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1

2 **Perceived parental alcohol problems and drinking patterns in youth: a**
3 **cross-sectional study of 69,030 secondary education students in**
4 **Denmark**

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7

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DRAFT

1 **Abstract**

2 The aim of the study was to examine whether young people with parental alcohol problems have
3 different drinking patterns than those without parental alcohol problems. Further, we examined
4 whether the association between parental alcohol problems and young people's drinking patterns
5 differed depending on the gender of the child and the parent, and whether more severe parental
6 alcohol problems and cohabitation with the parent with alcohol problems was associated with
7 earlier and heavier drinking patterns..

8 Data came from the Danish National Youth Study 2014, a web-based national survey. 75,025 high
9 school and vocational school students (15-25 years) participated. Drinking patterns were
10 investigated by the following outcomes: non-drinking, weekly alcohol consumption, frequent binge
11 drinking, and early intoxication debut age. The main predictor variables were perceived parental
12 alcohol problems, gender of the parent with alcohol problems, cohabitation with a parent with
13 alcohol problems and severity of the parents' alcohol problems.

14 Young people with parental alcohol problems had a higher weekly alcohol consumption (boys: 15.2
15 vs. 13.9 drinks per week; girls: 11.6 vs 10.2 drinks per week), higher odds of early intoxication
16 debut age (boys: OR= 1.68 [95%CI 1.50-1.89]; girls: OR 1.95 [95%CI 1.79-2.14]), and more
17 frequent binge drinking (boys, OR=1.16 [95%CI 1.04-1.29]; girls, OR=1.21 [95%CI 1.11-1.32])
18 compared to young people without parental alcohol problems.

19 In conclusion, this study shows that young people with perceived parental alcohol problems have an
20 earlier intoxication debut age, binge drink more frequently, and drink larger quantities per week
21 than young people without perceived parental alcohol problems.

1 **Introduction**

2 The heritability of alcohol use disorders is well documented and there is strong evidence indicating
3 that children of parents with alcohol use disorders are between 2 to 10 times more likely to develop
4 alcohol use disorders than other adults [1-11].

5 Many existing studies on parental alcohol problems and drinking patterns among their
6 children have largely been based on severe and often clinical cases of parental alcohol problems [5,
7 6, 8, 15], such as alcohol use disorders. The selection of more severe cases may have led to an
8 overestimation of adverse consequences. More studies based on the general population are needed
9 in order to generalize clinical results and expand the existing knowledge of the consequences of
10 parental alcohol problems on drinking patterns among young people.

11 In Denmark, it has been estimated that 9,5% of children aged 0-18 years grow up in
12 families with alcohol problems [12]. Given the high prevalence of children with parents with
13 alcohol problems gaining insight into the heritability of unhealthy drinking patterns is an important
14 public health and prevention issue.

15 It is unclear whether gender differences are important in relation to the effects of
16 parental alcohol problems and children's drinking patterns [5, 8, 13-17]. Studies have suggested that
17 children are more likely to imitate the drinking of the same-sex parent and that girls are more
18 vulnerable to parental alcohol problems than boys [8, 16, 17]. For example, Haugland et al. [14]
19 found that fathers' alcohol problems were associated with higher alcohol consumption among both
20 boys and girls, whereas mothers' alcohol problems were associated with lower odds of high alcohol
21 consumption among boys. Pearson et al. [15], in a study of college students, also found a consistent
22 pattern indicating that mothers' alcohol problems were significantly, more strongly associated with
23 more alcohol use and alcohol-related problems among girls but not boys. However, previous
24 findings lack consistency. For example, Lieb et al. [5] found no difference between boys and girls,
25 but found that mothers' alcohol problems affected the transition from occasional into regular
26 alcohol use, whereas fathers' alcohol problems also increased the risk of transition from regular into
27 hazardous use in their children. Therefore, to improve the understanding of the relationship between
28 parental alcohol problems and drinking patterns among their children, studies that include
29 information on the gender of the parents and children are required.

30 Previous research has also suggested that the association between parental alcohol
31 problems and drinking patterns in the child might depend on whether or not the child lives with the
32 parent with alcohol problems [18] and whether both parents have alcohol problems [5, 15, 19].

1 Though most studies have found evidence of imitative transmission of drinking
2 patterns from parents to children [1-9, 20, 21], aversive transmission has also been found among
3 young people with parents with alcohol problems [14, 17, 22]. Some young people with parental
4 alcohol problems may choose to reduce their drinking or abstain completely in order to avoid the
5 negative consequences of alcohol use observed in their parents [14, 22]. Hence, parental alcohol
6 problems may have bidirectional effects on children's drinking, leading to more risky drinking
7 patterns in some and less drinking or non-drinking in others.

8 The present study aimed to examine whether young people with perceived parental
9 alcohol problems have different drinking patterns than those without perceived parental alcohol
10 problems. We also examined whether the association between parental alcohol problems and young
11 people's drinking patterns differed depending on the gender of the child and the parent, and whether
12 more severe parental alcohol problems and cohabitation with the parent with alcohol problems was
13 associated with earlier and heavier drinking patterns.

1 **Method**

2 **The Danish National Youth Study 2014**

3 The data came from the Danish National Youth Study 2014, a national survey of 75,853 high school
4 and vocational school students. The Danish National Youth Study was conducted with the aim of
5 investigating health, health behavior and mental health among young people in secondary education
6 in Denmark. In spring 2014 all of Denmark's 137 general high schools and the 12 largest vocational
7 schools were invited to participate. School participant proportion was 87% among high schools and
8 83% among vocational schools. In high schools, students in all grades and classes were invited to
9 participate (N=83,751), while only students in basic courses at vocational schools were invited
10 (N=7,527). Individual participant proportions were 84% for students in high schools and 69% for
11 vocational school students. Data was collected from January to November 2014. Teachers gave
12 students a code for accessing the electronic survey. Students answered the electronic questionnaire,
13 which consisted of a total of 380 questions, in class during one to two lessons lasting 45 minutes
14 each. Participants older than 25 and younger than 15 years of age (N=828) and participants with
15 missing data on perceived parental alcohol problems (N=3,081), perceived ethnicity (N=1,031),
16 financial strains in the family within the last year (N=1,151), parental separation within the last year
17 (N=104), and family fragmentation (N=679) were excluded from all analysis. After excluding
18 missing on the outcomes, the study population was respectively 68,418, 68,491, and 69,030, in
19 analysis of non-drinking/weekly alcohol consumption, frequent binge drinking and early
20 intoxication debut age as the outcome.

21

22 **Measures**

23 Perceived parental alcohol problems

24 Parental alcohol problems were self-reported by young people and indicated through the question
25 "Does anyone in your immediate family have alcohol problems?" The possible responses were "no,
26 no one," "mother," "father," "step-parent," "siblings," or "other adults."

27

28 Parental alcohol problems

29 An overall variable indicating if participants perceived any parent (mother/father/step-parent) to
30 have alcohol problems (yes/no) was constructed.

31

32 Parent with alcohol problems

1 Based on the same question, a variable was coded to distinguish between the alcohol problems of
2 mothers, fathers, step-parents or both parents.

3

4 Cohabitation with parent with alcohol problems

5 To examine the role of cohabitation with parents with parental alcohol problems, a variable was
6 coded to differentiate between those living with and without the parent with perceived alcohol
7 problems.

8

9 Insecure due to parents' drinking

10 To study the severity of parental alcohol problems, participants who had previously answered that
11 they had a parent with alcohol problems were asked whether they "had ever felt insecure because
12 their mother, father, or step-parent was affected by alcohol?" The possible answers were: "no,
13 never," "yes, sometimes," and "yes, often."

14

15 Yelling or scolding due to parents' drinking

16 Participants were also asked if they "had ever been yelled at or scolded because their mother, father,
17 or step-parent was affected by alcohol?" The possible answers were: "no, never," "yes, sometimes,"
18 and "yes, often."

19

20 Drinking patterns

21 Drinking patterns among young people with perceived parental alcohol problems were measured in
22 terms of four different outcomes: 1) non-drinking 2) weekly alcohol consumption, 3) frequent binge
23 drinking, and 4) early intoxication debut age.

24 Non-drinking

25 *Non-drinkers* were defined as those who answered that they never drank alcohol on weekdays or at
26 weekends and those who answered they did not drink any alcoholic drinks during a typical week.

27 Non-drinkers were given the value 0 in the weekly alcohol consumption sum score.

28 Weekly alcohol consumption

29 Participants were asked how many alcoholic drinks (12 grams of pure alcohol) they normally drank
30 each day in a typical week. A *weekly alcohol consumption* score was calculated using the sum of
31 alcoholic drinks consumed on each of the weekdays.

1 Frequent binge drinking

2 Participants were asked how many times within the last 30 days they had consumed 5 or more
3 alcoholic drinks on one occasion. *Frequent binge drinking* was defined as having consumed more
4 than 5 alcoholic drinks 4 or more times within the last 30 days. Non-drinkers were all added to the
5 infrequent binge-drinking group in this variable. The cut-off point was chosen in order to
6 distinguish those with more extreme binge drinking patterns from what is normal in Danish youth
7 drinking culture [23-27].

8 Early intoxication debut age

9 To measure intoxication debut age, participants were asked how old they were the first time they
10 had got drunk. *Early intoxication debut age* was defined as having been intoxicated by alcohol
11 before the age of 14. A debut age of 14 years or younger has previously been associated with heavy
12 drinking later in life [28, 29].

13 **Statistical analysis**

14 Statistical analyses and data processing were performed using STATA 14. Zero inflated negative
15 binominal regression was used in the models where weekly alcohol consumption was the outcome.
16 Weekly alcohol consumption was non-normally distributed with excessive zeros. The Vuong test
17 showed that a zero inflated negative binominal model was preferred to a standard negative
18 binominal regression model. The zero inflated negative binominal regression model simultaneously
19 tested whether young people with perceived parental alcohol problems were more likely to be non-
20 drinkers and whether those who did drink had a higher weekly alcohol consumption compared to
21 young people who did not perceive their parents to have alcohol problems. Multiple logistic
22 regression modelling was used to test whether young people with perceived parental alcohol
23 problems were more likely than young people without perceived parental alcohol problems to have
24 had an early intoxication debut age or to frequently binge drink. For each of the four outcomes,
25 separate regression models were performed with the following exposure variables: parental alcohol
26 problems, parent with alcohol problems, cohabitation with parent with alcohol problems, insecurity
27 due to parents' drinking, or yelling or scolding due to parents' drinking.

28 All models were adjusted for covariates hypothesized to be potential confounders: age
29 (categorical <16, 16, 17, 18, 19, ≥ 20 years of age), perceived ethnicity (Danish/ Danish and other/
30 other ethnicity than Danish), family fragmentation (living alone/living with both parents/living with
31 one parent: mother or father), parents' separation within the last year (parents moved apart: yes/no)

1 and financial strains in the family within the last year (parents had difficulties paying the bills:
2 yes/no). Ethnicity and family situation (fragmentation, separation and financial strains) have been
3 shown to be associated with alcohol problems [30-33] and to affect drinking patterns among young
4 people [33-35].

5 Likelihood ratio test was used to test a model including interaction between parental
6 alcohol problems and child's gender against a model without interaction, as well as a model
7 including interaction between child's gender and which parent who had the alcohol problem against
8 a model without interaction. Chi-squared test was used to test differences with regard to which
9 parent was perceived to have alcohol problems and living status. Dose-response trends in the
10 associations depending on the severity of parents' alcohol problems were tested by including the
11 severity variables continuously.

12

DRAFT

1 **Results**

2 **Study population characteristics**

3 The study population included 69,030 young people in high schools and vocational schools (table
4 1). More girls (8.0%) than boys (5.8%) reported parental alcohol problems.

5 **Non-drinking**

6 Compared to girls without parental alcohol problems, girls with parental alcohol problems had
7 lower odds of being non-drinking (OR= 0.76 [95% CI 0.66-0.88]), whereas for boys no association
8 was found (OR=0.97 [95% CI 0.83-1.14]) (table 2). Fathers' alcohol problems were inversely
9 associated with non-drinking among girls (OR=0.75 [95% CI 0.63-0.88]) compared to girls without
10 parental alcohol problems.

11 **Weekly alcohol consumption**

12 Mean weekly alcohol intake among boys with and without parental alcohol problems was,
13 respectively 15.2 drinks [95% CI 14.4-16.0] and 13.9 drinks [95% CI 13.6-14.2] (table 3). Girls
14 with parental alcohol problems also drank more on average than girls without parental alcohol
15 problems (11.6 [95% CI 11.2-12.0] vs. 10.2 [95% CI 10.1-10.4] drinks per week). The log-
16 likelihood ratio test showed no differential association between the child's gender and parental
17 alcohol problems in the association with mean weekly alcohol intake (p=0.399). The log-likelihood
18 ratio test showed a significant interaction between the child's gender and which parent who had the
19 alcohol problem (p=0.003). However, the chi-squared test found no statistically significant different
20 association between mothers' and father's alcohol problems, neither among boys (p=0.456) nor
21 girls (p=0.058), in the stratified analysis. Girls who lived with the parent with alcohol problems
22 drank significantly more than girls who lived without the parent with alcohol problems (p=0.001).
23 This was not found for boys (p=0.228). A trend was identified between a higher frequency with
24 which boys and girls had felt insecure or been yelled at or scolded because of their parents' drinking
25 and a higher mean weekly alcohol consumption (test for trend p<0.001).

26 **Frequent binge drinking**

27 Young people with parental alcohol problems had higher odds of frequent binge drinking than those
28 without parental alcohol problems (boys, OR=1.16 [95%CI 1.04-1.29]; girls, OR=1.21 [95%CI
29 1.12-1.32]) (table 4). The log-likelihood ratio test found no interaction between child's gender and
30 parental alcohol problems (p=0.241) or child's gender and which parent had alcohol problems

1 (p=0.354). Among girls, fathers' (OR=1.25 [95%CI 1.13-1.38]) and step-parents' (OR=1.40
2 [95%CI 1.07-1.82]) alcohol problems were associated with frequent binge drinking, but not
3 mothers' alcohol problems. No difference was found in the association among either boys or girls in
4 relation to whether or not they lived with the parent with alcohol problems. Test for trend showed
5 that the more often boys and girls with parental alcohol problems felt insecure or were yelled at or
6 scolded because their parents were affected by alcohol, the higher the odds of frequent binge
7 drinking.

8 **Early intoxication debut age**

9 Seventeen percent of boys and 12 percent of girls without parental alcohol problems had been
10 intoxicated by alcohol before the age of 14 (table 4). Among young people with parental alcohol
11 problems, this was the case for 32 percent of boys and 28 percent of girls. Parental alcohol
12 problems were associated with higher odds of early intoxication debut age (boys: OR=1.68 [95%CI
13 1.50-1.89] and girls OR=1.95 [95%CI 1.79-2.14]). A statistically significant interaction between the
14 child's gender and parental alcohol problems was found in the association with early intoxication
15 debut age (p=0.002). Log-likelihood ratio test also showed a significant interaction between the
16 child's gender and which parent who had the alcohol problem (p=0.027). However, the chi-squared
17 test did not find that the association with early intoxication debut age was different depending on
18 whether it was the mother or father who had alcohol problems, neither among boys (p=0.769) nor
19 girls (p=0.166). Boys (OR=1.99 [95%CI 1.67-2.36]) and girls (OR=2.39 [95%CI 2.10-2.72]) who
20 lived with the parent with alcohol problems had higher odds of early intoxication debut age
21 compared to boys (OR=1.46 [95%CI 1.26-1.70]) and girls (OR=1.70 [95%CI 1.52-1.91]) who lived
22 without the parent with alcohol problems. The more often boys and girls with parental alcohol
23 problems felt insecure or were yelled at or scolded because their parents were affected by alcohol,
24 the higher the odds of early intoxication debut age.

25

1 **Discussion**

2 In this study of 69,030 young people, we found that young people with parental alcohol problems
3 have an earlier intoxication debut age, binge drink more frequently, and drink larger quantities per
4 week in comparison to young people without parental alcohol problems. Girls with parents with
5 alcohol problems were more likely than boys with parents with alcohol problems to have had an
6 early intoxication debut age, whereas no significant gender differences were found for mean weekly
7 alcohol consumption and frequent binge drinking. Given that neither boys nor girls with parental
8 alcohol problems had higher odds of non-drinking, we did not find support for the theory of
9 aversive transmission of drinking patterns. In fact, our study showed that girls with parental alcohol
10 problems had lower odds of non-drinking than girls without parental alcohol problems. The Danish
11 drinking culture is characterized by very few abstainers [30], which could influence our ability to
12 replicate previous findings of aversive transmission.

13 Although our study design prevents us from drawing casual inference from our
14 results, they are in line with previous findings of imitative transmission of parents' drinking patterns
15 [20]. Many studies have found at least two to three times increased risk of alcohol problems in
16 adulthood for children with alcohol-dependent parents compared to children of parents without
17 alcohol dependence [8, 11, 36], which could probably be explained partly by a mechanism of
18 genetic heritability and partly by environmental factors [37]. Family, twin, and adoption studies
19 have shown that genetic factors account for approximately 50-60% of causality of alcohol
20 dependence [9, 10, 37-40], although no single "alcohol-gene" has been identified. However,
21 environmental factors in relation to the parent-child relationship and parenting have also been found
22 to be important in relation to drinking patterns in adolescence [3, 18, 41]. Parents with alcohol
23 problems not only provide models for drinking and may provide easier access to alcoholic
24 beverages, they may also be impaired in their ability to monitor their children's behavior [42]. Low
25 levels of monitoring may facilitate more opportunities for offspring to establish risky drinking
26 patterns.

27 Generally, we found no evidence of difference depending on whether the parent with
28 the alcohol problem was the mother or the father. The only exception was that mothers' alcohol
29 problems were not associated with frequent binge drinking among girls. In contrast, Haugland et al.
30 found higher levels of alcohol consumption among boys and girls when their fathers had alcohol
31 problems, while mothers' alcohol problems were associated with lower levels of alcohol
32 consumption among boys but not among girls [14]. Our analyses of weekly alcohol consumption

1 support the direction of their findings, although we did not find the differences between mothers'
2 and fathers' alcohol consumption to be statistically significant.

3 Whether the young person lived with or apart from the parent with the alcohol
4 problems seemed to be important only with regard to early intoxication debut age, as well as weekly
5 alcohol consumption among girls but not boys. As outlined in Social Learning Theory [43], the
6 effects of parental alcohol use are likely to occur through children's direct observation of parents
7 drinking, as well as the transmission of values and norms regarding alcohol use. These results could
8 possibly be explained by a family norm of acceptance of heavy drinking and easy accessibility to
9 alcohol in the home, which could encourage young people to experiment early with alcohol and
10 possibly engage in heavy drinking [41]. It is unclear why cohabitation with parents with alcohol
11 problems would be associated with the weekly alcohol consumption among girls but not boys.
12 However, the finding is supported by Cleveland et al. 2014, whose cross-sectional study of 245
13 non-college-attending emerging adults showed that mothers' drunkenness was associated with
14 drunkenness among their living-at-home girls but not boys.

15 More frequent episodes of feeling insecure and being yelled at or scolded by drunk
16 parents were associated with higher weekly alcohol consumption, higher odds of frequent binge
17 drinking and early intoxication debut age among boys and girls, as well as lower odds of non-
18 drinking among girls but not boys. If young people who reported often feeling insecure or being
19 yelled at or scolded had showed higher odds of non-drinking and lower levels of drinking, this
20 could have supported the theory that young people who have witnessed the negative effects of
21 alcohol in their parents might as a consequence drink less. However, none of our results support the
22 hypothesis of aversive transmission of drinking behavior.

23 The large survey sample is one of the main strengths of our study. It also enabled the
24 study of separate associations for the alcohol problem of mothers, fathers, step-parents, and both
25 parents and the drinking pattern of young people, which can be difficult with the lower statistical
26 power of smaller sample sizes.

27 Parental alcohol problems were self-reported by the young people and therefore
28 express their perception of whether their parents' alcohol use can be characterized as problematic.
29 The approach gives unique insight into the prevalence of perceived parental alcohol problems and
30 the association with risky drinking patterns in youth that could not have been obtained via registers
31 or in clinical studies.

32 Selection bias due to non-participation is assumed to be limited because of high

1 (83%). participation proportion. By inviting all students in a class to participate, all students present
2 that day completed the survey, unless they refused to be part of the study. However, it cannot be
3 excluded that individuals who were more severely affected by parental alcohol problems may not
4 meet the requirements for admission to high school or vocational schools, or the family alcohol
5 problems might have prevented them from attending school on the day of the study. This could lead
6 to an underrepresentation of young people with parental alcohol problems. Despite the fact that our
7 study sample is not representative of all young people in Denmark, it does represent a considerably
8 large proportion of Danish adolescents (66% of all high school students and 11% of vocational
9 students in basic courses in Denmark) and can therefore be considered representative of secondary
10 education students in Denmark [44].

11 In addition to the cross-sectional design that excludes causal interpretations, some
12 limitations of this study should be noted. Given that data came from the Danish National Youth
13 Study 2014, all measures were self-reported. Parental alcohol problems were measured by a single
14 question and no information on duration and severity of parents' current alcohol problems was
15 collected. We did not include any information from the parents regarding their alcohol consumption
16 or their own perception of whether they themselves had alcohol problems. Neither was any kind of
17 objective classification used to assess whether the parents were alcohol dependent or heavy
18 drinkers. Children of parents with alcohol problems have been found to be loyal to their parents and
19 since alcohol problems are generally a subject of taboo [45], underreporting of parental alcohol
20 problems is likely to have occurred. Furthermore, there could be problems with the temporality of
21 the exposure and outcome measures. Participants could, in theory, have had their intoxication debut
22 before parents developed alcohol problems. However we find it unlikely that participants with an
23 earlier intoxication debut age should be more likely to perceive parents to have alcohol problems,
24 than participants with a later intoxication debut age. Moreover, we know that alcohol problems are
25 often long-lasting. From registers, we know that Danish citizens who receive publically financed
26 alcohol treatment have on average had alcohol problems 11 years prior to the contact with the
27 treatment facility [46]. We therefore find it more likely that parental alcohol problems precede
28 drinking among their children.

29 It is possible that young people answer questions about their drinking patterns in a
30 way that reflects their family norms and values. Young people from light drinking families could
31 therefore be more likely to underreport their alcohol consumption, while young people from heavy
32 drinking families might be more likely to exaggerate their alcohol consumption. If this is the case, it

1 could lead to a misclassification of drinking patterns and biased results.

2 The data material made it possible to include a wide range of confounders. However,
3 adjusting for too few confounders could have caused residual confounding. Socioeconomic
4 differences in alcohol problems among adults have been found [47] and there might also be
5 socioeconomic differences in drinking patterns among young people [33, 48, 49]. Therefore,
6 socioeconomic differences might exist in the prevalence of parental alcohol problems and in
7 drinking patterns among their children. Unfortunately, measures of family socioeconomic status
8 were not available in the Danish National Youth Study 2014.

9 In conclusion, this study shows that young people with perceived parental alcohol
10 problems have an earlier intoxication debut age, binge drink more frequently, and drink larger
11 quantities per week than young people without perceived parental alcohol problems.

12 **Implication**

13 Young people with parents with alcohol problems are a high risk group for experiencing acute harm
14 from alcohol and development of alcohol problems. Effective interventions are needed to prevent
15 young people with parental alcohol problems being harmed by alcohol in youth and to counter the
16 risk of developing serious alcohol problems as adults.

17

18

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