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# Parents' alcohol use: gender differences in the impact of household and family chores

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**Background:** Social roles influence alcohol use. Nevertheless, little is known about how specific aspects of a given role, here parenthood, may influence alcohol use. The research questions for this study were the following: (i) are family-related indicators (FRI) linked to the alcohol use of mothers and fathers? and (ii) does the level of employment, i.e. full-time, part-time employment or unemployment, moderate the relationship between FRI and parental alcohol use? **Methods:** Survey data of 3217 parents aged 25–50 living in Switzerland. Mean comparisons and multiple regression models of annual frequency of drinking and risky single occasion drinking, quantity per day on FRI (age of the youngest child, number of children in the household, majority of child-care/household duties). **Results:** Protective relationships between FRI and alcohol use were observed among mothers. In contrast, among fathers, detrimental associations between FRI and alcohol use were observed. Whereas maternal responsibilities in general had a protective effect on alcohol use, the number of children had a detrimental impact on the quantity of alcohol consumed per day when mothers were in paid employment. Among fathers, the correlations between age of the youngest child, number of children and frequency of drinking was moderated by the level of paid employment. **Conclusion:** The study showed that in Switzerland, a systematic negative relationship was more often found between FRI and women's drinking than men's. Evidence was found that maternal responsibilities *per se* may protect from alcohol use but can turn into a detrimental triangle if mothers are additionally in paid employment.

## Introduction

Social roles define an individual's position within society based on enduring relations to others and therefore provide a sense of identity and behavioural guidance.<sup>1–4</sup> In former studies,<sup>5–9</sup> the role accumulation theory has served as a theoretical framework not exclusively on alcohol use but also on beneficial health effects in general.<sup>5–7</sup> It assumes that the accumulation of social roles results in a more structured life and thus fewer opportunities to drink (heavily) as this may interfere with important activities connected with these social roles. Several studies provide evidence that social roles affect drinking behaviour<sup>8–13</sup> and most studies suggest a protective impact on alcohol use which is more pronounced and culturally persistent among men.<sup>8,9</sup> The studies mentioned above focus on the simple fact of being a parent or not. Specific characteristics of the parental role and the associated family and household chores were not considered. Thus, the underlying mechanisms of how social roles influence the individual's alcohol use still remain largely unknown. Yet it is highly plausible that being a parent is not a unitary concept but rather heavily dependent on the underlying characteristics of the role such as e.g. the number of children and the children's age. These aspects may play an important role in the prediction of parental alcohol use. This article, therefore, focuses on the relevance of family-related indicators (FRI) to the parental role and their impact on alcohol use. Previous studies have already examined the underlying mechanisms between the parental role and alcohol use by focusing on specific aspects of parental alcohol use such as drinking locations<sup>14</sup> or drinking contexts.<sup>15</sup>

In this study, it is expected that FRI, namely the number of children, the age of the children and a parent's share in household and child-care duties will affect the number of opportunities an individual has to engage in alcohol use. These assumptions are in line with the role accumulation theory. However, men and women are likely to differ in the extent to which FRI influence their alcohol use. Based on the results of previous

studies,<sup>16,17</sup> this study expects that mothers bear a disproportionately large share of the responsibility for children and the household. In addition, there has been a strong increase in recent decades in the number of women who combine the role of mother with paid employment.<sup>18</sup> In contrast, other studies have only identified a slight increase in the share of household chores undertaken by men in recent decades.<sup>16,17</sup> Therefore, FRI are more likely to impact mothers' alcohol use than fathers'.

In line with the multiple burden hypothesis, domestic and child-rearing responsibilities in addition to the demands of paid work may lead to stress, especially among women, and the possible positive effects of employment may be mitigated by such a role overload.<sup>19–21</sup> Strains arising from conflicts between family roles and work can be defined as 'between role stressors' and may lead to increased alcohol use.<sup>22</sup> A number of studies have reported a positive correlation between 'between role stressors' and alcohol use.<sup>23–25</sup> In a cross-national study, Kuntsche *et al.*<sup>9</sup> found that in some countries, including Switzerland, combining paid employment and motherhood resulted in higher alcohol consumption than being a housewife. This is in line with the multiple burden hypothesis, and contradictory to the assumptions of the role accumulation theory. This indicates that among employed women, family-related obligations may overburden women, thereby inciting them to drink to reduce stress.<sup>26,27</sup> This study will therefore also examine the importance of paid employment in the interplay between FRI and alcohol use by including paid employment as a possible moderator. To sum up, the central aims of this study are:

- (i) To identify whether family-related indicators are linked to the alcohol use of mothers and fathers; and
- (ii) To determine whether the level of employment, i.e. full-time or part-time employment or unemployment, moderates the relationship between family-related indicators and parental alcohol use.

## Methods

### Data and sampling design

The study is based on the third Swiss Health Survey (SHS), the largest health survey in Switzerland to date, conducted throughout 2002 among the general Swiss population aged >14 years as a representative telephone survey based on the Swiss electronic telephone register with a response rate of 63.9%. For this study, the age range was limited to 25- to 50-year olds ( $n=9117$ ; 4328 men and 4789 women). The chosen age range ensured that most people had completed their education and become parents or lived with underage children. Older age groups were not included to avoid possible health-related effects on alcohol use. Those with missing information on one of the variables examined were excluded from the analysis ( $n=663$ ). As the aim of the study focused on the relevance of FRI on parental drinking, all analyses were limited to parents ( $n=4536$ ; 2130 men and 2406 women) and to those reporting alcohol use during the past 12 months ( $n=3555$ ; 1869 men and 1686 women). In addition, only parents with a youngest child of 16 or younger were selected ( $n=3229$ ; 1759 men and 1470 women). All analyses were weighted throughout to counterbalance an oversampling and differential non-response of certain cantons and age groups.

### Dependent and independent variables

#### Dependent variables

- (i) Annual frequency of drinking: measuring the usual frequency of alcohol consumption in days per year.
- (ii) Annual frequency of risky single occasion drinking (RSOD). Gives the gender-specific annual frequency of drinking a certain amount (men-eight or more drinks; women-five or more drinks on a single occasion) during the last 12 months. A drink signifies ~10g of pure ethanol.
- (iii) Average quantity per day: based on the consumed annual volume of alcoholic beverages divided by 365, measuring the amount of pure ethanol in grams per day.

#### Independent variables

- (i) Number of children: variable with three categories: (a) one child, (b) two children and (c) three or more children.
- (ii) Age of the youngest child: a continuous variable measuring the age of the youngest child living in the same household as the respondent.

Respondents were asked how child care and household chores were distributed within their household. The answers ranged between 0% and 100% and allowed a trichotomization of participation in child care (respondent does the majority, shared responsibilities, partner is primarily responsible). As the middle category was endorsed by <5% of the sample, the information was dichotomized as follows: child care: 'respondent does the majority' (1) vs. not (0); household chores: 'respondent does the majority' (1) vs. not (0).

To test a possible moderating effect of paid employment on the relationship between FRI and alcohol use, the level of paid employment was measured in three categories: employed full-time (2), employed part-time (1) and unemployed (0).

Regression analyses were adjusted for the following variables: age of the respondent; cohabitation with a partner (1) or not (0) and educational level. The latter was used as the central indicator to measure socio-economic status as it is more static than occupation, which may change more often.<sup>28</sup> The indicator is based on the highest level of schooling the respondent has completed: compulsory schooling (0), secondary school diploma/apprenticeship/full-time trade school (1) and university degree/higher professional education (2).

All independent variables were z-transformed. The distribution of the independent variables and cell sizes are given in table 1.

### Statistical analysis

Statistical analysis was performed in two steps using PASW 18.0.<sup>29</sup> All analyses were performed stratified by gender. The first step involved a bivariate analysis of the relationship between FRI and alcohol use. To identify significant mean differences in alcohol use regarding FRI (child care and household) the study used *t*-tests. Differences in categorical indicators (age of the youngest child and number of children) were tested via ANOVA. In a second step, multiple regression models were used to examine the relationship between FRI and alcohol use. To study the impact of paid employment on the interplay between FRI and alcohol use, interaction effects of paid employment and FRI were tested using a forward stepwise procedure. Due to the small number of respondents with RSOD in the past 12 months among both genders, no interaction models were calculated for this indicator. Also, the distribution of the variables child care and household chores was too skewed to study the interaction with paid employment.

## Results

### Bivariate relations

Women drank less frequently than men ( $t=18.6$ ,  $df=3664.3$ ,  $P<0.001$ ), consumed smaller quantities per day ( $t=17.0$ ,  $df=2684.1$ ,  $P<0.001$ ) and reported RSOD less often ( $t=2.4$ ,  $df=3479$ ,  $P<0.05$ ). Mothers had a lower mean age (38.1) than fathers (39.3;  $t=6.0$ ,  $df=3672$ ,  $P<0.001$ ) but mothers reported a higher mean age of the youngest child (7.2) compared with fathers (6.5;  $t=-4.7$ ,  $df=3380.1$ ,  $P<0.001$ ).

Results (not presented) reveal that the more children living in a household, the more gender stereotypical the distribution of household chores and child care (women doing family-related work, men as breadwinners) became. Irrespective of the age of the youngest child, the large majority of mothers performed the majority of household chores and child care. An exception is the group of mothers of children aged  $\geq 13$  years, with only 46.0% (compared with above 80% in the other two age groups) of mothers performing the majority of child care. Mothers with younger children and more children at home were less likely to be employed than those with fewer children.

Table 2 displays the results of the bivariate relationship between alcohol use and FRI. Mothers' annual frequency of drinking was related

**Table 1** Description of level of employment and FRI: percentages (%), number of cases (n); stratified by gender

	Employment level			Age of the youngest child			Number of children in the household			Child care	household
	Full-time employed	Part-time employed	Unemployed	<7	7-12	13-16	1	2	$\geq 3$	Majority in child care <sup>a</sup>	Majority in household chores <sup>a</sup>
Fathers, <i>n</i> (%)	1610 (91.4)	100 (5.4)	49 (3.2)	1044 (55.6)	537 (29.4)	178 (15)	423 (22.3)	930 (52.2)	406 (25.5)	58 (2.9)	50 (2.7)
Mothers, <i>n</i> (%)	8.6 (112)	58.9 (856)	32.5 (502)	48.8 (776)	33 (489)	18.3 (205)	24.1 (343)	51.9 (786)	24 (341)	77.2 (1179)	86.5 (1288)

<sup>a</sup> Missing percentages to 100% give the share of respondents not performing the majority of child care or household duties

**Table 2** Bivariate relations between family characteristics and alcohol use; stratified by gender

	Fathers			Mothers		
	Annual frequency of drinking, mean (CI)	Annual frequency of RSOD, mean (CI)	Average quantity per day, mean (CI)	Annual frequency of drinking, mean (CI)	Annual frequency of RSOD, mean (CI)	Average quantity per day, mean (CI)
Age of the youngest child						
<7	140.8 (133.6–148.0)	2.6 (2.2–2.9)	14.6 (13.4–15.8)	71.3 (65.5–77.2)	1.1 (0.8–1.4)	5.4 (4.9–5.9)
7–12	164.2 (153.7–174.8)	2.4 (1.9–2.8)	16.4 (14.5–18.3)	95.9 (86.8–105.1)	2.7 (0.7–4.7)	6.9 (6.1–7.7)
13–16	181.0 (165.6–196.5)	1.4 (1.1–1.8)	17.2 (13.5–21.0)	98.5 (86.8–110.2)	0.6 (0.3–0.8)	5.7 (4.8–6.5)
F(df)	14.65*** (2,2073)	5.03 (2,1914)	2.13 (2,2073)	14.54*** (2,1595)	2.79 (2,1560)	5.27** (2,1595)
Number of children in the household						
1	145.1 (133.9–156.4)	2.5 (2.1–3.0)	12.6 (11.6–13.7)	88.1 (78.2–98.1)	0.9 (0.7–1.2)	5.7 (5.0–6.5)
2	148 (140.3–155.6)	2.4 (2.0–2.7)	16.4 (14.7–18.1)	86.9 (80.3–93.4)	0.9 (0.7–1.1)	5.9 (5.4–6.4)
≥3	174.8 (162.9–186.6)	2.1 (1.6–2.6)	16.5 (14.5–18.6)	76 (66.9–85.1)	3.3 (0.7–6.0)	6.3 (5.3–7.2)
F(df)	8.68*** (2,2073)	0.84 (2,1914)	4.88** (2,2073)	2.13 (2,1595)	4.62** (2,1560)	0.46 (2,1595)
Household chores						
Yes	118.4 (88.9–148.0)	2.1 (1.1–3.1)	13.4 (8.9–18.0)	83.5 (78.5–88.5)	1.6 (0.8–0.8)	6.0 (5.6–6.5)
No	154.7 (149.0–160.4)	2.4 (2.1–2.6)	15.6 (14.5–16.6)	89.9 (76.4–103.5)	(0.8–2.0)	5.6 (4.5–6.6)
t(df)	2.42* (60.2)	0.33 (1915)	0.66 (2074)	0.91 (1596)	–0.12 (1562)	–0.74 (1596)
Child-care duties						
Yes	154.0 (119.1–188.9)	3.0 (2.0–4.1)	18.1 (13.2–23.1)	80.6 (75.4–85.8)	0.9 (0.7–1.1)	5.9 (5.5–6.4)
No	153.7 (148.0–159.4)	2.3 (2.1–2.6)	15.4 (14.4–16.5)	97.1 (86.4–107.8)	3.6 (0.7–6.6)	6.0 (5.1–6.9)
t(df)	–0.18 (2074)	1.04 (1915)	–0.88 (2074)	2.72** (545.6)	1.78 (351.1)	0.08 (1596)

\* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ **Table 3** Results of multiple regression models of family indicators on alcohol use (adjusted for age, partnership and education); gender stratified

	Annual frequency of drinking			Annual frequency of RSOD			Quantity per day		
	B (SE)	t	Sig.	B (SE)	t	Sig.	B (SE)	t	Sig.
<b>Fathers</b>									
(constant)	141.90 (8.15)	17.42	0.000	2.24 (0.34)	6.63	0.000	15.06 (1.51)	10.00	0.000
Age	23.70 (3.54)	6.70	0.000	–0.34 (0.15)	–2.21	0.027	2.25 (0.66)	3.41	0.001
Partnership	–12.33 (2.55)	–4.84	0.000	–0.20 (0.11)	–1.82	0.069	–1.56 (0.47)	–3.28	0.001
Level of employment	5.37 (5.29)	1.02	0.310	0.37 (0.23)	1.62	0.105	0.50 (0.99)	0.50	0.614
Educational level	–0.86 (5.68)	–0.15	0.880	–0.28 (0.23)	–1.19	0.232	–1.21 (1.06)	–1.14	0.254
Number of children in household	–4.77 (3.81)	–1.25	0.211	–0.04 (0.12)	–0.33	0.743	0.92 (0.53)	1.75	0.080
Age of youngest child	5.53 (4.77)	1.16	0.247	–0.14 (0.15)	–0.94	0.350	–0.64 (0.66)	–0.97	0.332
Child-care duties	16.34 (9.88)	1.65	0.098	0.61 (0.42)	1.47	0.141	2.39 (1.83)	1.30	0.192
Household chores	–23.60 (10.22)	–2.31	0.021	–0.50 (0.45)	–1.13	0.261	–2.37 (1.90)	–1.25	0.213
Interaction level of employment × number of children	15.78 (4.11)	3.84	0.000						
Interaction level of employment × age youngest child	–11.59 (4.73)	–2.45	0.014						
<b>Mothers</b>									
(constant)	93.47 (4.69)	19.92	0.000	2.67 (0.68)	3.95	0.000	6.39 (0.41)	15.56	0.000
Age	13.08 (3.32)	3.94	0.000	–0.71 (0.48)	–1.48	0.140	0.25 (0.29)	0.85	0.397
Partnership	10.47 (2.69)	3.89	0.000	0.40 (0.40)	1.02	0.310	0.38 (0.23)	1.61	0.108
Level of employment	3.15 (3.16)	1.00	0.320	1.06 (0.46)	2.31	0.021	0.68 (0.28)	2.45	0.014
Educational level	–4.06 (1.68)	–2.42	0.016	–1.89 (0.25)	–7.72	0.000	–0.53 (0.15)	–3.59	0.000
Number of children in Household	–5.93 (2.41)	–2.45	0.014	1.20 (0.35)	3.45	0.001	0.74 (0.27)	2.69	0.007
Age of youngest child	1.89 (3.33)	0.57	0.570	–0.30 (0.49)	–0.61	0.541	–0.05 (0.29)	–0.17	0.862
Child-care duties	–1.77 (3.18)	–0.56	0.578	–1.20 (0.46)	–2.63	0.009	0.16 (0.28)	0.56	0.573
Household chores	–2.42 (3.77)	–0.64	0.520	0.45 (0.55)	0.81	0.417	0.07 (0.33)	0.21	0.835
Interaction level of employment × age youngest child							0.65 (0.22)	2.92	0.004

SE: standard error

to the age of the youngest child and performing the majority of child care in the expected direction: those with more obligations drank less frequently. Regarding average quantity per day, none of the FRI showed the expected influence, i.e. in line with the role accumulation theory. The only significant effect was found for age of the youngest child. Although those with young children drank least, the correlation was not linear but U-shaped as those parents with the youngest child between 7 and 12 drank the highest quantities. Another unexpected finding, more in line with the multiple burden hypothesis, was the significantly higher frequency of RSOD among mothers with at least three children in the household.

Among fathers, only two outcomes, both regarding annual frequency of alcohol use, were of significance in the expected direction: the younger their youngest child and the more responsibility for household chores

they had, the lower the annual frequency of alcohol consumption. As the latter group consists of only 50 individuals, it must be seen as a marginal result. Another unexpected finding was that fathers increased their quantity per day and the annual frequency of drinking as the number of children in the household increased (table 2).

### Multiple regression models

The multiple regressions largely confirm the bivariate analyses (table 3). Among mothers, the number of children had the expected protective impact on annual frequency of drinking. Mothers who were mainly responsible for child care reported lower risks for frequent RSOD. In contrast to the bivariate analyses, age of the youngest child was not found to have any significant influence on mothers' drinking. Among fathers, FRIs were not found to have any direct protective effect on

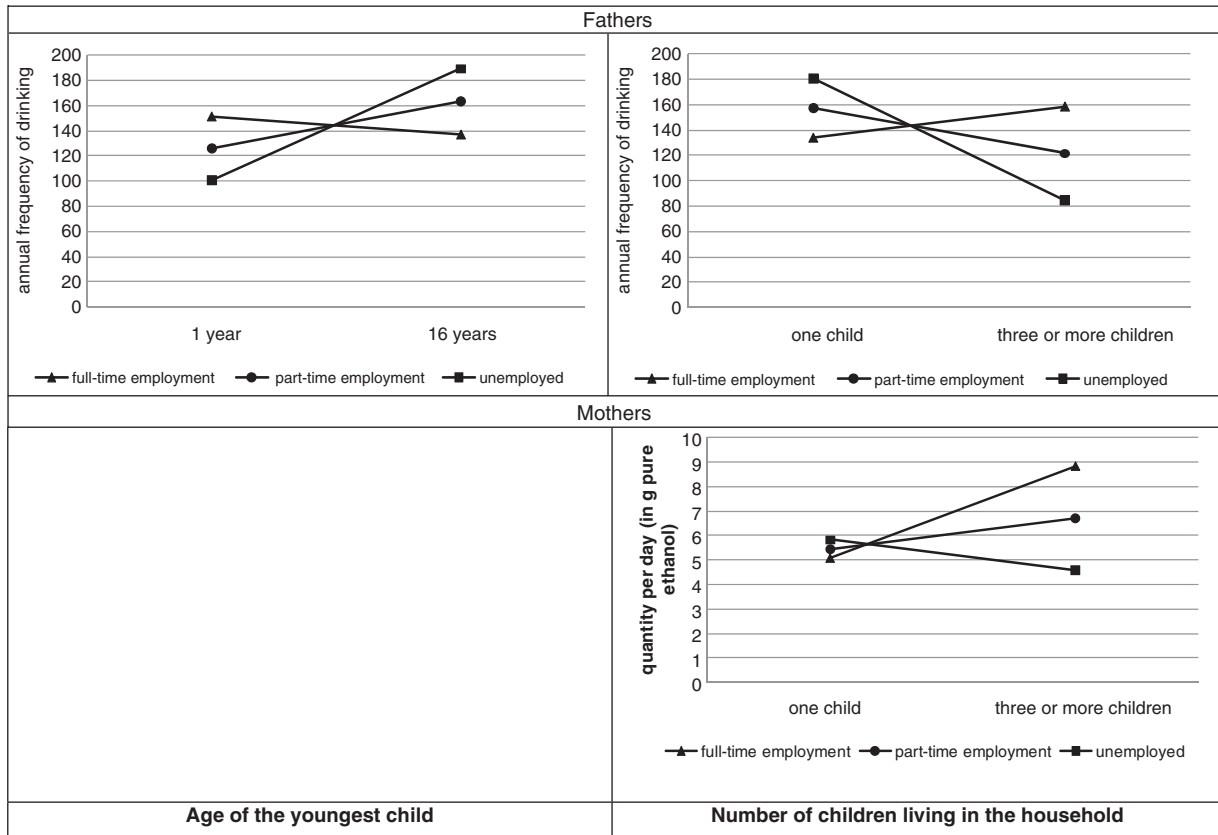


Figure 1 Interaction between FRI and level of paid employment and alcohol use

alcohol use and annual frequency of drinking despite the small group of fathers mentioned above who do the majority of household chores. Besides an unexpected positive correlation between the number of children in the household and the annual frequency of RSOD among women, this is consistent with the bivariate relations reported previously.

Interactions between paid employment and FRI among fathers reveal a relationship between the number of children and annual frequency of drinking. There is also a second interaction between the age of the youngest child and annual frequency of drinking for the small group of unemployed fathers or fathers employed part time (<10%), whereby annual frequency of drinking was lower among this group the younger the youngest child was or the more children there were living in the household (figure 1).

Among mothers, an interaction between the number of children and quantity revealed that only mothers who were not in paid employment showed a relationship in the expected direction: a decrease in the quantity of alcohol consumed as the number of children increased. The opposite was found for part-time and, especially, full-time working mothers: the more children they had, the greater their alcohol intake per day (figure 1).

## Discussion

The study raised the question as to whether FRI are linked to the alcohol use of mothers and fathers. In addition, it aimed to answer the question of whether the level of employment moderates the relationship between FRI and parental alcohol use.

The results reveal that in Switzerland, protective associations were observed between FRI and alcohol use among mothers. In contrast, among fathers, detrimental associations between FRI and alcohol use were found, such as an increase in quantity and frequency of drinking the more children there were living in the household and more frequent instances of RSOD the younger the children. This suggests a differentiation between male and female gender roles among parents living in Switzerland, which becomes even more pronounced the more children live in a household or the younger these children are. Thus, the results

regarding women largely confirm the assumptions of the role accumulation theory: the more obligations connected to a role, the less frequently alcohol will be consumed. Among men, only one indicator, the age of the youngest child, showed the expected negative correlation with annual frequency of alcohol use, whereby the younger the child was, the lower the annual frequency. Although fathers reported a lower annual frequency of drinking when responsible for household chores, the group of men concerned was very small so the effect must be considered marginal. In contrast to men, an expected negative effect was found in relation to women's annual frequency of alcohol use for three of the four indicators: those with more family obligations drank less. Regarding the other two alcohol measures, average quantity per occasion and annual frequency of RSOD, for each only one factor, (age of the youngest child for quantity and child-care duties for RSOD) were seen to have a significant protective effect. The role accumulation theory, therefore, seems to be somewhat less relevant to mothers' RSOD and the usual quantity consumed. A possible interpretation of this is that FRI tend to limit the opportunities to engage in drinking but not necessarily the amount drunk in a given situation. Among men, FRI were less often associated with lower alcohol use as suggested by the theory. Given the results of former studies,<sup>9,30</sup> parenthood has a protective effect on men's drinking, but this may be related to a more general responsibility for dependent children (e.g. financial security, providing a safe home) and not necessarily the responsibility for everyday matters related to child care. This study did not identify any strong effects of FRI on fathers' drinking.

In addition, the presented results demonstrate the inequality in the distribution of family work as Switzerland still shows a strong differentiation between the gender roles. This comes as no surprise, however, given the fact that paid maternity leave of 14 weeks (at 80% of the ordinary salary) was only introduced in July 2005 and child-care costs are high, places scarce and mostly limited to larger cities.

Nevertheless, the study found some indication for gender convergence at least among specific population groups. Whereas employed mothers drank alcohol more frequently or in larger quantities per day than those



not in employment, the study found that the level of paid employment had no direct influence on alcohol use among men, but a moderation effect of this pattern on the correlation between age of the youngest child and annual frequency or quantity of drinking. The positive association between alcohol use and paid employment among mothers may be due to the weaker influence of FRI among (full-time) working mothers. Consequently, the study found an interaction between the level of paid employment and the number of children among mothers. Mothers in paid employment, especially full-time working mothers, failed to benefit from the protective effect of having more children at home and consequently reported larger quantities per day. This interaction suggests that maternal responsibilities may protect from alcohol use but can turn into a detrimental triangle if mothers are additionally in paid employment, as suggested by the multiple burden hypothesis. Nevertheless, this interaction is the only indication of an increase in maternal alcohol use related to a possible burden linked to multiple roles. Against this background, it is important to assess how combining paid and unpaid labour affects women, and how this varies according to socio-economic conditions.<sup>20,21</sup> Previous studies have concluded that among women who are employed, the inequality of household chores can lead to role overload.<sup>31,32,33</sup>

This study faced some limitations. Due to the cross-sectional design, no conclusions about the causal relations between family life and alcohol use can be drawn. It may be that those respondents with higher alcohol consumption have always made a limited contribution to family life or that those with limited support increase their alcohol use. In addition, the dichotomized measures on household chores and child-care duties used in this study only allow very general comparisons between men and women's participation to be drawn. Future studies should try to gauge household tasks in a more comprehensive and detailed manner.

To conclude, the results of this study suggest a clear differentiation between male and female gender roles among parents living in Switzerland. Although the parental role had a protective impact on fathers' drinking,<sup>12,13</sup> none of the specific factors of the parental role considered in the study influenced paternal alcohol use. The study provided further evidence that maternal responsibilities *per se* may protect from alcohol use but can turn into a detrimental triangle if mothers are additionally in paid employment. Facilitating the combination of paid employment and maternal responsibilities may help women counterbalance the demands of both roles. Therefore, investment in affordable and sufficient child-care places, paid absences from work when children are sick and an increased acceptance of paternal involvement in child care such as the possibility of reducing working hours in early childhood, will decrease the alcohol use of those women.

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- It is important to assess how combining paid and unpaid employment affects women, and how this varies according to socio-economic conditions as inequality of household chores can lead to role overload among mothers in paid employment.

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## Key points

- In Switzerland, FRI have protective effects on women's alcohol use.
- Full-time working mothers failed to benefit from the protective effect of having more children at home, and consequently reported higher quantities per day. This suggests that maternal responsibilities *per se* may protect from alcohol use but can turn into a detrimental triangle if mothers are additionally in paid employment.

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## Does the prevention paradox apply to various alcohol habits and problems among Swedish adolescents?

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**Background:** The prevention paradox states that a majority of alcohol-related problems in a population come from moderate drinkers because they are more numerous than heavy drinkers, although the latter have a higher individual risk of adverse outcomes. We examined the extent to which the prevention paradox applies to the relationship between alcohol consumption, heavy episodic drinking (HED) and alcohol-related problems in adolescents; an area in which studies are lacking. **Methods:** A total of 7288 alcohol-consuming adolescents aged 13–17 years were examined. The proportions (%) of problems related to drinking measures [the upper 10% and bottom 90% of drinkers by annual alcohol intake, and those with frequent (monthly), less frequent, and no heavy drinking episodes] were calculated. **Results:** The bottom 90% of consumers by annual intake accounted for a large majority of the alcohol-related problems among boys and girls at all ages. The share of problems accounted for by monthly HEDs increased with age, from ~10% among those aged 13 years to >50% among those aged 17 years. Attributable proportions for the top 10% alcohol consumers ranged between 22% and 37%. **Conclusions:** Our analyses suggest that the prevention paradox is valid for adolescent boys and girls aged  $\geq 15$  years and applies to a large range of alcohol-related problems of varying severity. Our results imply that not only that prevention directed at all adolescents is essential, but also that HED should be particularly noticed.

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### Introduction

Two different, but not mutually exclusive, approaches to prevention in the alcohol field can be taken: a high-risk strategy and a population strategy.<sup>1–5</sup> A high-risk strategy aims at reducing consumption and problems by targeted interventions towards a small group of individuals who are at an increased risk, while a population strategy aims at reducing consumption and problems by interventions directed at the general population. It is in the latter case that the validity of the prevention paradox is of particular relevance. That is, the notion that, although those individuals at highest risk may be responsible for a large number of problems per person, they may yet only account for a minor fraction of the overall number of problems, simply because they are relatively few.<sup>6</sup> Most of the problems, then, can be attributed to the vast majority of the drinkers, those at low or moderate risk of subsequent problems, supporting general population prevention efforts.

The validity of the prevention paradox among adult alcohol consumers first gained support with respect to accidents, injuries and social alcohol-related problems (e.g. relationships) where the association between consumption and problems tends to be fairly straightforward.<sup>3,7</sup> Hence, from a public health point of view, prevention strategies aimed at the entire adult population of drinkers may prove more effective for most alcohol-related problems, as compared with strategies aimed only at a small, high-risk sub-population.<sup>7</sup> However, analyses have shown that the majority of problems may occur in relation to heavy drinking occasions, and that the number of people with heavy drinking occasions is larger among low-moderate consumers than among heavy consumers.<sup>3,5,8</sup> This has been called the ‘second-order prevention paradox’.<sup>3,5</sup>

The scientific literature on the prevention paradox is limited; the number of empirical studies is rather small and the findings are not entirely consistent. The scientific debate is also, to some extent, blurred by different uses of concepts<sup>9</sup> and—more importantly—studies on adolescents, a main target group for prevention, are lacking. The proportion of ‘a small group of high-risk individuals’, a key concept, has been operationalized quite differently in previous empirical studies, varying between 5% and 35%, although 10% is commonly reported.<sup>9</sup> Obviously, the likelihood of finding empirical support for the validity of the prevention paradox rests upon the relative size of the high-risk group. From a practical prevention point of view, it seems unlikely that targeted individual strategies can be delivered effectively to, say, >5–10% of the general population. Although adolescents often are the prime group for prevention efforts, to our knowledge, there is only one study examining the validity of the prevention paradox in relation to adolescents. Weitzman and Nelson<sup>10</sup> reported support for the prevention paradox in 49 163 college students in the USA. However, the authors did not present data for consumption levels or for different ages, or for young men and women separately. Hence, there is a need for age- and gender-specific analyses of the prevention paradox among adolescents.

Accordingly, the aim of the present study is to examine the validity of the prevention paradox in both annual alcohol consumption and (frequent) heavy episodic drinking (HED), and different alcohol-related problems among adolescents. Our research question was: is the prevention paradox valid for adolescents, irrespective of drinking patterns, gender, age and kind of problem?