



# Longitudinal associations between intuitive eating and weight-related behaviors in a population-based sample of young adults

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## ABSTRACT

Intuitive eating has been associated with markers of better health in cross-sectional studies, but less is known about long-term associations between intuitive eating and subsequent eating and weight-related behaviors. This study assessed how intuitive eating in early adulthood is related to weight status, dieting, healthy and unhealthy weight control behaviors, and binge eating with loss of control five years later. Young adults ( $N = 1660$ ) were asked about intuitive eating as part of the 2008–2009 third wave of the Project EAT (Eating and Activity in Teens and Young Adults) longitudinal cohort study. Weight status, dieting, healthy and unhealthy weight control behaviors, and binge eating with loss of control were assessed during both the third (EAT-III: mean age 25.3 ± 1.5) and fourth (EAT-IV mean age 31.1 ± 1.5) waves. In analyses adjusted for sociodemographic characteristics, both male and female intuitive eaters had a lower prevalence of high weight status and lower engagement in dieting, unhealthy weight control behaviors, and binge eating at the 5-year follow-up, compared to non-intuitive eaters. Among women, after additional adjustment for EAT-III values for the respective outcome measures, intuitive eating was unrelated to any of the behaviors studied at 5-year follow-up. Among men, intuitive eating predicted a lower likelihood of engaging in unhealthy weight control behaviors (intuitive eaters: 30.0% vs. non-intuitive: 41.9%,  $p = 0.002$ ) and binge eating (intuitive eaters: 0.9% vs. non-intuitive: 1.5%,  $p = 0.046$ ) independent of participating in these behaviors at EAT-III. In a population-based sample of young adults, intuitive eating was associated with better markers of eating and weight-related behaviors five years later, suggesting intuitive eating may have potential long-term benefits.

## 1. Introduction

There is growing evidence that dieting and encouragement to diet have negative impacts on disordered eating (Eisenberg, Berge, & Neumark-Sztainer, 2013; Hillard, Gondoli, Corning, & Morrissey, 2016), various health outcomes including weight gain (Dulloo & Montani, 2015; Neumark-Sztainer, Wall, Story, & Standish, 2012), and lower psychosocial well-being (Berge et al., 2019). Accordingly, more attention is now being directed to non-dieting alternative approaches to

promoting healthy eating and weight gain prevention. Intuitive eating, the practice of choosing when and how much to eat based on physical hunger and satiety cues (Tylka & Kroon Van Diest, 2013), is one strategy used to promote healthful eating (Byrne, 2019; Levy, 2019). Emerging evidence suggests intuitive eating may be associated with improved physical health indicators (Van Dyke & Drinkwater, 2014) and weight gain prevention in specific populations (Nogueet al., 2019; Quansah et al., 2019). Furthermore, research has reported that intuitive eating is associated with markers of psychological health including positive body

Abbreviations: BMI, body mass index; IES, Intuitive Eating Scale.

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image (Bruce & Ricciardelli, 2016) and lower depressive symptoms (Hazzard et al., 2020).

Much of the existing evidence on intuitive eating and weight is based on cross-sectional studies showing that intuitive eating is associated with lower weight status (Camilleri et al., 2016; Horwath, Hagmann, & Hartmann, 2019; Madden, Leong, Gray, & Horwath, 2012) and with greater weight stability (Tylka, Calogero, & Daníelsdóttir, 2020). These cross-sectional designs limit understanding of the temporal ordering of intuitive eating and hypothesized outcomes. Longitudinal, prospective studies are therefore needed to assess the impact of intuitive eating on weight status in population-based samples.

The existing evidence suggests that intuitive eating is characteristic of individuals who are less likely to engage in disordered eating. For example, among college women surveyed cross-sectionally, intuitive eating was associated with low eating disorder symptomology (Tylka & Wilcox, 2006). In Project EAT, cross-sectional analyses of intuitive eating within the same cohort used in the current longitudinal analysis showed that young adults who engaged in intuitive eating had lower odds of chronic dieting and binge eating (Denny, Loth, Eisenberg, & Neumark-Sztainer, 2013). One of the few longitudinal population-based studies on this topic published to date was conducted in the EAT 2010–2018 cohort, which followed a diverse population over eight years from adolescence into emerging young adulthood. This study found that intuitive eating at baseline was related to lower odds of engaging in unhealthy weight control behaviors at follow-up (Hazzard et al., 2020).

There is a need to learn more about the potential impact of intuitive eating on weight control behaviors and binge eating using longitudinal study designs conducted with population-based samples. This study addresses this need by examining how intuitive eating during young adulthood is related to weight status, dieting, healthy and unhealthy weight control behaviors, and binge eating with loss of control five years later in a large, population-based sample of young women and men.

## 2. Methods

### 2.1. Study Design and Sample

Project EAT I-IV (Eating and Activity in Teens and Young Adults) is a longitudinal study of dietary intake, physical activity, weight control behaviors, weight status, and factors associated with these outcomes, among young people. At EAT-I, the original assessment involving surveys and anthropometric measures was designed as a cross-sectional study of students enrolled at middle schools and senior high schools in the Minneapolis-St. Paul metropolitan area of Minnesota, USA in 1998–1999 (Neumark-Sztainer, Croll, et al., 2002; Neumark-Sztainer, Story, Hannan, & Croll, 2002). Given growing research interest in the eating and weight-related health of young people, a decision was made to follow-up at five-year intervals with participants from the original sample who provided sufficient contact information at EAT-I ( $N = 3672$  of 4746). Follow-up mailed/online assessments were conducted in 2003–2004 (EAT-II) and 2008–2009 (EAT-III) to examine changes in the eating patterns, weight control behaviors, and weight status of the original participants as they progressed through adolescence and emerging adulthood (Larson, Neumark-Sztainer, Harwood, et al., 2011; Neumark-Sztainer, Wall, Eisenberg, Story, & Hannan, 2006; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011). The EAT-IV follow-up assessment in 2015–2016 was similarly conducted online and by mail with the purpose of building further understanding of the progression through young adulthood; accordingly, only participants who previously responded to EAT-II, EAT-III, or both prior follow-up assessments were invited to participate (Larson, Chen, et al., 2018; Neumark-Sztainer et al., 2018). The University of Minnesota's Institutional Review Board Human Subjects Committee approved all protocols used in Project EAT at each time point.

Of relevance to the current analysis using EAT-III and EAT-IV data, the EAT-III survey was completed by 2287 participants and the EAT-IV

survey by 1830 participants (66.4% and 66.1% of the original EAT-I respondents with valid contact information, respectively). A total of 1664 participants completed surveys for both EAT-III and EAT-IV, and only those who answered the question concerning intuitive eating at EAT-III were included in the current analysis ( $N = 1660$ ). Attrition from the cohort over time has not occurred completely at random; thus, to account for missing data, inverse probability weighting was used for all analyses (Seaman & White, 2013). Weights were derived as the inverse of the estimated probability that an individual responded at each time point based on several EAT-I covariates, including demographics, weight status, parental living situation, and grades in school. Weighting minimizes potential response bias due to missing data and allows for extrapolation back to the original school-based sample. In the weighted sample, participants were 48.1% women and 51.9% men; 47.8% white, 18.6% African American, 19.7% Asian, 5.7% Hispanic, 3.4% Native American, and 4.8% mixed or other ethnicity/race. The sample was well-distributed across the four categories of educational attainment: 30.3% equivalent of high school degree or less; 27.3% vocational, technical or associate degree; 29.2% bachelor's degree, and 13.2% graduate or professional degree.

### 2.2. Survey Development and Measures

Surveys at EAT-III and EAT-IV were based on the initial Project EAT survey, modified based on life-course theory, and pilot-tested with focus groups involving community-based samples of young adults (Fine & Kotelchuck, 2010, pp. 1–20; Neumark-Sztainer, Croll, et al., 2002; Neumark-Sztainer, Story, et al., 2002). The surveys assessed self-reported sociodemographic characteristics, behavioral variables (e.g., intuitive eating, other eating practices, physical activity), and height and weight. Test-retest reliability correlations were calculated for ordinal and continuous variables and percent agreement for categorical variables. The test-retest reliability of intuitive eating measures is based on pilot testing in a separate community-based sample of 66 young adults who completed a draft of the EAT-III survey twice within a one-month period (Larson, Neumark-Sztainer, Story, et al., 2011). The reliability of the EAT-IV outcome measures described below is based on the responses of a subgroup of 103 cohort participants who completed the survey twice.

#### 2.2.1. Intuitive Eating

Intuitive eating was assessed using two items on the EAT-III survey adapted from the Intuitive Eating Scale (Neumark-Sztainer, Flattum, Story, Feldman, & Petrich, 2008; Tylka, 2006). Participants were asked to indicate how strongly they agreed with the statements: *I stop eating when I feel full* and *I trust my body to tell me how much to eat*. Four response options were listed, ranging from *strongly disagree* to *strongly agree*. Test-retest reliability was  $r = 0.65$  for the first item and  $r = 0.62$  for the second item (Denny et al., 2013). Similarly to prior research (Denny et al., 2013), participants who somewhat or strongly agreed to both items were categorized as intuitive eaters.

#### 2.2.2. Weight Status

Weight status was based on self-reported height and weight measures, which correlated highly with objectively measured height and weight in a subsample of participants at EAT-III,  $r = 0.95$  for males and  $r = 0.98$  for females (Quick, Wall, Larson, Haines, & Neumark-Sztainer, 2013; Sirard, Hannan, Cutler, Graham, & Neumark-Sztainer, 2013). For analysis, BMI was calculated and weight status was dichotomized into (1) non-overweight (BMI  $< 25$  kg/m<sup>2</sup>) and overweight (BMI  $\geq 25$  kg/m<sup>2</sup>) and (2) non-obese (BMI  $< 30.99$  kg/m<sup>2</sup>) and obesity (BMI  $\geq 30$  kg/m<sup>2</sup>).

#### 2.2.3. Dieting, Weight Control Behaviors, and Binge Eating

To test the long-term relationship between intuitive eating at EAT-III and engagement in dieting, weight control behaviors, and binge eating

at EAT-IV, behaviors were dichotomized at both EAT-III and EAT-IV to allow for adjustment for behaviors at the prior wave.

**Dieting** was assessed via the question: *How often have you gone on a diet during the last year? By 'diet' we mean changing the way you eat so you can lose weight*, followed by response options of *never*, *1–4 times*, *5–10 times*, *more than 10 times*, and *I am always dieting*. Those who reported *never* were categorized as non-dieters and those who reported ever dieting in the past year were categorized as dieters (test-retest agreement = 89%).

Weight control behaviors were classified as healthy or unhealthy based on health promotion and healthy weight maintenance guidelines (Golden et al., 2016; Larson, Neumark-Sztainer, & Story, 2009). While any weight control behavior may be unhealthy if taken to an extreme, healthy weight control behaviors in this study were defined as behaviors generally viewed as healthy and sustainable over time.

Six healthy weight control behaviors were assessed by asking how often they were done in the past year in order to lose or keep from gaining weight. Four response options were listed, ranging from *never* to *on a regular basis*, followed by the behaviors: *exercise*, *ate more fruits and vegetables*, *ate less high-fat foods*, *ate less sweets*, *drank less soda pop (not including diet pop)*, and *watched my portion sizes (serving sizes)*. In a manner similar to prior research (Lampard et al., 2016), anyone who reported performing one or more of the six behaviors on a regular basis was categorized as performing healthy weight control behaviors (test-retest agreement = 96%).

**Unhealthy weight control behaviors**, or those adjacent to eating disorders (Gonsalves, Hawk, & Goodenow, 2014) or weight gain (Quick et al., 2013), were assessed by asking if the following behaviors were done in the past year in order to lose or keep from gaining weight: *fasted*, *ate very little food*, *used a food substitute (powder or a special drink)*, *skipped meals*, and *smoked more cigarettes*, *took diet pills*, *made myself vomit*, *used laxatives*, and *used diuretics* with response options being *yes/no*. Consistent with prior analyses (Neumark-Sztainer, Wall, Eisenberg, Story, & Hannan, 2006), those reporting engaging in one or more unhealthy weight control behaviors in the previous year were coded as using unhealthy weight control behaviors (Test-retest agreement = 86%).

**Binge eating with loss of control** was assessed via two questions adapted from the Questionnaire on Eating and Weight Patterns–Revised (Zelitch Yanovski, 1993) and the validated Eating Disorder Examination Questionnaire (Berg et al., 2012; Mond, Hay, Rodgers, Owen, & Beumont, 2004): *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)? (yes/no)*. If affirmative, loss of control was assessed via the question, *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? (yes/no)*. Those responding yes to both questions were categorized as engaging in binge eating (test-retest agreement = 94%).

#### 2.2.4. Covariates

Participants self-reported their gender, ethnicity/race, age, educational attainment, and income (Larson, Haynos, et al., 2018). The latter three items were analyzed as continuous variables for this analysis.

### 2.3. Analysis

In descriptive analyses, associations between intuitive eating and weight status, dieting, weight control behaviors, and binge eating were examined using Chi-squared tests. In multivariable adjusted analyses, predicted probabilities using PROC GENMOD were calculated to measure the association between intuitive eating at EAT-III and outcomes at EAT-IV including: weight status (dichotomized into BMI  $\geq 25$  or  $< 25$  kg/m<sup>2</sup> and BMI  $\geq 30$  or  $< 30$  kg/m<sup>2</sup>); dieting; engaging in healthy and unhealthy weight control behaviors; and binge eating. Multivariable models were adjusted for age, educational attainment, income, ethnicity/race, and EAT-III outcomes (e.g. the model testing the relationship between intuitive eating and binge eating at EAT-IV adjusted

for binge eating at EAT-III). All analyses were stratified by gender, as prior research has suggested that there may be gender differences in awareness of intuitive eating (International Food Information Council Foundation, 2019) and the way it relates to making food decisions including using Nutrition Facts labels (Christoph et al., 2018). Since loss-to-follow-up occurred non-randomly, all adjusted analyses were weighted based on the response propensity method (Seaman & White, 2013) to make the sample more representative of the original school-based population (see Study Design and Sample section above for details). All analyses were performed using the Statistical Analysis System (version 9.4, SAS Institute Inc, Cary, NC, 2016).

### 3. Results

At EAT-III, 58% of women and 63% of men reported eating intuitively (somewhat or strongly agreeing that they both stopped eating when full and trusted their bodies to tell them how much to eat) (Table 1).

**Table 1**

Demographic characteristics, intuitive eating, and prevalence of weight status, dieting, weight control behaviors, and binge eating for 1660 young adults surveyed over two waves in the population-based EAT survey.

Demographic Characteristics	Women, % (n) N = 956	Men, % (n) N = 704
Age, years at EAT-III	25.2 1.6	25.3 1.5
Age, years at EAT-IV	31.0 1.7	31.1 1.6
Education at EAT-IV		
High school graduate or less	19.4 (185)	26.0 (182)
Associate/technical degree/certification	26.0 (248)	22.3 (156)
Bachelor degree or higher	54.6 (520)	51.7 (362)
Income at EAT-IV		
Low (\$0–\$49,999)	37.1 (348)	33.4 (232)
Middle (\$50,000–\$99,999)	38.8 (364)	40.9 (284)
High (\$100,000+)	24.2 (227)	25.7 (178)
Intuitive eating at EAT-III		
I stop eating when I feel full		
Strongly agree	26.6 (254)	29.0 (204)
Somewhat agree	49.2 (470)	48.2 (339)
Somewhat disagree	21.1 (202)	19.5 (137)
Strongly disagree	3.1 (30)	3.4 (24)
I trust my body to tell me how much to eat		
Strongly agree	16.5 (158)	23.0 (162)
Somewhat agree	48.9 (468)	50.6 (356)
Somewhat disagree	28.3 (271)	21.5 (151)
Strongly disagree	6.4 (61)	5.0 (35)
Intuitive eaters <sup>a</sup>	58.1 (555)	62.6 (441)
Weight status, dieting, weight control behaviors, and binge eating at EAT-IV		
Weight status		
Non-overweight (<24.99 kg/m <sup>2</sup> )	44.6 (423)	35.5 (248)
Overweight ( $\geq 25$ kg/m <sup>2</sup> )	55.4 (525)	64.5 (451)
Obesity ( $\geq 30$ kg/m <sup>2</sup> )	28.2 (267)	25.0 (175)
Currently dieting	64.0 (612)	43.6 (306)
Healthy weight control behaviors (past year) <sup>b</sup>	75.7 (721)	61.0 (427)
Unhealthy weight control behaviors (past year) <sup>c</sup>	50.3 (480)	36.2 (253)
Binge eating with loss of control (past year)	16.4 (156)	8.5 (60)

<sup>a</sup> Participants who either somewhat or strongly agreed to both questions (*I stop eating when I feel full* and *I trust my body to tell me how much to eat*) were defined as intuitive eaters.

<sup>b</sup> Healthy weight control behaviors included: exercise, ate more fruits and vegetables, ate less high-fat foods, ate less sweets, drank less soda pop (not including diet pop), and watched my portion sizes (serving sizes).

<sup>c</sup> Unhealthy weight control behaviors included: fasted, ate very little food, used a food substitute (powder or a special drink), skipped meals, smoked more cigarettes, took diet pills, made myself vomit, used laxatives, and used diuretics.

### 3.1. Associations of Intuitive Eating with Weight Status, Dieting, Weight Control Behaviors, and Binge Eating Adjusted for Sociodemographic Characteristics

Intuitive eating at EAT-III was significantly related to several eating and weight-related behaviors five years later in analyses adjusted for age, ethnicity/race, education, and income (Table 2). Among women, fewer intuitive eaters compared to non-intuitive eaters had BMI  $\geq 25$  kg/m<sup>2</sup> (53.0% for intuitive vs. 67.9% for non-intuitive) or BMI  $\geq 30$  kg/m<sup>2</sup> (22.9% for intuitive and 36.7% for non-intuitive, both  $p = 0.001$ ) at the 5-year follow-up. Intuitive eaters reported lower engagement in dieting at 5-year follow-up (intuitive: 63.2% vs. non-intuitive: 72.4%), unhealthy weight control behaviors (intuitive: 49.5% vs. non-intuitive: 61.7%), and binge eating with loss of control (intuitive: 11.4% vs. non-intuitive: 21.1%, all associations:  $p = 0.01$ ). At the 5-year follow-up, approximately three-quarters of both intuitive and non-intuitive eaters engaged in healthy weight control behaviors such as exercising and eating fewer sweets to control weight with no statistically significant differences between intuitive and non-intuitive eaters.

Among men, differences between intuitive and non-intuitive eaters were similar to the patterns seen in women. Men who ate intuitively had lower prevalence of BMI  $\geq 25$  kg/m<sup>2</sup> (intuitive: 63.3% vs. non-intuitive: 73.9%,  $p = 0.002$ ) and BMI  $\geq 30$  kg/m<sup>2</sup> (intuitive: 22.6% vs. non-intuitive: 31.1%,  $p = 0.008$ ) at 5-year follow-up. Fewer intuitive eaters engaged in dieting (intuitive: 41.1% vs. non-intuitive: 51.1%), unhealthy weight control behaviors (intuitive: 31.6% vs. non-intuitive: 45.6%), and binge eating with loss of control (intuitive: 0.9% vs. non-intuitive: 1.9%), all  $p = 0.01$ . Engagement in healthy weight control behaviors was high at around 60% among both intuitive and non-intuitive eaters and did not differ by intuitive eating status.

### 3.2. Associations of Intuitive Eating with Weight Status, Dieting, Weight Control Behaviors, and Binge Eating Adjusted for EAT-III Outcomes

In multivariable models adjusted for sociodemographic factors and the specific outcome measured at EAT-III, weight status and reported dieting, weight control behaviors, and binge eating did not differ by intuitive eating independent of sociodemographic factors and EAT-III outcomes among women (Table 3).

Among men, unhealthy weight control behaviors and binge eating with loss of control at follow-up differed by intuitive eating (Table 3). Men who ate intuitively at EAT-III were significantly less likely to engage in unhealthy weight control behaviors (intuitive: 30.0% vs. non-intuitive: 41.9%,  $p = 0.002$ ) and binge eating (intuitive: 0.9% vs. non-intuitive: 1.5%,  $p = 0.046$ ), even accounting for engagement in unhealthy weight control behaviors and binge eating, respectively, at the prior wave. Weight status and engagement in dieting and healthy weight

**Table 3**

Adjusted<sup>a</sup> percentages showing weight status, dieting, weight control behaviors, and binge eating at EAT-IV among women and men who reported eating intuitively and non-intuitively at EAT-III. \*indicates  $p = 0.05$

Probability at EAT-IV	Women			Men		
	Intuitive N = 555 % SE	Non-intuitive N = 401 % SE	P value	Intuitive N = 441 % SE	Non-intuitive N = 263 % SE	P value
BMI $\geq 25$ kg/m <sup>2</sup>	69.8 3.4	71.2 3.8	0.779	73.0 2.5	76.7 3.0	0.326
BMI $\geq 30$ kg/m <sup>2</sup>	24.6 2.8	29.8 3.4	0.212	23.1 2.3	22.2 2.9	0.795
Currently dieting	69.0 2.5	70.3 2.9	0.713	44.3 2.5	46.5 3.3	0.589
Healthy weight control behaviors <sup>b</sup>	80.7 2.0	77.3 2.5	0.252	63.3 2.2	58.0 3.2	0.168
Unhealthy weight control behaviors <sup>c</sup>	53.3 2.8	57.1 3.2	0.367	30.0 2.3	41.9 3.3	0.002*
Binge eating with loss of control	11.8 1.7	14.3 2.1	0.321	0.9 0.2	1.5 0.3	0.046*

<sup>a</sup> Adjusted for age, ethnicity/race, education, income, and EAT-III outcome (e. g. binge eating at EAT-IV model was adjusted for binge eating at EAT-III). BMI  $\geq 25$  and  $\geq 30$  were not mutually exclusive.

<sup>b</sup> Healthy weight control behaviors included: exercise, ate more fruits and vegetables, ate less high-fat foods, ate less sweets, drank less soda pop (not including diet pop), and watched my portion sizes (serving sizes).

<sup>c</sup> Unhealthy weight control behaviors included: fasted, ate very little food, used a food substitute (powder or a special drink), skipped meals, and smoked more cigarettes, took diet pills, made myself vomit, used laxatives, and used diuretics.

control behaviors were not related to intuitive eating independent of sociodemographic characteristics and the EAT-III outcomes.

## 4. Discussion

The goal of this longitudinal study was to examine how intuitive eating is related to weight status, dieting, weight control behaviors, and binge eating in a large, population-based sample of young adults transitioning from their mid-twenties to early thirties. Results showed that over half of the women and men in this population reported eating intuitively in early adulthood. Intuitive eating was related to lower prevalence of higher weight status, dieting, engaging in unhealthy weight control behaviors, and binge eating among both men and women

**Table 2**

Adjusted<sup>a</sup> percentages showing weight status, dieting, weight control behaviors, and binge eating at the 5-year EAT-IV follow-up for women and men who reported eating intuitively and non-intuitively at EAT-III. \* $p = 0.05$

Probability at EAT-IV	Women			Men		
	Intuitive, % (n) N = 555 <sup>b</sup>	Non-intuitive, % (n) N = 401	P value	Intuitive, % (n) N = 441 <sup>b</sup>	Non-intuitive, % (n) N = 263	P value
BMI $\geq 25$ kg/m <sup>2</sup>	53.0 (271)	67.9 (254)	0.001*	63.3 (255)	73.9 (196)	0.002*
BMI $\geq 30$ kg/m <sup>2</sup>	22.9 (125)	36.7 (142)	0.001*	22.6 (93)	31.1 (82)	0.008*
Currently dieting	63.2 (330)	72.4 (282)	0.009*	41.1 (170)	51.1 (136)	0.006*
Healthy weight control behaviors <sup>c</sup>	79.0 (416)	76.6 (305)	0.442	62.1 (263)	58.5 (164)	0.329
Unhealthy weight control behaviors <sup>d</sup>	49.5 (248)	61.7 (232)	0.001*	31.6 (132)	45.6 (121)	0.001*
Binge eating with loss of control	11.4 (55)	21.1 (101)	0.001*	0.9 (28)	1.9 (32)	0.005*

<sup>a</sup> Adjusted for age, ethnicity/race, education, income.

<sup>b</sup> Sample sizes listed are unadjusted and varied for each variable, ranging from 948 to 956 among women, and  $n = 699$  and  $704$  among men.

<sup>c</sup> Healthy weight control behaviors included: exercise, ate more fruits and vegetables, ate less high-fat foods, ate less sweets, drank less soda pop (not including diet pop), and watched my portion sizes (serving sizes).

<sup>d</sup> Unhealthy weight control behaviors included: fasted, ate very little food, used a food substitute (powder or a special drink), skipped meals, and smoked more cigarettes, took diet pills, made myself vomit, used laxatives, and used diuretics.



at the 5-year follow-up. In analyses further adjusted for EAT-III outcomes among women, intuitive eating was unrelated to weight status or any of the behaviors studied independent of measures five years prior. Among men, intuitive eating predicted lower engagement in unhealthy weight control behaviors and binge eating five years later independent of engagement in these behaviors at EAT-III. The results of this study suggest that intuitive eating may be associated with lower risk of high weight status and lower engagement in dieting, unhealthy weight control behaviors, and binge eating five years later, although these associations did not occur independent of engagement in these outcomes at EAT-III among women. In the context of prior research, this study extends cross-sectional work reporting on the relationship between intuitive eating and weight status, weight control behaviors, and binge eating, particularly among young adults past the college age range.

Cross-sectional research has noted that intuitive eating is related to weight stability (Tylka et al., 2020) and negatively related to higher weight status (Camilleri et al., 2016; Van Dyke & Drinkwater, 2014). In the current study, intuitive eating was related to lower risk of high weight status at the 5-year follow-up among both men and women, though not independent of weight status at EAT-III. While the cross-sectional relationship between intuitive eating and weight status has been reported on extensively among college-age women (Van Dyke & Drinkwater, 2014), results among men are less clear. Camilleri et al. (2016) found that intuitive eating was negatively associated with weight status among both men and women in France, but that the associations between intuitive eating and weight status were stronger in women compared to men. Our study suggests that intuitive eating was negatively related to high weight status among both women and men; however, the finding that this relationship was not independent of weight status at EAT-III suggests that intuitive eating patterns and weight trajectories may have bidirectional associations that may have already been established by young adulthood. Further investigation into the longitudinal relationship between intuitive eating and weight status is needed, particularly as a foundation to better understand: if and how components of intuitive eating should be incorporated into effective interventions; if, how, and why these relationships differ by gender in other populations; and to better understand how intuitive eating and weight-related behaviors may change over time.

Results from this study expand upon prior work (Leong, Gray, Hazzard, & Horwath, 2016; Tylka & Wilcox, 2006) by examining longitudinal associations between intuitive eating and engagement in various forms of weight control behaviors among a large population-based sample of both men and women. Prior cross-sectional studies have shown that intuitive eating is related to lower disordered eating behaviors (Anderson, Reilly, Schaumberg, Dmochowski, & Anderson, 2016; Bruce & Ricciardelli, 2016; Linardon & Mitchell, 2017). However, the cross-sectional designs limit interpretation, and in their review Bruce and Ricciardelli (2016) also note weak generalizability due to an overrepresentation of university students. This Project EAT study filled an additional gap by reporting on the longitudinal relationship between intuitive eating and forms of weight control behaviors that have health benefits (e.g., exercising, eating fewer sweets). Interestingly, intuitive eating was not related to engagement in these healthy weight control behaviors. Engaging in behaviors such as exercising, eating fewer sweets, and eating more fruits and vegetables for the purpose of weight loss or management was very common in this Project EAT sample, particularly among women; this high prevalence could have made it difficult to detect an association with intuitive eating. Further, it is possible that individuals engage in intuitive eating as an alternative to engaging in these behaviors. Qualitative and quantitative research is needed to better understand how intuitive eating relates to engagement in various forms of weight control behaviors and, in particular, a potential alternative to unhealthy weight control behaviors.

Intuitive eating was negatively related to engagement in unhealthy weight control behaviors at the 5-year follow-up among both men and women, suggesting that intuitive eating predicts a lower prevalence of

these concerning behaviors. After adjustment for earlier participation in weight control behaviors, these associations only remained significant among men, suggesting that these patterns may have already been established in young adult women. Gender differences have been previously noted in health markers and specifically the associations between intuitive eating and lower depression (Van Dyke & Drinkwater, 2014) and higher dietary quality (Horwath et al., 2019) being stronger among women compared to men. Gender differences could also relate to differences in awareness of intuitive eating; in a 2019 survey, 42% of women compared to 30% of men were familiar with the concept of “mindful or intuitive eating” (International Food Information Council Foundation, 2019). Since women often have higher engagement in dieting and restrictive eating behaviors compared to men (Gonsalves et al., 2014; Larson et al., 2009; Neumark-Sztainer et al., 2011), understanding if intuitive eating is seen as an alternative type of diet or as non-compatible with dieting will be important to creating interventions and messaging related to intuitive eating. Engagement in unhealthy weight control behaviors was already very high among women in this study, which could have made it hard to detect an increase in incident behaviors. Further research should investigate onset of engagement in weight control behaviors and intuitive eating to provide insight for intervention timing.

Few studies have looked specifically at the relationship between intuitive eating and binge eating. In a cross-sectional survey of 196 undergraduate women, intuitive eating was inversely related to binge eating symptomology (Craven & Fekete, 2019). Previous cross-sectional studies have also found associations between intuitive eating and lower engagement in binge eating among a community-based sample in the US (Tylka, Calogero, & Danielsdottir, 2015) and in a nationwide sample of women in New Zealand (Madden et al., 2012). One longitudinal study in the population-based EAT 2010–2018 cohort found that baseline intuitive eating and changes in intuitive eating scores were related to lower odds of binge eating eight years later (Hazzard et al., 2020). The current study strengthens and extends these findings by showing that among both men and women, intuitive eaters had about half the likelihood of engaging in binge eating at the 5-year follow-up. Among men, intuitive eating predicted lower incidence and prevalence of binge eating, independent of binge eating at the previous study wave.

#### 4.1. Strengths and limitations

Strengths of this study include the longitudinal design and a large diverse population-based cohort sample. The present study is among the first to describe these associations in a prospective real-life setting. Models were adjusted for sociodemographic characteristics, and additional analyses were adjusted for the outcome at the previous study wave. Thus, any observed associations in the adjusted analyses between intuitive eating and follow-up behaviors were independent of the occurrence of that behavior in early adulthood. This approach may have been overly-conservative given the influence of intuitive eating may have occurred by early adulthood, in which case adjusting for behaviors at the previous study wave may have adjusted away some of the association of interest. Behaviors may not change substantially over this time period, and engagement in weight control behaviors and binge eating is relatively high during young adulthood. This study also fills a critical gap in its assessment of intuitive eating in relation to eating and weight-related behaviors in a sample that is slightly older and more representative than university-based samples. It is a limitation that this study, in a Western (US) population of young adults, may not be generalizable to young people in other countries; further understanding the salience of IE across different cultures and countries is needed (Swami et al., 2020; Vintilă et al., 2020). This study was limited by the brief assessment of intuitive eating at EAT-III and the relatively small validation study of self-reported vs. objectively-measured height and weight. Finally, loss-to-follow-up did not occur randomly; however, sample weights were used to increase the generalizability to the original population of

Minneapolis-St. Paul middle and high school students.

#### 4.2. Conclusions

In Project EAT, intuitive eating during young adulthood was related to lower prevalence of high weight status and engaging in dieting, unhealthy weight control behaviors, and binge eating five years later among both women and men. These results were generally not independent of weight status, dieting, weight control behaviors, or binge eating at EAT-III among women, whereas among men intuitive eating was related to lower engagement in unhealthy weight control behaviors and binge eating independent of the prior wave. Future research should aim to better understand how individuals conceptualize and utilize intuitive eating when making food-related decisions about what, when, and how much to consume, particularly within different contexts including work and home. A better understanding of potential gender differences in the relationship between intuitive eating and health indicators is needed, as is study of individuals who neither engage in disordered nor intuitive eating behaviors at baseline. Longitudinal research is needed to further investigate the long-term relationships between intuitive eating and eating and weight-related behaviors.

#### Author contributions

MJC: conceptualized the study, performed the analysis, and drafted the manuscript; DN-S: is the study principal investigator and was responsible for the conceptualization and implementation of the broader study and contributed to the writing of the manuscript; NL: provided oversight for the collection of the survey data used in the analysis described here, contributed to the analysis plan and interpretation of the results, and critically reviewed the manuscript; EJ-R, LH, and SM: reviewed, edited, and contributed to the proposal, analysis, and manuscript drafts. All authors approved the final manuscript.

#### Ethics

This research was conducted in accordance with the Declaration of Helsinki. The University of Minnesota's Institutional Review Board Human Subjects Committee approved all protocols used in Project EAT at each time point.

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#### References

- Anderson, L. M., Reilly, E. E., Schaumberg, K., Dmochowski, S., & Anderson, D. A. (2016). Contributions of mindful eating, intuitive eating, and restraint to BMI, disordered eating, and meal consumption in college students. *Eating and Weight Disorders*, 21(1), 83–90. <https://doi.org/10.1007/s40519-015-0210-3>

- Berge, J. M., Christoph, M. J., Winkler, M. R., Miller, L., Eisenberg, M. E., & Neumark-Sztainer, D. (2019). Cumulative encouragement to diet from adolescence to adulthood: Longitudinal associations with health, psychosocial well-being, and romantic relationships. *Journal of Adolescent Health*, 65(5), 690–697. <https://doi.org/10.1016/j.jadohealth.2019.06.002>
- Berg, K. C., Stiles-Shields, E. C., Swanson, S. A., Peterson, C. B., Lebow, J., & Le Grange, D. (2012). Diagnostic concordance of the interview and questionnaire versions of the eating disorder examination. *International Journal of Eating Disorders*, 45(7), 850–855. <https://doi.org/10.1002/eat.20948>
- Bruce, L. J., & Ricciardelli, L. A. (2016). A systematic review of the psychosocial correlates of intuitive eating among adult women. *Appetite*, 96, 454–472. <https://doi.org/10.1016/j.appet.2015.10.012>
- Byrne, C. (2019). Intuitive eating is the ultimate anti-diet. Retrieved from <https://www.outsideonline.com/2394686/what-is-intuitive-eating>.
- Camilleri, G. M., Mejean, C., Bellisle, F., Andreeva, V. A., Kesse-Guyot, E., Hercberg, S., et al. (2016). Intuitive eating is inversely associated with body weight status in the general population-based NutriNet-Sante study. *Obesity*, 24(5), 1154–1161. <https://doi.org/10.1002/oby.21440>
- Christoph, M. J., Loth, K. A., Eisenberg, M. E., Haynos, A. F., Larson, N., & Neumark-Sztainer, D. (2018). Nutrition Facts use in relation to eating behaviors and healthy and unhealthy weight control behaviors. *Journal of Nutrition Education and Behavior*, 50(3), 267–274. <https://doi.org/10.1016/j.jneb.2017.11.001>
- Craven, M. P., & Fekete, E. M. (2019). Weight-related shame and guilt, intuitive eating, and binge eating in female college students. *Eating Behaviors*, 33, 44–48. <https://doi.org/10.1016/j.eatbeh.2019.03.002>
- Denny, K. N., Loth, K., Eisenberg, M. E., & Neumark-Sztainer, D. (2013). Intuitive eating in young adults: Who is doing it, and how is it related to disordered eating behaviors? *Appetite*, 60(1), 13–19. <https://doi.org/10.1016/j.appet.2012.09.029>
- Dulloo, A. G., & Montani, J. P. (2015). Pathways from dieting to weight regain, to obesity and to the metabolic syndrome: An overview. *Obesity Reviews*, 16(Suppl 1), 1–6. <https://doi.org/10.1111/obr.12250>
- Eisenberg, M. E., Berge, J. M., & Neumark-Sztainer, D. (2013). Dieting and encouragement to diet by significant others: Associations with disordered eating in young adults. *American Journal of Health Promotion*, 27(6), 370–377. <https://doi.org/10.4278/ajhp.120120-QUAN-57>
- Fine, A., & Kotelchuck, M. (2010). *Rethinking MCH: The life course model as an organizing framework*. US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau.
- Golden, N. H., Schneider, M., Wood, C., Daniels, S., Abrams, S., Corkins, M., ... Slusser, W. (2016). Preventing obesity and eating disorders in adolescents. *Pediatrics*, 138(3). <https://doi.org/10.1542/peds.2016-1649>
- Gonsalves, D., Hawk, H., & Goodenow, C. (2014). Unhealthy weight control behaviors and related risk factors in Massachusetts middle and high school students. *Maternal and Child Health Journal*, 18(8), 1803–1813. <https://doi.org/10.1007/s10995-013-1424-5>
- Hazzard, V. M., Telke, S. E., Simone, M., Anderson, L. M., Larson, N. I., & Neumark-Sztainer, D. (2020). Intuitive eating longitudinally predicts better psychological health and lower use of disordered eating behaviors: Findings from EAT 2010-2018. *Eating and Weight Disorders*. <https://doi.org/10.1007/s40519-020-00852-4>
- Hillard, E. E., Gondoli, D. M., Corning, A. F., & Morrissey, R. A. (2016). In it together: Mother talk of weight concerns moderates negative outcomes of encouragement to lose weight on daughter body dissatisfaction and disordered eating. *Body Image*, 16, 21–27. <https://doi.org/10.1016/j.bodyim.2015.09.004>
- Horwath, C., Hagmann, D., & Hartmann, C. (2019). Intuitive eating and food intake in men and women: Results from the Swiss food panel study. *Appetite*, 135, 61–71. <https://doi.org/10.1016/j.appet.2018.12.036>
- International Food Information Council Foundation. (2019). Food and health survey. Retrieved from <https://foodinsight.org/2019-food-and-health-survey/>.
- Lampard, A. M., Maclehorse, R. F., Eisenberg, M. E., Larson, N. I., Davison, K. K., & Neumark-Sztainer, D. (2016). Adolescents who engage exclusively in healthy weight control behaviors: Who are they? *International Journal of Behavioral Nutrition and Physical Activity*, 13, 5. <https://doi.org/10.1186/s12966-016-0328-3>
- Larson, N., Chen, Y., Wall, M., Winkler, M., Goldschmidt, A., & Neumark-Sztainer, D. (2018). Personal, behavioral, and environmental predictors of healthy weight maintenance during the transition to adulthood. *Preventive Medicine*, 113, 80–90.
- Larson, N., Haynos, A. F., Roberto, C. A., Loth, K. A., & Neumark-Sztainer, D. (2018b). Calorie labels on the restaurant menu: Is the use of weight-control behaviors related to ordering decisions? *Journal of the Academy of Nutrition and Dietetics*, 118(3), 399–408. <https://doi.org/10.1016/j.jand.2017.11.007>
- Larson, N., Neumark-Sztainer, D., Harwood, E., Eisenberg, M., Wall, M., & Hannan, P. (2011). Do young adults participate in surveys that 'go green'? Response rates to a web and mailed survey of weight-related health behaviors. *Int J Child Health Hum Dev*, 4(2), 225–237.
- Larson, N., Neumark-Sztainer, D., & Story, M. (2009). Weight control behaviors and dietary intake among adolescents and young adults: Longitudinal findings from Project EAT. *Journal of the American Dietetic Association*, 109(11), 1869–1877. <https://doi.org/10.1016/j.jada.2009.08.016>
- Larson, N., Neumark-Sztainer, D., Story, M., van den Berg, P., & Hannan, P. J. (2011b). Identifying correlates of young adults' weight behavior: Survey development. *American Journal of Health Behavior*, 35(6), 712–725.
- Leong, S. L., Gray, A., Hazzard, J., & Horwath, C. (2016). Weight-control methods, 3-year weight change, and eating behaviors: A prospective nationwide study of middle-aged New Zealand women. *Journal of the Academy of Nutrition and Dietetics*, 116(8), 1276–1284. <https://doi.org/10.1016/j.jand.2016.02.021>
- Levy, J. (2019). Intuitive eating: The anti-dieting approach to losing weight. Retrieved from <https://draxe.com/nutrition/intuitive-eating/>.

- Linardon, J., & Mitchell, S. (2017). Rigid dietary control, flexible dietary control, and intuitive eating: Evidence for their differential relationship to disordered eating and body image concerns. *Eating Behaviors*, 26, 16–22. <https://doi.org/10.1016/j.eatbeh.2017.01.008>
- Madden, C. E., Leong, S. L., Gray, A., & Horwath, C. C. (2012). Eating in response to hunger and satiety signals is related to BMI in a nationwide sample of 1601 mid-age New Zealand women. *Public Health Nutrition*, 15(12), 2272–2279. <https://doi.org/10.1017/s1368980012000882>
- Mond, J. M., Hay, P. J., Rodgers, B., Owen, C., & Beumont, P. J. V. (2004). Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy*, 42(5), 551–567. [https://doi.org/10.1016/S0005-7967\(03\)00161-X](https://doi.org/10.1016/S0005-7967(03)00161-X)
- Neumark-Sztainer, D., Croll, J., Story, M., Hannan, P. J., French, S. A., & Perry, C. (2002). Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys: Findings from Project EAT. *Journal of Psychosomatic Research*, 53(5), 963–974.
- Neumark-Sztainer, D., Flattum, C. F., Story, M., Feldman, S., & Petrich, C. A. (2008). Dietary approaches to healthy weight management for adolescents: The New moves model. *Adolescent Medicine: State of the Art Reviews*, 19(3), 421–viii.
- Neumark-Sztainer, D., Story, M., Hannan, P. J., & Croll, J. (2002). Overweight status and eating patterns among adolescents: Where do youths stand in comparison with the healthy people 2010 objectives? *American Journal of Public Health*, 92(5), 844–851. <https://doi.org/10.2105/ajph.92.5.844>
- Neumark-Sztainer, D., Wall, M., Chen, C., Larson, N. I., Christoph, M. J., & Sherwood, N. E. (2018). Eating, activity, and weight-related problems from adolescence to adulthood. *American Journal of Preventive Medicine*, 55(2), 133–141. <https://doi.org/10.1016/j.amepre.2018.04.032>
- Neumark-Sztainer, D., Wall, M., Eisenberg, M. E., Story, M., & Hannan, P. J. (2006). Overweight status and weight control behaviors in adolescents: Longitudinal and secular trends from 1999 to 2004. *Preventive Medicine*, 43(1), 52–59. <https://doi.org/10.1016/j.ypmed.2006.03.014>
- Neumark-Sztainer, D., Wall, M., Guo, J., Story, M., Haines, J., & Eisenberg, M. (2006b). Obesity, disordered eating, and eating disorders in a longitudinal study of adolescents: How do dieters fare 5 years later? *Journal of the American Dietetic Association*, 106(4), 559–568.
- Neumark-Sztainer, D., Wall, M., Larson, N. I., Eisenberg, M. E., & Loth, K. (2011). Dieting and disordered eating behaviors from adolescence to young adulthood: Findings from a 10-year longitudinal study. *Journal of the American Dietetic Association*, 111(7), 1004–1011. <https://doi.org/10.1016/j.jada.2011.04.012>
- Neumark-Sztainer, D., Wall, M., Story, M., & Standish, A. R. (2012). Dieting and unhealthy weight control behaviors during adolescence: Associations with 10-year changes in body mass index. *Journal of Adolescent Health*, 50(1), 80–86. <https://doi.org/10.1016/j.jadohealth.2011.05.010>
- Nogue, M., Nogue, E., Molinari, N., Macioce, V., Avignon, A., & Sultan, A. (2019). Intuitive eating is associated with weight loss after bariatric surgery in women. *American Journal of Clinical Nutrition*, 110(1), 10–15. <https://doi.org/10.1093/ajcn/nqz046>
- Quansah, D. Y., Gross, J., Gilbert, L., Helbling, C., Horsch, A., & Puder, J. J. (2019). Intuitive eating is associated with weight and glucose control during pregnancy and in the early postpartum period in women with gestational diabetes mellitus (GDM): A clinical cohort study. *Eating Behaviors*, 34, 101304. <https://doi.org/10.1016/j.eatbeh.2019.101304>
- Quick, V., Wall, M., Larson, N., Haines, J., & Neumark-Sztainer, D. (2013). Personal, behavioral and socio-environmental predictors of overweight incidence in young adults: 10-yr longitudinal findings. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 37. <https://doi.org/10.1186/1479-5868-10-37>
- Seaman, S. R., & White, I. R. (2013). Review of inverse probability weighting for dealing with missing data. *Statistical Methods in Medical Research*, 22(3), 278–295. <https://doi.org/10.1177/0962280210395740>
- Sirard, J. R., Hannan, P. J., Cutler, G. J., Graham, D. J., & Neumark-Sztainer, D. (2013). Evaluation of two self-report measures of physical activity with accelerometry in young adults. *Journal of Physical Activity and Health*, 10(1), 85–96.
- Swami, V., Todd, J., Zahari, H. S., Mohd Khatib, N. A., Toh, E. K. L., & Barron, D. (2020). Dimensional structure, psychometric properties, and sex and ethnic invariance of a Bahasa Malaysia (Malay) translation of the Intuitive Eating Scale-2 (IES-2). *Body Image*, 32, 167–179. <https://doi.org/10.1016/j.bodyim.2020.01.003>
- Tylka, T. L. (2006). Development and psychometric evaluation of a measure of intuitive eating. *Journal of Counseling Psychology*, 53(2), 226–240. <https://doi.org/10.1037/0022-0167.53.2.226>
- Tylka, T. L., Calogero, R. M., & Danielsdottir, S. (2015). Is intuitive eating the same as flexible dietary control? Their links to each other and well-being could provide an answer. *Appetite*, 95, 166–175. <https://doi.org/10.1016/j.appet.2015.07.004>
- Tylka, T. L., Calogero, R. M., & Danielsdottir, S. (2020). Intuitive eating is connected to self-reported weight stability in community women and men. *Eating Disorders*, 28(3), 256–264. <https://doi.org/10.1080/10640266.2019.1580126>
- Tylka, T. L., & Kroon Van Diest, A. M. (2013). The Intuitive Eating Scale-2: Item refinement and psychometric evaluation with college women and men. *Journal of Counseling Psychology*, 60(1), 137–153. <https://doi.org/10.1037/a0030893>
- Tylka, T. L., & Wilcox, J. A. (2006). Are intuitive eating and eating disorder symptomatology opposite poles of the same construct? *Journal of Counseling Psychology*, 53(4), 474–485. <https://doi.org/10.1037/0022-0167.53.4.474>
- Van Dyke, N., & Drinkwater, E. J. (2014). Relationships between intuitive eating and health indicators: Literature review. *Public Health Nutrition*, 17(8), 1757–1766. <https://doi.org/10.1017/s1368980013002139>
- Vintilă, M., Todd, J., Goian, C., Tudorel, O., Barbat, C. A., & Swami, V. (2020). The Romanian version of the Intuitive Eating Scale-2: Assessment of its psychometric properties and gender invariance in Romanian adults. *Body Image*, 35, 225–236. <https://doi.org/10.1016/j.bodyim.2020.09.009>
- Zelitch Yanovski, S. (1993). Binge eating disorder: Current knowledge and future directions. *Obesity Research*, 1(4), 306–324. <https://doi.org/10.1002/j.1550-8528.1993.tb00626.x>