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Research Paper

Who buys non-alcoholic beer in Finland? Sociodemographic characteristics and associations with regular beer purchases

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ABSTRACT

Background: The consumption of non-alcoholic beer and other non-alcoholic and low-alcohol beverages has grown significantly in recent years. Due to a lack of suitable datasets, there have been few studies conducted on the forerunners of the non-alcoholic beer consumption trend. This study examined the associations of sociodemographic characteristics with non-alcoholic beer purchase, and of non-alcoholic beer purchases with regular beer purchases.

Methods: The data consisted of longitudinal individual purchases of non-alcoholic and regular beer from grocery stores in 2017 and 2018. The study participants were loyalty cardholders from the largest food retailer in Finland (n = 47,066). The level of education, household income and occupational status were analyzed as determinants of non-alcoholic beer purchase using logistic regression models. The changes in the regular and non-alcoholic beer purchases from 2017 to 2018 and the distributions of non-alcoholic beer purchase by regular beer purchase, by gender and by age were described.

Results: Between 2017 and 2018, the total volume of non-alcoholic beer purchases increased from 2.3% to 3.7% of the total volume of all beer purchases. Men and older people purchased non-alcoholic beer more often than women and younger people did. Non-alcoholic beer purchases were most common among the highly educated and high-income consumers. Non-alcoholic beer purchases were most prevalent in the groups with the highest volumes of regular beer purchase.

Conclusions: Educated and affluent consumers have been the forerunners of non-alcoholic beer consumption in Finland. In order to promote the substitution of regular beer with non-alcoholic beer the shift towards lower-strength beverages should be facilitated across social strata.

Introduction

Non-alcoholic and low-alcohol beverages have become increasingly popular in recent years, and there is a growing research interest in how, why and by whom these products are consumed. In countries that have been previously characterized by a high prevalence of heavy episodic drinking, there seems to be a general trend towards more 'mindful' drinking behavior. In Finland, Sweden, Australia and the UK, for instance, there has been a marked decrease in the total consumption of alcohol and an increase in the number of people abstaining from alcohol (Tigerstedt et al., 2020; Meng et al., 2014; Kraus et al., 2015; Chang et al., 2016). These trends parallel the rapidly growing consumption of low-alcohol and non-alcoholic beverages (Euromonitor, 2021). As alcohol consumption is one of the leading causes of premature death, and beer represents a significant portion of the global alcohol market, a wider adoption of non- and low-alcohol alternatives to regular beer would have numerous benefits for public health (Segal & Stockwell, 2009). The substitution of regular beer with non- or low-alcohol alternatives would reduce the consumption of ethanol, thereby lowering the risk of short- and long-term health complications associated with alcohol consumption. However, very little is known about the sociodemographic characteristics of those who consume non-alcoholic beer and

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how non-alcoholic beer consumption is associated with regular beer consumption.

The definition of non-alcoholic beer may vary by country, but it typically refers to alcohol-free or low-alcohol products that can contain up to 0.5% of alcohol by volume. Due to the new, more efficient ways of producing non-alcoholic beer, a considerable number of new brands and products have entered the market globally. The worth of the global non-alcoholic beer segment is estimated to amount to US$32 billion in 2022 (including both non-alcoholic beer purchased from grocery stores and out of home consumption). The market is expected to grow 13–14% annually (Statista, 2022). Currently, non-alcoholic beer represent 3–4% of the beer consumption in the European Union (Kokole et al., 2022). In Finland, the availability of non-alcoholic beverages has increased recently. For example, in Alko (the national alcoholic beverage retailing monopoly), the number of non-alcoholic beverage items offered in stores has increased from 84 in 2015 to 189 in 2019 (Alko, 2019). In terms of non-alcoholic beer, the consumption increased by 281%, from 1.6 million to 4.2 million litres from 2014 to 2019, with the growth especially high in 2018 at 71% (Federation of the Brewing and Soft Drinks Industry). In comparison, the consumption of regular beer (>2.8% of alcohol) in 2019 was approximately 34.5 million litres (Valvira, 2019), and it has been steadily decreasing. During 2016–2019, consumption of regular beer declined approximately 6 percent.

The growing availability of non-alcoholic beer and its increasing popularity among consumers likely stem from several factors. The restrictions in the marketing of alcoholic drinks do not apply to non-alcoholic drinks, and they offer the beverage industry new opportunities for market growth (Noel et al., 2017). The products also correspond to the changing consumer preferences regarding food and drinks. There has been an increasing consumer demand for healthier products (Niva et al., 2013), and non-alcoholic beer can be considered a less harmful option in terms of health compared to regular beer, stemming from current ideals of healthiness and individualized health promotion (Chrysochou, 2014; Ayo, 2012). Those wishing to cut down their drinking or to avoid drunkenness may have embraced these new products to replace regular beer with a non-alcoholic alternative (Saliba et al., 2013).

Recent studies on the sociodemographic characteristics of non-alcoholic beer consumers have yielded mixed results. While some studies have reported no socioeconomic differences between non-alcoholic and regular beer consumers (Anderson et al., 2020), others have found that high income and high education status increase the likelihood of non-alcoholic beer consumption (Anderson et al., 2021). New products such as low-alcohol and non-alcoholic beer are likely to appeal to those who are at the forefront in adopting new consumer goods, namely members of higher socioeconomic groups with both economic and symbolic resources, as has been observed with regard to the connoisseur consumption of coffee, wine and food (Eckhart et al., 2015).

Beer is a product that has recently gained new appreciation due to the growing popularity of specialty and craft beers (Carvalho et al., 2018). Consumers are more interested in the taste, quality and origin of beer, implying that new meanings of cultural prestige have become associated with a common, widely consumed commodity (Thurnell-Read, 2018). The expansion of the non-alcoholic beer market can be seen as a parallel trend as the variety and quality of non-alcoholic beer have also improved. The wide selection of beer qualities and brands currently available requires the acquisition of knowledge, taste and skills regarding what constitutes good beer, indicating the emergence of 'educated beer drinkers' (Thurnell-Read, 2016; Ikäheimo, 2020).

The aim of the present study was to examine who the forerunners of the non-alcoholic beer consumption are. We analyzed the associations of sociodemographic characteristics with non-alcoholic beer purchase, and of non-alcoholic beer purchases with regular beer purchases. We hypothesized that non-alcoholic beer consumption has been first adopted by high-status consumers as higher socioeconomic groups tend to be forerunners in adopting new consumer goods as well as substances (e.g. Legleye et al., 2014; Pampel et al., 2015). Non-alcoholic beer is likely to be associated with several desirable qualities, such as healthiness and moderation, for high status consumers in a new, cultivated beer culture. With the decline in alcohol consumption in Finland over the past decade (THL, 2021) and the growing interest in more moderate drinking habits (Mäkelä, 2018b), we expected that non-alcoholic beer would not only be purchased on top of regular beer or by non-drinkers, but that it would also have replaced regular beer purchases to some extent. The grocery purchase data used in this study enabled the scrutiny of the consumers of non-alcoholic beer and helped in understanding how new, potentially less harmful consumption patterns spread.

Material and methods

Study population

The data used in the present study consisted of longitudinal individual purchases of non-alcoholic and regular beer. The data were obtained from S Group, the largest food retailer in Finland, with approximately 46% market share (S Group in brief, Finnish Grocery Trade Association). The S Group loyalty cardholders get a financial reward for their purchases (but not for alcohol purchases since January 3, 2018) by registering their purchases with their loyalty card at the cash desk. The data collection method has been described in detail in Vuorinen et al. (2020).

The study participants were recruited from the entire Finland by an email sent by S Group in June 2018. The consent of the primary loyalty cardholders for the use of their grocery purchase data for research purposes was obtained. The cardholders were also asked to fill out a voluntary online questionnaire. An invitation email was sent to 1108,524 primary loyalty cardholders who had given their email addresses to the retailer, were ≥ 18 years old and had not refused to be contacted for marketing or research purposes (58% of all the loyalty cardholders). Of those who were sent an invitation email, 47,066 consented to participate in the study. We could not calculate the study participation rate because we do not know how many of the cardholders actually received the invitation email. We also do not know how many of the email addresses were valid and how many of the emails had passed through spam filters or were ignored by the recipients, thinking that they were just advertisements. The online questionnaire was completed by 36,621 loyalty cardholders (78% of those who consented to participate in the study). In this study, the data that were obtained within the two-year study period (January 1, 2017 to December 31, 2018) were used.

Purchase data

We used the data on the purchases of non-alcoholic and regular beer. Each loyalty cardholder's purchases in the study years 2017 and 2018 were aggregated to form a yearly total. Regular beer was presented in the original data in alcohol concentration categories (1.2%, 1.3% to 2.8%, 2.9% to 4.7% and 4.8% to 5.5%). The total volume of regular beer purchases was calculated as the sum of these variables. Due to the large proportion of non-buyers and the highly skewed distribution, non-alcoholic beer was analyzed as dichotomous 'purchased/not purchased' variables formed separately for each study year.

Sociodemographic and other background variables

Data regarding the study participants' birth years and gender were obtained from the retailer's database. The ages were calculated on the basis of the birth years and were categorized into age groups 18–29, 30–44, 45–59 and ≥ 60 years. The level of education and employment status of the respondent, the monthly gross income of the household and the number and age group of the family members were asked in the online questionnaire. The original ten categories of employment status were reduced to six for the analyses by merging 'temporarily laid off' with 'unemployed', 'part-time employed, part-time retired' with 'retired' and 'long-term (> 6 months) sick leave' and 'otherwise out of working life'

with 'other'. The household gross income was scaled according to the size of the household by dividing the income by the square root of the number of household members (organisation for Economic Co-operation and Development [OECD] square root scale; OECD Project on Income Distribution and Poverty), and was categorized into < €1000, €1000–1999, €2000–2999, €3000–3999 and ≥ €4000/month.

Statistical methods

The mean and standard deviation of the purchased volume of non-alcoholic beer, and the percentage of those who bought non-alcoholic beer, were calculated for the total sample, and within strata defined by each background variable. The changes in regular and non-alcoholic beer purchases from 2017 to 2018 were described by calculating the numbers of study participants, and the mean purchased volumes of the two beer types, within the groups formed on the basis whether alcoholic beer, non-alcoholic beer, both, or neither was bought during the respective study year. The descriptive analyses were conducted using SPSS (IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). Fig. 1 was built by SankeyMATIC (https://sankeymatic.com).

Level of education, household income and employment/occupational status were analyzed as determinants of non-alcoholic beer purchase using logistic regression models. The dependent variable was whether or not the participant had purchased non-alcoholic beer in the year 2018. The explanatory variables were included in the model one at a time. They were not adjusted for each other because of the structural connections between education level and main activity (e.g. university students likely resembled the high-education groups even if their education statuses at the time of the study were lower). The analyses were adjusted for sex, age group and self-assessed degree of loyalty (proportion of S Group grocery purchases in the total household grocery purchases) as potential confounding factors. The overall significance of the explanatory variables in the logistic models was tested with a likelihood ratio test comparing the models with and without the respective variables. To analyze the distributions of non-alcoholic beer purchases compared to alcoholic beer purchases, the percentages of those who had bought non-alcoholic beer in 2018 were plotted against the deciles of the yearly volume of purchased alcoholic beer, separately for each gender and age group.

Loyalty card data provide objective measures on alcohol purchases that could decrease information biases, but the study participants generating the data could be a highly selected subgroup. Women and highly educated people are overrepresented in the current sample. To a lesser extent, e.g. age and employment were related to participation likelihood. To minimize the potential for biases, we used a number of sociodemographic variables (sex, age, education, marital status, occupational status) and by the raking method matched all possible bivariate tables of them to those available for the Finnish adult population from Statistics Finland. Post-stratification weights obtained from this procedure were used to balance the sample. The procedure has been described in detail in Vuorinen et al. (2020). The logistic regression analyses were thus weighted to improve the sample's representativeness of the adult Finnish population. The analyses included all consenting individuals for whom weights could be computed and who had provided their purchase data (n = 46,832). Missing values in the explanatory variables were treated as a category of their own to keep the concerned individuals in the analyses. The statistical analyses were conducted using R (R Core Team 2014).

Ethical issues

The study was approved by the University of Helsinki Ethical Review Board for Humanities and Social and Behavioural Sciences (Statement 21/2018). The informed consent of all the study participants was collected electronically when they were invited via email to release their loyalty card data and fill out the background questionnaire. S Group pseudonymized the study participants' data before transferring these to the research group.

Results

As shown in Table 1, 65% of the participating S Group loyalty cardholders were women, and 61% were in the 30–44 and 45–59 age groups. Most of the participants had upper secondary level education (28.5%) or lower tertiary level education (25%). The most common monthly gross household income category, scaled to household size, was €2000–2999/month (22%). As for the employment status, 47% were employed, 18% were fully or partly retired and 4% were unemployed. Thirty percent of the participants estimated that they made over 80% of their household purchases in S Group stores. Nearly 20% of the participating loyalty cardholders over 30 years old had bought non-alcoholic beer at least once in 2018.

The total volume of non-alcoholic beer purchases in 2017 was 2.3% of all beer purchases (Mean (SD) of non-alcoholic 0.7 (10.1) l/year, alcoholic 30.2 (97.5) l/year). In 2018, the volume of non-alcoholic beer purchases represented 3.7% of the volume of all beer purchases (non-alcoholic 1.1 (11.1) l/year, alcoholic 29.0 (87.9) l/year). For those who purchased non-alcoholic beer in 2018, the mean volume of non-alcoholic beer purchase was 6.4 (SD 27.2) l/year.

Fig. 1 shows that for most of the participating loyalty cardholders, the beer-purchasing category did not change over time. For example, over 70% of those who purchased only regular beer in 2017 purchased only regular beer in 2018, and most of those who purchased both non-alcoholic and regular beer in 2017 continued to purchase both products in 2018. In all beer-purchasing categories, however, the volume of non-alcoholic beer purchases increased while regular beer purchases decreased, and the proportion of people who purchased only regular beer decreased slightly. The number of participants who purchased only non-alcoholic beer markedly increased on a relative scale, and such participants also purchased non-alcoholic beer in larger volumes. The largest change was observed in the prevalence of buying both, from 10% to nearly 16%. Among those who purchased only regular beer in 2017, 14% started to purchase both regular and non-alcoholic beer in 2018. In both of these beer-purchasing categories, the volume of regular beer purchase declined.

It is noteworthy that the group that began purchasing more non-alcoholic beer in 2018 was primarily accustomed beer drinkers. In addition, there was no significant shift from the number of individuals buying only regular beer in 2017 to those buying only non-alcoholic beer in 2018. As a result, it is likely that non-alcoholic beer was primarily consumed alongside regular beer in 2018. Considering the decline in the volume of regular beer purchases, it appears that non-alcoholic beer partially replaced regular beer.

Table 2 shows that higher education level and higher household income were both consistently associated with higher likelihood of non-alcoholic beer purchase. The higher the education or income level, the more commonly non-alcoholic beer was purchased. A comparison of the highest category to the lowest category showed that the odds for purchase were approximately twofold. Being retired, unemployed or a student decreased the likelihood of non-alcoholic beer purchase compared to being employed, but this difference was smaller than that between the education and income levels.

Fig. 2 summarizes the results regarding non-alcoholic beer purchases with the volume of regular beer purchases, with gender and with age. Non-alcoholic beer purchases were most prevalent in the groups with the highest volumes of regular beer purchases; the higher the volume of regular beer purchases, the greater the proportion of non-alcoholic beer buyers. Men purchased non-alcoholic beer more commonly than women did, and in all the beer-drinking deciles, the oldest age group had the highest percentage of non-alcoholic beer buyers.

Table 1
Characteristics of the participating loyalty cardholders of a large Finnish retail chain (n = 47,066).

Background characteristic	n	%	Mean (SD) volume of purchased non-alcoholic beer in 2018 (l/year)	Purchased non-alcoholic beer in 2018 (%)
Gender				
Men	16,232	34.5	1.75 (15,6)	21.9
Women	30,605	65.0	0.79 (8.9)	15.3
Missing	229	0.5	–	–
Age group				
18–29	5808	12.3	0.25 (2.0)	9.4
30–44	15,002	31.9	1.00 (14.1)	18.2
45–59	13,719	29.1	1.2 (9.3)	18.2
60-	12,308	26.2	1.7 (13.3)	19.9
Missing	229	0.5	–	–
Education level				
Primary school or less	2252	4.8	1.0 (8.7)	15.9
Upper secondary school	13,409	28.5	1.1 (16.4)	15.0
Lower degree-level tertiary education	11,752	25.0	1.2 (11.9)	17.7
Higher degree-level tertiary education	8871	18.8	1.5 (7.9)	23.2
Other or missing	10,782	22.9	0.9 (5.9)	16.2
Household income (€/month), scaled for household size				
<1000	3180	6.8	0.6 (8.0)	10.2
1000–1999	5323	11.3	1.0 (14.6)	15.5
2000–2999	10,461	22.2	1.1 (15.6)	15.9
3000–3999	8056	17.1	1.3 (13.1)	20.2
≥4000	6806	14.5	1.8 (9.4)	24.6
Missing	13,240	28.1	0.9 (6.0)	16.2
Occupational status				
Employed	22,210	47.2	1.1 (13.3)	18.4
Retired or part-time retired	8616	18.3	1.7 (12.9)	19.5
Unemployed or temporarily laid off	1726	3.7	1.4 (18.3)	13.8
Student	1885	4.0	0.3 (2.3)	10.4
Housewife or –husband	1255	2.7	0.6 (3.2)	18.6
Other or missing	11,374	24.2	0.9 (6.2)	16.1
Self-assessed proportion of purchases from S-group from all household purchases				
20% or less	2246	4.8	0.3 (1.8)	9.2
21–40%	4634	9.8	0.7 (10.4)	13.8
41–60%	6134	13.0	0.8 (7.3)	17.1
61–80%	9190	19.5	1.3 (9.6)	19.7
>80%	14,154	30.1	1.6 (17.5)	19.9
Missing	10,708	22.8	0.9 (5.9)	16.2
Total	47,066	100.0	1.1 (11.7)	17.5

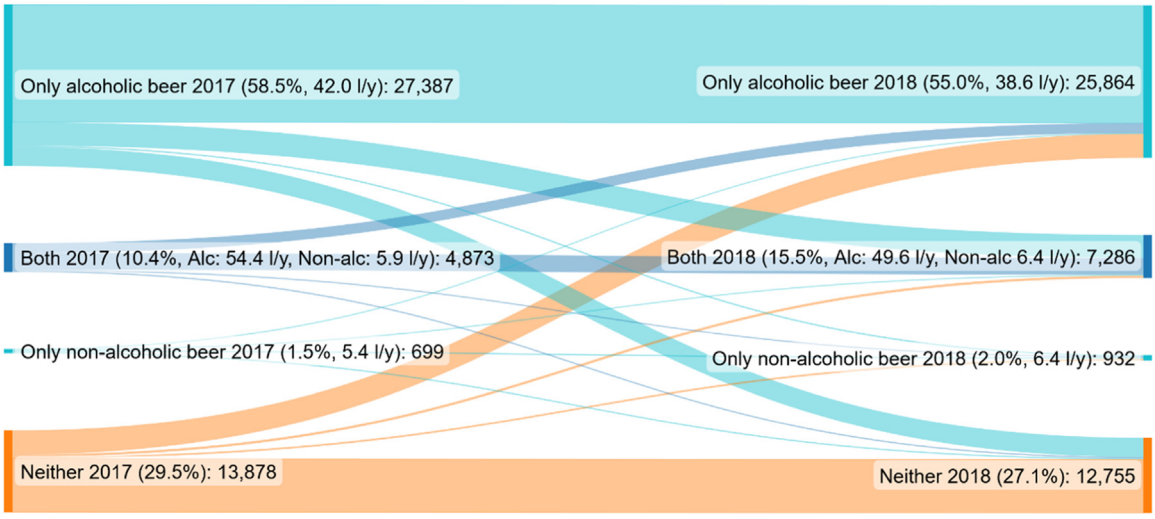

Fig. 1. Changes in regular and non-alcoholic beer purchases from 2017 to 2018 among the loyalty cardholders of a large Finnish retail chain (n = 46,837).

Table 2
Associations of background characteristics with purchases of non-alcoholic beer during the year 2018 among loyalty card holders of a large Finnish retail chain (n = 46,832).

Background variable	OR (95% CI) [1]
Level of education[2,3]	
Primary school or less*	1
Upper secondary school	1.09 (1.01–1.17)
Lower-degree level tertiary education	1.32 (1.21–1.44)
Higher-degree level tertiary education	1.75 (1.60–1.94)
Missing	0.80 (0.47–1.31)
Household income (€/month), scaled for household size[2,3]	
<1000*	1
1000–1999	1.61 (1.43–1.82)
2000–2999	1.56 (1.39–1.75)
3000–3999	1.90 (1.69–2.15)
≥4000	2.30 (2.04–2.62)
Missing	1.44 (1.24–1.67)
Occupational status (OR Main activity) [2,3]	
Employed*	1
Retired (also part-time)	0.83 (0.76–0–91)
Unemployed or temporarily laid off	0.72 (0.63–0.81)
Student	0.66 (0.55–0.79)
Housewife, househusband (also maternity leave, nursing leave)	1.05 (0.82–1.31)
Other or missing	0.84 (0.66–1.05)
Gender[4]	
Male*	1
Female	0.72 (0.69–0.76)
Age group[5]	
18–29*	1
30–44	2.00 (1.84–2.19)
45–59	1.89 (1.73–2.07)
60-	2.03 (1.86–2.21)

[1] Analyzed by logistic regression model, with outcome variable defined as purchasing or not purchasing non-alcoholic beer during the year 2018. Weighted to improve representativeness.
[2] Adjusted for gender, age group and self-assessed degree of loyalty (proportion of purchases from S-group from all household purchases).
[3] p-value for the overall significance of the variable <0.001.
[4] Adjusted for age group and self-assessed degree of loyalty.
[5] Adjusted for gender and self-assessed degree of loyalty.
* Reference category.

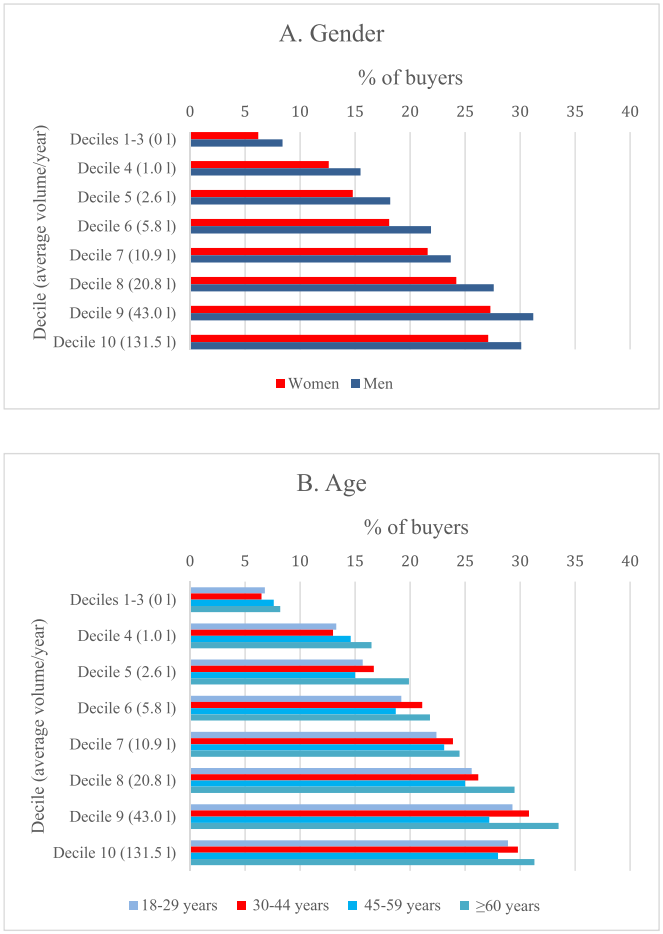

Fig. 2. Percentages of those who bought non-alcoholic beer in 2018 in deciles of volume of regular beer purchases by gender and age.

Discussion

In this study, we investigated the sociodemographic characteristics of non-alcoholic beer consumers and non-alcoholic beer purchase in relation to regular beer purchase. The volume of non-alcoholic beer purchases comprised only a small proportion of the volume of all beer purchases, but the proportion increased from 2017 to 2018, with a simultaneous decline in the volume of regular beer purchases. To our knowledge, only two previous studies have analysed the characteristics of non-alcoholic beer consumers (Anderson et al., 2020; 2021). On the basis of our findings, we discuss three issues herein: the association of non-alcoholic beer purchase with socioeconomic status, with age and gender, and with regular beer purchase.

Non-alcoholic beer was most commonly purchased by consumers who were employed and had high income and education levels. This result is consistent with Anderson et al. (2021) finding that non-alcoholic beer purchases have become more prevalent among educated, high-income consumers as well as with socio-epidemiological models predicting that higher socioeconomic groups tend to lead the way in the adoption of new substances (e.g. Legleye et al., 2014; Pampel et al., 2015). Higher socioeconomic groups have a broader range of tastes, are more likely to adopt new consumption habits and have more material resources to purchase costly products (Bennett et al., 2009), making them more likely to develop non-alcoholic and low-alcohol beer drinking habits. Consumption of any kind, including that of alcohol, is a means by which one can distinguish oneself from others (Thurnell-Read, 2013; Järvinen et al., 2014). Moreover, alcohol consumption in higher socioeconomic groups is generally more diverse in Finland. Heavy episodic drinking is less common and lighter drinking is more prevalent than in the lower socioeconomic groups (Mäkelä, 2018a). Moreover, the adoption of non-alcoholic beer consumption corresponds with the pursuit of a healthy lifestyle, which has been particularly associated with the middle and higher socioeconomic classes (Korp, 2008).

Considering our findings, non-alcoholic beer appears to be most compatible with the lifestyles of higher status groups in Finland. In order to promote the substitution of regular beer with non-alcoholic beer, more research is needed on the motives of consuming non-alcoholic beer and what drives the change across socioeconomic groups, for example health considerations, cost, taste or brand appeal (Rehm et al., 2016). If non-alcoholic beer appeals, or is marketed, primarily to higher socioeconomic groups, it would mean a missed opportunity for both public health advocates and alcohol producers to reduce alcohol-related harm across the population.

Non-alcoholic beer purchases were most common in the oldest age group. Our findings thus deviate from those of Anderson et al. (2020) that the increases in the volumes of low-alcohol and non-alcoholic beer purchases were largely driven by younger consumers. Previous studies have also found that new beer products, especially craft and specialty beer, are mostly consumed by young adults (Anderson et al., 2021; Murray & O'Neill, 2012). However, young adults drink more often socially in bars and restaurants than at home and are therefore more likely to prefer alcoholic drinks (Mäkelä & Warpenius, 2020). This might explain the lower number of purchases of non-alcoholic beer compared to older age groups in our data. Cheaper prices for alcohol-free products in bars and other contexts that

young people frequent could be an option to promote non-alcoholic alternatives to young adults. However, there is little evidence of the effect on the level of drinking or drinking-related harm (Rehm et al., 2016).

The purchase of non-alcoholic beer was more common among men than among women. In general, men tend to buy more alcoholic beer than women in Finland (Uusitalo et al., 2022). Yet, previous research has shown that the gender differences in beer drinking have declined; that is, women now drink more beer than they did before, and there has been a noticeable increase in women's interest in craft beer (Chapman et al., 2018).

Non-alcoholic beer purchases were most prevalent in the groups with the highest volumes of regular beer purchases. In the group that purchased both regular and non-alcoholic beer, the volume of non-alcoholic beer purchases increased, with a simultaneous decline in the volume of regular beer purchases. At the beginning of 2018, new alcoholic beverages were introduced to Finnish grocery stores due to the renewal of the Alcohol Act. The most significant change was an increase in the maximum ethanol content of beverages sold in grocery stores from 4.7% to 5.5%. Uusitalo et al. (2022) found that consumers may have replaced regular beer with the new products that came available in the shops, such as long drinks and alcopops. However, according to the previous findings of Anderson et al. (2020; 2021), the volumes of non-alcoholic and low-alcohol beer purchases have especially increased in the higher-alcohol-purchasing households in the UK, with a simultaneous decline in the volume of alcohol purchases. This concerns especially households with higher amounts of beer purchase. Together with our results, this would support the interpretation that non-alcoholic beer purchases indicate an overall reduction in the mean alcohol content in beer purchases.

Strengths and limitations

Compared to traditional survey data, loyalty card data used in this study have both strengths and limitations. In terms of limitations, the data do not capture all the cardholders' alcoholic and non-alcoholic product purchases, only those in the grocery stores where the loyalty cards were used. It is worth noting, however, that the Finnish retail market is very centralized, with S Group accounting for 46.4% of the grocery market share in 2018 (Finnish Grocery Trade Association, n.d.). The S Group reports that 88% of Finnish households have registered their purchases to their databases. According to the online survey conducted for this study, 64% of participants reported purchasing at least 61% of their food at the S Group's stores (Vuorinen et al., 2020). The data are also likely to exclude those pertaining to some population groups in which heavy drinking is prevalent, such as homeless people (Collins, 2016). On the contrary, women are overrepresented in the data. This could be because women are more likely to be responsible for household food purchases (Mortimer & Clarke, 2011). Also, the youngest and oldest age groups were under-represented compared to the adult Finnish population. Loyalty card data pertain to the purchases made for households, and it is therefore not certain who actually consumed the purchased products. This feature is likely to dilute gender differences and other factors that may substantially differ between household adults. Despite these limitations, previous research indicates that grocery purchases of alcohol seem to be associated with the level of purchasers' own consumption (Lintonen et al., 2020).

A major strength of loyalty card data is the large sample size. The use of such data in the present study thus allowed the non-alcoholic beer purchases to be analyzed in relation to the sociodemographic background variables and regular beer purchases. A particular strength of our study is that the study covered two entire calendar years; thus, the seasonal variation in beer consumption did not affect the results. Moreover, survey respondents generally underreport the amounts of alcohol that they consume (Livingston & Calnan, 2015). Grocery purchase data are likely to give a more realistic picture of the proportions of non-alcoholic and regular beer in the market compared to self-reported alcohol consumption (Gmel & Rehm, 2004).

Conclusions

Our results indicate that the growing market share and availability of non-alcoholic beer have a potential to facilitate the shift towards more moderate drinking habits. As expected, the forerunners in non-alcoholic beer consumption have been consumers with higher levels of education and income. A major question regarding the development of non-alcoholic beer drinking patterns is whether a shift towards lower-strength beverages can be facilitated across social strata. For example, lowering the prices of alcohol-free beverages and setting a minimum unit price for alcoholic beverages have both been shown to be effective in promoting the purchase of lower-strength beverages (Llopis et al., 2021). For future research, it is important to determine what types of non-alcoholic beer different consumers purchase, and how the purchases are divided between the cheaper lager beers produced by large breweries and the more expensive specialty beers. Such analysis will refine our understanding of the social status of non-alcoholic beers. There is also a need for further research into the reasons for purchasing non-alcoholic beer and the situations in which it is consumed. A more in-depth understanding of consumption patterns will enable both companies and policymakers to introduce initiatives to promote more mindful drinking behavior.

Ethics approval

The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation.

The study was approved by the University of Helsinki Ethical Review Board for humanities and social and behavioural sciences (Statement 21/2018).

Declarations of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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