active | 7957 | 51.3 |
| Economically inactive | 7553 | 48.7 |
| Household income | | |
| £31,200+ | 3021 | 19.9 |
| £20,800-31,200 | 3038 | 20.0 |
| £10,400-20,800 | 4741 | 31.3 |
| £0-10,400 | 3640 | 24.0 |
| Unknown | 728 | 4.8 |
| Missing | 342 | |
| Age at first live birth | | |
| >30 | 3735 | 24.3 |
| 25-29 | 4298 | 27.9 |
| 20-24 | 4068 | 26.4 |
| 14-19 | 3286 | 21.4 |
| Missing | 123 | |
| Cohabitation status | | |
| Married | 8671 | 56.2 |
| Cohabiting | 4120 | 26.7 |
| Lone parent | 2638 | 17.1 |
| Missing | 81 | |
| Number of children | | |
| >3 | 3403 | 21.9 |
| 2 | 5535 | 35.7 |
| 1 | 6572 | 42.4 |

Table 3: The OR of drinking patterns according to: Social circumstances and level of disadvantage

| | Infrequent drinking (never/<1/week) | | Infrequent light drinking (1 unit/day, <1/week) | | Frequent light drinking (<14 units/week) | |
|---------------------------------|--|--|--|--|---|--|
| | Bivariate age adjusted | Mutually adjusted (n=14975) | Bivariate age adjusted | Mutually adjusted (n=8828) | Bivariate age adjusted | Mutually adjusted (n=6397) |
| Childhood circumstances | (n=15503) | | (n=9083) | | (n=6420) | |
| Managerial/prof | 1.00 | 1.00 | 1.00 | | 1.00 | |
| Intermediate | OR: 1.40 (CI: 1.25-1.58) | OR: 1.21 (CI: 1.08-1.36) | OR: 1.09 (CI: 0.91-1.29) | | OR: 1.24 (CI: 1.03-1.50) | |
| Economically inactive/lowest | OR: 1.87 (CI: 1.65-2.12) | OR: 1.42 (CI: 1.27-1.59) | OR: 0.97 (CI: 0.84-1.12) | | OR: 1.13 (CI: 0.96-1.32) | |
| Unknown | OR: 1.85 (CI: 1.63-2.10) P=0.000 | OR: 1.39 (CI: 1.23-1.57) P=0.000 | OR: 1.16 (CI: 0.98-1.36) P=0.206 | | OR: 0.90 (CI: 0.74-1.09) P=0.412 | |
| Age of leaving education | (n=15503) | | (n=9083) | | (n=6420) | |
| 22 and over | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| 19-21 | OR: 1.30 (CI: 1.08-1.56) | OR: 1.15 (CI: 0.95-1.38) | OR: 0.82 (CI: 0.62-1.09) | OR: 0.78 (CI: 0.58-1.04) | OR: 0.94 (CI: 0.76-1.17) | |
| 17-18 | OR: 2.05 (CI: 1.71-2.46) | OR: 1.52 (CI: 1.28-1.80) | OR: 0.74 (CI: 0.58-0.95) | OR: 0.70 (CI: 0.54-0.89) | OR: 1.09 (CI: 0.86-1.33) | |
| 16 and under | OR: 2.84 (CI: 2.36-3.43) P=0.000 | OR: 1.70 (CI: 1.41-2.03) P=0.000 | OR: 0.67 (CI: 0.53-0.85) P=0.000 | OR: 0.58 (CI: 0.45-0.75) P=0.000 | OR: 0.95 (CI: 0.79-1.14) P=0.739 | |
| Employment status | (n=15503) | | (n=9083) | | (n=6420) | |
| Economically active | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Economically inactive | OR: 1.40 (CI: 1.30-1.51) P=0.000 | OR: 1.08 (CI: 0.98-1.18) P=0.104 | OR: 1.55 (CI: 1.39-1.74) P=0.000 | OR: 1.55 (CI: 1.37-1.74) P=0.000 | OR: 1.06 (CI: 0.93-1.20) P=0.421 | |
| Household income | (n=15164) | | (n=8885) | | (n=6279) | |
| £31,200+ | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| £20,800-31,200 | OR: 1.91 (CI: 1.65-2.22) | OR: 1.64 (CI: 1.42-1.88) | OR: 0.84 (CI: 0.70-1.01) | OR: 0.87 (CI: 0.72-1.06) | OR: 1.31 (CI: 1.11-1.56) | |
| £10,400-20,800 | OR: 2.98 (CI: 2.56-3.46) | OR: 2.24 (CI: 1.93-2.59) | OR: 1.06 (CI: 0.90-1.24) | OR: 1.11 (CI: 0.93-1.32) | OR: 1.22 (CI: 1.03-1.44) | |
| £0-10,400 | OR: 3.42 (CI: 2.88-4.07) | OR: 2.38 (CI: 1.98-2.87) | OR: 1.18 (CI: 0.97-1.43) | OR: 1.32 (CI: 1.06-1.64) | OR: 0.80 (CI: 0.63-1.01) | |
| Unknown | OR: 2.23 (CI: 1.80-2.78) P=0.000 | OR: 1.81 (CI: 1.45-2.25) P=0.000 | OR: 1.21 (CI: 0.95-1.55) P=0.002 | OR: 1.25 (CI: 0.97-1.60) P=0.001 | OR: 1.28 (CI: 0.94-1.73) P=0.670 | |
| Age at first live birth | (n=15382) | | (n=9007) | | (n=6375) | |
| 30+ | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| 25-29 | OR: 1.70 (CI: 1.50-1.92) | OR: 1.44 (CI: 1.28-1.63) | OR: 0.83 (CI: 0.70-0.98) | | OR: 1.09 (CI: 0.93-1.28) | OR: 1.18 (CI: 1.00-1.39) |
| 20-24 | OR: 2.40 (CI: 2.08-2.76) | OR: 1.52 (CI: 1.31-1.77) | OR: 0.93 (CI: 0.77-1.13) | | OR: 0.90 (CI: 0.74-1.10) | OR: 1.16 (CI: 0.91-1.47) |
| 14-19 | OR: 2.96 (CI: 2.51-3.50) P=0.000 | OR: 1.61 (CI: 1.32-1.97) P=0.000 | OR: 0.89 (CI: 0.72-1.09) P=0.429 | | OR: 0.65 (CI: 0.50-0.85) P=0.018 | OR: 0.95 (CI: 0.70-1.29) P=0.525 |
| Cohabitation status | (n=15422) | | (n=9025) | | (n=6397) | |
| Married | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Cohabiting | OR: 1.24 (CI: 1.13-1.36) | OR: 0.99 (CI: 0.90-1.08) | OR: 0.81 (CI: 0.71-0.92) | OR: 0.77 (CI: 0.67-0.88) | OR: 0.73 (CI: 0.62-0.85) | OR: 0.72 (CI: 0.61-0.85) |
| Lone parent | OR: 1.61 (CI: 1.40-1.85) P=0.000 | OR: 0.98 (CI: 0.84-1.14) P=0.149 | OR: 0.82 (CI: 0.69-0.97) P=0.006 | OR: 0.64 (CI: 0.52-0.79) P=0.000 | OR: 0.50 (CI: 0.38-0.64) P=0.000 | OR: 0.52 (CI: 0.39-0.68) P=0.000 |
| Number of children in household | (n=15503) | | (n=9083) | | (n=6420) | |
| 3+ | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 2 | OR: 0.69 (CI: 0.62-0.77) | OR: 0.92 (CI: 0.82-1.03) | OR: 0.82 (CI: 0.71-0.96) | OR: 0.84 (CI: 0.72-0.99) | OR: 1.13 (CI: 0.95-1.34) | OR: 1.12 (CI: 0.93-1.35) |
| 1 | OR: 0.60 (CI: 0.54-0.68) P=0.000 | OR: 1.00 (CI: 0.88-1.15) P=0.541 | OR: 0.79 (CI: 0.67-0.92) P=0.009 | OR: 0.86 (CI: 0.73-1.02) P=0.231 | OR: 1.32 (CI: 1.11-1.56) P=0.001 | OR: 1.34 (CI: 1.09-1.65) P=0.002 |

OR: Odds ratio, CI: Confidence interval, P=Statistical significance

relatively small increases in the age of leaving education and first birth have been witnessed, as has a steady decline in birth within marriage [34,35]. Therefore, the results of our study remain comparable to current demographic groups in the UK.

Notwithstanding these limitations, our analyses provide a “snapshot” of mothers’ alcohol use at key life stage and describe how mothers’ social circumstances may influence their patterns of alcohol use.

CONCLUSIONS

In the UK, alcohol consumption is considered a social norm [3]. As such, alcohol is deeply ingrained in society, with evidence that alcohol use tracks over time and across generations [36,37]. However, there have been few studies focused on mothers [16]. We, therefore, undertook an analysis of the UK's largest study of mothers to investigate patterns of alcohol use around 9 months after birth. We focused on the most common patterns of use: Infrequent drinking (never/<1/week), infrequent light quantities (1 unit/day, <1/week), and frequent light quantities (<14 units/week). We used the rich data on social circumstances collected at 9 months and, for the mother's childhood circumstances, at 3 years to describe the social profile of these three patterns of use.

Our findings suggest that the patterns of alcohol use reported by the wider population are also evident among mothers with young children. Studies of women and of young adults suggest that increasingly advantaged social circumstances are associated with increased frequency of alcohol consumption [11,13]. There is also evidence for adult women, young adults, and mothers that social disadvantage are associated with higher quantities of consumption on each drinking occasion [11,13,17].

The study adds to this evidence by employing a more comprehensive range of indicators of mothers' social background. Focusing on the most common patterns of alcohol use among mothers with infants, it confirms that the frequency and quantity of alcohol use vary in line with their socioeconomic and domestic circumstances. These findings have implications for future research and public health interventions from a population perspective with regards to the underlying social determinants of alcohol use among mothers and its potential effect on children.

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