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## Exploring public preferences for alcohol risk communication

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### ABSTRACT

**Background:** Despite numerous educational initiatives, effectively communicating alcohol-related risks remains a significant public health challenge. This study investigates the sources and preferences for alcohol risk information in Poland, analyzing how these are influenced by sociodemographic factors and alcohol consumption levels.

**Methods:** Data were collected from a nationally representative sample of 2000 Polish residents aged 18–64 through face-to-face interviews. Associations with sociodemographic factors and alcohol consumption were examined using chi-square tests and regression models.

**Results:** Internet and traditional media were the most commonly used information sources, though scientific sources, while less accessed, were rated most reliable. Respondents prioritized information about health effects over conventional awareness topics like underage drinking or drink driving. While female and younger participants showed greater interest in health impacts, those from lower economic backgrounds were more concerned with workplace and driving risks. No significant correlation was found between alcohol consumption levels and information preferences.

**Conclusions:** Alcohol risk communication strategies should expand beyond responsible drinking to address broader health impacts. Messages should utilize commonly accessed information sources while considering varied information needs across different sociodemographic groups.

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### Introduction

After decades of efforts to address the structural drivers of alcohol harm, it seems widely acknowledged that restrictions on alcohol availability and affordability as well as limitations on alcohol marketing are considered the “best buys” in health policies (Babor et al., 2023; WHO, 2017). Yet, the communication of alcohol-related risks continues to pose a persistent challenge for public health experts. To this day, various approaches in alcohol risk communication have been developed globally, ranging from school education programmes, awareness campaigns to alcohol labeling. Alcohol education as a dominant measure in market-oriented alcohol policies, has been largely scrutinized by public health scholars due to its high costs and low effectiveness in reducing alcohol consumption and preventing harm (Ósterberg, 2004; Anderson et al., 2012). Furthermore, studies have reported the low effectiveness of public awareness campaigns in reducing alcohol use and alcohol-related problems (Snyder et al., 2004; Young et al., 2018). On the other hand, effective and persuasive communication strategies can lead to behavior change (Elder et al., 2004; Pettigrew et al. 2023; Quatremère et al. 2023, Wakefield et al., 2018), especially when combined with other prevention measures. Given the complexity of the issue, some evidence suggests that effective media campaigns may

raise awareness of alcohol as a risk factor for certain diseases such as alcohol-related cancers (Christensen et al., 2019; Dixon et al., 2015; Martin et al., 2018), which in turn may influence public support for policy changes (Buykx et al., 2015, 2016; Christensen et al., 2019).

Despite doubts and a lack of conclusive evidence regarding the effectiveness of alcohol education as a standalone measure, these initiatives continue to garner strong support from alcohol industry actors. Alcohol companies have consistently championed numerous educational programs in school settings and awareness campaigns as part of their corporate social responsibility initiatives, commonly targeting populations perceived as particularly vulnerable to alcohol-related risks, such as young people, pregnant women, or drivers (Babor & Robaina, 2013). However, these efforts frequently represent a narrow and industry-favored approach, positioning consumer education on “responsible drinking” as the primary solution to mitigate alcohol-related harm (Bond, et al., 2009; Maani & Petticrew, 2018; Mialon & McCambridge, 2018), while effectively overlooking the need for a comprehensive, multi-faceted approach that extends beyond individual-level interventions. The industry’s communication employing ambiguous messages like “drink responsibly” or “moderate drinking” has faced criticism for misrepresenting scientific

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evidence on alcohol's detrimental effects and promoting drinking rather than preventing harm and fostering meaningful behavior change (Mialon & McCambridge, 2018; Petticrew et al., 2016a, 2016b; Smith et al., 2006). Moreover, the alcohol industry's selective focus on measures closely aligning with its commercial interests has been widely documented. While actively promoting education programs in school settings (van Schalkwyk et al., 2022), the industry has concurrently resisted more comprehensive labelling labeling initiatives (Petticrew et al., 2016a, 2016b), reflecting a strategic approach to prioritize measures that minimize threats to its economic interests.

In the scholarship on risk perception and risk communication, it has been argued that individuals exposed to certain risks should have adequate information to manage those risks (Renn & Levine, 1991). Effective communication would deliver accurate information on alcohol-related risks while aligning with public views and expectations. This translates into a two-way model of risk communication which could encourage the engagement of interested parties and ensure equal participation of professionals and members of the public in the risk management process (Fishchoff, 2005; Wardmann, 2008). Nevertheless, to achieve the desired outcomes, alcohol risk communication, like any other lifestyle risk communication, must be substantial, comprehensive, transparent, inclusive, and built on trust (Holmes et al., 2009; Löfstedt et al., 2008; 2008; Palenchar & Heath, 2007; Renn & Levine, 1991).

People have different levels of interest in acquiring knowledge on alcohol risks. Some individuals are motivated to learn about risks, some have a passive interest in knowing but do not actively seek information, while others actively avoid potentially conflicting knowledge that may challenge or contradict their beliefs, attitudes and routines. Therefore, if the primary goal of risk communication is to provide knowledge that motivates individuals to make well-informed, healthy choices (Boholm & Corvellec, 2014), it is crucial to assess whether the content of risk information aligns with the expectations of different audience groups.

There is a notable gap in the literature concerning the effectiveness of alcohol risk communication in Poland, specifically regarding campaigns and educational efforts. This gap extends to understanding public perceptions—how people view these initiatives and what information they seek from them. Moreover, it is crucial to investigate whether individuals express a greater interest in receiving information related to the somatic and mental health consequences of alcohol consumption. This aspect has been largely overlooked in Polish alcohol prevention campaigns, which have primarily focused on targeting specific risk groups such as adolescents, drivers, and pregnant women – groups that are commonly addressed in both public and alcohol industry educational campaigns within Poland. Exploring the broader population's needs for comprehensive health information could inform more effective and inclusive prevention strategies. Taking the above into consideration, this paper aims to contribute to the field of alcohol risk communication by (i) exploring various sources of information on alcohol risks and their perceived reliability and (ii) examining the interest in learning about an alcohol-related risk in relation to sociodemographic determinants and alcohol use.

## Methods

### Data

For this analysis, a subset of data was used from a study on alcohol risk perception and risk communication in Poland (Bujalski & Stokwizewski, 2022). The primary focus of the study was to examine the public perception of alcohol harm within the context of social and cultural determinants of knowledge and attitudes toward alcohol consumption.

A nationally representative sample of households was obtained through stratified random sampling, with strata defined by province and level of urbanization, to ensure that the sample accurately reflected the actual distribution of households across the country. The last birthday method was used to select one resident from each drawn household for the survey. Households were approached in person by trained interviewers through door-to-door visits. To ensure a high response rate, each sampled address was visited up to three times. A total of  $n=2000$  study participants were recruited for face-to-face interviews. Participants ranged from 18 to 64 years of age. Among them, 50.1% were women. 25% of the respondents held a university degree. The majority of the survey respondents (87%) reported alcohol drinking in the past 12 months (Table 1). The study was conducted between August and September 2019 with an overall response rate of 58%. Study participants did not receive any financial incentives. Before implementing the study, a sample of 50 cognitive interviews was conducted to explore participants' understanding of the questions and potential difficulties in providing answers.

### Measures

Sources of knowledge on alcohol risk were measured using the question "What kind of sources of knowledge on alcohol-related risk do you use?" Respondents could select multiple options from the following list: internet sources, traditional media sources, scientific sources, and friends. All items required a "yes" or "no" answer. In the subsequent step, respondents were asked to rate the reliability of information on alcohol risks from these sources using the scale from 0 to

**Table 1.** Study sample characteristics.

		N	%
Gender	Men	998	50
	Women	1002	50
Age	18–29	447	22
	30–39	504	25
	40–49	435	22
	50–64	614	31
Education	Primary or Vocational	776	39
	Secondary	720	36
	University	504	25
Monthly household income per capita <sup>a</sup>	<1000 PLN	341	17
	1000–2000 PLN	737	27
	2000–3000 PLN	395	20
	>3000 PLN	339	17
TOTAL <sup>b</sup>		2000	100

<sup>a</sup>1EUR = ca. 4.5 PLN.

<sup>b</sup>The discrepancy in the total monthly household income figures is due to the missing values.

10, where 0 represented the least reliable source, and 10 represented the most reliable source. Similarly, the question regarding the preferred content of alcohol risk communication was formulated as follows: "Which of the following alcohol-related risks would you like to learn about?" Respondents could select multiple options from the following list: "drink-driving", "drinking during pregnancy", "underage drinking", "drinking in the workplace".

The two last items were provided with examples: "somatic health (e.g. cancer, cardiovascular diseases)", and "mental health (e.g. depression, psychosis)". This question also employed a binary response format ("yes"/"no").

### Control variables

We predicted the demand for information on alcohol-related risks, based on demographic characteristics and the amount of alcohol consumed. Data on age, gender, education, monthly household net income, and number of persons in a household were obtained from respondents during interviews. The volume of alcohol consumption was calculated using beverage-specific quantity-frequency (BSQF) and risky single occasion drinking (RSOD) methods (Sierosławski et al., 2016). The method is based on the aggregation of average consumption of three alcoholic beverage types (spirits, wine, beer) combined with risky drinking occasions during the past 12 months (drinking more than 60 grams of ethanol in a single occasion for men and more than 40 grams for women). Reported annual volume of consumed alcohol (BSQF) was adjusted to account for larger quantities consumed on single occasions (RSOD), enabling an effective estimation of total alcohol consumption. The dataset was weighted using the Central Statistical Office to eliminate the sample bias and provide that the sample was representative of the Polish adult population about gender, age, and region.

### Analysis

Chi-square tests ( $\alpha=0.05$ ) were conducted to examine the associations between key sociodemographic variables and both sources of knowledge about alcohol risk and preferences

for receiving information on this topic. To further explore these relationships, multiple logistic regression models were employed. Specifically, four logistic regression models investigated the impact of sociodemographic variables and alcohol use on the sources of knowledge about alcohol risk, while six separate logistic regression models explored the influence of these factors on the information preferences regarding alcohol risks. Additionally, a multiple linear regression model was run to assess the perceived reliability of different alcohol risk information sources based on sociodemographic characteristics and alcohol consumption patterns.

Respondents who had missing values on household income items were removed from the analysis. All statistical tests and regression models were run using the weighted data. To reduce skewness in the distribution of self-reported alcohol consumption levels, the alcohol volume was transformed into logarithmic form before entering into the model. Before performing regression analyses, we tested for multicollinearity. All correlation coefficients were below 0.4. Cook distance and leverage values were examined to identify and exclude potential confounders from the analyses.

## Results

### Sources of knowledge on alcohol risk

The knowledge of the risks associated with alcohol may come from a variety of sources. The respondents of this study most frequently obtained information on alcohol risk from internet sources (64%) (see Table 2). Traditional media platforms such as television, radio, and newspapers were also significant sources of information on alcohol risk (57%). Less frequently, individuals obtained risk information from friends (39%) or scientific publications (35%).

The results presented in Table 3 show that women did not differ from men in using specific sources of information on alcohol risk. However, being of a younger age (18–28 years old) was positively associated with using the internet (aOR = 2.57, 95% CI: 1.902–3.479) and traditional media (aOR = 1.58, 95% CI: 1.199–2.093) to learn about alcohol risks. Individuals aged 30–39 were also more likely to use internet resources than the oldest respondents (aOR = 1.65, 95% CI:

**Table 2.** Sources of knowledge on alcohol risk<sup>a</sup>.

		Internet			Media			Science			Friends		
		n	%	p-value	n	%	p-value	n	%	p-value	N	%	p-value
Gender	Men	645	64.6	0.469	529	53	0.001	347	35	0.911	365	37	0.041
	Women	632	63.1		602	60.1		346	35		411	41	
Age	18-29	344	77	<0.001	280	63	0.011	163	37	0.430	196	44	0.038
	30-39	343	68		287	57		175	35		196	39	
	40-49	246	57		245	56		137	32		150	34	
	50-64	344	56		320	52		218	36		234	38	
		459	59		416	54		226	29		290	37	
Education	Primary	479	66	0.002	415	58	0.083	261	36	<0.001	286	40	0.571
	Secondary	339	67		300	60		206	41		200	40	
	University	199	58		176	52		99	29		125	37	
Monthly household income per capita (PLN) <sup>b</sup>	<1000	467	63	0.092	423	58	0.279	261	35	0.019	294	40	0.680
	>1000–2000	263	67		225	57		134	34		154	39	
	>2000–3000	223	66		196	58		137	40		125	37	
	>3000	1277	64		1131	57		693	35		776	39	

<sup>a</sup>Chi-Square, 2-tailed tests used.

<sup>b</sup>1EUR=ca. 4.5 PLN.

**Table 3.** Multiple logistic regression models of alcohol risk information sources.

		INTERNET		MEDIA		SCIENCE		FRIENDS	
		aOR	95%CI	aOR	95%CI	aOR	95%CI	aOR	95%CI
Gender	Women	0.95	0.772-1.166	1.28	1.047-1.557	1.02	0.827-1.246	1.26	1.027-1.536
	Men (ref.)								
Age	18-29	2.57***	1.902-3.479	1.58***	1.199-2.093	0.97	0.731-1.285	1.33	1.006-1.748
	30-39	1.65***	1.261-2.155	1.16	0.896-1.501	0.92	0.703-1.199	1.04	0.800-1.353
	40-49	0.96	0.736-1.257	1.18	0.904-1.543	0.82	0.617-1.084	0.85	0.646-1.123
	50-64 (ref.)								
Education	Primary	0.80	0.618-1.044	0.84	0.655-1.083	0.65***	0.502-0.842	0.99	0.767-1.277
	Secondary	0.88	0.675-1.154	0.92	0.710-1.181	0.87	0.676-1.125	1.04	0.804-1.339
	University (ref.)								
Monthly household income per capita (PLN)*	<1000	0.72	0.511-1.007	0.73	0.529-1.019	0.69	0.494-0.976	0.92	0.660-1.290
	>1000–2000	0.92	0.689-1.220	0.94	0.712-1.234	0.85	0.646-1.125	1.07	0.813-1.416
	>2000–3000	1.05	0.762-1.453	0.84	0.617-1.139	0.79	0.576-1.077	1.00	0.733-1.364
	>3000 (ref.)								
Alcohol consumption (log)		1.07	0.980-1.173	1.13**	1.033-1.228	1.01	0.921-1.100	1.15**	1.052-1.251
Nagelkerke R <sup>2</sup>		0.057		0.022		0.018		0.018	

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 4.** Multiple linear regression results for reliability of information sources.

	INTERNET		MEDIA		SCIENCE		FRIENDS	
	B	95% CI	B	95% CI	B	95% CI	B	95% CI
Women	-0.313**	-0.542–0.084	-0.318**	-0.561–0.076	-0.662***	-0.923–0.401	-0.515***	-0.815–0.216
Age	0.018***	0.009–0.0260	0.026***	0.017–0.035	0.005	-0.005–0.015	0.026***	0.016–0.037
University education	-0.307**	-0.559–0.055	-0.135	-0.401–0.132	0.113	-0.169–0.394	-0.180	-0.514–0.154
Highest household income	-0.333*	-0.621–0.045	-0.268	-0.570–0.035	0.118	-0.197–0.433	-0.516**	-0.900–0.132
Alcohol consumption (log)	-0.032	-0.134–0.070	-0.111	-0.217–0.006	-0.042	-0.162–0.078	0.056	-0.074–0.186
R <sup>2</sup>	0.035		0.050		0.049		0.066	
F	(5. 1277) 7.845		(5. 1131) 10.121		(5. 1308) 15.854		(5. 1224) 34.278	
Mean	6.92		7.13		8.65		7.45	
Median	7		7		9		8	
SD	1.90		1.93		1.65		2.00	

\* $p < 0.05$ ; \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

1.261–2.155). It also seems that individuals with primary education turn to scientific sources less often than those with academic degrees (aOR = 0.65, 95% CI: 0.502–0.842). Those, who drink more had slightly increased odds of turning to traditional media resources (aOR = 1.13, 95% CI: 1.033–1.228), but also sought information from friends (aOR = 1.15, 95% CI: 1.052–1.251). However, there were no significant differences between the net household income per capita in the information sources preference

Interestingly, when examining the individual assessments of information source reliability, the least utilized sources – scientific ones – were deemed to deliver the most highly reliable information ( $M=8.65$ ,  $Me = 9$ ,  $SD = 1.65$ ). Overall, the investigated information sources received relatively high-reliability ratings, with friends ( $M=7.45$ ,  $Me = 8$ ,  $SD = 2.0$ ) and traditional media sources ( $M=7.13$ ,  $Me = 7$ ,  $SD = 1.93$ ) being rated favorably. The internet sources, while rated slightly lower ( $M=6.92$ ,  $Me = 7$ ,  $SD = 1.90$ ), still received moderately high-reliability assessments from the participants (Table 4).

The multiple linear regression model examined factors associated with the perceived reliability of alcohol risk information sources (Table 4). Gender emerged as the sole consistent predictor for all sources, with women perceiving the internet, media, science, and friends as less reliable compared to men. Age was also a significant factor for the internet, traditional media, and social sources like friends, where older

individuals viewed these as less reliable. However, age did not impact the perceived reliability of scientific sources. For the friends source specifically, those with higher household incomes tended to perceive it as less reliable. University education only predicted lower perceived reliability of internet sources. Notably, alcohol consumption levels did not significantly influence perceived reliability of any information source. In summary, gender was the most robust predictor, with women consistently rating alcohol risk information sources as less reliable. Age and income also played a role, but their effects varied by source type.

### Interests in receiving information on alcohol-related risks

As emphasized at the beginning of this article, understanding the specific knowledge individuals seek regarding alcohol risk is essential for professionals responsible for designing educational programs. In our study, respondents indicated their interest in receiving information on six alcohol-related risks (Table 5). The most frequently indicated issues were risks to somatic health (e.g. cancer, cardiovascular diseases) and mental health (77% and 75%, respectively), while the risks associated with drinking alcohol in the workplace were indicated least frequently (49%). Other alcohol-related problems that are usually the subject of alcohol education, such as drink-driving, drinking during pregnancy, and underage drinking, received moderate attention (53% – 61%).

Table 5. Information preferences regarding alcohol-related risks\*.

	Somatic health			Mental health			Alcohol and workplace			Alcohol and adolescents			Alcohol and pregnancy			Alcohol and Driving		
	n	%	p-value	n	%	p-value	n	%	p-value	n	%	p-value	n	%	p-value	n	%	p-value
Gender	748	74.9	0.009	714	71.5	0.002	494	49.4	0.562	591	59.2	0.085	566	56.7	0.919	576	57.7	<0.001
Women	799	79.7		777	77.5		482	48.2		631	63.0		566	56.5		478	47.7	
Age	372	83.0	<0.001	354	79.0	0.098	250	55.8	0.008	276	61.7	0.645	312	69.6	<0.001	272	60.7	<0.001
30-39	364	72.2		368	73.0		234	46.4		305	60.5		299	59.4		273	54.2	
40-49	346	79.4		316	72.6		210	48.3		276	63.3		210	48.2		210	48.3	
50-64	465	75.9		454	73.9		282	46.0		365	59.5		312	50.8		299	48.7	
Education	603	77.7	0.952	587	75.6	0.612	384	49.5	0.652	490	63.1	0.281	421	54.3	0.229	412	53.1	0.772
Primary	555	77.1		536	74.3		355	49.3		426	59.2		421	58.4		383	53.2	
Secondary	388	77.1		369	73.2		237	47.0		305	60.6		291	57.7		258	51.3	
University	255	74.8	0.035	253	74.2	0.040	192	56.5	0.012	217	63.8	0.009	199	58.5	0.353	196	57.6	0.005
Monthly household income per capita (PLN)*	583	79.1		564	76.5		350	47.5		473	64.2		426	57.8		362	49.2	
<1000 - 2000	321	81.3		300	76.1		196	49.6		236	59.7		224	56.9		229	58.0	
>2000 - 3000	249	73.7		232	68.6		151	44.5		183	54.0		178	52.5		167	49.3	
>3000	1546	77		1491	75		976	49		1222	61		1132	55		1054	53	

\*Chi-Square, 2-tailed tests used.

<sup>b</sup>1EUR = ca. 4.5 PLN.

Table 6 reports the odds ratios for multiple logistic regressions of alcohol risk information needs. Given the variables that emerged as statistically significant in this model, women were more likely to express interest in the effects of alcohol on somatic (aOR = 1.32, 95% CI: 1.036–1.677) and mental health (aOR = 1.42, 95% CI: 1.126–1.782), while they showed less interest in drink-driving issues compared to men (aOR = 0.64, 95% CI: 0.526–0.784). Younger respondents had higher odds of preferring information on somatic health problems related to alcohol (aOR = 1.76, 95% CI: 1.239–2.513) as well as issues like alcohol in the workplace (aOR = 1.71, 95% CI: 1.300–2.252), alcohol drinking during pregnancy (aOR = 2.62, 95% CI: 1.961–3.507), and drink-driving (aOR = 1.77, 95% CI: 1.339–2.343). The latter topic was also of considerable interest among individuals aged 30–39 (aOR = 1.46, 95% CI: 1.124–1.888). In terms of economic position, those with the lowest household incomes per capita showed more interest in several alcohol-related topics. The model suggests that they were more likely than those with the highest incomes to prefer information on alcohol in the workplace (aOR = 1.62, 95% CI: 1.163–2.250), underage drinking (aOR = 1.68, 95% CI: 1.163–2.250), and drink-driving (aOR = 1.68, 95% CI: 1.200–2.351). The higher odds of interest in knowledge of alcohol effects on mental health were found in the next two income categories (aOR = 1.54, 95% CI: 1.132–2.080, and aOR = 1.42, 95% CI: 1.007–1.993, respectively). Moreover, individuals in the second income category were more likely to prefer information on underage drinking (aOR = 1.61, 95% CI: 1.225–2.122). Notably, two variables, namely education level and alcohol consumption, were not found to be predictive factors for information preference.

## Discussion

The present study explored sources of knowledge on alcohol risks and information preferences regarding alcohol-related risks among the Polish population. Our findings reveal the prominence of the internet and traditional news media as the most favored sources of knowledge related to alcohol risks. Notably, the preference for internet sources was more pronounced among younger respondents, particularly those in their 20s and 30s, as well as individuals with secondary and university education levels. This finding aligns with the prevailing media usage patterns in Poland (CBOS, 2019a, 2019b), reflecting the increasing reliance on digital and online sources among younger and more educated segments of the population.

While individual social contacts based on trust play a significant role in shaping health risk perceptions (Alaszewski, 2005, 2006; Petts & Niemeyer, 2004), our study indicates that scientific sources were utilized less frequently for guiding risk judgments, but nearly as often as individual social contacts. However, scientific sources were considered the most reliable by participants, except among individuals with lower education levels. This finding suggests the need for tailored strategies to effectively engage individuals with lower education levels in risk communication processes (Gaspar et al., 2016). The prominence of knowledge sources embedded in individual life worlds (Habermas, 1987; Schutz & Luckmann, 1983),

**Table 6.** Multiple logistic regression models of information preferences.

		Somatic health		Mental health		Alcohol and workplace		Alcohol and adolescents		Alcohol and pregnancy		Alcohol and driving	
		aOR	95%CI	aOR	95%CI	aOR	95%CI	aOR	95%CI	aOR	95%CI	aOR	95%CI
Gender	Women Men (ref.)	1.32*	1.036-1.677	1.42**	1.126-1.782	0.98	0.802-1.190	1.15	0.941-1.410	1.00	0.821-1.228	0.64***	0.526-0.784
Age	18-29	1.76**	1.239-2.513	1.36	0.975-1.884	1.71***	1.300-2.252	1.28	0.966-1.699	2.62***	1.961-3.507	1.77***	1.339-2.343
	30-39	0.91	0.676-1.228	0.96	0.715-1.290	1.04	0.803-1.344	1.11	0.855-1.449	1.46**	1.124-1.888	1.27	0.978-1.643
	40-49	1.28	0.92-1.767	0.92	0.676-1.248	1.11	0.85-1.448	1.14	0.867-1.499	0.92	0.704-1.198	0.95	0.725-1.238
	50-64 (ref.)												
Education	Primary	1.16	0.853-1.567	1.19	0.886-1.589	1.08	0.841-1.388	1.10	0.846-1.416	1.00	0.778-1.294	1.10	0.857-1.419
	Secondary University (ref.)	1.04	0.763-1.406	0.96	0.718-1.283	1.05	0.818-1.353	0.90	0.692-1.158	1.02	0.785-1.315	1.03	0.796-1.322
Monthly household income per capita (PLN)*	<1000	0.98	0.664-1.446	1.40	0.960-2.029	1.62**	1.163-2.250	1.68**	1.200-2.351	1.27	0.909-1.773	1.68**	1.201-2.336
	>1000–2000	1.21	0.877-1.662	1.54**	1.132-2.080	1.11	0.842-1.452	1.61***	1.225-2.122	1.26	0.955-1.656	1.12	0.848-1.466
	>2000–3000	1.33	0.920-1.911	1.42*	1.007-1.993	1.16	0.854-1.570	1.26	0.925-1.705	1.16	0.852-1.578	1.47	1.083-2.002
	>3000 (ref.)												
Alcohol consumption (log)		1.05	0.939-1.163	1.07	0.962-1.181	1.021	0.936-1.114	0.98	0.896-1.071	0.99	0.901-1.077	1.02	0.938-1.118
Nagelkerke R <sup>2</sup>			0.023		0.073		0.025		0.020		0.051		0.047

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

such as knowledge shared in genuine social relationships, like those with friends and relatives, is particularly evident among women (Lampi, 2011) and, to some extent, among the youngest participants. This highlights the localized nature of risk perception, influenced by personal meanings and everyday narratives focused on specific aspects of risk considered relevant (Boholm, 1998). Such socially embedded knowledge sources appear to play a significant role in shaping risk perceptions, especially for women and younger individuals, underscoring the importance of considering the intricate interplay between risk communication and the lived experiences within specific social contexts.

The role of social sources in providing information about alcohol risks was also particularly important among those who engage in higher levels of drinking. Given the social nature of drinking behaviors, the influence of peers is amplified by the dynamics of social networks and contexts. Therefore, the reliance on information from friends and social sources among drinkers is largely driven by peer influence, aligning with research indicating that social networks can effectively facilitate or hinder drinking behaviors (Graupensperger et al., 2021; Reid et al., 2015). Interestingly, higher alcohol consumption was also associated with the use of traditional media as a source of information about alcohol-related risks. This observation can be attributed to the proportion of older drinkers, in contrast to younger drinkers, considering the engagement of young people in social media disseminating alcohol-related content and shaping perceptions of drinking norms (Curtis et al., 2018; Savolainen et al., 2020).

When examining the individual assessments of source reliability, women exhibited more skepticism than men, while reliability assessments generally increased with age, except for scientific sources. This finding aligns with previous research suggesting that women may exhibit a higher tendency to question or disbelieve risk information in health-related contexts (Scherer et al., 2013), including online sources and assessment tools (Fowler et al., 2017; Picardo et al., 2003). Consequently, skepticism toward tailored risk information may be more prevalent among women compared to men.

Among investigated information sources, internet sources were generally considered the least reliable, with their perceived reliability decreasing as household income and education levels increased. This observation suggests that younger individuals and those with lower socioeconomic status may exhibit a less critical attitude toward the reliability of online alcohol health-related information (Sbaffi & Rowley, 2017). In contrast, the assessments of scientific sources did not follow the same pattern based on age, education, and household income levels, potentially indicating a consistent level of trust or skepticism toward scientific information across different sociodemographic groups.

Our findings revealed notable differences in information preferences across demographic groups. Women expressed a significantly higher interest compared to men in receiving information about both the mental and somatic health effects of alcohol consumption. This observation resonates with prior research indicating that women tend to seek mental health information more frequently than men, particularly when they perceive a need for support or assistance (Freytag et al., 2023). Existing literature suggests that men are generally less likely than women to engage in help-seeking behaviors and actively search for health-related information (Baumann et al., 2017; Bidmon & Terlutter, 2015; Swami, 2012). Furthermore, the youngest respondents demonstrated a heightened interest in understanding the impact of alcohol on somatic health. Conversely, multivariate analysis underscored the importance of providing information on mental health risks, particularly among individuals from economically disadvantaged backgrounds. Interestingly, when examining the association between income and the preferred content of risk communication, no relationship was found with somatic health information.

When shifting the focus from general somatic and mental health issues to more specific alcohol risks associated with the work environment, adolescents, pregnant women, and drivers, the salience of information needs became more nuanced. Our analysis revealed no significant gender differences in the expressed interest levels, except for a noticeably lower interest among women regarding drink-driving risks.

This finding warrants further investigation, particularly when considering the intersectional nature of alcohol risk discourse. Traditionally, drink-driving has been portrayed as a predominantly male issue, contrasting with the explicit feminization of Fetal Alcohol Spectrum Disorder (FASD) diagnoses, which often place a greater emphasis on the risks associated with alcohol consumption during pregnancy.

On the other hand, individuals from economically disadvantaged backgrounds exhibited significantly higher odds of showing interest in issues related to workplace alcohol use, adolescent drinking, and drunk driving. This interest in workplace and drink-driving issues might reflect the prevalence of alcohol use in lower-paid occupations, where alcohol testing is more common compared to settings typical of white-collar or office jobs. Additionally, this pattern could indicate a higher incidence of alcohol-related harm within their social environments, which may be less prevalent among more affluent individuals. It may also suggest a distinct perception of alcohol-related problems within these communities. However, this cannot be confirmed based on the current study. Surprisingly, our analysis did not find a statistically significant effect of alcohol consumption on the preferred content of risk communication. This suggests that harmful drinkers may disregard alcohol risk information, highlighting the challenges of effectively communicating risks to this particular group.

When discussing the results of our study, several contextual factors influencing alcohol risk communication need to be considered. First, risk information provision aims to increase knowledge and raise awareness among consumers. However, during the communication process, even evidence-based knowledge and expert accounts of risk are filtered by various mediators, including media outlets, industries, institutions, and individuals. As a result, risk messages are selected, simplified, and reduced to the elements considered relevant at each step of the process. This may lead to the amplification or attenuation of risk signals (Kasperson et al., 1988; Pidgeon et al., 2003).

Second, it is essential to acknowledge that messages on alcohol risk can often be inconsistent, confusing, and even contradictory due to the alcohol industry discursive practices distorting scientific evidence on harms and promoting questionable benefits from drinking (Babor et al., 2018; McCambridge & Hartwell, 2015; Petticrew et al., 2016a, 2016b). Such conflicting information may increase uncertainty and overwhelm alcohol consumers with an overload of information.

Third, health risks communication loaded with moral concerns may lead individuals to feel guilt and blame for failing to adhere to social norms, values, and ideologies (Guttman, 2023), thereby reducing its effectiveness.

Fourth, presenting risk messages in scientific language rather than morality may not necessarily lead to a better understanding of alcohol risks and changes in drinking behavior. As our study confirms, certain groups, particularly women and young people, may prefer to rely on social sources of information rather than scientific or institutional ones. This highlights the competition between systemic knowledge embedded in risk messages and anecdotal evidence, shared experiences, and individual beliefs of affected

persons. Reluctance toward expert accounts may reflect the drawbacks of the vertical sender-receiver model of communication, including a lack of trust in expert sources and governmental risk communicators (Healy, 2001; Löfstedt & Perri, 2008; Renn, 2008; Siegrist & Cvetkovich, 2000). Additionally, it may be linked to potential difficulties in understanding expert risk messages, as they typically require a certain level of literacy and numeracy (Bodemer & Gaissmaier, 2012; Peters et al., 2006; Visschers et al., 2009, 2012). The challenge for practitioners in this regard lies not only in providing different information content but also in engaging in the communication process (Fischhoff, 2005; Löfstedt & Perri, 2008).

The role of traditional media in disseminating public health information should not be overlooked. Further research in diverse social and national contexts is essential to ascertain its impact. It is anticipated that younger audiences and women may exhibit ambivalence toward public health communications, as they often depend on social sources for information. The topics highlighted in the Corporate Social Responsibility initiatives of alcohol producers, such as drink-driving and drinking during pregnancy, tend to resonate primarily with younger individuals, who are also interested in issues frequently overlooked by the industry, such as adverse effects of drinking on somatic health or drinking in the workplace. For public health communicators in Poland, it is crucial to address mental health problems associated with alcohol consumption—a topic that is seldom discussed in public discourse. This focus is particularly timely given the increasing public awareness of mental health issues and well-being.

Such awareness presents a unique opportunity for public health decision-makers and the general public to collaboratively develop and support effective alcohol policy measures. Public attitudes toward policy can evolve with the growing body of evidence demonstrating the effectiveness of interventions (Reynolds et al., 2018, 2019). Consequently, risk communication that enhances awareness of alcohol-related risks can also bolster public support for policy measures aimed at mitigating alcohol harm (Room et al., 2005). Therefore, the objective of risk communication should extend beyond merely improving understanding of risks and promoting behavioral change among target groups. It should also serve as a mechanism to legitimize risk-related decisions and endorse effective policy measures (Renn & Levine, 1991).

While interpreting the findings of this study, it is important to acknowledge its limitations. The selection of sources of knowledge and topics of alcohol risk communication was arbitrary, which may have influenced the outcomes and interpretation. Additionally, we did not comprehensively analyze the sources of information, particularly internet sources, which can vary widely in credibility and may include both legitimate health information and misinformation. A major limitation of this study was also the lack of detailed responses concerning the mental and physical health effects of alcohol consumption, as the desired information on these topics can vary depending on individuals' personal experiences, existing knowledge and understanding. Moreover, the preferred topics of alcohol risk communication may simply reflect the heightened awareness of widely recognized

issues such as drink-driving, underage drinking, and drinking during pregnancy, all of which are heavily influenced by societal norms. Our findings indicate differences in demographic characteristics among individuals who exhibited varying levels of interest in specific types of risks. However, these differences do not account for the participants' prior knowledge of these risks. Consequently, some groups might have reported no interest because they had already been effectively informed about the risks before participating in the study. Based on the findings, we are unable to suggest specific strategies for messaging through different sources or for shifting individuals toward more reliable sources of information.

It should be also noted that the regression models used in the analysis explained only a relatively small portion of the variance. Additionally, while our weighting approach adjusted for non-response bias in gender, age, and region, it did not fully account for the stratified sampling design employed in the survey. By not incorporating the stratification elements into the analysis, the standard errors in the regression models are likely underestimated to some degree. This limitation might impact the accuracy of variance and significance estimates derived from the models.

## Conclusions

This study presents evidence supporting the need for comprehensive alcohol risk communication that goes beyond the alcohol industry's conventional emphasis on responsible drinking and narrowly defined risk groups. Several aspects of alcohol risk communication including evidence-based knowledge of detrimental effects of alcohol on mental and somatic health can empower individuals to make informed choices. This, in turn, provides a strategic advantage for public health experts seeking effective ways to engage the public in discussions about alcohol-related risks. Further research should investigate alternative or more specific sources of knowledge regarding alcohol risk, for example, various internet sites and social media platforms. It is crucial to explore the role of social sources of knowledge and address the challenges associated with the transmission of scientific knowledge, its reception, and subsequent diffusion, which can either amplify or attenuate alcohol-related risk messages. Developing more nuanced and contextualized approaches appears to be a significant goal in scientific inquiry, as risk communication strategies, even if effective in particular situations and environments, may prove inadequate in others. Therefore, additional support for the findings of the current study could be derived from analyses of alcohol risk communication in different policy settings. Moreover, poor or inconclusive evidence regarding the effectiveness of communication efforts coupled with noticeable alcohol industry involvement should not discourage public health professionals and decision-makers from developing effective alcohol risk communication. Public health advocates have demonstrated that despite facing long-standing opposition from the tobacco industry, it is possible to increase public awareness of the harm and subsequently reduce the use of harmful commodities.

## Ethical approval

The study was conducted in accordance with ethical research principles. All participants were provided with detailed information about the study's purpose and procedures before participation. Verbal informed consent was obtained from each participant. The information sheet clearly stated that participation was voluntary, and respondents could withdraw from the study at any point without providing a reason and without any consequences. Participants were assured of confidentiality and anonymity throughout the research process, with all collected data treated as confidential and presented only in aggregated statistical form to ensure no individual respondent could be identified. Contact information for the principal investigator was provided to all participants should they have any concerns about the study or the interviewer, or require additional information about the research.

## Disclosure statement

No potential conflict of interest is reported by the author.

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