Online Supplementary Material for:

An eating pattern characterised by skipped or delayed breakfast is associated with mood disorders among an Australian adult cohort

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Supplementary Table S1. Time-of-day eating pattern factor loadings generated by principal components analyses of percentage of daily food consumed during each interval at CDAH-1 and CDAH-2 (n=1374)

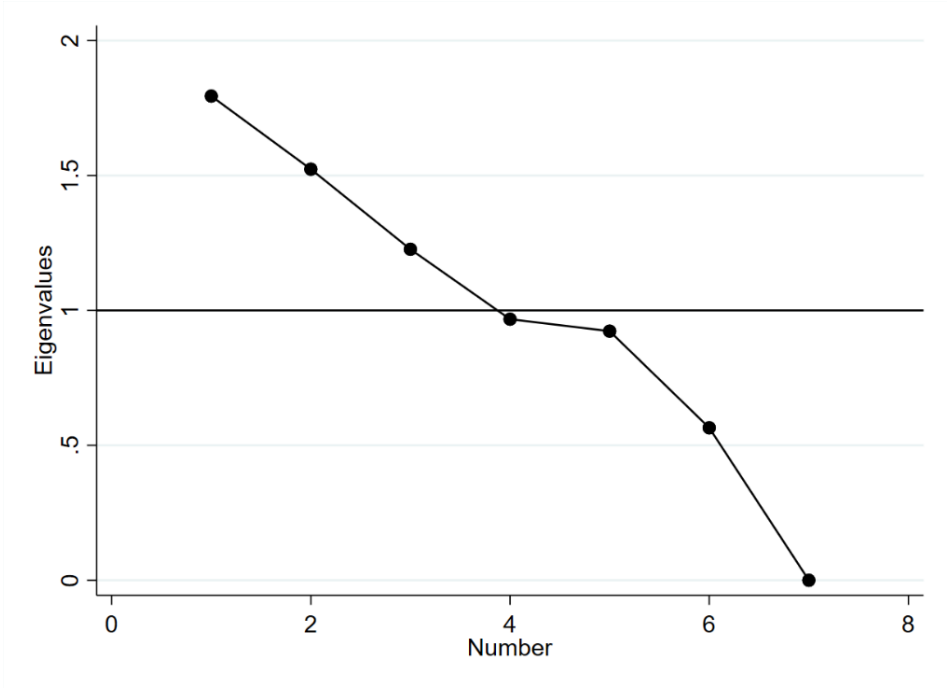
	CDAH-1*			CDAH-2*		
Eating interval	Grazing	Traditional	Late	Grazing	Traditional	Late
Early 6-9am	–	–	-0.69	–	–	-0.74
Late morning 9am-12pm	–	-0.67	–	–	-0.61	–
Midday 12-3pm	–	0.69	–	–	0.75	–
Afternoon 3-6pm	0.65	–	–	0.67	–	–
Evening 6-9pm	-0.73	–	–	-0.72	–	–
Night 9-11pm	–	–	0.49	–	–	0.51
Overnight 11pm-6am	–	–	0.47	–	–	0.32
Eigenvalue	1.68	1.53	1.33	1.68	1.46	1.37
Variance explained†	0.24	0.22	0.19	0.24	0.21	0.20

CDAH: Childhood Determinants of Adult Health study.

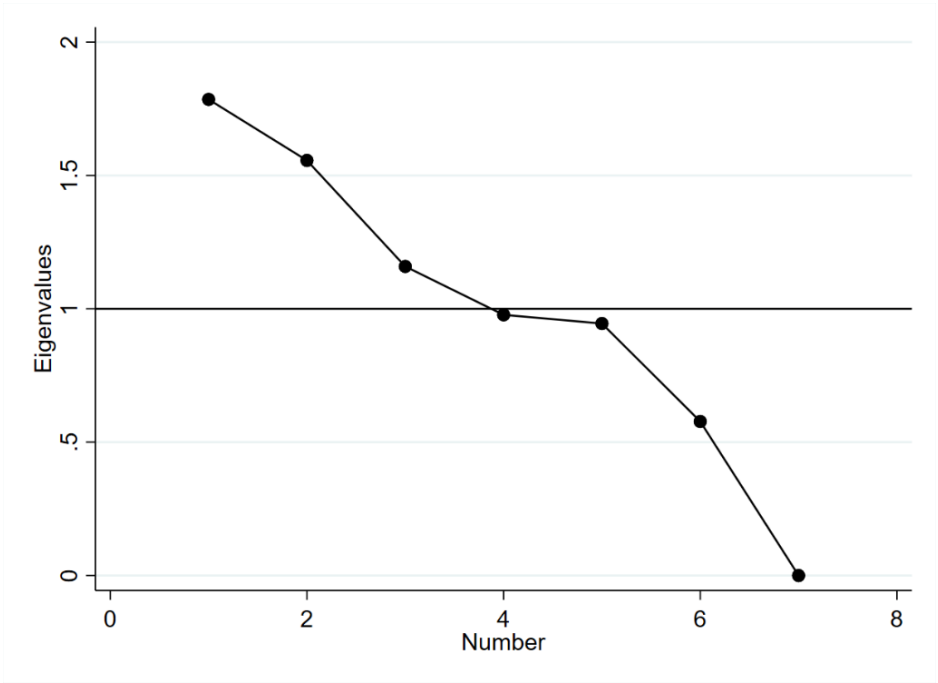
*Only factor loadings >|0.3| are shown for clarity. Loadings are for varimax rotated components

†Proportion of common variance (total of 1.00), explained by component.

Supplementary Figure S1. Principal components analysis (PCA) scree plots for time-of-day eating patterns for n= 1374 participants at CDAH-1 (2004-06) and CDAH-2 (2009-11)



S1a. Scree plot of eigenvalues after PCA on eating-time intervals at CDAH-1



S1b. Scree plot of eigenvalues after PCA on eating-time intervals at CDAH-2

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Supplementary Table S2. Percent agreement of low, middle and high score categories of time-of-day eating patterns at CDAH-1 (2004-2006) and CDAH-2 (2009-2011).

Pattern and score category at CDAH-1	Score category at CDAH-2						Cohen's Kappa[a]
	Lowest		Middle		Highest		
	%	(n)	%	n	%	n	
Grazing[b]							0.099
Lowest	14.7	(192)	9.9	(129)	8.9	(116)	
Middle	10.9	(142)	12.0	(157)	10.6	(138)	
Highest	8.2	(107)	11.6	(151)	13.2	(172)	
Traditional[c]							0.081
Lowest	13.4	(175)	10.1	(131)	10.6	(138)	
Middle	9.4	(123)	12.9	(168)	10.6	(138)	
Highest	10.1	(132)	10.5	(137)	12.4	(162)	
Late[d]							0.144
Lowest	13.8	(180)	11.6	(151)	7.9	(103)	
Middle	10.9	(142)	13.1	(171)	9.3	(121)	
Highest	8.8	(115)	8.6	(112)	16.0	(209)	

CDAH: Childhood Determinants of Adult Health study.

[a]Possible range -1 to +1. < 0: no agreement; 0–0.20: slight; 0.21–0.40: fair; 0.41–0.60: moderate; 0.61–0.80: substantial; 0.81–1: almost perfect agreement.

[b]Grazing pattern: intake spread across the day, highest in the afternoon.

[c]Traditional pattern: highest proportions of intake reflect breakfast, lunch and dinner times.

[d]Late pattern: skipped/delayed breakfast and higher intakes during the evening.

Supplementary Table S3. Percent agreement of low, middle and high score categories of time-of-day eating patterns and weekly frequency of skipping breakfast at CDAH-2 (2009-2011) among n=1284 participants.

	Usual breakfast skipping frequency per week at CDAH-2						
Score category at CDAH-2	Never (n=875)		1-3 days (n=235)		4-7 days (n=174)		Cohen's Kappa[a]
	%	(n)	%	(n)	%	(n)	
Grazing[b]							-0.110
Lowest	21.9	(281)	5.8	(74)	5.8	(75)	
Middle	24.2	(311)	6.4	(82)	3.3	(42)	
Highest	22.0	(283)	6.2	(79)	4.4	(57)	
Traditional[c]							-0.032
Lowest	20.6	(265)	6.1	(78)	6.1	(78)	
Middle	24.8	(319)	5.8	(74)	3.0	(38)	
Highest	22.7	(291)	6.5	(83)	4.5	(58)	
Late[d]							0.144
Lowest	27.7	(356)	5.1	(65)	0.8	(10)	
Middle	25.9	(332)	5.0	(64)	2.4	(31)	
Highest	14.6	(187)	8.3	(106)	10.4	(133)	

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[a]Possible range -1 to +1. < 0: no agreement; 0–0.20: slight; 0.21–0.40: fair; 0.41–0.60: moderate; 0.61–0.80: substantial; 0.81–1: almost perfect agreement.

[b]Grazing pattern: intake spread across the day, highest in the afternoon.

[c]Traditional pattern: highest proportions of intake reflect breakfast, lunch and dinner times.

[d]Late pattern: skipped/delayed breakfast and higher intakes during the evening.

Supplementary Table S4. Sensitivity analyses: Associations between time-of-day eating pattern category at CDAH-1 or tracking of eating pattern category from CDAH-1 to CDAH-2, with first onset of mood disorder during follow-up between CDAH-1 and CDAH-2 (n=1056).

	Mood events		Model 1[a,b]		Model 2[c,d]	
	%	(n/N)	RR/PR	95% CI	RR/PR	95% CI
CDAH-1 patterns predicting mood disorders during follow-up						
Grazing						
Low	7.4	(26/353)	Reference		Reference	
Middle	6.6	(24/362)	0.73	(0.42, 1.26)	0.74	(0.43, 1.27)
High	7.0	(24/341)	0.89	(0.50, 1.56)	0.86	(0.49, 1.52)
Trend			*p*=0.683		*p*=0.615	
Traditional						
Low	8.5	(30/353)	Reference		Reference	
Middle	6.5	(22/340)	0.76	(0.44, 1.33)	0.81	(0.46, 1.43)
High	6.1	(22/363)	0.79	(0.45, 1.38)	0.90	(0.50, 1.62)
Trend			*p*=0.398		*p*=0.698	
Late						
Low	7.0	(26/372)	Reference		Reference	
Middle	6.7	(23/344)	1.00	(0.56, 1.77)	1.01	(0.57, 1.78)
High	7.4	(25/340)	1.21	(0.69, 2.13)	1.06	(0.61, 1.85)
Trend			*p*=0.523		*p*=0.845	
Tracking categories CDAH-1 to CDAH-2 and association with mood disorder onset during follow-up						
Grazing						
Consistently low	6.3	(10/159)	Reference		Reference	
Decreased	8.0	(26/325)	1.14	(0.55, 2.37)	1.15	(0.55, 2.40)
Consistently middle	6.2	(8/130)	0.80	(0.31, 2.05)	0.78	(0.30, 2.04)
Increased	8.1	(25/307)	1.16	(0.55, 2.44)	1.19	(0.56, 2.53)
Consistently high	3.7	(5/135)	0.55	(0.18, 1.73)	0.54	(0.18, 1.60)
Trend			*p*=0.457		*p*=0.451	
Traditional						
Consistently low	11.6	(16/138)	Reference		Reference	
Decreased	6.8	(22/323)	0.58	(0.31, 1.11)	0.62	(0.32, 1.23)
Consistently middle	3.8	(5/131)	**0.28**	**(0.10, 0.83)**	**0.34**	**(0.12, 0.99)**
Increased	8.0	(26/326)	0.62	(0.33, 1.17)	0.63	(0.34, 1.16)
Consistently high	3.6	(5/138)	**0.30**	**(0.11, 0.83)**	**0.31**	**(0.11, 0.87)**
Trend			*p*=0.068		*p*=0.054	
Late						
Consistently low	3.8	(6/159)	Reference		Reference	
Decreased	6.6	(20/304)	1.80	(0.66, 4.86)	1.60	(0.59, 4.32)
Consistently middle	3.6	(5/138)	1.23	(0.35, 4.26)	1.15	(0.33, 3.98)
Increased	8.6	(26/301)	**2.61**	**(1.00, 6.82)**	2.32	(0.89, 6.07)
Consistently high	11.0	(17/154)	**3.73**	**(1.37, 10.15)**	**2.84**	**(1.06, 7.58)**
Trend			***p*=0.002**		***p*=0.011**	

CDAH: Childhood Determinants of Adult Health study; RR, relative risk; PR, prevalence ratio; CI, confidence interval.

Statistically significant ($p<0.05$) results are highlighted in bold.

[a]Prediction analysis models adjusted for sex and age at CDAH-1.

[b]Tracking analysis models adjusted for sex and age at CDAH-2.

[c]Prediction analysis models adjusted for sex and CDAH-1 age, BMI, social support, and smoking status.

[d]Tracking analysis models adjusted for sex, age, and work schedule at CDAH-2, and change from CDAH-1 to CDAH-2 in social support, smoking, marital status, and BMI.

Supplementary Table S5. Sensitivity analyses: associations between time-of-day eating pattern category for weekday reporters only at CDAH-1 or tracking of pattern categories from CDAH-1 to CDAH-2, and mood disorder during follow-up between CDAH-1 and CDAH-2.

	Mood events		Model 1[a,b]		Model 2[c,d]	
	%	(n/N)	RR/PR	95% CI	RR/PR	95% CI
CDAH-1 patterns predicting mood disorders during follow-up (n=926)						
Grazing						
Low	17.1	(55/321)	Reference		Reference	
Middle	17.5	(58/331)	0.93	(0.65, 1.33)	0.88	(0.62, 1.25)
High	16.4	(45/274)	0.89	(0.61, 1.30)	0.78	(0.53, 1.15)
Trend				*p*=0.545		*p*=0.206
Traditional						
Low	20.2	(58/287)	Reference		Reference	
Middle	15.0	(51/341)	0.71	(0.49, 1.03)	0.77	(0.52, 1.14)
High	16.4	(49/298)	0.82	(0.57, 1.19)	0.97	(0.66, 1.43)
Trend				*p*=0.292		*p*=0.798
Late						
Low	15.3	(50/327)	Reference		Reference	
Middle	16.9	(54/320)	1.03	(0.71, 1.51)	1.01	(0.70, 1.46)
High	19.4	(54/279)	1.25	(0.85, 1.84)	1.06	(0.72, 1.56)
Trend				*p*=0.256		*p*=0.764
Tracking categories CDAH-1 to CDAH-2 and association with mood disorder during follow-up (n=636)						
Grazing						
Consistently low	7.7	(8/104)	Reference		Reference	
Decreased	14.4	(25/174)	1.81	(0.80, 4.09)	1.86	(0.82, 4.23)
Consistently middle	13.8	(13/94)	1.92	(0.78, 4.71)	2.21	(0.88, 5.53)
Increased	17.5	(33/189)	**2.65**	**(1.18, 5.96)**	**2.67**	**(1.19, 5.99)**
Consistently high	10.7	(8/75)	1.45	(0.52, 4.04)	1.42	(0.51, 3.92)
Trend				*p*=0.096		*p*=0.083
Traditional						
Consistently low	12.5	(10/80)	Reference		Reference	
Decreased	15.1	(28/186)	1.23	(0.60, 2.52)	1.24	(0.60, 2.55)
Consistently middle	11.9	(12/101)	1.05	(0.44, 2.52)	1.19	(0.49, 2.91)
Increased	14.0	(26/186)	1.27	(0.61, 2.64)	1.13	(0.51, 2.52)
Consistently high	13.3	(11/83)	1.20	(0.53, 2.75)	1.23	(0.54, 2.79)
Trend				*p*=0.682		*p*=0.888
Late						
Consistently low	8.3	(8/96)	Reference		Reference	
Decreased	13.7	(24/175)	2.14	(0.95, 4.84)	1.86	(0.81, 4.31)
Consistently middle	8.6	(8/93)	1.15	(0.41, 3.19)	1.09	(0.39, 3.05)
Increased	14.2	(26/183)	**2.53**	**(1.12, 5.67)**	**2.30**	**(1.01, 5.24)**
Consistently high	23.6	(21/89)	**4.34**	**(1.94, 9.72)**	**3.46**	**(1.47, 8.14)**
Trend				***p*=0.001**		***p*=0.002**

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Statistically significant ($p<0.05$) results are highlighted in bold.

[a]Prediction analysis models adjusted for sex and age at CDAH-1.

[b]Tracking analysis models adjusted for sex and age at CDAH-2.

[c]Prediction analysis models adjusted for sex and CDAH-1 age, BMI, social support, and smoking status.

[d]Tracking analysis models adjusted for sex, age, and work schedule at CDAH-2, and change from CDAH-1 to CDAH-2 in social support, smoking, marital status, and BMI.