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Prospective relevance of evening carbohydrate and protein intake during adolescence for body composition in young adulthood

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Popular weight loss diets commonly advocate the reduction of carbohydrate intake (CHO) in evening meals and/or a high evening protein intake (PRO)[1,2]. However, little is known about the longer-term relevance of circadian eating pattern during adolescence, a potential critical period for later body composition[3]. Therefore, the aim of the present study was to investigate the prospective relation of evening CHO and PRO intake during adolescence to body composition in young adulthood. For comparative purposes, the relevance of morning and daily CHO and PRO intake was also assessed.

Multivariable regression analyses were performed on data from 182 female and 164 male participants of the DONALD-study with at least two 3-day weighed dietary records during adolescence (baseline: girls 9–14 years; boys 10–15 years) and anthropometric measurements in young adulthood (18–25 years)[4]. Fat free mass index (FFMI, kg/m^2) and fat mass index (FMI, kg/m^2) were estimated from four skinfolds. Day-time specific data was used to calculate morning (before 11 a.m.) and evening (after 6 p.m.) as well as daily CHO and PRO intake (in % of energy). In addition, the ratio of carbohydrate to protein (CHO:PRO) was also determined.

Females with a higher evening CHO:PRO ratio during adolescence had lower adult FFMI values ($p = 0{\cdot}018$, see table). Similar trends for lower adult FFMI values were observed for females with a higher evening CHO intake or a lower evening PRO intake during adolescence ($p < 0{\cdot}1$, see table). Evening CHO or PRO intake was not related to adult FMI among females ($p > 0{\cdot}2$). Among males, prospective associations were confined to a trend for higher adult FMI levels among those who had consumed more evening CHO during adolescence ($p = 0{\cdot}053$). Morning CHO or PRO intake was not related to adult body composition among females and males. Analyses of the daily intake revealed that a higher CHO:PRO ratio, a higher CHO intake and a lower PRO intake was again related to lower adult FFMI values among females only (see table).

	Mean adult FFMI in kg/m^2 (95 %-CI)* among female participants by tertiles (T) of the predicting variable						
	T1		T2		T3		
Predicting variable	mean	(95 %-CI)	mean	(95 %-CI)	mean	(95 %-CI)	p for trend
Evening intake							
CHO: PRO ratio	15·64	(15·38–15·91)	15·61	(15·35–15·88)	15·29	(15·04–15·55)	0·018°
CHO	15·62	(15·36–15·90)	15·66	(15·40–15·93)	15·26	(15·01–15·52)	0·090
PRO	15·31	(15·06–15·57)	15·71	(15·44–15·98)	15·52	(15·27–15·79)	0·051
Daily intake							
CHO:PRO ratio	15·82	(15·54–16·10)	15·56	(15·29–15·83)	15·29	(15·03–15·56)	0·002°
CHO	15·91	(15·63–16·19)	15·36	(15·10–15·63)	15·41	(15·15–15·67)	0·005°
PRO	15·38	(15·11–15·65)	15·54	(15·28–15·82)	15·74	(15·47–16·03)	0·012°

* adjusted for FFMI at the beginning of adolescence; ° mean FFMI values of tertiles were significantly different: $p < 0{\cdot}05$; FFMI – fat free mass index (kg/m^2)

In conclusion, our analyses support a longer-term benefit of a lower evening CHO:PRO intake ratio during adolescence, which was however confined to a higher adult fat free mass among females. Similar, albeit more pronounced associations were observed for the daily CHO:PRO ratio, which argues against a unique relevance of evening CHO or PRO intake.

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