



Young adult nutrition and weight correlates of picky eating during childhood

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Abstract

Objective: To identify whether picky eating during childhood is associated with dietary intake, weight status and disordered eating behaviour during young adulthood.

Design: A population-based study using data from young adults who responded online or by mail to the third wave of the Project EAT (Eating and Activity in Teens and Young Adults) study in 2008–2009. Participants retrospectively reported the extent to which they were a picky eater in childhood, sociodemographic characteristics, disordered eating behaviours, usual dietary intake, and weight and height.

Setting: Participants were initially recruited in the Minneapolis/St. Paul metropolitan area of Minnesota, USA, in 1998–1999.

Participants: The analytic sample included 2275 young adults (55% female, 48% non-Hispanic White, mean age 25.3 (SD 1.6) years).

Results: Young adults who reported picky eating in childhood were found to currently have lower intakes of fruit, vegetables and whole grains, and more frequent intakes of snack foods, sugar-sweetened beverages and foods from fast-food restaurants. No associations were observed between picky eating in childhood and young adults' weight status, use of weight-control strategies or report of binge eating.

Conclusions: While young adults who report picky eating during childhood are not at higher risk for disordered eating, those who were picky eaters tend to have less healthy dietary intake. Food preferences and dietary habits established by picky eaters during childhood may persist into adulthood.

Keywords
Picky eating
Dietary variety
Child
Young adult

Picky eating, defined as the avoidance or rejection of foods resulting in consumption of an inadequate variety of foods⁽¹⁾, is common among children^(1–4). While parents are often concerned about their children's picky eating^(5,6), evidence is mixed regarding whether the impacts of picky eating on children are clinically meaningful^(1,4,6–8). Some studies have found that children who are picky eaters consume less protein and fewer servings of fruits and vegetables^(9–11), and more fat and sweets⁽¹²⁾. Overall, however, the nutritional impact of commonplace picky eating is generally considered to be minimal⁽⁹⁾ and may even be protective with regard to obesity⁽¹³⁾. This knowledge,

in concert with evidence that pressuring children to eat does not improve children's picky eating⁽¹⁴⁾, has led to recommendations that clinicians reassure parents that for most children, picky eating will not have long-term impacts on health⁽⁹⁾.

However, the vast majority of research on picky eating has focused on nutritional impacts and growth during childhood. Very few studies have examined the adult consequences of being a picky eater during childhood^(3,15–17). Despite high attention to the impact of picky eating on children's dietary quality^(9,18), no studies have examined whether adults who were picky eaters as children consume

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diets of differing quality than adults who were not picky eaters. The studies of individuals who were picky eaters as children that do exist have focused on disordered eating behaviours and have produced inconsistent evidence regarding whether childhood picky eating increases risk for disordered eating behaviours later in life. Findings from one study⁽¹⁷⁾ suggest that individuals who are picky eaters as children have a greater risk for developing an eating disorder (e.g. anorexia nervosa) as adolescents and adults. However, that study defined picky eating atypically as a composite of poor appetite, mealtime conflicts and stomach pain. Meanwhile, other studies have found that picky eating in childhood is protective against⁽¹⁹⁾ or not associated with^(3,15,16) disordered eating in adulthood.

In light of our limited understanding of the long-term consequences of picky eating during childhood, the objectives of the current exploratory study were to understand whether self-reported picky eating during childhood is associated with dietary intake, weight status and disordered eating behaviour during young adulthood among a large, sociodemographically diverse sample. Identifying how picky eating during childhood may be associated with eating behaviours later in life is important to inform the counselling of picky eaters and their families, and for identifying individuals who may need greater monitoring for disordered eating, specifically binge eating and unhealthy weight-control strategies, and poor-quality dietary intake through adolescence into adulthood. Of note, avoidant restrictive food intake (ARFID) behaviours were not evaluated in the present study.

Methods

Study design and population

Data for the present population-based study were drawn from Project EAT-III (Eating and Activity in Teens and Young Adults), the third wave of a cohort study designed to examine dietary intake, physical activity, weight-control behaviours and weight status, and factors associated with these outcomes, among a large, diverse sample of young adults. Study participants originally enrolled in Project EAT as middle-school and high-school students in the Minneapolis/St. Paul metropolitan area of Minnesota, USA, in 1998–1999. Ten years later, in 2008–2009, participants were mailed letters inviting them to a complete online or paper version of the Project EAT-III survey and an FFQ. A total of 2287 young adults completed the Project EAT-III survey between November 2008 and October 2009, representing 66.4% of Project EAT participants who could be contacted. Picky eating was measured by self-report on a continuous scale of 1–4. Nine participants did not complete the measure of childhood picky eating and were excluded from the current study's analytic sample, resulting in a sample size of 2278. Analyses were weighted (n_{weighted} 2275) so the sample demographically

represented the original sample of youth who participated in Project EAT. Of participants who completed the Project EAT-III survey, 88.5% completed the FFQ, resulting in an analytic sample of $n_{\text{unweighted}}$ 2016 for analyses examining dietary intake. Participants who completed the FFQ were more likely to be White and have higher socio-economic status (SES) during adolescence, but were similar to other participants in terms of sex and age. All study protocols were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee.

Survey development and measures

The Project EAT-III survey was created by adapting the Project EAT baseline survey, which was used to assess determinants of dietary intake and weight status among adolescents. Adaptations were made to improve the relevance of items for young adults and to include newly created items and measures from other studies that would allow for investigating areas of growing interest. The Project EAT-III survey was pilot tested to examine test-retest reliability over a period of 1 to 3 weeks, and psychometric values are provided for each measure below when available. Additional details of the survey development process are described elsewhere⁽²⁰⁾.

Childhood picky eating

The extent to which young adults were picky eaters during childhood was assessed with the survey item, 'I was a picky eater growing up', to which participants responded on a 4-point Likert scale ranging from 'strongly disagree' to 'strongly agree' (test-retest $r=0.85$). Use of a single continuous survey item to assess picky eating was based on prior literature^(2,21,22).

Weight status

Participants' weight status was assessed using self-reported height and weight, from which BMI (kg/m^2) was calculated. The use of self-reported height and weight (test-retest reliability $r=0.99$ for height and weight) was validated in a sub-sample of sixty-three male and sixty-two female participants in Project EAT-III for whom height and weight measurements were both self-reported and measured by trained research staff^(23,24). Very high correlations were observed between self-reported BMI and measured BMI in males ($r=0.95$) and females ($r=0.98$). Weight status was categorized according to current BMI guidelines for adults (normal weight/underweight: $\text{BMI} < 25 \text{ kg}/\text{m}^2$; overweight: $\text{BMI} \geq 25$ and $< 30 \text{ kg}/\text{m}^2$; obesity: $\text{BMI} \geq 30 \text{ kg}/\text{m}^2$). Only fifty-seven participants had a BMI in the underweight range ($\text{BMI} < 18.5 \text{ kg}/\text{m}^2$), therefore the underweight and normal weight status categories were combined.

Unhealthy and extreme weight-control behaviours

Participants' use of weight-control behaviours was assessed with the question, 'Have you done any of the



following things in order to lose weight or keep from gaining weight during the past year?' with response options of 'yes' and 'no' for each behaviour. Weight-control behaviours categorized as unhealthy included: (i) fasted; (ii) ate very little food; (iii) used a food substitute (powder or a special drink); (iv) skipped meals; and (v) smoked more cigarettes. Weight-control behaviours categorized as extreme included: (i) took diet pills; (ii) made myself vomit; (iii) used laxatives; and (iv) used diuretics. Participants reporting the use of one or more of the behaviours were respectively coded as having used any unhealthy or extreme weight-control behaviours (test–retest agreement = 83% for unhealthy behaviours and 97% for extreme behaviours).

Binge eating with loss of control

Two survey questions were used to assess the experience of binge eating with loss of control over the past year. Participants first responded 'yes' or 'no' to the question, 'In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge-eating)?' Test–retest agreement for this question = 92%. If participants selected 'yes', they were then asked, 'During the times when you ate this way, did you feel you couldn't stop eating or control what or how much you were eating?' with the response options of 'yes' and 'no'. Test–retest agreement for this question = 84%. Participants who responded 'yes' to both of these questions were identified as having experienced binge eating with loss of control in the past year⁽²⁵⁾.

Dietary intake

Monthly fast-food intake was determined using a five-item measure asking participants how often in the past month they ate something from the following types of restaurants, including take-out and delivery: traditional 'burger-and-fries' fast-food restaurant; Mexican fast-food, fried chicken, sandwich or sub shop; pizza place; and Asian fast food. Test–retest reliability for each of the types of restaurant ranged from 0.43 to 0.83. Intakes of other foods and nutrients were measured using the 2007 grid form of the 151-item, Willett semi-quantitative FFQ, which assesses participants' usual dietary intake during the past year. For each food item, participants reported their intake by selecting one of nine frequency categories that range from 'never or less than once per month' to 'six plus per day'. The reproducibility and validity of this FFQ have been previously evaluated^(26,27). One-year reproducibility coefficients for unadjusted nutrient intake ranged from 0.47 to 0.80. Foods were grouped into the following categories: fruit (excluding juice); vegetables (excluding French fries); dark green and orange vegetables; whole grains; snack foods (e.g. potato chips, candy bars, doughnuts, crackers); and sugar-sweetened beverages. A daily serving was defined as the equivalent of one-half cup for fruit and vegetables, and 16 g for whole grains. For sugar-sweetened beverages, a serving was defined as the equivalent of one glass, bottle

or can. Daily intakes of energy and nutrients were determined in 2009 by the Nutrition Questionnaire Service Center at the Harvard School of Public Health using a specially designed database, primarily based on the US Department of Agriculture's Nutrient Database for Standard Reference (release 19)⁽²⁸⁾. Macro- and micronutrients selected for examination included saturated fat, total fat, carbohydrates, Ca and Fe.

Sociodemographic characteristics

Participants self-reported their sex, date of birth (from which age was calculated) and ethnicity/race. Because current educational attainment, income or occupation may not accurately reflect available socio-economic resources for young adults, a measure of SES created at baseline from responses in Project EAT when the participants were adolescents was used. This five-category SES indicator was formed using an algorithm composed of adolescent-reported parent education, eligibility for public assistance, eligibility for free/reduced-price school meals and parent employment⁽²⁹⁾.

Statistical analysis

Bivariate associations between participants' agreement that they were a picky eater growing up and sociodemographic characteristics were first examined to understand how childhood picky eating varies across sociodemographic characteristics in the diverse study sample. Logistic regression models were then used to examine how picky eating (modelled as a continuous predictor variable) related to weight status category (overweight *v.* BMI < 25 kg/m²; obesity *v.* BMI < 25 kg/m²) and use of unhealthy and extreme weight-control behaviours. Each model was adjusted *a priori* for sex, ethnicity/race and SES; these covariates were selected *a priori* as potential confounding factors and their inclusion in the regression models helps to reduce variability in the associations between picky eating and the outcomes. Models examining weight-control behaviours and binge eating additionally included adjustment for BMI. To characterize how picky eating during childhood related to current dietary intake, linear regression models were used to estimate least-squares mean intake, in servings per day, of fruits, vegetables, dark green vegetables, whole grains, sugar-sweetened beverages and other indicators of diet quality. Models examining associations between childhood picky eating and young adult fast-food and energy intakes were adjusted for age, sex, ethnicity/race and SES during adolescence. Other models examining dietary outcomes were additionally adjusted for total daily energy intake. Analyses were performed using the statistical software package SAS version 9.4. Since attrition did not occur randomly from Project EAT-I, the response propensity method⁽³⁰⁾ was used to weight data in all analyses to allow better representation of the demographic make-up of the school-based adolescent sample surveyed in Minneapolis/St. Paul during 1998–1999⁽²⁹⁾.

Table 1 Demographic characteristics of the sample of young adults, overall and by endorsement of picky eating during childhood; Project EAT-III (Eating and Activity in Teens and Young Adults), Minneapolis/St. Paul, MN, USA, 2008–2009

	'I was a picky eater growing up'										P value
	Total sample (n2275)*		Strongly disagree (n 688; 30.3 %)		Somewhat disagree (n 548; 24.1 %)		Somewhat agree (n 542; 23.8 %)		Strongly agree (n 497; 21.9 %)		
	Mean or %	SD or n	Mean or %	SD or n	Mean or %	SD or n	Mean or %	SD or n	Mean or %	SD or n	
Age (years), mean and sd	25.3	0.6	25.3	1.7	25.3	1.7	25.4	1.7	25.4	1.6	0.21
Sex											0.14
Male	45.1	1025	30.4	312	23.9	245	25.7	263	20.1	206	
Female	55.0	1250	30.1	377	24.3	303	22.3	279	23.3	291	
Ethnicity/race											<0.001
White	48.6	1092	29.2	319	22.1	241	25.0	273	23.8	260	
Black or African American	18.6	419	26.6	112	21.3	89	25.4	106	26.7	112	
Hispanic	5.9	134	34.6	46	25.9	35	21.3	29	18.2	24	
Asian American	19.4	436	35.4	154	29.0	127	23.8	104	11.8	52	
Other	7.5	168	30.4	51	29.3	49	15.4	26	24.9	42	
SES during adolescence											0.24
Low	17.9	392	34.3	135	24.7	97	24.4	96	16.6	65	
Low-moderate	19.0	417	31.4	131	23.0	96	20.9	87	24.8	104	
Moderate	26.3	576	29.2	168	25.4	146	23.1	133	22.2	128	
Moderate-high	23.3	511	28.9	147	21.6	110	25.6	131	24.0	122	
High	13.5	295	29.5	87	23.2	69	25.3	75	22.0	65	

SES, socio-economic status.

Data are presented as n and %, unless indicated otherwise.

*n for individual variables may not add to 2275 due to missing data.

Results

Self-reported endorsement of being a picky eater as a child was distributed equally across the four response categories ranging from strongly disagree (30.3%) to strongly agree (21.9%; Table 1). Childhood picky eating did not differ by young adults' sex, current age or SES during adolescence. Differences in picky eating by ethnicity/race were observed. While 23.8% of non-Hispanic White participants and 26.7% of non-Hispanic Black participants strongly agreed that they were a picky eater growing up, only 11.8% of non-Hispanic Asian participants strongly agreed with this statement.

Several relationships were observed between extent of childhood picky eating and current dietary intake in adjusted analyses (Table 2). Picky eating during childhood was associated with lower young adult daily intake of fruit (linear trend (SE) = -0.11 (0.03), $P < 0.001$), vegetables (linear trend (SE) = -0.27 (0.04), $P < 0.001$) and whole grains (linear trend (SE) = -0.08 (0.03), $P = 0.004$). For example, young adults who strongly agreed they were a picky eater as a child consumed 0.82 fewer servings of vegetables daily than those who strongly disagreed they were a picky eater. Young adults who more strongly agreed they were a picky eating during childhood also reported higher current intakes of snack foods (linear trend (SE) = 0.11 (0.02), $P < 0.001$) and sugar-sweetened beverages (linear trend (SE) = 0.11 (0.02), $P < 0.001$), and more frequently ate foods from fast-food restaurants (linear trend (SE) = 1.15 (0.26), $P < 0.001$). While no differences were

found in total daily energy intake by extent of childhood picky eating, pickier eating during childhood was associated with higher carbohydrate intake among young adults. Picky eating in childhood was also negatively associated with young adult intake of Ca (linear trend (SE) = -22.3 (10.4), $P = 0.03$), but not Fe.

In adjusted analyses, picky eating in childhood was not associated with odds of having an overweight or obese weight status compared with underweight or normal weight status in young adulthood (Table 3). Furthermore, in both unadjusted (results not shown but available from authors upon request) and adjusted analyses, picky eating in childhood was not associated with use of weight-control strategies (unhealthy or extreme) or binge eating with loss of control as a young adult (Table 3).

Discussion

The present study sought to identify whether retrospective report of picky eating during childhood was associated with indicators of current dietary quality, weight status or unhealthy weight-control behaviours among a diverse, population-based sample of young adults. Report of picky eating in childhood was associated with multiple indicators of poorer dietary quality in young adulthood, including lower intakes of fruit, vegetables and whole grains, and more frequent intakes of snack foods, sugar-sweetened beverages and foods from fast-food restaurants. Of note, childhood picky eaters consumed almost a serving less



Table 2 Associations between picky eating during childhood and young adult usual daily dietary intake; Project EAT-III (Eating and Activity in Teens and Young Adults), Minneapolis/St. Paul, MN, USA, 2008–2009

	'I was a picky eater growing up'								Linear trend	SE	P value
	Strongly disagree		Somewhat disagree		Somewhat agree		Strongly agree				
	Adjusted mean	SE	Adjusted mean	SE	Adjusted mean	SE	Adjusted mean	SE			
Foods											
Fruit, excluding juice (servings)*	1.61	0.08	1.43	0.09	1.39	0.09	1.27	0.09	-0.11	0.03	<0.001
Vegetables, excluding French fries (servings)*	3.65	0.12	3.41	0.12	3.15	0.13	2.83	0.13	-0.27	0.04	<0.001
Dark green and orange vegetables (servings)*	1.00	0.04	0.95	0.05	0.89	0.05	0.72	0.05	-0.09	0.01	<0.001
Whole grains (servings)*	1.80	0.09	1.84	0.10	1.67	0.10	1.56	0.10	-0.08	0.03	0.004
Snack foods (servings)*	1.63	0.07	1.82	0.08	1.85	0.08	1.97	0.08	0.11	0.02	<0.001
Sugar-sweetened beverages (servings)*	0.60	0.08	0.77	0.08	0.79	0.08	0.95	0.08	0.11	0.02	<0.001
Fast-food consumption frequency (times/month)†	13.6	0.8	14.4	0.9	16.6	0.9	16.7	0.9	1.15	0.26	<0.001
Nutrients											
Saturated fat (g)*	23.7	0.4	23.6	0.4	23.4	0.4	23.4	0.5	-0.09	0.13	0.51
Total fat (g)*	70.5	0.9	70.8	1.0	69.8	1.0	68.9	1.1	-0.56	0.30	0.06
Carbohydrates (g)*	271	3	273	3	275	3	279	3	2.75	0.97	0.005
Ca (mg)*	1170	30	1090	40	1140	40	1080	40	-22.3	10.4	0.03
Ca without supplements (mg)*	1020	27	956	29	978	30	955	30	-17.3	8.6	0.05
Fe without supplements (mg)*	15.1	0.3	15.2	0.3	14.9	0.3	14.8	0.3	-0.12	0.10	0.20
Total energy (kcal; 1 kcal = 4.184 kJ)†	2240	60	2220	60	2220	60	2260	60	3.33	17.64	0.85

SES, socio-economic status.

*Models adjusted for daily energy intake, age, sex, ethnicity/race and SES during adolescence.

†Models adjusted for age, sex, ethnicity/race and SES during adolescence.

Table 3 Associations between picky eating during childhood and young adult weight status, weight-control behaviours and binge eating with loss of control; Project EAT-III (Eating and Activity in Teens and Young Adults), Minneapolis/St. Paul, MN, USA, 2008–2009

	'I was a picky eater growing up'								Total sample (n2275)			
	Strongly disagree		Somewhat disagree		Somewhat agree		Strongly agree				Adjusted OR*	95 % CI
	n	%	n	%	n	%	n	%	n	%		
Weight status category												
Underweight (v. BMI = 18.5–24.9 kg/m ²)	14	25.0	12	20.4	13	23.5	18	31.1	57	2.7	1.42	1.09, 1.83
Normal weight (BMI = 18.5–24.9 kg/m ²)	310	31.8	232	23.8	236	24.2	197	20.2	975	45.5	–	–
Overweight (v. BMI = 18.5–24.9 kg/m ²)											1.08	0.98, 1.19
Obesity (v. BMI = 18.5–24.9 kg/m ²)											1.09	0.99, 1.21
Overweight (v. BMI < 25 kg/m ²)	194	30.8	138	22.0	150	23.9	146	23.3	628	29.3	1.06	0.97, 1.16
Obesity (v. BMI < 25 kg/m ²)	141	29.2	125	25.9	104	21.6	113	23.3	483	22.6	1.07	0.97, 1.18
Any unhealthy weight-control strategies (v. no)	278	28.1	260	26.2	237	23.9	217	21.9	992	43.8	1.06	0.97, 1.16
Any extreme weight-control strategies (v. no)	107	30.8	83	23.8	76	21.9	82	23.5	347	15.3	0.96	0.86, 1.08
Binge eating with loss of control (v. no)	74	28.2	79	29.9	61	23.3	49	18.6	263	11.6	0.92	0.82, 1.04

SES, socio-economic status.

*Sex, ethnicity/race and SES included as covariates. Weight-control strategies and binge eating with loss of control models additionally include adjustment for BMI.

of vegetables per day as young adults than their non-picky counterparts. These dietary patterns observed in young adults who reported picky eating during childhood are similar to those found among children who are picky eaters

(e.g. reduced dietary variety, higher intake of sweet foods)⁽¹²⁾. No associations were found between picky eating in childhood and current weight status, use of unhealthy or extreme weight-control behaviours or binge eating.

Parents of children who are picky eaters often report being frustrated and/or concerned with their children's limited intake and consequently provide less structured eating environments and more frequent access to highly palatable foods as a means to ensure their child is consuming sufficient energy^(31–33). In the present study, young adults who were picky eaters as children more frequently consumed highly palatable foods of low nutritional quality. This suggests that parental feeding practices, in concert with youths' continued biologically driven food aversions⁽³⁴⁾, may contribute to less healthy food preferences that persist into young adulthood. Long-term diets characterized by low intakes of fruit, vegetables, whole grains and Ca, and high intakes of fast foods, sugar-sweetened beverages and processed foods, can contribute to chronic conditions including diabetes and CVD even in the absence of a higher weight status^(35,36). Therefore, it may be particularly important to advise parents of picky eaters not to encourage their children to eat foods of low nutritional quality as a means to promote eating more. Furthermore, children who display problematic or persistent picky eating may benefit from an evaluation for ARFID as may be requested by parents in coordination with paediatricians or psychologists.

Findings that young adults who report picky eating during childhood have consistently lower intakes of healthful food groups and nutrients is of concern, and mirrors findings in adult picky eaters⁽³⁷⁾. A small number of recent studies have characterized adults who currently identify as picky eaters^(37–41). Similar to children who are picky eaters, adult picky eaters have lower dietary variety and lower fruit and vegetable intakes than their non-picky counterparts⁽⁴²⁾. This profile is similar to the present study's findings among adults who report being picky as children. However, a limitation of the present study is that participants' perception of whether they are currently a picky eater was not measured, so it is not possible to distinguish between young adults whose picky eating persisted from childhood and those who are no longer picky. Additional research is needed to differentiate dietary outcomes among children whose picky eating persists into adulthood, children whose picky eating resolves by adulthood, and adults for whom picky eating is new.

Despite the observed associations with intake of energy-dense food choices, picky eating as a child was not associated with higher weight status in young adulthood. Some^(43–47) but not all^(48,49) previous studies of children who are picky eaters suggest that picky eating is associated with a lower likelihood of experiencing obesity. Studies of picky eating among adults have also found that adult picky eaters do not differ from non-picky eaters in their likelihood of having low BMI or overweight (BMI between 25 and 30 kg/m²), but may be less likely to experience obesity (BMI \geq 30 kg/m²) than non-picky eaters⁽³⁸⁾. Among participants in the current study, it may be that despite consuming diets of poorer nutritional quality, adults who were picky eaters as children are not

consuming more energy and thus are not at elevated risk for obesity in the long term. Alternatively, the impacts of a diet high in energy-dense, highly processed foods on weight may be more likely to emerge later in life, beyond the young adult years. Future studies that follow individuals who were picky as children into middle adulthood are needed to more fully understand the role of picky eating in weight later in life. The present study did not examine the potential for heterogeneous outcomes of picky eating; other factors such as appetitive traits may contribute to differences in diet, weight and disordered eating behaviours among picky eaters.

Our findings that picky eating in childhood was not associated with unhealthy or extreme weight-control behaviours or binge eating are consistent with some of previous studies in this area^(3,4,15,16). Studies examining the association between adult picky eating and disordered eating in adulthood have produced mixed findings, with one study⁽⁴¹⁾ finding no association and others^(38–40,50) finding some overlap between picky eating and disordered eating behaviours in adulthood. These differences between studies of children who were picky eaters *v.* adult picky eaters may reflect differences in disordered eating behaviours. However, they are dependent on the extent to which picky eating resolves by adulthood. It is also important to differentiate commonplace picky eating from ARFID, which is an eating disorder characterized by selective eating or food restriction, involving limited dietary variety or volume associated with one or more of the following: faltering growth, weight loss, dependence on tube feeding or supplements and/or psychosocial impairment⁽⁵¹⁾. ARFID has been found to be associated with picky eating in adults^(38,52,53). ARFID was not assessed in the present study; however, given the overlap of picky eating behaviour and ARFID in adults⁽³⁸⁾, it will be important for future studies to measure the overlap and emergence of both ARFID and picky eating during childhood and young adulthood.

Among the large sample of young adults participating in Project EAT-III, there were few sociodemographic differences according to extent of childhood picky eating. The existing literature is mixed with regard to whether there is sociodemographic variation among children who are picky eaters. Some studies⁽⁵⁴⁾ find male children are more likely to be picky eaters, while others⁽²²⁾ have not found any sex differences. Furthermore, children of higher SES compared with lower SES are more likely to be picky eaters in some studies⁽⁵⁵⁾, whereas other work⁽⁷⁾ has found that lower-SES children are more likely to be persistently picky across childhood. One study of lower-SES parents suggested that families with more limited resources do not have the 'luxury' of wasting food while trying to repeatedly expose their picky eaters to new flavours or dietary variety^(56,57), which may limit children's ability to overcome picky eating⁽⁵⁸⁾. However, in the current study, young adults who were raised in lower-SES households during



adolescence were not more or less likely to endorse that they were picky eaters as children.

Strengths of the present study include the large, socio-demographically diverse sample with well-characterized dietary intake. While there are limitations to the use of FFQ to assess dietary intake^(59,60), the Willett semi-quantitative FFQ has been evaluated for validity and reliability⁽⁶¹⁾ and has been frequently used in large epidemiological cohorts such as the Project EAT sample where alternative measurement approaches, such as repeated 24 h dietary recalls, are not feasible. The retrospective recall of picky eating in the present study also makes report of picky eating vulnerable to bias, and the extent to which participants' endorsement of picky eating may be impacted by their current food preferences cannot be determined. However, retrospective assessment of childhood picky eating has been used in previous studies⁽¹⁵⁾. It should also be considered that young adults whose parents recall them as being picky and engaged in more coercive and intrusive styles of feeding may be more likely to recall themselves as being picky in childhood⁽⁶²⁾. Longitudinal studies of child eating and parental feeding behaviours are necessary to disentangle these relationships. Furthermore, picky eating was measured using the result of a single item that included the term 'growing up', which may be interpreted differently by different participants, possibly influencing findings. Participants who exhibited picky eating behaviours but did not self-identify as 'picky' in childhood may have also been missed. Participants who completed the FFQ were more likely to be White non-Hispanic and high SES, which may limit generalizability of results. Finally, all participants with BMI below 25 kg/m² were categorized together as only a small number of participants had a BMI in the underweight weight status category. However, in supplemental analyses in which participants with BMI < 18.5 kg/m² were examined separately, childhood picky eating was not associated with an increased risk of being overweight.

Conclusions

While young adults who reported that they were a picky eater as a child may not be at increased risk for unhealthy weight-control practices or binge eating, their current dietary intake, exemplified by higher intakes of fast foods, snacks and sugar-sweetened beverages compared with adults who were not picky eaters as children, may reflect a persistence of poor-quality dietary intake from childhood. Study findings suggest that it may be particularly valuable for parents of picky eaters to use feeding practices that expose children to a wide variety of foods to instil positive long-term habits. Parents of picky eaters should also consider avoiding pressured feeding strategies such as bribing children to eat, using food as a reward or encouraging children to eat energy-dense, low-nutritional-quality foods, which may promote unhealthy future eating habits⁽³²⁾.

Understanding young adults' history and persistence of picky eating may aid in identifying and addressing current dietary habits. Future work should examine whether the eating and weight-control behaviours of young adults who were picky eaters in childhood differ by parent feeding practices. Further, recognizing and addressing the behavioural or health conditions that may underlie children's picky eating could help improve individuals' dietary trajectories into young adulthood. Finally, further research on the long-term consequences of picky eating that uses comprehensive measures of picky eating and a longitudinal study design is needed.

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