

# To Cause Harm and to be Harmed by Others: New Perspectives on Alcohol's Harms to Others



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### ABSTRACT

**OBJECTIVE:** To examine how sociodemographic factors and alcohol consumption are related to a four-way typology of causing harm to others and/or being harmed by others' and one's own drinking.

**DATA AND METHODS:** Data from the 2011 Danish national survey ( $n = 2,569$ ) were analyzed with multinomial logistic regression.

**RESULTS:** Younger age and heavy drinking were significant correlates of both causing harm and being harmed. Women and better educated respondents were more likely to report negative effects on relationship and family from another's drinking. Better educated respondents had higher risks for work, financial, or injury harms from another's drinking. Mean alcohol consumption and risky single occasion drinking were related to both causing harm and being harmed from one's own drinking.

**CONCLUSIONS:** Drinking variables were the strongest correlates of causing harm and being harmed. Efforts to reduce risky drinking may also help reduce exposures to collateral harm.

**KEYWORDS:** alcohol-related harm, alcohol's harm to others, Denmark, general population survey, sociodemographic correlates, risky drinking

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## Introduction

In recent years, research on alcohol-related problems has shifted focus from problems suffered by the drinker to problems suffered because of the drinker,<sup>1-4</sup> that is, alcohol's harm to others (or alternatively secondhand alcohol effects, externalities of drinking, or collateral harm). One of the main findings of this recent wave of research is that it is often women who suffer the most from another's drinking within the family while men are more often the targets of alcohol-related violence and nuisance in public spaces.<sup>4-6</sup> However, what this new wave appears to have overlooked are those persons who have not only been harmed by another's drinking but also who are themselves also drinkers who have caused harm to others, and often to themselves, as well. Furthermore, it appears that, until recently, little attention has been paid to the existence of social disparities in the occurrence of collateral harms. This paper thus sets out to (1) identify those who have been harmed by another's drinking and who have also caused harm to others and/or themselves because of their own drinking and

(2) examine the socioeconomic position of such persons who report this combination of harm statuses.

Since, to the best of our knowledge, this particular combination of alcohol harm statuses has not yet been investigated, we first briefly recount research that has sought to identify the main sociodemographic correlates of those harmed by another's drinking. It is generally agreed upon that this line of recent research began with a study by Fillmore<sup>5</sup> who found that those affected by others' drinking were mainly women and younger people. Furthermore, she reported that those who experienced such harms from other drinkers also often drank more frequently themselves. Using the 2005 US National Alcohol Survey, which asked about alcohol "externalities," Greenfield et al.<sup>3</sup> found that it was those who were unmarried, older, White who had ever been a monthly heavy drinker or had experienced alcohol problems of their own who were more likely to report lifetime alcohol's harms from others (12-month harms more often were experienced by younger people). With data from a 1999 National Norwegian Survey,



Rossow and Hauge<sup>7</sup> determined that problems were more likely to be experienced by women, younger persons, those with higher education as well as those with a higher alcohol intake, more frequent episodes of intoxication, or who visited bars or restaurants more frequently. In 2004, with a Canadian national sample of adults, Kellner<sup>8</sup> reported that most of those who had experienced at least one of the six types of harms from another's drinking were younger and unmarried, but men and women tended to experience harm equally.

Very recent research has begun to explicitly address the socioeconomic correlates of collateral harm. Karriker-Jaffe and colleagues examined neighborhood-level disadvantage in relation to collateral alcohol harm while adjusting for individual socioeconomic status (SES).<sup>6</sup> In addition to finding gender differences for various kinds of harms, the authors also found at the individual level that the unemployed were more likely to experience harms and that those with higher incomes were less likely to. Overall, area-level deprivation was associated with higher rates of harm. In general, though previous research that has reported an association between SES and alcohol-related problems has shown mixed results, some studies have found that higher educated persons more often report being harmed, whereas other studies found that those of lower SES experience harm more often than those of higher status, and still others found no association between SES and alcohol-related problems. For instance, Rossow and Hauge<sup>7</sup> using cross-sectional survey in the Norwegian population found that social harms from others' drinking were most often reported by individuals who reported high education. However, using Canadian general population survey data, Room et al.<sup>9</sup> found that the likelihood to report alcohol-related harm was lower for those with a postsecondary education. Furthermore, alcohol-related hospitalization and mortality were found to be higher among lower educational and social class categories in Finland.<sup>10,11</sup> A study in New Zealand conducted by Huckle et al.<sup>12</sup> has shown that SES was not associated with alcohol-related consequences once drinking patterns were controlled for. Similarly, Kellner<sup>13</sup> has reported that levels of education and income were not significantly associated with the likelihood of alcohol-related problems. In contrast, with regard to alcohol-related problems in general, there is a rather large and more consistent literature confirming that among high-income societies those who report alcohol-related problems tend to be persons of lower education and of lower SES in general.<sup>14-17</sup>

One reason for the lack of concordance in previous research with regard to SES and collateral harm could be attributed in part to the various types of harm measures that have been employed. Briefly, one can generally divide measures of alcohol's harm to others into two broad categories. The first includes questions that concern harm caused by unknown persons and occurring in more or less public spaces. A well-known instrument used for this is a seven-item questionnaire originally used in Nordic surveys of the 1980s.<sup>18,19</sup> The second

category concerns various types of questions relating to harm caused by persons known to the survey respondent (friends, family, colleagues). This category may be further divided into questions that ask the respondent about a specific person and the harm that person has caused. An example of this is what could be called the "heavy drinkers in your life" question battery. Research using this approach has been conducted by projects in Australia<sup>1</sup> and New Zealand.<sup>20</sup> An important concern involved in the choice of survey instrument is of course time and space in survey instruments for posing such questions. What might have been the ideal set of questions for a particular research aim may not always have been possible because of time and financial restrictions.

Turning to the prevalence of alcohol's harms to others in Denmark, preliminary research has revealed findings<sup>21</sup> similar to those recounted here, that is, heavy drinking was significantly associated with experiencing harm from another's drinking, as noted earlier by Fillmore<sup>5</sup> and Greenfield et al.<sup>3</sup> This recurring association has thus led us to raise the question as to whether those who report being harmed by another's drinking and who also are heavy drinkers themselves are also more likely to cause harm to others and themselves than moderate drinkers. Until now, alcohol research has primarily examined alcohol-related problems of either the drinker or, more recently, of the other. But it is not clear who are those who both cause harm and have been harmed. This avenue of research might reveal new clues as to how to approach the challenges of formulating prevention policies for collateral harm.

To better understand the relationship between causing harm and being harmed, we have developed a four-way typology that captures the four different possibilities of harming due to one's own drinking and of being harmed by another's drinking. It consists of the following groupings: (1) causing harm and being harmed, (2) not causing harm but being harmed, (3) causing harm but not being harmed, and (4) not causing harm and not being harmed. Such a classification scheme should help to identify not only persons who report that their drinking has harmed others and themselves as well as having experienced harm from other drinkers but also those who have experienced other variations of the causing harm/being harmed combination. An example of the first category could be a male person causing harm, who engages in a barroom brawl and who hurts another drunk bar patron while becoming hurt himself (by another drunk patron). Another example could be a drunken young woman driving home from a party who runs into a car stopped at an intersection. A person who has not caused harm but has been harmed would likely include those persons whom the literature to date has identified: often women of young or middle ages. This could be a young mother who has no extra money to pay for her children's clothing because her partner has spent the family budget on alcohol. Those who cause harm but are not harmed could be heavy drinkers, perhaps family fathers who take out their frustrations on their wives or children. But as these are only plausible



examples or conjectures, the present paper aims to describe in more concrete terms not only the group least examined to date, that of the harming person who is also harmed, but also of the three other categories as well. Furthermore, we examine the socioeconomic characteristics of the members of these various groups in order to determine the presence and extent of social disparities in collateral harm in Denmark.

## Methods

**Data and measures.** Data came from a nationally representative survey of Danish residents conducted in the autumn of 2011. The survey was carried out by the Research Unit of Statistics Denmark and was financed by the Centre for Alcohol and Drug Research, Aarhus University. A sampling frame of 8,000 persons aged 15–79 years was randomly drawn from the central person registry that lists all the residents of Denmark. All potential respondents received a postal letter of invitation from Statistics Denmark that described the study and gave the recipient the website address for the Web questionnaire. One week later, a reminder letter was sent to recipients who had not yet answered the questionnaire. After another week, letter recipients who had still not answered the Web questionnaire were contacted by telephone for a telephone interview. The response rate was 64%. The final sample consisted of 5,133 respondents, 47% men ( $n = 2,422$ ) and 53% women ( $n = 2,710$ ). Of these respondents, 68% chose to fill in the Web questionnaire, while 32% were interviewed by telephone. If respondents could not speak Danish, the interview was conducted in the respondent's native language; Statistics Denmark has an extensive bilingual staff whose abilities cover the major non-European languages. Prior to the interview, oral or written consent was provided by respondents. Ethical approval was obtained from the Danish Data Protection Agency (Datatilsynet). In order to avoid fatigue in answering an extensive questionnaire, the sample was randomly divided into two halves and additional questions were posed in each half. The items on collateral harm were posed to one of these halves ( $n = 2,569$ ).

**Measures.** *Alcohol variables.* Alcohol consumption variables used in the present analysis include mean volume consumed in grams ethanol. This value was calculated from a series of beverage-specific quantity-frequency questions. In the analyses, its logarithm (base 10) was taken after adding 1 to account for nondrinkers. Also included in the analysis was a measure of risky single occasion drinking (RSOD; also known as heavy episodic drinking or binge drinking). This measure was based on a single question regarding the frequency (in days) of consuming the equivalent of five Danish standard units (12 grams ethanol) of alcohol on one occasion within the last 12 months. For this study, we collapsed the original response categories to create a dichotomous variable representing RSOD at least monthly vs. never or less often.

*Harms measures.* We used two sets of measures of harms covering four areas of problems (Supplementary Table 1 shows the original wording). The first set asked respondents whether

their own drinking had a negative effect in the last 12 months on (1) their work, schoolwork or employment opportunities, (2) financial situation, (3) marriage or partnership or relationship, and (4) family members, as well as (5) whether they had become injured as a result of their drinking. This group of problems represents a standard set of social consequences initially used in U.S. survey research over the last several decades<sup>22–24</sup> and often in international alcohol survey research.<sup>18,25,26</sup> Using Canadian survey data, Rehm et al.<sup>26</sup> tested the items and found them to have high internal consistency and homogeneity. Additionally, with a smaller sample but a larger pool of the original items representing these five problem areas, Gmel et al.<sup>27</sup> essentially confirmed the dimensionality found by Rehm et al.<sup>26</sup>

The second set of questions asked respondents whether in the last 12 months they had experienced the following problems due to another's drinking: (1) with colleagues or supervisors, (2) with their finances, (3) in their family or marriage/relationships, and (4) whether they had been injured. These items stem from a set developed initially for use in survey research in Canada,<sup>28</sup> first in 1989 and again in 1994 and 2005.<sup>13</sup> The items have been used in U.S. research as well.<sup>3</sup> Although, to the best of our knowledge, these items have not yet been tested psychometrically, they have been included in reviews as appropriate items to use in alcohol survey research.<sup>18,29</sup>

To describe how the four-way typology was constructed for each problem area, we use marriage/relationship harm here as an example. Two questions were used: (1) to measure the drinker inflicting harm: "in the last 12 months has your drinking had negative consequences for your marriage or partnership/relationship" (answered as yes/no) and (2) to measure the respondent reporting being harmed: "in the last 12 months have you had family or marriage problems because of another's drinking" (answered as yes/no). A typology variable was then constructed to reflect the four possible combinations of answers to the two questions. Thus, for each corresponding pair of harm items (eg, having harmed one's own marriage due to one's own drinking and having one's marriage harmed due to another's drinking), four possible combinations of responses were created: (1) causing harm/being harmed, (2) not causing harm/being harmed, (3) causing harm/not being harmed, and (4) not causing harm/not being harmed.

We then grouped the typologies for the four problem areas of harm (work, finance, injury, and family/partnership) into two larger harm areas by counting every individual who experienced at least once within the last 12 months: 1) harms with regard to the family and partnership or 2) all other harms (work/studies, finances, colleagues, injuries).

*Sociodemographic measures.* In the multivariable analyses, we also included control variables such as sex; age (15–29, 30–45, 46–64, and 65+ years); education (completion of up to 11 years of schooling, high school or technical school, college or university); personal income (from a low grouping of <100,000 Danish Kroner (DKK) per year to high at



≥400,000 DKK per year); occupation grouped as follows: white-collar, blue-collar, self-employed, student, apprentice, pensioner, unemployed, and other, including homemaker; civil status (married/living with partner or not); and having children under 18 years old living at home (yes/no).

In order to be more confident in the obtained results, we also controlled for survey mode as a dummy variable, as previous studies have indicated some selectivity in reporting, with younger men and more educated being more likely to answer via the Web.<sup>30</sup> Moreover, it has been shown that more alcohol-related behaviors (problems and consumption) tend to be reported on the Internet than by telephone interview.<sup>31</sup>

**Statistical analyses.** Analyses were performed using the statistical package of Stata (release 13) using weighted data. Weights were created by Statistics Denmark and are based on national distributions of age, sex, family structure, education, income, and country of origin. A multinomial logistic model was used to examine the outcome of the four possible combinations of alcohol-related harm. Two separate analyses were conducted on the two main problem areas: the first was based on harm experience in marriage/relationship and family, and the second was conducted on harms in work, finance, and injury. In both cases, the dependent variable was categorized into the four-way typology variable as described in the Measures section with the group “not causing harm and not being harmed” as reference. To assure ourselves that our typology categories were statistically robust, we tested whether each pair of categories could be combined with another to obtain more efficient estimates. The estimation command “combine” computes Wald tests of the null hypothesis that two alternatives can be combined for all pairs of alternatives.<sup>32</sup> The results indicated that all the categories were distinguishable. Furthermore, the Hausman test of the independence of irrelevant alternatives (ie, inclusion or exclusion of harm categories does not affect the odds ratios associated with the remaining categories) was not violated.<sup>32</sup> Furthermore, the pairwise correlation and variance inflation factor tests (the mean was ~2.40) did not detect multicollinearity in our models. If respondents had any missing data, they were excluded from the relevant analysis. However, the highest number of missing values for any variable was <2%, and therefore not likely to bias our results.

## Results

Table 1 presents the frequency distributions of the relevant sociodemographic and alcohol variables for the study sample. There was no statistically significant difference in age, civil status, and occupational distributions between men and women, but more women reported having a higher education and living with children under 18 years than men, whereas more men fell into the highest income category. There were almost twice as many men as women who engaged in RSOD at least monthly; men’s mean alcohol consumption was also over twice that of women. Furthermore, more men than women had to be interviewed by telephone.

**Table 1.** Descriptive statistics (percentages) of study sample (total  $n = 2,567$ ) (unweighted).

VARIABLES	MEN (n = 1207)	WOMEN (n = 1360)	P-VALUES
<b>Age (years)</b>			0.305
15–29	23.0	19.3	
30–45	25.5	26.9	
46–64	33.4	37.6	
>65	18.1	16.2	
<b>Education<sup>a</sup></b>			<0.001
Low	24.7	23.0	
Middle	41.9	32.7	
High	33.3	44.3	
<b>Income<sup>b</sup></b>			<0.001
<100,000	16.0	18.0	
100,000–199,999	18.5	23.9	
200,000–299,999	16.8	24.7	
300,000–399,999	18.3	21.2	
≥400,000	30.4	12.2	
<b>Occupation</b>			0.229
White-collar	28.0	32.5	
Blue-collar	20.4	16.7	
Self-employed	7.6	2.5	
Student/pupil	11.7	13.2	
Apprentice	2.5	0.9	
Pensioner	22.4	23.8	
Unemployed	3.2	4.2	
Other	4.2	6.2	
<b>Civil Status<sup>c</sup></b>			0.177
In a relationship	72.8	70.4	
not	27.2	29.6	
<b>Family Status<sup>d</sup></b>			0.035
Live with children	28.7	32.5	
Live without children	71.3	67.5	
RSOD (% ≥monthly)	39.7	21.0	<0.001
Alcohol consumption (mean grams ethanol per day)	17.5	7.9	<0.001
<b>Survey mode</b>			0.047
Internet	64.4	68.1	
Telephone	35.6	31.9	

**Notes:** <sup>a,b,c,d</sup>Missing data for 50, 77, 27, and 4 respondents. *P*-values are for equality of means and proportions between men and women in the study sample.

**Table 2.** Overview of frequency counts (and percentages) of causing harm/being harmed combinations (unweighted).

HARM COMBINATION	HARM INVOLVING:					
	WORK (1) n (%)	FINANCE (2) n (%)	INJURY (3) n (%)	FAMILY/PARTNERSHIP (4) n (%)	ANY OF HARMS 1 TO 3 n (%)	ANY OF HARMS 1 TO 4 (1 OR 2 OR 3 OR 4) n (%)
Causing harm/being harmed	10 (0.4)	4 (0.2)	19 (0.8)	15 (0.6)	52 (2.2)	83 (3.5)
Not causing harm/being harmed	104 (4.4)	9 (0.4)	31 (1.3)	133 (5.6)	116 (4.9)	196 (8.3)
Causing harm/not being harmed	58 (2.5)	125 (5.3)	80 (3.4)	111 (4.7)	163 (6.9)	211 (9.0)
Not causing harm/not being harmed	2185 (92.7)	2219 (94.1)	2227 (94.5)	2098 (89.0)	2026 (86.0)	1867 (79.2)
Total	2357	2357	2357	2357	2357	2357

In Table 2, an overview of the four possible harm combinations for the original single harm questions is displayed. The number of respondents who could be classified in group (1) (ie, causing harm/being harmed; top row), across all harm categories, was small (ie, 3.5% for at least one of the four harms). Approximately 8% of respondents reported that they had experienced any of the four harms due to somebody's drinking in at least one area in the last 12 months (second row). Just under a tenth reported harming themselves or harming others in at least one area due to their own drinking (third row), and almost four of five were harmed neither from someone else's drinking nor from their own drinking (bottom row). One can see that with respect to work or family problem areas, respondents more often reported being harmed than causing harm. However, more respondents reported that they harmed themselves financially or physically due to their drinking than they reported being harmed financially or injured by another drinker.

**Results of multinomial logit model.** Table 3 presents odds ratios for the multinomial logistic regressions using partnership and family harms as the outcome variable. In comparison to the reference group (those who reported neither causing harm nor being harmed), the three columns report results, respectively, for (1) those who reported both causing harm and having been harmed, (2) those who reported not causing harm but being harmed, and (3) those who reported causing harm but not being harmed.

For the first group, the only significant covariate was occupation (first data column of Table 3). The results show that those who reported themselves to be blue-collar workers, unemployed, or in the "other" employment category were more likely to report both family and relationship harm from their own drinking and from others' drinking.

With respect to experiencing family and relationship harm from another's drinking while also not causing harm (middle data column of Table 3), women were twice as likely as men to report such harm. Better educated individuals were more likely to report being harmed by others' drinking than their counterparts with lower levels of education. Regarding occupation, those in the "other" category were more likely to be harmed by another's drinking as compared to white-collar

employees. Moreover, respondents in a partnership or married had a lower risk of reporting that their marriage/partnership and families were harmed due to someone else's drinking compared to unmarried or unpartnered respondents.

Considering now those causing harm but not being harmed (compared to those with no harms at all, the reference category; third data column of Table 3), individuals aged 46–64 years were less likely to report that their partner and family relationships were negatively affected by their own drinking. Furthermore, those who reported to be unemployed were more likely to cause harm. The variable of being married or living with a partner showed that those in a relationship were more likely to cause harm to their partner and/or family relationships because of their own drinking. Mean alcohol consumption as well as monthly or more frequent RSOD were strongly associated with the causing harm (while not being harmed by others) group.

The results of the multinomial logistic regressions using combinations of harm from work, finance, and injury as an outcome variable are presented in Table 4. For the first harm combination, women again were less likely to cause and experience harm (first data column of Table 4). Also, older respondents were less likely to report that they caused harm or were harmed than those in the youngest age category. Interestingly, being a pensioner was quite strongly associated with causing and experiencing these types of harms. Furthermore, volume of drinking – but not RSOD – was positively associated with this harm category. Individuals who responded to the survey by telephone were less likely to be in this "causing harm/being harmed" group.

For the second typology combination (middle data column of Table 4), that of "not causing harm, but being harmed," the oldest individuals were less likely to report being harmed from another's drinking. Better educated individuals reported experiencing this type of harm more often than lower educated individuals. Regarding occupational status, the self-employed, students, and unemployed were all more likely to report harm from another's drinking compared to white-collar employees. Respondents who reported being married or living with a partner were less likely to report this type of harm from



**Table 3.** Multinomial logistic regression results for social characteristics associated with marriage/relationship and family harms (odds ratios, 95% confidence intervals).

	CAUSING HARM/BEING HARMED		NOT CAUSING HARM/BEING HARMED		CAUSING HARM/NOT BEING HARMED	
	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.
<b>Gender (Male = Ref.)</b>						
Female	0.81	(0.23–2.90)	2.30**	(1.38–3.84)	0.65	(0.39–1.06)
<b>Age (15–29 = Ref.)</b>						
30–45	4.07	(0.69–24.05)	1.15	(0.57–2.33)	0.73	(0.33–1.58)
46–64	1.51	(0.24–9.62)	0.84	(0.38–1.86)	0.38*	(0.17–0.82)
>64	–	–	0.31	(0.10–1.03)	0.32	(0.10–1.01)
<b>Education (Low = Ref.)</b>						
Middle	0.48	(0.11–2.13)	1.20	(0.62–2.34)	1.56	(0.88–2.79)
High	0.61	(0.12–3.18)	1.95*	(1.01–3.77)	1.31	(0.68–2.54)
<b>Income (DK Kroner; &lt;100,000 = Ref.)</b>						
100,000–199,999	1.50	(0.28–8.13)	1.41	(0.61–3.23)	1.93	(0.86–4.31)
200,000–299,999	0.45	(0.05–3.91)	1.06	(0.40–2.82)	1.06	(0.43–2.60)
300,000–399,999	0.89	(0.14–5.75)	1.24	(0.47–3.30)	1.51	(0.58–3.95)
≥400,000	0.57	(0.10–3.14)	1.71	(0.60–4.83)	1.05	(0.35–3.19)
<b>Occupation (White-collar = Ref.)</b>						
Blue-collar	10.45*	(1.59–68.52)	1.16	(0.60–2.24)	1.50	(0.72–3.16)
Self-employed	4.79	(0.34–66.90)	0.79	(0.29–2.13)	0.71	(0.19–2.61)
Student/pupil	6.86	(0.59–80.11)	2.19	(0.79–6.06)	1.14	(0.41–3.17)
Apprentice	–	–	–	–	0.63	(0.12–3.44)
Pensioner	–	–	1.34	(0.51–3.54)	1.50	(0.52–4.32)
Unemployed	22.56*	(1.98–256.52)	1.67	(0.57–4.87)	3.73*	(1.19–11.69)
Other	20.34*	(2.01–206.25)	2.20*	(1.05–4.59)	0.79	(0.24–2.60)
<b>Partnership<sup>a</sup> (Not married = Ref.)</b>						
Married/living with partner	0.99	(0.23–4.23)	0.56*	(0.35–0.90)	1.89*	(1.01–3.53)
<b>Children (None is Ref.)</b>						
Children under 18 in home	0.55	(0.14–2.18)	1.57	(0.96–2.56)	1.17	(0.64–2.15)
Log volume (grams)	2.86	(0.70–11.73)	1.47	(0.81–2.66)	4.13***	(2.15–7.93)
RSOD (≥monthly)	4.79	(0.78–29.25)	1.08	(0.62–1.90)	2.20**	(1.26–3.85)
<b>Survey mode (Internet = Ref.)</b>						
Telephone	0.23	(0.05–1.17)	0.62	(0.38–1.03)	0.29***	(0.16–0.54)
Log likelihood	–855.69					
Likelihood ratio <sup>b</sup>	40.62***					
Pseudo R2	0.14					
N observations	2208					

**Notes:** In the multinomial logistic regression, the reference group is “not causing harm/not being harmed.” <sup>a</sup>Includes single, widow, divorced, and separated. <sup>b</sup>The likelihood ratio test provides evidence supporting the inclusion of alcohol variables in the model. \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

another’s drinking (while not causing harms) compared to respondents not married or not living with a partner.

As regards the typology combination “causing harm but not being harmed,” those aged 46–64 years were less likely to cause harms in the problem area of work, finance, or injuries than the youngest age group (third data column of Table 4). Also blue-collar workers, students, and the unemployed compared to

white-collar employees were more likely to cause such harm, and those not married/not living with a partner were also more likely to occupy this category. Furthermore, both volume of alcohol consumed and RSOD were associated with causing harm. Survey administration mode was again significantly associated with reporting harm; but here it was those who answered by the internet who were more likely to report causing harm.

**Table 4.** Multinomial logistic regression results for social characteristics associated with work, finance, or injury harms (odds ratios, 95% confidence intervals).

	CAUSING HARM/BEING HARMED		NOT CAUSING HARM/BEING HARMED		CAUSING HARM/NOT BEING HARMED	
	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.
<b>Gender</b> (Male = Ref.)						
Female	0.42*	(0.18–0.98)	0.89	(0.55–1.44)	0.74	(0.46–1.20)
<b>Age</b> (15–29 = Ref.)						
30–45	0.05*	(0.01–0.45)	0.82	(0.39–1.73)	0.55	(0.26–1.15)
46–64	0.01**	(0.00–0.03)	0.63	(0.30–1.33)	0.06***	(0.02–0.19)
>64	–	–	0.28*	(0.08–0.99)	0.49	(0.11–2.30)
<b>Education</b> (Low = Ref.)						
Middle	0.64	(0.27–1.52)	5.73***	(2.29–14.37)	1.20	(0.68–2.11)
High	0.51	(0.15–1.66)	8.10***	(3.06–21.45)	0.78	(0.40–1.52)
<b>Income</b> (DK Kroner; <100,000 = Ref.)						
100,000–199,999	0.81	(0.25–2.65)	1.25	(0.52–2.99)	0.75	(0.38–1.49)
200,000–299,999	0.36	(0.10–1.31)	1.25	(0.50–3.15)	0.64	(0.26–1.59)
300,000–399,999	0.64	(0.15–2.71)	1.45	(0.57–3.68)	1.24	(0.43–3.58)
≥400,000	–	–	0.83	(0.30–2.31)	0.63	(0.20–2.01)
<b>Occupation</b> (White-collar = Ref.)						
Blue-collar	1.49	(0.35–6.32)	1.87	(0.96–3.65)	2.50*	(1.08–5.78)
Self-employed	–	–	3.68**	(1.75–7.74)	0.28	(0.04–2.22)
Student/pupil	1.03	(0.25–4.27)	3.67*	(1.33–10.16)	4.05**	(1.53–10.73)
Apprentice	0.25	(0.03–2.10)	–	–	1.46	(0.30–7.09)
Pensioner	6.63*	(1.16–38.0)	0.95	(0.34–2.65)	0.43	(0.09–1.99)
Unemployed	–	–	3.06*	(1.25–7.48)	4.62*	(1.27–16.80)
Other	0.42	(0.05–4.00)	1.52	(0.58–3.98)	0.99	(0.25–3.98)
<b>Partnership<sup>a</sup></b> (Not married = Ref.)						
Married/living with partner	0.60	(0.24–1.46)	0.44**	(0.28–0.71)	0.61*	(0.37–0.99)
<b>Children</b> (None is Ref.)						
Children under 18 in home	0.94	(0.17–5.07)	1.09	(0.66–1.82)	0.74	(0.37–1.48)
Log volume (grams)	20.07***	(6.67–60.37)	1.49	(0.79–2.83)	3.64***	(1.91–6.92)
RSOD (≥monthly)	2.51	(0.66–9.57)	0.72	(0.41–1.25)	4.59***	(2.41–8.75)
<b>Survey mode</b> (Internet = Ref.)						
Telephone	0.26**	(0.10–0.65)	1.00	(0.62–1.63)	0.56*	(0.31–0.99)
Log likelihood	–835.03					
Likelihood ratio <sup>b</sup>	80.53***					
Pseudo R <sup>2</sup>	0.31					
N observations	2208					

**Notes:** In the multinomial logistic regression, the reference group is "not causing harm/not being harmed." <sup>a</sup>Includes single, widow, divorced, and separated. <sup>b</sup>The likelihood ratio test provides evidence supporting the inclusion of alcohol variables in the model. \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

**Sensitivity analyses.** In order to feel more confident that our results were adequately robust, we repeated the analyses with various combinations of harms (the results are available upon request). We reestimated our model combining harms from work, finance, injury, and family as the outcome variable. Furthermore, we conducted an additional analysis that was stratified by gender. Overall, the results

reported above, particularly for education, relationship, drinking, and mode of survey variables were robust both to changes in specification as well as to sex-specific estimations. Finally, we reexamined our analyses using respondents who answered through the Internet only. Our results were similar to those obtained for the larger sample. The direction of associations was the same as for the larger sample, but due



to the reduced sample size, the strength of the associations was somewhat reduced.

## Discussion

The aim of the present study was to examine how sociodemographic factors and an individual's own alcohol consumption are related to each combination in a four-way harm typology that incorporates harms from others as well as harms caused by oneself. Based on data from the 2011 Danish alcohol and drug survey, we constructed a typology that comprised four possible combinations of harm due to one's own and another's drinking.

**The four-way typology.** The point of departure for this paper was to examine the group of respondents "who had harmed themselves and/or had harmed others" because of their drinking. Earlier research on those harmed by others' drinking has neglected to examine this particular status with respect to whether the harmed also do or do not cause harm to themselves or to others due to their own drinking. Owing to this gap in the research, we sought to identify them and thus developed a typology with which we could discriminate between other harm combinations as well. Such groupings as we have used may prove useful in identifying other risk groups in need of support or interventions. It turns out, however, that this is a rather small group, which represents a study limitation limiting the power to observe sociodemographic associations. Nonetheless, they have some distinctive characteristics. In regard to relationship and family harm, these respondents were either unemployed or blue-collar workers. And in regard to work/finance/injury harm, these respondents were more likely to be male, young, heavy drinkers, and already pensioned. Furthermore, these traits distinguish it from the group with the other combination that includes causing harm, ie, the group reporting to "have caused harm, but not to have been harmed." Interestingly, this latter group sets itself apart significantly by engaging in both heavy and risky episodic drinking with respect to both problem areas of harm. It is of note that these two groups that cause harm are marked by a distinct socioeconomic gradient.

Moreover, the traits of these two harming groups are quite distinct from the final group: those who reported "not causing harm, but being harmed." These respondents were mainly women for the problem area of relationship and family, younger or middle aged for the work/finance/injury harm, of middle or high education; and not in a relationship for both problem areas. Thus, here, too, we find a socioeconomic characteristic, that of higher education, that helps identify this harmed group. The information uncovered by our analyses should be a first step in assembling identifiers that could aid in the developing steps to counter collateral harm from various angles in Denmark.

**Sociodemographic characteristics and alcohol's harm to others in general.** In addition to examining the correlates of the harm combinations of our four-way typology, we also assess how our analyses contribute to the general literature

on the sociodemographic correlates of collateral harm and alcohol-related harm in general.

Interestingly, it has been reported previously that SES is not as closely related to drinking behavior in Denmark as it is in other countries.<sup>33</sup> Although personal annual income had no significant relationship to any combination of harms in the present study, there are, as we have mentioned, evidence of socioeconomic correlates of collateral harm. Also, as just mentioned above, higher education was associated with a greater likelihood to belong to the group of "not causing harm/being harmed" for all problem areas. This is similar to the findings of Rossow and Hauge<sup>7</sup> who examined collateral harm in Norway. However, it differs from the evidence reported in other studies conducted on alcohol-related problems in general. For example, Grittner et al.<sup>34</sup> have shown that less educated individuals are more likely to report external social consequences (harm from their own drinking) in comparison to better educated individuals. It will be of interest to observe whether such a relationship between harm and education holds in more recent research in other Nordic countries.

With regard to occupational status, it was most often unemployment that was more likely to be associated with causing harm. One possible explanation for our results is that unemployment may be associated with loss of psychosocial assets such as time structure, personal status, and work relationship.<sup>35</sup> As a result, this may increase vulnerability to adverse life events or destructive coping strategies. Our results on gender agree with many other studies that have found that women experience a higher risk of harms from another's drinking.<sup>4,36</sup> Furthermore, with other covariates accounted for, we found that younger respondents more often caused harm compared to older respondents, a result which has been found in many previous studies. Our results also suggest marriage or living in a relationship was protective against reporting harm from another's drinking. This is in line with Greenfield et al.<sup>3</sup> who found that married people had a lower risk of harms from another's drinking. Moreover, in our study, both mean alcohol consumption and RSOD were significantly related to the probability of causing harms in all problem areas due to one's own drinking. This is consistent with a broad and long range of previous research on alcohol-related problems, including recent studies from Switzerland<sup>37</sup> and Sweden,<sup>38</sup> which have demonstrated that higher alcohol consumption levels were positively associated with higher probabilities of experiencing alcohol-related consequences.

A final result worth reflection concerns the mode of administration of our survey. In all regression models, telephone interview as the administration mode was negatively associated with almost all of the caused harm/been harmed categories. After controlling for a variety of sociodemographics, it appears that reporting on the sensitive topic of alcohol harm might be better done over the Web than via telephone.<sup>30</sup>

The present study, of course, was marked by certain limitations. First, the study relied on self-reports of alcohol-related harms, which might lead to underreporting because



of a tendency to respond in a socially desired manner.<sup>39</sup> This was evidenced in our sample in which more harm was reported by the Internet as the mode of survey administration than by telephone interview. Second, we have analyzed cross-sectional data and can only speak of associations – not of causal relationships. Another major limitation was the small number in a group of considerable interest: those who have both caused harm and have been harmed. The use of other analytical techniques should be considered for future research (eg, case-control designs). Another limitation was that we grouped together harm categories that did not truly correspond one-to-one with causing harm and being harmed (the reader can refer to the description of the original questions in Supplementary Table 1). In other words, these were not exactly parallel questions, for example, the harm of one's drinking negatively affecting one's work or work opportunities does not correspond exactly with being harmed by the drinking of a colleague or work superior. Therefore, our results can only be regarded as rough estimates of how such relationships between caused harm and being harmed may exist in the real world. Future research could improve on this by designing new questions that have a true one-to-one correspondence in reporting the same kind of harm from the perspectives of those causing harm and those being harmed. We have proposed questionnaire items to be used for a future study in Supplementary Table 2.

We believe our paper to be the first to attempt to look in depth not only at drinkers who both cause harm to themselves and others and are also harmed by another's drinking but also at the other two possible combinations of being harmed and harming. Furthermore, we have examined the socioeconomic correlates of these harm combinations. In doing so, we hope to have contributed to a new strand of research that investigates socioeconomic differences in the experience of alcohol-related collateral harm. In future, more sophisticated analyses might be able to reveal more about these various groups and thus provide more fresh information for new and innovative intervention and prevention programs to reduce the occurrence of alcohol's harms to others.

## Conclusion

To the best of our knowledge, this paper is the first to examine the association between sociodemographic characteristics and a four-way harm typology. Our findings suggest that sociodemographic characteristics were related to experiencing harm even after controlling for alcohol intake and risky episodic drinking. Future research could improve on this by designing new questions that have a true one-to-one correspondence in reporting the same kind of harm from the perspectives of the harmer and the harmed.

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## Author Contributions

Conceived and designed the study: KB. Analyzed the data: AKS. Wrote the first draft of the manuscript: AKS, KB. Contributed to the writing of the manuscript: AKS, KB, UG, TKG. Agreed with manuscript results and conclusions: AKS, KB, UG, TKG. Jointly developed the structure and arguments for the paper: AKS, KB, UG, TKG. Made critical revisions and approved the final version: UG, TKG, KB, AKS. All the authors reviewed and approved the final manuscript.

## Supplementary Material

**Supplementary Table 1.** Questionnaire items used for construction of harmer and harmed variables.

**Supplementary Table 2.** Proposed questionnaire items used for a future study.

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