Supplemental Online Content

Zhao L, Zhang Xinyuan, Coday M, et al. Sugar-sweetened and artificially sweetened beverages and risk of liver cancer and chronic liver disease mortality. *JAMA*. doi:10.1001/jama.2023.12618

This supplemental material has been provided by the authors to give readers additional information about their work.

eAppendix. Methods

Covariates assessment

Race and ethnicity were included in this study because the association between beverage intake and liver outcomes could differ by race and ethnicity. The information on race and ethnicity was collected by asking the participants to self-identify their racial or ethnic category. The question was “How would you describe your racial or ethnic group?” with six responses: 1. American Indian or Alaskan Native; 2. Asian or Pacific Islander; 3. Black or African-American (not of Hispanic origin); 4. Hispanic/Latino; 5. White (not of Hispanic origin); 6. Others. Weight, height, waist and hip circumference were measured by trained staff at baseline. Physical activity was measured via a reliable and valid questionnaire. Total energy expenditure from recreational physical activity (MET-hours/week) were used in current study. Modified alternate healthy eating index (AHEI) was calculated by excluding the sugar-sweetened drink component from the AHEI, an index measuring dietary quality with 11 components: 6 beneficial (vegetables, fruit, whole grains, nuts and legumes, long chain omega-3 fatty acids, and polyunsaturated fatty acids), 1 moderate (alcohol), and 4 harmful (sugar-sweetened drinks and fruit juice, red and processed meat, trans fats, and sodium). Each component is scored on a 0-10 scale, and the total score ranges from 0 (non-adherence) to 110 (perfect adherence), with higher scores indicating better dietary quality. All dietary data including the AHEI, coffee or tea intake, and added sugar were estimated based on a validated FFQ. The mean correlation coefficient between the FFQ and 8 day intake, using four days food records and four 24-hour dietary recalls for selected nutrients, was 0.50.[1]

HBV/HCV assessment

In a subsample of WHI (n=214), the HBV/HCV infection status was tested.[2] Hepatitis B surface antigen (HBsAg) and anti-HCV were measured using BioRad GS HBsAg 3.0 enzyme immunoassay (Bio-Rad Laboratories) and Ortho HCV Version 3.0 ELISA test system (Ortho-Clinical Diagnostics), respectively. Details about the measurement of diet and HCV/HCV infection status in the National Health and Nutrition Examination Survey (NHANES 2007-2018, n=23,520) could be found elsewhere.[3]

Sensitivity analysis

Several sensitivity analyses were conducted. First, coffee or tea intake, modified AHEI, added sugar intake, history of liver diseases, and WHR were further adjusted. Models without adjusting for BMI and self-reported diabetes were also provided considering that BMI and diabetes may be potential mediators. Second, stratified analyses by BMI or WHR groups were conducted. Interactions were evaluated using Wald test, with models including the interaction term between exposure and stratified factors. Third, the liver cancer cases or chronic liver disease deaths diagnosed within the first 2 years of follow-up were excluded to address potential reverse causation. Fourth, participants with history of liver diseases or diabetes at enrollment were also excluded. Fifth, the analyses were restricted to the WHI Observational Study participants only. Sixth, given that some people consume more sugar-sweetened

beverages also like drinking alcohol, additional analyses were performed by restricting participants to those who consumed less than one drink per day.

Substitution analysis

Substitution analyses were further conducted to evaluate whether replacing sugar-sweetened beverages with other beverages was associated with liver cancer risk and chronic liver disease mortality. For these analyses, consumption of coffee and tea was separately evaluated on the third year of follow-up questionnaire when these beverages were first separately asked. Substitution of replacing sugar-sweetened beverage or artificially sweetened beverages for an equal serving of coffee or tea were estimated by calculating the difference in β coefficients of pair-wise beverages modeled as continuous intakes (serving/day).

References:

1. Patterson RE, Kristal AR, Tinker LF, Carter RA, Bolton MP, Agurs-Collins T. Measurement characteristics of the Women's Health Initiative Food Frequency Questionnaire. *Ann Epidemiol.* 1999;9(3):178-187.

2. Petrick JL, Thistle JE, Zeleniuch-Jacquotte A, et al. Body Mass Index, Diabetes and Intrahepatic Cholangiocarcinoma Risk: The Liver Cancer Pooling Project and Meta-analysis. *Am J Gastroenterol.* Oct 2018;113(10):1494-1505.

3. Centers for Disease Control and Prevention (CDC). National Center for Health Statistics (NCHS). National Health and Nutrition Examination Survey Data. 2022; https://www.cdc.gov/nchs/nhanes/index.htm. Accessed March 22, 2023.

eTable 1. Participants in the Women's Health Initiative According to Beverage Consumption

Artificially sweetened beverages	Sugar-sweetened beverages			
	Never to ≤3 servings/month	1-6 servings/week	≥1 serving/day	No data
Never to ≤3 servings/month	32488	5599	2328	917
1-6 servings/week	11626	2225	777	321
≥1 serving/day	6599	879	814	214
No data	26460	6218	2773	0

eTable 2. Sensitivity Analyses on Associations Between Beverages and Liver Cancer Risk With Additional Adjustments[a]

Exposures	Category [b]	Adjustment for coffee/tea	Adjustment for liver diseases	Adjustment for modified AHEI	Adjustment for added sugar	Adjustment for waist-hip ratio	Not adjusted for body mass index and diabetes
Sugar-sweetened beverages	Never to ≤3/month	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
	1-6 servings/week	1.09 (0.73-1.63)	1.09 (0.74-1.63)	1.09 (0.73-1.62)	1.12 (0.75-1.68)	1.10 (0.74-1.63)	1.04 (0.70-1.55)
	≥1/day	1.77 (1.11-2.84)	1.85 (1.16-2.96)	1.81 (1.13-2.90)	1.96 (1.11-3.45)	1.82 (1.14-2.92)	1.77 (1.11-2.82)
	P_{trend} [c]	0.02	0.01	0.02	0.02	0.02	0.02
Soft drinks	Never to ≤3/month	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
	1-6 servings/week	0.93 (0.59-1.47)	0.93 (0.59-1.47)	0.92 (0.58-1.45)	0.93 (0.59-1.48)	0.93 (0.59-1.47)	0.88 (0.56-1.39)
	≥1/day	1.59 (0.93-2.74)	1.66 (0.97-2.84)	1.61 (0.94-2.78)	1.63 (0.84-3.17)	1.64 (0.95-2.81)	1.59 (0.93-2.72)
	P_{trend} [c]	0.20	0.14	0.17	0.28	0.15	0.21
Fruit drinks	Never to ≤3/month	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
	1-6 servings/week	1.35 (0.74-2.46)	1.39 (0.76-2.52)	1.37 (0.75-2.48)	1.35 (0.74-2.46)	1.37 (0.76-2.49)	1.33 (0.73-2.42)
	≥1/day	1.65 (0.72-3.78)	1.74 (0.76-3.98)	1.69 (0.74-3.87)	1.62 (0.70-3.75)	1.69 (0.74-3.87)	1.66 (0.73-3.80)
	P_{trend} [c]	0.15	0.10	0.12	0.16	0.12	0.14
Artificially sweetened beverages [d]	Never to ≤3/month	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
	1-6 servings/week	1.00 (0.66-1.54)	1.00 (0.65-1.53)	1.00 (0.65-1.53)	0.99 (0.65-1.51)	0.99 (0.65-1.51)	1.05 (0.69-1.60)
	≥1/day	1.15 (0.70-1.92)	1.17 (0.71-1.94)	1.20 (0.72-1.99)	1.16 (0.70-1.92)	1.14 (0.69-1.90)	1.29 (0.79-2.13)
	P_{trend} [c]	0.67	0.64	0.59	0.68	0.71	0.37

Abbreviations: AHEI, alternate healthy eating index.

[a] Results were shown as hazard ratios (95% confidence intervals) from the Cox proportional hazards model adjusting for age (continuous), total energy intake (quartile), race and ethnicity (Hispanic, non-Hispanic Blacks, non-Hispanic Whites, others), education (less than high school, high school or some college, above college), smoking status (non-smoker, past smoker, current smoker), alcohol consumption (non-drinker, past drinker, <1 drink/month, <1 drink/week, 1-<7 drinks/week, ≥7 drinks/week), body mass index (<18.5, 18.5-<25, 25-<30, 30-<35, 35-<40, ≥40 kg/m^2), physical activity (quartile), non-steroidal anti-inflammatory drugs use (yes, no), family history of cancer (yes, no), prior oral contraceptive use (yes, no), post-menopausal hormone therapy (yes, no), and self-reported diabetes (yes, no) with additionally adjustment for covariates listed in the head row.

[b] One serving defined as 12 fl oz or 355 mL.

[c] The median intake of each category was modeled as a continuous variable to calculate the *P* value for trend.

[d] For artificially sweetened beverage analyses, we used the follow-up year 3 as the baseline.

eTable 3. Sensitivity Analyses on Associations Between Beverages and Chronic Liver Disease Mortality With Additional Adjustments[a]

Exposures	Category [b]	Adjustment for coffee/tea	Adjustment for liver diseases	Adjustment for modified AHEI	Adjustment for added sugar	Adjustment for waist-hip ratio	Not adjusted for body mass index and diabetes
Sugar-sweetened beverages	Never to ≤3/month	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
	1-6 servings/week	0.69 (0.41-1.15)	0.70 (0.42-1.17)	0.67 (0.40-1.12)	0.67 (0.40-1.13)	0.70 (0.42-1.18)	0.66 (0.39-1.10)
	≥1/day	1.65 (1.01-2.69)	1.69 (1.04-2.76)	1.51 (0.92-2.48)	1.30 (0.71-2.37)	1.65 (1.01-2.69)	1.58 (0.97-2.57)
	P_{trend} [c]	0.10	0.08	0.18	0.60	0.09	0.14
Soft drinks	Never to ≤3/month	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
	1-6 servings/week	0.66 (0.38-1.17)	0.67 (0.38-1.19)	0.64 (0.36-1.13)	0.65 (0.37-1.14)	0.68 (0.39-1.20)	0.63 (0.36-1.11)
	≥1/day	1.77 (1.05-2.98)	1.78 (1.06-2.99)	1.61 (0.95-2.71)	1.34 (0.69-2.60)	1.76 (1.05-2.96)	1.70 (1.01-2.85)
	P_{trend} [c]	0.13	0.12	0.24	0.77	0.12	0.19
Fruit drinks	Never to ≤3/month	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
	1-6 servings/week	1.07 (0.54-2.14)	1.12 (0.56-2.22)	1.07 (0.54-2.14)	1.05 (0.53-2.10)	1.10 (0.55-2.20)	1.06 (0.53-2.11)
	≥1/day	0.93 (0.29-2.96)	1.00 (0.31-3.19)	0.91 (0.29-2.90)	0.80 (0.25-2.57)	0.94 (0.30-2.99)	0.90 (0.28-2.88)
	P_{trend} [c]	0.99	0.86	0.98	0.82	0.95	0.96
Artificially sweetened beverages [d]	Never to ≤3/month	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
	1-6 servings/week	1.03 (0.59-1.79)	1.02 (0.59-1.78)	1.00 (0.57-1.73)	1.03 (0.59-1.78)	1.01 (0.58-1.76)	1.24 (0.72-2.14)
	≥1/day	0.94 (0.49-1.83)	0.96 (0.49-1.85)	0.90 (0.47-1.75)	0.93 (0.48-1.80)	0.93 (0.48-1.80)	1.26 (0.66-2.41)
	P_{trend} [c]	0.91	0.95	0.81	0.90	0.88	0.37

Abbreviations: AHEI, alternate healthy eating index.

[a] Results were shown as hazard ratios (95% confidence intervals) from the Cox proportional hazards model adjusting for age (continuous), total energy intake (quartile), race and ethnicity (Hispanic, non-Hispanic Blacks, non-Hispanic Whites, others), education (less than high school, high school or some college, above college), smoking status (non-smoker, past smoker, current smoker), alcohol consumption (non-drinker, past drinker, <1 drink/month, <1 drink/week, 1-<7 drinks/week, ≥7 drinks/week), body mass index (<18.5, 18.5-<25, 25-<30, 30-<35, 35-<40, ≥40 kg/m^2), physical activity (quartile), non-steroidal anti-inflammatory drugs use (yes, no), family history of cancer (yes, no), prior oral contraceptive use (yes, no), post-menopausal hormone therapy (yes, no), and self-reported diabetes (yes, no) with additionally adjustment for covariates listed in the head row.

[b] One serving defined as 12 fl oz or 355 mL.

[c] The median intake of each category was modeled as a continuous variable to calculate the *P* value for trend.

[d] For artificially sweetened beverage analyses, we used the follow-up year 3 as the baseline.

eTable 4. Stratified Analyses by Body Mass Index and Waist-Hip Ratio for the Associations Between Beverages and Risk of Liver Cancer and Chronic Liver Disease Mortality

Subgroups	Liver cancer						Chronic liver disease mortality					
	Sugar-sweetened beverages			Artificially sweetened beverages			Sugar-sweetened beverages			Artificially sweetened beverages		
	Cases	$HR_{\geq 1/d \text{ vs } \leq 3/mon}$ (95% CI)	$P_{interaction}$	Cases	$HR_{\geq 1/d \text{ vs } \leq 3/mon}$ (95% CI)	$P_{interaction}$	Cases	$HR_{\geq 1/d \text{ vs } \leq 3/mon}$ (95% CI)	$P_{interaction}$	Cases	$HR_{\geq 1/d \text{ vs } \leq 3/mon}$ (95% CI)	$P_{interaction}$
Body mass index			0.01			0.78			0.55			0.91
≤30 kg/m^2	140	2.85 (1.64-4.94)		95	1.25 (0.66-2.34)		76	2.31 (1.14-4.68)		40	0.89 (0.33-2.37)	
>30 kg/m^2	67	0.74 (0.30-1.79)		38	1.10 (0.47-2.60)		72	1.32 (0.67-2.59)		34	1.14 (0.46-2.83)	
Waist-hip ratio			0.18			0.88			0.10			0.61
≤0.80	75	2.59 (1.17-5.70)		47	1.04 (0.40-2.73)		37	3.39 (1.41-8.11)		18	0.36 (0.04-2.85)	
>0.80	132	1.51 (0.85-2.70)		86	1.18 (0.65-2.15)		111	1.26 (0.70-2.28)		56	1.07 (0.52-2.17)	

Abbreviations: HR, hazard ratio; CI, confidence interval.

The multivariable-adjusted model was adjusted for age (continuous), total energy intake (quartile), race and ethnicity (Hispanic, non-Hispanic Blacks, non-Hispanic Whites, others), education (less than high school, high school or some college, above college), smoking status (non-smoker, past smoker, current smoker), alcohol consumption (non-drinker, past drinker, <1 drink/month, <1 drink/week, 1-<7 drinks/week, ≥7 drinks/week), body mass index (<18.5, 18.5-<25, 25-<30, 30-<35, 35-<40, ≥40 kg/m^2), physical activity (quartile), non-steroidal anti-inflammatory drugs use (yes, no), family history of cancer (yes, no), prior oral contraceptive use (yes, no), post-menopausal hormone therapy (yes, no), and self-reported diabetes (yes, no) except for the stratified factors.

eTable 5. Sensitivity Analyses on Associations Between Beverages and Liver Cancer Risk With Different Exclusion Criteria[a]

Exposures	Category [b]	Cases	Excluding first 2 years cases	Cases	Excluding liver diseases at baseline	Cases	Excluding diabetes at baseline	Cases	Only Observational Study	Cases	Alcohol intake <1 drink/day
Sugar-sweetened beverages	Never to ≤3/month	143	1 [Reference]	141	1 [Reference]	131	1 [Reference]	120	1 [Reference]	136	1 [Reference]
	1-6 servings/week	26	1.01 (0.65-1.54)	27	1.09 (0.71-1.66)	29	1.15 (0.76-1.74)	25	1.24 (0.80-1.94)	29	1.12 (0.74-1.70)
	≥1/day	21	1.83 (1.12-2.98)	21	2.00 (1.22-3.26)	22	2.03 (1.25-3.30)	18	1.95 (1.15-3.31)	20	1.74 (1.06-2.87)
	P_{trend} [c]		0.03		0.008		0.005		0.01		0.03
Soft drinks	Never to ≤3/month	157	1 [Reference]	156	1 [Reference]	146	1 [Reference]	134	1 [Reference]	151	1 [Reference]
	1-6 servings/week	17	0.80 (0.48-1.33)	18	0.87 (0.53-1.42)	21	0.97 (0.61-1.55)	17	1.00 (0.60-1.68)	50	0.93 (0.58-1.50)
	≥1/day	16	1.81 (1.05-3.11)	15	1.84 (1.05-3.21)	15	1.74 (0.99-3.06)	12	1.66 (0.89-3.09)	14	1.59 (0.89-2.82)
	P_{trend} [c]		0.13		0.10		0.10		0.17		0.22
Fruit drinks	Never to ≤3/month	175	1 [Reference]	173	1 [Reference]	165	1 [Reference]	148	1 [Reference]	168	1 [Reference]
	1-6 servings/week	10	1.28 (0.67-2.46)	10	1.33 (0.69-2.55)	11	1.43 (0.76-2.67)	10	1.57 (0.81-3.02)	12	1.52 (0.83-2.76)
	≥1/day	5	1.59 (0.65-3.93)	6	2.00 (0.87-4.58)	6	1.98 (0.86-4.54)	5	1.82 (0.73-4.49)	5	1.52 (0.62-3.75)
	P_{trend} [c]		0.22		0.07		0.06		0.08		0.15
Artificially sweetened beverages [d]	Never to ≤3/month	83	1 [Reference]	79	1 [Reference]	77	1 [Reference]	NA	NA	73	1 [Reference]
	1-6 servings/week	30	0.99 (0.65-1.51)	29	0.99 (0.64-1.53)	26	0.99 (0.63-1.56)	NA	NA	28	1.05 (0.67-1.64)
	≥1/day	20	1.17 (0.70-1.94)	14	0.87 (0.48-1.56)	16	1.15 (0.66-1.99)	NA	NA	16	1.08 (0.62-1.90)
	P_{trend} [c]		0.66		0.71		0.72	NA	NA		0.75

Abbreviations: NA, not applicable.

[a] Results were shown as hazard ratio (95% confidence intervals) from the Cox proportional hazards model adjusting for age (continuous), total energy intake (quartile), race and ethnicity (Hispanic, non-Hispanic Blacks, non-Hispanic Whites, others), education (less than high school, high school or some college, above college), smoking status (non-smoker, past smoker, current smoker), alcohol consumption (non-drinker, past drinker, <1 drink/month, <1 drink/week, 1-<7 drinks/week, ≥7 drinks/week), body mass index (<18.5, 18.5-<25, 25-<30, 30-<35, 35-<40, ≥40 kg/m^2), physical activity (quartile), non-steroidal anti-inflammatory drugs use (yes, no), family history of cancer (yes, no), prior oral contraceptive use (yes, no), post-menopausal hormone therapy (yes, no), and self-reported diabetes (yes, no).

[b] One serving defined as 12 fl oz or 355 mL.

[c] The median intake of each category was modeled as a continuous variable to calculate the *P* value for trend.

[d] For artificially sweetened beverage analyses, we used the follow-up year 3 as the baseline.

eTable 6. Sensitivity Analyses on Associations Between Beverages and Chronic Liver Disease Mortality With Different Exclusion Criteria[a]

Exposures	Category [b]	Cases	Excluding first 2 years cases	Cases	Excluding liver diseases at baseline	Cases	Excluding diabetes at baseline	Cases	Only Observational Study	Cases	Alcohol intake <1 drink/day
Sugar-sweetened beverages	Never to ≤3/month	107	1 [Reference]	92	1 [Reference]	87	1 [Reference]	80	1 [Reference]	94	1 [Reference]
	1-6 servings/week	17	0.66 (0.39-1.12)	17	0.81 (0.47-1.37)	15	0.67 (0.38-1.18)	15	0.79 (0.45-1.40)	15	0.64 (0.37-1.12)
	≥1/day	22	1.58 (0.96-2.60)	21	1.86 (1.12-3.12)	21	1.71 (1.02-2.88)	20	1.81 (1.06-3.11)	21	1.67 (1.00-2.80)
	P trend		0.14		0.03		0.08		0.05		0.10
Soft drinks	Never to ≤3/month	113	1 [Reference]	99	1 [Reference]	93	1 [Reference]	87	1 [Reference]	101	1 [Reference]
	1-6 servings/week	14	0.69 (0.39-1.22)	14	0.82 (0.46-1.45)	12	0.67 (0.36-1.23)	12	0.78 (0.42-1.45)	11	0.59 (0.31-1.11)
	≥1/day	19	1.83 (1.08-3.08)	17	1.93 (1.11-3.35)	18	1.90 (1.10-3.28)	16	1.85 (1.04-3.29)	18	1.90 (1.11-3.27)
	P trend		0.09		0.06		0.08		0.09		0.10
Fruit drinks	Never to ≤3/month	135	1 [Reference]	118	1 [Reference]	115	1 [Reference]	105	1 [Reference]	119	1 [Reference]
	1-6 servings/week	9	1.10 (0.55-2.20)	9	1.35 (0.67-2.70)	5	0.70 (0.28-1.73)	7	1.06 (0.49-2.33)	9	1.21 (0.60-2.41)
	≥1/day	2	0.63 (0.15-2.57)	3	1.15 (0.36-3.66)	3	1.05 (0.33-3.37)	3	1.10 (0.34-3.51)	2	0.67 (0.16-2.72)
	P trend		0.71		0.52		0.72		0.83		0.87
Artificially sweetened beverages [d]	Never to ≤3/month	43	1 [Reference]	41	1 [Reference]	38	1 [Reference]	NA	NA	36	1 [Reference]
	1-6 servings/week	19	1.01 (0.59-1.76)	17	0.94 (0.53-1.66)	13	0.90 (0.48-1.70)	NA	NA	17	1.06 (0.59-1.92)
	≥1/day	12	0.95 (0.49-1.84)	12	0.97 (0.50-1.90)	10	1.04 (0.51-2.13)	NA	NA	10	0.92 (0.45-1.90)
	P trend		0.92		0.88		0.96	NA	NA		0.92

Abbreviations: NA, not applicable.

[a] Results were shown as hazard ratio (95% confidence intervals) from the Cox proportional hazards model adjusting for age (continuous), total energy intake (quartile), race and ethnicity (Hispanic, non-Hispanic Blacks, non-Hispanic Whites, others), education (less than high school, high school or some college, above college), smoking status (non-smoker, past smoker, current smoker), alcohol consumption (non-drinker, past drinker, <1 drink/month, <1 drink/week, 1-<7 drinks/week, ≥7 drinks/week), body mass index (<18.5, 18.5-<25, 25-<30, 30-<35, 35-<40, ≥40 kg/m^2), physical activity (quartile), non-steroidal anti-inflammatory drugs use (yes, no), family history of cancer (yes, no), prior oral contraceptive use (yes, no), post-menopausal hormone therapy (yes, no), and self-reported diabetes (yes, no).

[b] One serving defined as 12 fl oz or 355 mL.

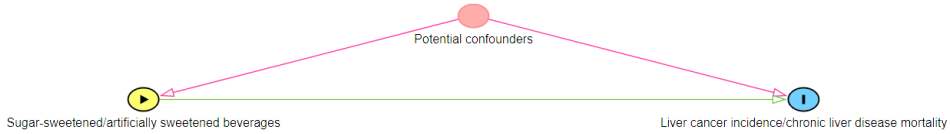
[c] The median intake of each category was modeled as a continuous variable to calculate the *P* value for trend.

[d] For artificially sweetened beverage analyses, we used the follow-up year 3 as the baseline.

eFigure 1. Hypothesized Directed Acyclic Graphs (DAGS) on Associations Between Sugar-Sweetened and Artificially Sweetened Beverage Intake and Liver Cancer Risk and Chronic Liver Disease Mortality in the Women's Health Initiative

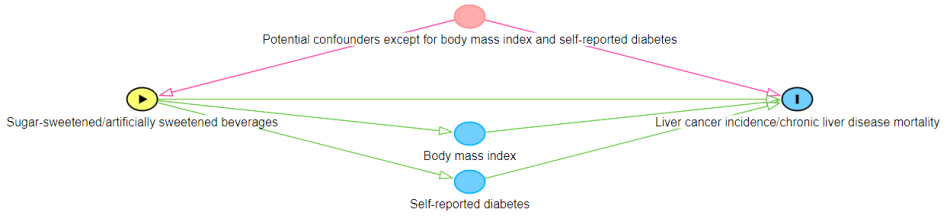
The set of *a priori* confounders included age, energy intake, race/ethnicity, education, alcohol intake, smoking status, body mass index, non-steroidal anti-inflammatory drugs use, oral conceptive use, menopausal hormone therapy, physical activity, family history of cancer, and self-reported diabetes.

a. DAGs in main model



b. DAGs in sensitivity analyses with additional adjustments

c. DAGs in sensitivity analyses considering body mass index and self-reported diabetes as mediators



eFigure 2. Hazard Ratios (95% CIs) for Liver Cancer Risk and Chronic Liver Disease Mortality Associated With the Replacement of 1 Serving Per Day of Sugar-Sweetened or Artificially Sweetened Beverages With 1 Serving Per Day of Coffee or Tea at Follow-Up Year 3

The multivariable-adjusted model controlled for age, energy intake, race/ethnicity, education, alcohol intake, smoking status, body mass index, non-steroidal anti-inflammatory drugs use, oral conceptive use, menopausal hormone therapy, physical activity, family history of cancer, and self-reported diabetes. Hazard ratio was shown on log 2 scale. Abbreviations: HR, hazard ratio; CI, confidence interval.

Replacement of beverages	Liver cancer	$HR_{per\ serving}$ (95% CI)	Chronic liver disease mortality	$HR_{per\ serving}$ (95% CI)
Coffee for				
Sugar-sweetened beverages	0.83 (0.62-1.12)		0.85 (0.62-1.16)	
Artificially sweetened beverages	0.96 (0.74-1.25)		1.02 (0.77-1.35)	
Tea for				
Sugar-sweetened beverages	0.79 (0.57-1.09)		0.84 (0.59-1.20)	
Artificially sweetened beverages	0.90 (0.67-1.20)		1.00 (0.73-1.38)