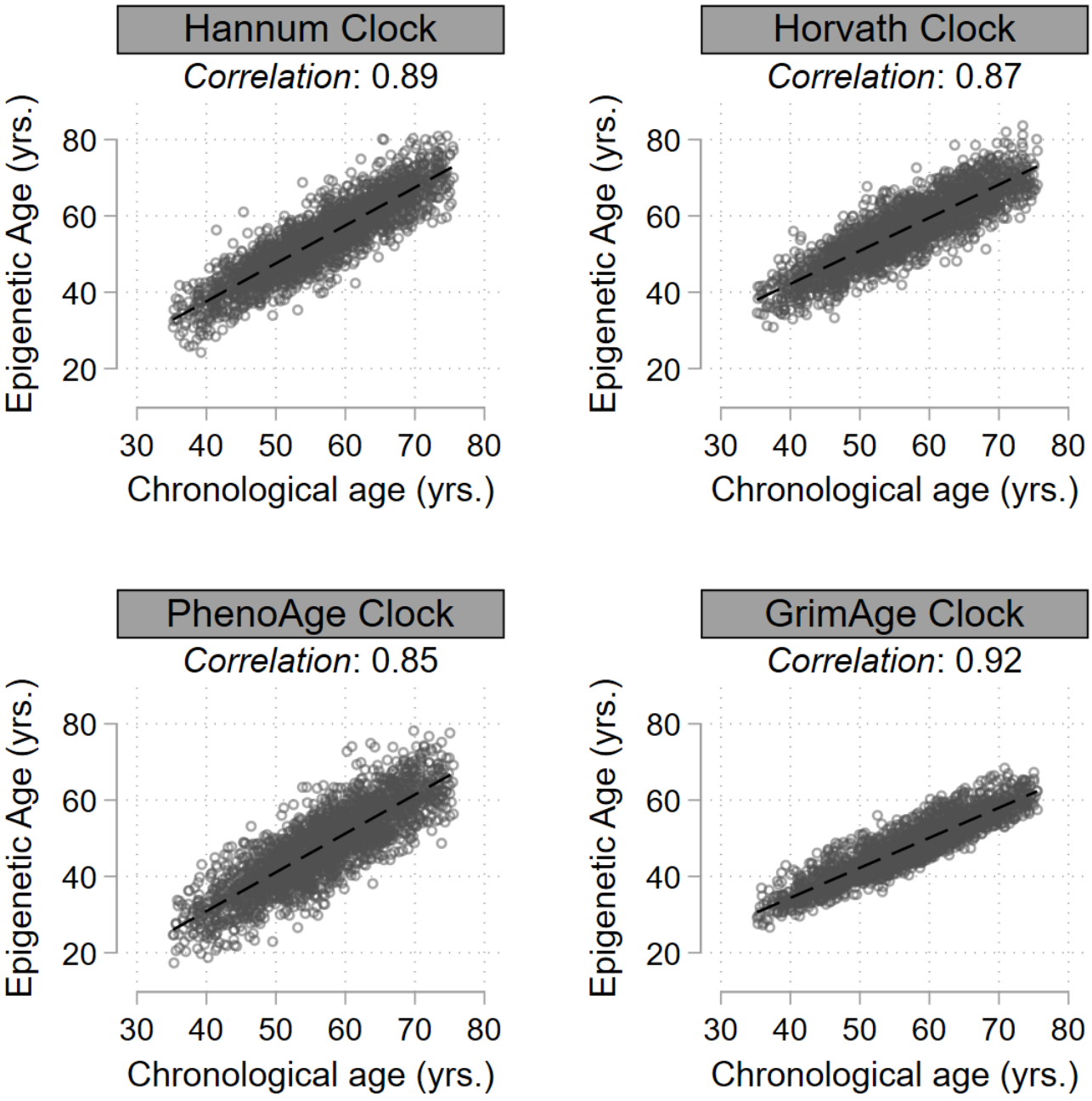
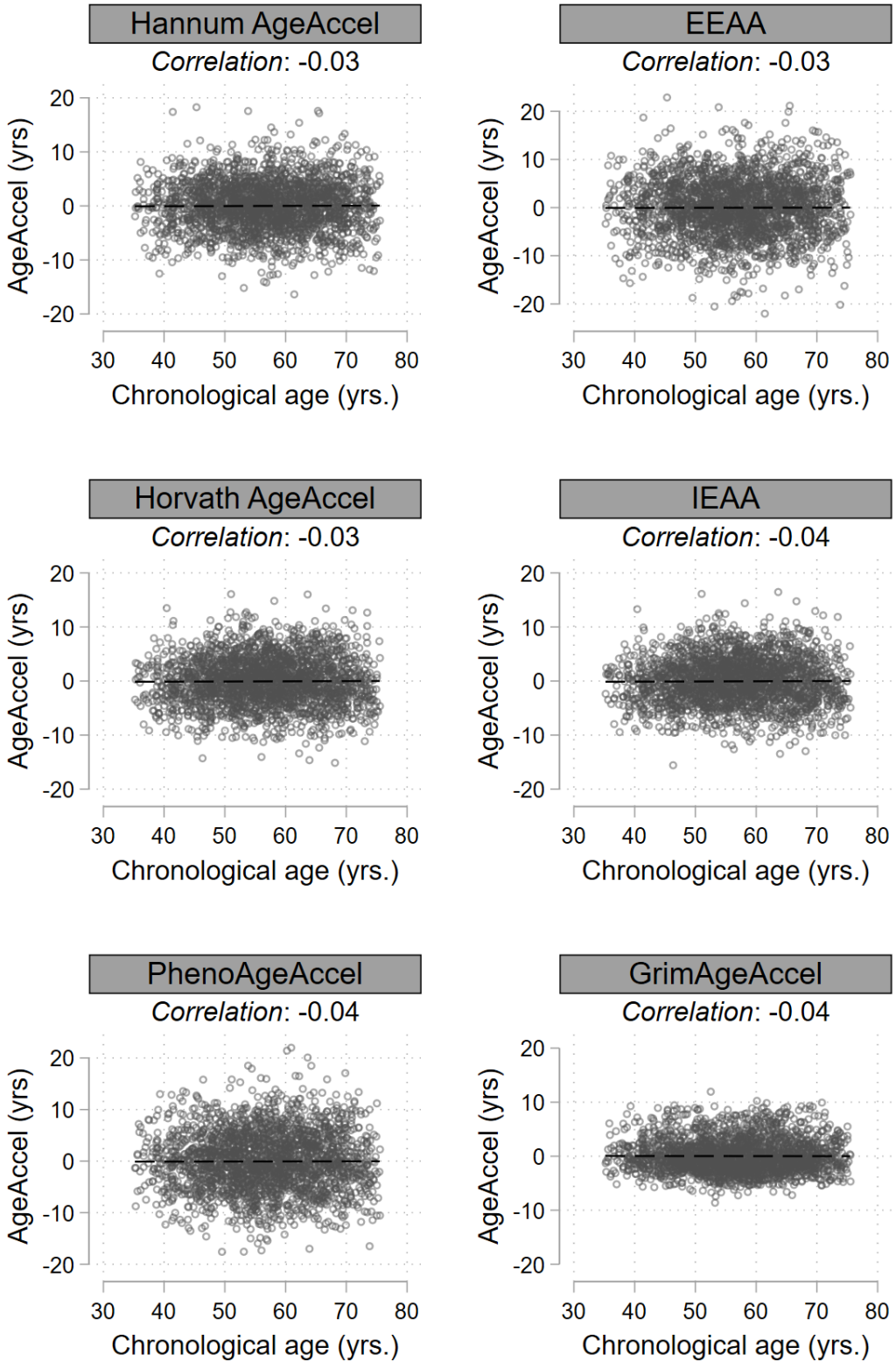
Supplemental Table 1. Characteristics of the eligible Sister Study participants from the full cohort and the unweighted and weighted DNA methylation subsample

	Sister study cohort[1] (n= 35,861)	Methylation subsample (unweighted, n= 2,316)	Methylation subsample (weighted, n= 2,316)
Age, yrs. (SD)	55.5 (9)	56.7 (9)	55.3 (9)
Body mass index, kg/m^2 (SD)	27.2 (6)	27.3 (6)	27.1 (6)
Waist-to-hip ratio, ratio (SD)	0.80 (0.1)	0.81 (0.1)	0.80 (0.1)
Current physical activity, METs/wk. (SD)	51.5 (31)	51.7 (32)	52.9 (32)
Education, %			
High school degree/GED	14	15	15
Attended college	61	59	60
Advanced degree	25	27	25
Smoking Status, %			
Never	52	50	50
Former	40	43	42
Current	8	7	8
Menopause status, %			
Premenopausal	35	32	36
Postmenopausal	65	68	64
Ever drinkers, %	97	97	97
Current drinkers, %	88	88	88
Duration of alcohol use, yrs. (SE)[2]	34 (11)	36 (11)	35 (11)
Recent alcohol use, drinks/week (SD)	3.4 (5)	3.6 (5)	3.4 (5)
Lifetime alcohol use, drinks/year drinking (SD)	110 (142)	115 (137)	108 (124)

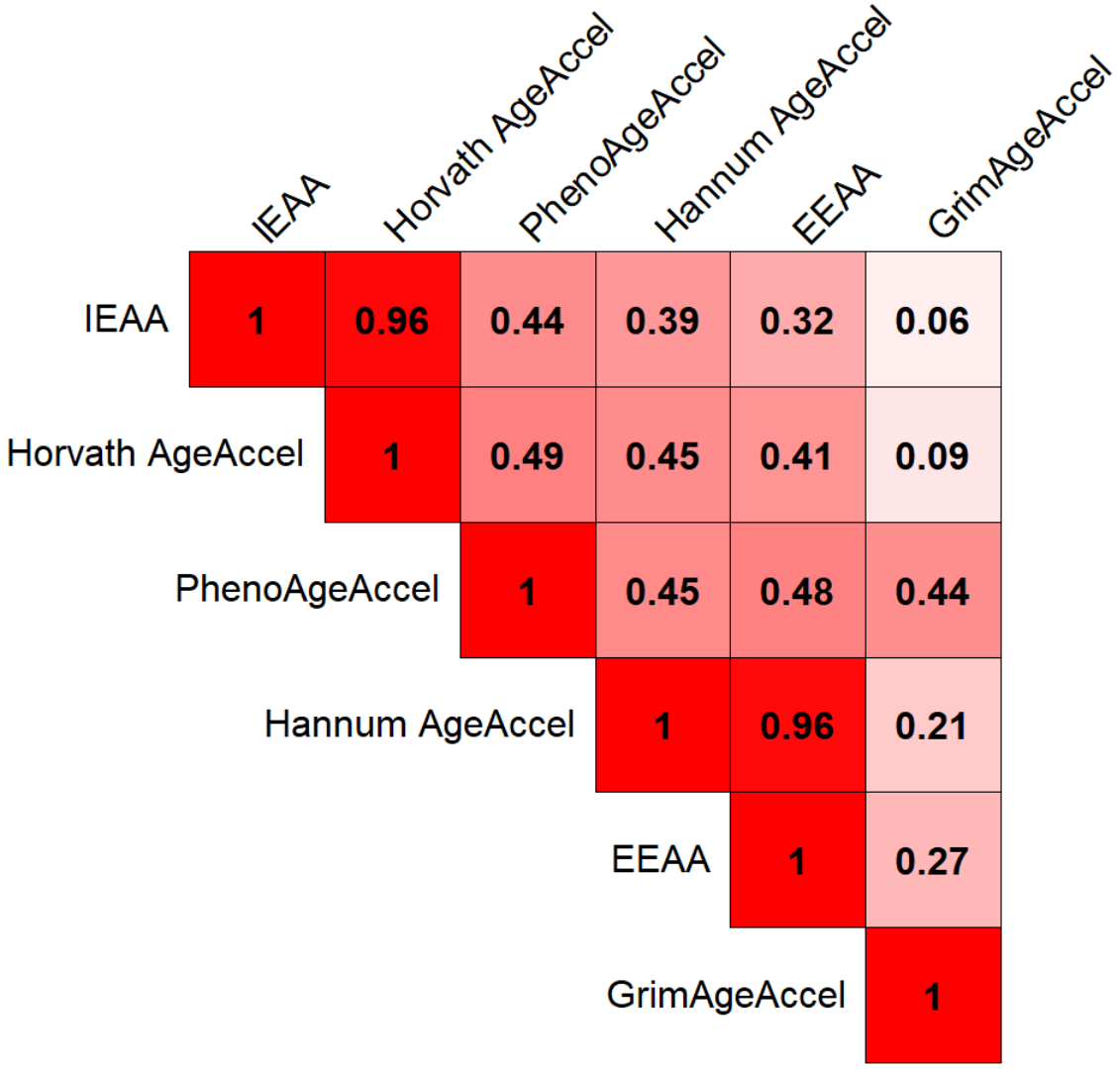
[1]Restricted to non-Hispanic White women who were not missing alcohol use or covariate information
[2]Among ever drinkers
Abbreviations: standard deviation, SD; metabolic equivalent tasks, METs; General education development, GED.



Supplemental Figure 1. *Survey weighted correlations of epigenetic age and chronological age.* For each of the four epigenetic clocks, scatterplots and Pearson correlation coefficients of predicted epigenetic age and chronological age.



Supplemental Figure 2. *Survey weighted correlations between epigenetic age acceleration metrics and chronological age.* Scatterplots and Pearson correlation coefficients for the six metrics of epigenetic age acceleration and chronological age.



Supplemental Figure 3. *Survey weighted correlations between the six epigenetic age acceleration metrics*. Pairwise Pearson correlations for the six epigenetic age acceleration metrics generated by the four epigenetic clocks.

Supplemental Table 2. Survey weighted crude alcohol consumption associations with the four epigenetic age acceleration metrics (N= 2,316)

	Hannum AgeAccel		Horvath AgeAccel		PhenoAgeAccel		GrimAgeAccel	
	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P
Separate alcohol consumption models								
Lifetime use								
Per additional 135 drinks/yr.	0.18 (-0.12, 0.49)	0.24	-0.23 (-0.51, 0.06)	0.12	0.12 (-0.27, 0.51)	0.54	0.53 (0.31, 0.75)	< 0.001
Recent use								
Per additional 5 drinks/wk.	0.13 (-0.17, 0.44)	0.39	-0.26 (-0.52, 0.01)	0.06	-0.11 (-0.47, 0.25)	0.55	0.25 (0.05, 0.46)	0.02
Mutually adjusted alcohol consumption models								
Lifetime use								
Per additional 135 drinks/yr.	0.16 (-0.20, 0.51)	0.39	-0.13 (-0.48, 0.22)	0.45	0.24 (-0.23, 0.72)	0.32	0.55 (0.28, 0.82)	< 0.001
Recent use								
Per additional 5 drinks/wk.	0.05 (-0.30, 0.40)	0.78	-0.18 (-0.51, 0.14)	0.27	-0.24 (-0.68, 0.20)	0.28	-0.04 (-0.30, 0.22)	0.76

All models are unadjusted

Supplemental Table 3. Survey weighted alcohol consumption associations with the four epigenetic age acceleration metrics, stratified by menopause status at enrollment (N= 2,316)

	Hannum AgeAccel		Horvath AgeAccel		PhenoAgeAccel		GrimAgeAccel	
	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P
Premenopausal women								
Separate alcohol consumption models								
Lifetime use								
Per additional 135 drinks/yr.	0.33 (-0.17, 0.83)	0.20	0.42 (-0.07, 0.91)	0.09	0.50 (-0.13, 1.14)	0.12	0.44 (0.13, 0.76)	0.006
Recent use								
Per additional 5 drinks/wk.	0.43 (-0.07, 0.93)	0.09	0.37 (-0.04, 0.78)	0.08	0.32 (-0.34, 0.99)	0.34	0.27 (-0.06, 0.60)	0.11
Mutually adjusted alcohol consumption models								
Lifetime use								
Per additional 135 drinks/yr.	0.10 (-0.47, 0.67)	0.72	0.29 (-0.32, 0.89)	0.35	0.45 (-0.26, 1.15)	0.22	0.41 (0.06, 0.75)	0.02
Recent use								
Per additional 5 drinks/wk.	0.38 (-0.19, 0.95)	0.19	0.22 (-0.28, 0.72)	0.38	0.10 (-0.63, 0.82)	0.79	0.07 (-0.28, 0.42)	0.72
Postmenopausal women								
Separate alcohol consumption models								
Lifetime use								
Per additional 135 drinks/yr.	0.22 (-0.15, 0.60)	0.25	-0.40 (-0.74, -0.06)	0.02	0.03 (-0.45, 0.52)	0.90	0.24 (0.01, 0.47)	0.04
Recent use								
Per additional 5 drinks/wk.	0.15 (-0.24, 0.54)	0.46	-0.46 (-0.80, -0.12)	0.01	-0.12 (-0.55, 0.32)	0.60	0.16 (-0.05, 0.37)	0.13
Mutually adjusted alcohol consumption models								
Lifetime use								
Per additional 135 drinks/yr.	0.20 (-0.23, 0.64)	0.36	-0.25 (-0.66, 0.16)	0.23	0.11 (-0.47, 0.70)	0.71	0.22 (-0.07, 0.50)	0.13
Recent use								
Per additional 5 drinks/wk.	0.04 9-0.41, 0.50)	0.85	-0.33 (-0.74, 0.08)	0.11	-0.17 (-0.71, 0.36)	0.52	0.05 (-0.22, 0.31)	0.73

All models adjust for education level (High school/GED; attended college; advanced degree), body mass index (continuous, kg/m^2), waist-to-hip ratio (continuous, ratio) smoking status (never, former, current), and physical activity (continuous, METs/wk.).

Supplemental Table 4. Survey weighted alcohol consumption quintile associations with the four epigenetic age acceleration metrics (N= 2,316)

	Hannum AgeAccel		Horvath AgeAccel		PhenoAgeAccel		GrimAgeAccel	
	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P
Separate alcohol consumption models								
Lifetime use								
Quintile 1 (mean: 6.9 drinks/yr.)	Ref.		Ref.		Ref.		Ref.	
Quintile 2 (mean: 31.6 drinks/yr.)	0.57 (-0.24, 1.38)	0.17	-0.05 (-0.89, 0.78)	0.90	-0.14 (-1.11, 0.82)	0.77	0.05 (-0.40, 0.50)	0.83
Quintile 3 (mean: 71.9 drinks/yr.)	-0.14 (-1.02, 0.74)	0.76	-0.91 (-1.78, -0.04)	0.04	-0.74 (-1.76, 0.28)	0.16	0.06 (-0.39, 0.52)	0.78
Quintile 4 (mean: 137 drinks/yr.)	0.86 (0.02, 1.69)	0.04	-0.17 (-1.05, 0.70)	0.70	-0.91 (-1.94, 0.11)	0.08	-0.08 (-0.55, 0.40)	0.75
Quintile 5 (mean: 327 drinks/yr.)	0.90 (-0.01, 1.81)	0.05	-0.63 (-1.53, 0.27)	0.17	0.01 (-1.11, 1.13)	0.99	0.63 (0.12, 1.13)	0.02
Recent use								
Quintile 1 (mean: 0.03 drinks/wk.)	Ref.		Ref.		Ref.		Ref.	
Quintile 2 (mean: 0.51 drinks/wk.)	-0.28 (-1.08, 0.52)	0.49	-0.65 (-1.45, 0.15)	0.11	-0.77 (-1.74, 0.21)	0.12	-0.19 (-0.64, 0.26)	0.41
Quintile 3 (mean: 1.95 drinks/wk.)	0.71 (-1.05, 0.71)	0.71	-0.95 (-1.75, -0.15)	0.02	-0.84 (-1.84, 0.17)	0.10	-0.26 (-0.72, 0.20)	0.27
Quintile 4 (mean: 4.70 drinks/wk.)	-0.04 (-0.94, 0.85)	0.92	-0.42 (-1.33, 0.48)	0.36	-0.90 (-1.99, 0.18)	0.10	-0.38 (-0.86, 0.11)	0.13
Quintile 5 (mean: 11.7 drinks/wk.)	0.32 (-0.58, 1.23)	0.48	-0.90 (-1.78, -0.01)	0.05	-0.49 (-1.61, 0.62)	0.39	0.16 (-0.35, 0.67	0.53
Mutually adjusted alcohol consumption models								
Lifetime use								
Quintile 1 (mean: 6.9 drinks/yr.)	Ref.		Ref.		Ref.		Ref.	
Quintile 2 (mean: 31.6 drinks/yr.)	0.68 (-0.15, 1.50)	0.11	0.19 (-0.66, 1.04)	0.66	0.09 (-0.91, 1.09)	0.87	0.17 (-0.31, 0.65)	0.49
Quintile 3 (mean: 71.9 drinks/yr.)	-0.02 (-0.96, 0.92)	0.96	-0.68 (-1.61, 0.25)	0.15	-0.50 (-1.61, 0.60)	0.37	0.26 (-0.27, 0.79)	0.33
Quintile 4 (mean: 137 drinks/yr.)	0.95 (-0.01, 1.91)	0.05	-0.01 (-0.96, 0.94)	0.99	-0.75 (-1.92, 0.41)	0.21	0.11 (-0.45, 0.67)	0.70
Quintile 5 (mean: 327 drinks/yr.)	0.93 (-0.13, 2.00)	0.09	-0.43 (-1.49, 0.63)	0.43	0.07 (-1.29, 1.42)	0.93	0.72 (0.10, 1.34)	0.02
Recent use								
Quintile 1 (mean: 0.03 drinks/wk.)	Ref.		Ref.		Ref.		Ref.	
Quintile 2 (mean: 0.51 drinks/wk.)	-0.33 (-1.15, 0.49)	0.43	-0.65 (-1.46, 0.17)	0.12	-0.74 (-1.74, 0.27)	0.15	-0.20 (-0.66, 0.27)	0.41
Quintile 3 (mean: 1.95 drinks/wk.)	-0.27 (-1.18, 0.64)	0.56	-0.82 (-1.67, 0.02)	0.06	-0.64 (-1.70, 0.43)	0.24	-0.31 (-0.83, 0.20)	0.23
Quintile 4 (mean: 4.70 drinks/wk.)	-0.30 (-1.30, 0.70)	0.56	-0.23 (-1.21, 0.76)	0.65	-0.54 (-1.76, 0.68)	0.39	-0.48 (-1.04, 0.09)	0.10
Quintile 5 (mean: 11.7 drinks/wk.)	-0.16 (-1.21, 0.90)	0.77	-0.66 (-1.71, 0.38)	0.22	-0.35 (-1.68, 0.98)	0.61	-0.15 (-0.77, 0.47)	0.64

All models adjust for education level (High school/GED; attended college; advanced degree), body mass index (continuous, kg/m^2), waist-to-hip ratio (continuous, ratio) smoking status (never, former, current), and physical activity (continuous, METs/wk.).

Supplemental Table 5. Survey weighted alcohol consumption associations with the two cell-type modified epigenetic age acceleration metrics (N= 2,316)

	EEAA		IEAA	
	β (95% CI)	P	β (95% CI)	P
Separate alcohol consumption models				
Lifetime use				
Per additional 135 drinks/yr.	0.22 (-0.19, 0.63)	0.29	-0.19 (-0.48, 0.09)	0.18
Recent use				
Per additional 5 drinks/wk.	0.32 (-0.09, 0.73)	0.13	-0.20 (-0.45, 0.06)	0.13
Mutually adjusted alcohol consumption models				
Lifetime use				
Per additional 135 drinks/yr.	0.09 (-0.38, 0.56)	0.72	-0.13 (-0.47, 0.21)	0.41
Recent use				
Per additional 5 drinks/wk.	0.27 (-0.20, 0.75)	0.26	-0.13 (-0.44, 0.18)	0.41

All models adjust for education level (High school/GED; attended college; advanced degree), body mass index (continuous, kg/m^2), waist-to-hip ratio (continuous, ratio) smoking status (never, former, current), and physical activity (continuous, METs/wk.).

Supplemental Table 6. Survey weighted alcohol consumption associations with the individual GrimAge clock components (N= 2,316)

	ADM		B2m		Cystatin C		GDF15	
	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P
Separate models								
Lifetime use	0.51 (-0.66, 1.68)	0.39	-68 (-9608, 9473)	0.99	-1428 (-3560, 703)	0.19	3.50 (-3.82, 10.8)	0.35
Recent use	1.08 (-0.12, 2.29)	0.08	-341 (-10072, 9388)	0.95	-583 (-2664, 1499)	0.58	4.47 (-3.21, 12.2)	0.25
Combined model								
Lifetime use	-0.04 (-1.42, 1.34)	0.96	137 (-11309, 11583)	0.98	-1526 (-4087, 1035)	0.24	1.70 (-7.17, 10.6)	0.71
Recent use	1.10 (-0.28, 2.49)	0.12	-412 (-12092, 11268)	0.95	197 (-2313, 2706)	0.88	3.61 (-5.57, 12.8)	0.44

	Leptin		Pack-years		PAI-1		TIMP-1	
	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P
Separate models								
Lifetime use	-25.2 (-127, 76.6)	0.63	0.67 (0.19, 1.14)	0.01	248 (131, 367)	< 0.001	-25.8 (-110, 58.4)	0.55
Recent use	-76.1 (-176, 23.6)	0.14	0.57 (0.11, 1.03)	0.02	211 (89.0, 333)	0.001	7.81 (-75.2, 90.8)	0.85
Combined model								
Lifetime use	17.0 (-95.3, 129)	0.77	0.51 (-0.04, 1.07)	0.07	192 (50.9, 333)	0.008	-39.8 (-142, 62.9)	0.45
Recent use	-84.8 (-199, 29.6)	0.15	0.31 (-0.23, 0.84)	0.26	113 (-30.6, 256)	0.12	28.1 (-72.5, 128)	0.58

All models adjust for education level (High school/GED; attended college; advanced degree), body mass index (continuous, kg/m^2), waist-to-hip ratio (continuous, ratio) smoking status (never, former, current), and physical activity (continuous, METs/wk.).

[1]Combined models are mutually adjusted for both recent and lifetime alcohol use variables.

Supplemental Table 7. Survey weighted associations between additional alcohol consumption measures and the four epigenetic age acceleration metrics (N= 2,316)

	Hannum AgeAccel		Horvath AgeAccel		PhenoAgeAccel		GrimAgeAccel	
	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P
Current drinking status								
Never	Ref.		Ref.		Ref.		Ref.	
Former	0.69 (-0.83, 2.20)	0.37	1.63 (-0.10, 3.35)	0.06	1.92 (-0.29, 4.13)	0.09	1.05 (0.14, 1.97)	0.02
Current	1.25 (0.00, 2.49)	0.05	0.66 (-0.90, 2.23)	0.41	1.18 (-0.75, 3.11)	0.23	0.62 (-0.16, 1.39)	0.12
Recent use intensity								
Per additional 1 drink/day on days drinking	0.26 (0.00, 0.51)	0.05	-0.18 (-0.43, 0.07)	0.15	-0.07 (-0.45, 0.31)	0.73	0.09 (-0.09, 0.27)	0.30
Lifetime number of binges[1]								
None	Ref.		Ref.		Ref.		Ref.	
1-25	-0.29 (-1.03, 0.44)	0.43	0.02 (-0.69, 0.72)	0.96	-0.62 (-1.47, 0.22)	0.15	-0.01 (-0.39, 0.37)	0.95
26-249	0.10 (-0.91, 1.10)	0.85	0.19 (-0.84, 1.22)	0.72	-0.58 (-1.77, 0.61)	0.34	0.15 (-0.46, 0.75)	0.64
250+	-0.38 (-2.59, 1.83)	0.74	1.93 (-0.18, 4.04)	0.07	1.70 (-1.09, 4.50)	0.23	0.36 (-0.89, 1.61)	0.57

[1]Excludes 308 women who never reported binge drinking but had lifetime averages greater than 60 drinks/year drinking. Referent group is women reporting fewer than 60 drinks/year drinking and never binging (low level drinkers).

All models adjust for average lifetime alcohol use, education level (High school/GED; attended college; advanced degree), body mass index (continuous, kg/m^2), waist-to-hip ratio (continuous, ratio) smoking status (never, former, current), and physical activity (continuous, METs/wk.).