



Research report

Intuitive eating in young adults. Who is doing it, and how is it related to disordered eating behaviors? ☆

Kara N. Denny^{a,*}, Katie Loth^b, Marla E. Eisenberg^{b,c}, Dianne Neumark-Sztainer^d

^a Department of Pediatrics, University of Minnesota, 717 Delaware St. SE, Minneapolis, MN 55455, USA

^b Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, 1300 S 2nd St., WBOB, Minneapolis, MN 55454, USA

^c Division of General Pediatrics and Adolescent Health, Department of Pediatrics, School of Medicine, University of Minnesota, 717 Delaware St. SE, Minneapolis, MN 55455, USA

^d Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, 1300 S 2nd St., Minneapolis, MN 55454, USA

ARTICLE INFO

Article history:

Received 4 February 2012

Received in revised form 10 September 2012

Accepted 27 September 2012

Available online 11 October 2012

Keywords:

Hunger

Eating behavior

Intuitive eating

Disordered eating

Dieting

Binge eating

ABSTRACT

Intuitive eating (i.e., reliance on physiologic hunger and satiety cues to guide eating) has been proposed as a healthier, more effective, and more innate alternative to current strategies of weight management. The current study explored intuitive eating among young adults according to socio-demographic characteristics and body mass index (BMI), and examined associations between intuitive and disordered eating behaviors. Data were drawn from Project EAT-III, a population-based study of 2287 young adults (mean age: 25.3 years). More males reported trusting their bodies to tell them how much to eat than did females. Intuitive eating was inversely associated with BMI in both genders. Males and females who reported trusting their body to tell them how much to eat had lower odds of utilizing disordered eating behaviors compared to those that did not have this trust. Females who reported that they stop eating when they are full had lower odds of chronic dieting and binge eating than those who do not stop eating when full. Overall, this study found that intuitive eating practices are inversely associated with a number of harmful outcomes. Clinicians should discuss the concept of intuitive eating with their young adult patients to promote healthier weight-related outcomes.

© 2012 Elsevier Ltd. All rights reserved.

Introduction

The prevalence of overweight and obesity continues to be high; a nationally representative study in the United States found that two in three adults were either overweight or obese (Flegal, Carroll, Ogden, & Curtin, 2010). Thinner aesthetic preferences (Swami & Tovee, 2005; Swami et al., 2010) and physical and emotional health consequences associated with obesity (Wyatt, Winters, & Dubbert, 2006) are among the drivers for weight loss. Dieting is a commonly utilized method of attempted weight loss (Field, Haines, Rosner, & Willett, 2010; McCracken, Jiles, & Blanck, 2007; Wharton, Adams, & Hampl, 2008). Dieting becomes extremely common by adolescence, during which time 46% of U.S. high school students

report dieting behaviors (Centers of Disease Control and Prevention [CDC], 2012). Furthermore, research indicates that dieting behaviors observed in adolescence have a general tendency to continue into adulthood, suggesting that early behaviors set the stage for later behaviors (Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011). Interestingly, research consistently shows that attempts at dieting are often unsuccessful and do not predict weight loss or maintenance, but instead predict weight gain and overweight status (Field et al., 2007, 2010; Neumark-Sztainer, Wall, Story, & Standish, 2012; Neumark-Sztainer et al., 2006; Williams, Germov, & Young, 2007). Furthermore, dieters may experience large weight fluctuations (Mann et al., 2007), emotional distress (Hawks, Madanat, & Christley, 2008; Rubinstein, 2006; Theim, 2007), depression (Cachelin & Regan, 2006; Gillen, Markey, & Markey, 2012), and are at risk for the development of eating disorders (Cachelin & Regan, 2006; Hawks et al., 2008; Keel, Baxter, Heatherton, & Joiner, 2007; Neumark-Sztainer et al., 2006). This body of evidence suggests that dieting is not a sustainable strategy for weight loss and does not promote a healthy lifestyle.

In a society where concerns and public attention regarding obesity and its associated physical health problems are at the forefront, methods to improve weight status and associated health problems that also promote healthier emotional status need to be explored. A new body of research suggests that helping people

* Acknowledgements: Data collection for this study is financially supported by a grant for Project EAT [Grant No. R01HL084064 (PI: Neumark-Sztainer)] from the National Heart, Lung, and Blood Institute. Additionally, financial support for the first author was provided by a grant for Faculty Development in Primary Care [Grant No. D55HP04186 (PI: Borowsky)] from the Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services (Public Health Service Act, Title VII, Section 747).

* Corresponding author.

E-mail addresses: denny045@umn.edu (K.N. Denny), fall0075@umn.edu (K. Loth), eisen012@umn.edu (M.E. Eisenberg), neumark@epi.umn.edu (D. Neumark-Sztainer).

recognize and respond to their internal signs of hunger and satiety may offer a healthier alternative to dieting (Bacon, Stern, Van Loan, & Keim, 2005; Smith & Hawks, 2006; Tylka & Wilcox, 2006). Researchers have proposed that humans are naturally equipped to use internal cues to regulate their food consumption for optimal energy balance (Birch & Fisher, 1998; Birch, Johnson, Andersen, Peters, & Schulte, 1991; Fomon, 1993). For example, research has shown that infants as young as 6 weeks old (Fomon, 1993) and young children (Birch & Fisher, 1998; Birch, Johnson, Andersen, Petersen, & Schulte, 1991) have the ability to respond to and compensate for the energy density of their diet and to self-regulate their caloric intake based on their physiologic needs.

Research has also demonstrated that the ability to innately regulate energy intake by responding to internal hunger and satiety cues can be disrupted by a change in focus from internal cues to external cues, notably environmental pressures, such as parental control and messages (Birch & Fisher, 1998; Patrick & Nicklas, 2005; Scaglioni, Salvioni, & Galimberti, 2008). Parental control over when, what, and how much a child eats is negatively associated with that child's ability to self-regulate their energy intake (Birch & Fisher, 1998; Patrick & Nicklas, 2005; Scaglioni et al., 2008). For example, children who are regularly encouraged to "clean their plate" will begin to associate fullness with the cleanliness of their plate rather than their own physical sensation of fullness (Fisher & Birch, 1999). Caregiver messages regarding eating and weight can impact a child's eating behavior (Birch & Fisher, 2000; Fisher & Birch, 1999). For instance, certain foods become more desirable to children if withheld from them (Birch, Fisher, & Davison, 2003) or less desirable if pushed upon them (Galloway, Fiorito, Francis, & Birch, 2006). Such restriction and pressure on child eating are inversely associated with eating in accordance with internal hunger and satiety cues later in life (Kroon Van Diest & Tylka, 2010). Notably, the replacement of these internal signals with external cues, or motivators, has been shown to be related to weight gain (Faith, Scanlon, Birch, Francis, & Sherry, 2004; Kroon Van Diest & Tylka, 2010) and several unhealthy eating practices, such as dietary restraint, eating in the absence of hunger, and eating in response to emotions (Birch & Fisher, 2000; Birch et al., 2003; Carper, Fisher, & Birch, 2000; Faith et al., 2004; Kroon Van Diest & Tylka, 2010; Patrick & Nicklas, 2005; Scaglioni et al., 2008). This body of evidence suggests that the ability to use physical hunger and satiety cues to effectively regulate energy consumption is innate. Yet, when this ability diminishes due to increased focus on external cues, naturally regulated energy consumption is replaced by unhealthy eating practices.

Individual motivations for eating have been classified into three groups (Hawks, Madanat, Merrill, Goudy, & Miyagawa, 2003), including physical (eating due to internal cues, such as a growling stomach), emotional (eating due to depression, boredom, or other emotional states), or environmental (eating triggered by something in the immediate surrounding, such as food odor). Intuitive eating is a style of eating that focuses on eating motivated by physical reasons, with an individual relying on their connection with and understanding of physical hunger and satiety cues, rather than on emotional or environmental motivators (Avalos & Tylka, 2006; Tribole & Resch, 1995; Tylka, 2006). It has been proposed that unconditional permission to eat whatever food is desired based on these cues, regardless of nutrient or caloric content, may decrease excessive preoccupation with food (Avalos & Tylka, 2006; Tribole & Resch, 1995; Tylka, 2006). Although research has been limited, intuitive eating has shown some promise in promoting healthy dietary practices and improving physical and emotional health outcomes (Avalos & Tylka, 2006; Bacon & Aphramor, 2011; Bacon et al., 2005; Hawks, Madanat, Hawks, & Harris, 2005; Smith & Hawks, 2006; Tylka, 2006; Tylka & Wilcox, 2006). Intuitive eating is associated with several markers of improved

physical health, including lower body mass index (BMI), cholesterol, and blood pressure, indicating lower cardiovascular risk (Augustus-Horvath & Tylka, 2011; Bacon & Aphramor, 2011; Bacon et al., 2005; Hawks et al., 2005; Madden, Leong, Gray, & Horvath, 2012; Smith & Hawks, 2006; Tylka, 2006). Furthermore, research has suggested that intuitive eating is associated with a number of measures of better psychological health. For example, intuitive eaters have been found to show greater unconditional self-regard and body satisfaction (or appreciation) and lower levels of depression and disordered eating behaviors (Bacon & Aphramor, 2011; Bacon et al., 2005; Polivy & Herman, 1992; Smith & Hawks, 2006; Tylka, 2006; Tylka & Wilcox, 2006).

While existing research on intuitive eating is promising, studies have been conducted primarily in small samples (Bacon et al., 2005; Hawks et al., 2005; Polivy & Herman, 1992; Smith & Hawks, 2006; Tylka & Wilcox, 2006), in females (Augustus-Horvath & Tylka, 2011; Avalos & Tylka, 2006; Bacon et al., 2005; Hawks et al., 2005; Madden et al., 2012; Polivy & Herman, 1992; Tylka, 2006; Tylka & Wilcox, 2006), and in limited populations within single universities (Avalos & Tylka, 2006; Hawks et al., 2005; Smith & Hawks, 2006; Tylka, 2006; Tylka & Wilcox, 2006) and weight loss programs (Bacon et al., 2005; Polivy & Herman, 1992). It is of interest to learn more about the extent to which the general population utilizes intuitive eating principles and their associations with dieting and disordered eating behaviors. The present study expands the current literature by: (1) describing two aspects of intuitive eating according to socio-demographic characteristics and BMI within a large community-based, racially and socioeconomically diverse sample of young adult women and men; and (2) examining associations of the same two aspects of intuitive eating with chronic dieting, unhealthy and extreme weight control behaviors, and binge eating within this population.

Method

Sample and study design

Data for this observational, cross-sectional analysis were drawn from Project EAT-III (Eating and Activity in Teens and Young Adults), the third wave of Project EAT, a Minnesota population-based study designed to examine weight-related issues among adolescents and young adults. Project EAT involves data collection over time, but does not include an intervention component. The University of Minnesota's Institutional Review Board Human Subjects Committee approved all study protocols.

In Project EAT-I (1998–1999), middle school and senior high school students from 31 public schools in the Minneapolis/St. Paul metropolitan area completed in-class surveys and anthropometric measures (Neumark-Sztainer, Wall, Story, & Perry, 2003). For Project EAT-III (2008–2009), original participants from Project EAT-I were mailed letters asking them to complete an online or paper version of the Project EAT-III survey and a food frequency questionnaire. Completed surveys were returned by 2,287 young adults, representing 66.4% of those for whom correct contact information was available and 48.2% of the original cohort. Statistical adjustments were made to account for attrition, as described below. Details on the study design and study population have been previously described (Eisenberg, Berge, Fulkerson, & Neumark-Sztainer, 2011, 2003; Neumark-Sztainer et al., 2011).

Sample characteristics

The sample for this study included 1,030 males (45.2%) and 1,257 females (54.9%) with mean age 25.3 years \pm 1.7. The final weighted sample (see statistical analysis section) was 48.4% White,

18.6% Black/African American, 5.9% Hispanic/Latino, 19.6% Asian American, 3.3% Native American/American Indian, and 4.3% mixed/other. The sample was well-distributed across the five levels of socioeconomic status (SES), with percentages per category of: low 18%, low-middle 19%, middle 26%, high-middle 23%, and high 14%.

Survey development

The Project EAT survey used in previous study waves (Neumark-Sztainer et al., 2003) was modified to increase the relevance of items for young adults and to capture a broader range of factors relevant to eating, physical activity, and weight-related issues (Larson, Neumark-Sztainer, Story, van den Berg, & Hannan, 2011). The questions used to measure intuitive eating were new items, which were added to the EAT-III survey given growing interest in this topic. The revised survey was pre-tested by 27 young adults in focus groups, and test–retest reliability over a 1–3 week period was examined in 66 young adults.

Measures

Aspects of intuitive eating were assessed using two items adapted from the 21-item validated Intuitive Eating Scale (Tylka, 2006). Participants were asked to indicate how strongly they agreed with the following two statements: “I trust my body to tell me how much to eat” and “I stop eating when I am full” using a four point Likert scale (test–retest $r = .65$ [first question], $r = .62$ [second question]). For the purposes of this analysis, the responses were dichotomized: no (strongly disagree and disagree) and yes (agree and strongly agree) in order to compare intuitive eaters with all other participants. These items were used separately throughout the analyses.

Four weight control behaviors were included in the present study. Dieting frequency was assessed with 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.” Response options included: never, 1–4 times, 5–10 times, more than 10 times, and “I am always dieting.” For the purposes of this analysis, responses were dichotomized to compare chronic dieters (5 or more times) vs. those who diet less frequently or not at all (test–retest agreement = 97%; Neumark-Sztainer et al., 2002). Specific behaviors were 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?” Unhealthy weight control behavior was assessed by the following responses: (a) fasted, (b) ate very little food, (c) used a food substitute (powder or a special drink), (d) skipped meals, and (e) smoked more cigarettes (Neumark-Sztainer et al., 2002). Those who responded yes to the use of one or more of these behaviors were coded as using unhealthy weight control behaviors (test–retest agreement 83%). Extreme weight control behavior was assessed by the following responses: (a) took diet pills, (b) made myself vomit, (c) used laxatives, and (d) used diuretics (Neumark-Sztainer et al., 2002). Those who responded yes to the use of one or more of these behaviors were coded as using extreme weight control behaviors (test–retest agreement 97%). Binge eating was assessed using two questions (Yanovski, 1993). Participants were first asked to respond “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)?” If they responded yes, participants were asked to respond to the question, “During the times when you ate this way, did you feel you could not stop eating or control what or how much you were eating?” Participants responding “yes” to both questions were coded as engaging in binge eating with loss

of control (test–retest agreement = 92% [first question] and 84% [second question]).

BMI status was assessed using self-reported height and weight, from which body mass index (BMI, kg/m^2) was calculated. This variable was divided into three categories: normal weight or underweight ($\text{BMI} < 25$), overweight ($25 \leq \text{BMI} < 30$), and obese ($\text{BMI} \geq 30$) according to well-defined classifications (Centers of Disease Control and Prevention [CDC], 2010). Self-report of height and weight were validated in a subsample of 63 male and 62 female participants in Project EAT-III for whom height and weight measurements were completed by trained research staff. Results showed very high correlations between self-reported BMI and measured BMI in males ($r = .95$) and females ($r = .98$).

Demographic variables including gender, age, race/ethnicity, and SES were assessed by self-report on the Project EAT-I survey. Race/ethnicity was assessed with one survey item: “Do you think of yourself as (a) White, (b) Black or African American, (c) Hispanic or Latino, (d) Asian American, (e) Hawaiian or Pacific Islander, or (f) American Indian or Native American?” Respondents were asked to check all that apply. Participants who checked two options were categorized as “Mixed/Other” race. Hawaiian/Pacific Islander participants were also categorized as “Mixed/Other” due to their small numbers in this dataset.

Five categories of SES were created based upon data from EAT-I. SES was determined primarily from parental education level, defined by the highest level of educational attainment of either parent (Neumark-Sztainer et al., 2002). When this information was not available, other variables were used, such as family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parental employment status (Neumark-Sztainer et al., 2002). In this sample, the use of parental SES to characterize the current SES of the participants was based on the assumption that many individuals do not complete their transition to independence before their mid-twenties. Therefore, widely used indicators of SES, such as education and income, are poor measures of SES in young adults (Shavers, 2007).

Statistical analysis

T-tests were used to compare mean ages of those who reported different aspects of intuitive eating (trusting one’s body to tell one how much to eat and stopping eating when one is full) and those who did not. Chi-square tests of significance were used to identify differences in these intuitive eating practices by race/ethnicity, SES, BMI status, and gender; where differences were significant overall, post hoc tests were used to identify differences between specific categories. Logistic regression was used to examine associations between each aspect of intuitive eating (entered simultaneously) and disordered eating behaviors, controlling for race/ethnicity, age, SES, and BMI. All analyses were stratified by gender and were performed in SAS 8.2.

Attrition from the original Project EAT sample was not equal across socio-demographic characteristics and genders. Thus, in all analyses, the data were weighted using the response propensity method (Little, 1986). Response propensities (the probability of responding to the EAT-III survey) were estimated using a logistic regression of response to EAT-III (yes/no) on a large number of predictor variables available from the EAT-I survey. Weights were calibrated so that the weighted sample sizes used in analyses would accurately reflect the actual observed number of males and females. This weighting method resulted in estimates representative of the demographic make-up of the original Minnesota school-based sample, thereby allowing results to be more fully generalizable to the population of young people in this area.

Results

Intuitive eating by socio-demographic characteristics and weight status

Among young adult men, 74.8% indicated that they trusted their body to tell them how much to eat, and 79.1% reported that they stopped eating when full. Among young adult women, 64.8% indicated that they trusted their body to tell them how much to eat, and 76.4% reported that they stopped eating when full. More men than women reported trusting their body to tell them how much to eat ($p < .01$), but there was no difference between genders in their report of stopping eating when full ($p = .12$). There were no significant differences in either aspect of intuitive eating by age in either gender. Additionally, few differences were noted across race/ethnicity and SES (Table 1). Notably, fewer young Native American men reported stopping eating when full (61.3%) than young men of other race/ethnicity. Also, fewer young men of low SES reported trusting their body to tell them how much to eat (65.4%) than young men of other SES categories. In general, effect sizes ranged from .04 to .16, which are small (Cohen, 1988).

In both gender groups, the prevalence of both trusting one's body to tell one how much to eat and stopping eating when full varied significantly by BMI group ($p < .01$; Table 1). Both aspects of intuitive eating were more common in those within the normal weight or underweight category and trended downward in frequency with increasing BMI. For example, 75.1% of women in the normal weight and underweight category indicated that they trusted their body to tell them how much to eat as compared to only 47.5% of those in the obese category ($p < .01$). Effect sizes ranged from .13 to .25, which are considered small to moderate (Cohen, 1988).

Disordered eating behaviors by intuitive eating

Overall, young adults who reported that they trust their bodies to tell them how much to eat had significantly lower odds for all

disordered eating behaviors compared to those who reported that they did not trust their body, stratifying by gender and adjusting for age, race/ethnicity, SES, and BMI (Table 2). For example, women who reported trusting their body to tell them how much to eat had almost 40% lower odds of reporting extreme weight control behaviors than those who reported that they do not trust their body (OR = 0.62, 95% CI = [0.45, 0.85]). Men who reported trusting their bodies to tell them how much to eat had almost 75% lower odds of reporting chronic dieting than those who reported that they do not trust their body (OR = 0.29, 95% CI = [0.13, 0.53]).

Women who reported that they stop eating when they are full had lower odds of reporting chronic dieting and binge eating than those who reported that they do not stop eating when full, but they did not significantly differ in regard to report of unhealthy or extreme weight control behaviors (Table 2). For example, women who reported that they stop eating when they are full had one-third the odds of reporting binge eating compared to those who reported that they do not stop eating when they are full (OR = 0.34, 95% CI = [0.23, 0.48]).

Men who reported that they stop eating when they are full had less than half the odds of reporting binge eating behaviors compared to those who reported that they do not stop eating when they are full (OR = 0.44, 95% CI = [0.24, 0.81]; Table 2). However, stopping when full was not associated with the other disordered eating behaviors examined here.

Discussion

The objectives of the current study were to describe two aspects of intuitive eating according to socio-demographic characteristics and BMI, and to examine associations between these aspects of intuitive eating and disordered eating behaviors, including chronic dieting, binge eating, and unhealthy and extreme weight control behaviors, in a population-based sample of young adults. Overall, young adults reported a high prevalence of both trusting their body to tell them how much to eat and of stopping when full. More

Table 1
Intuitive eating by demographic characteristic & weight.

	Males (N = 1050)			Females (N = 1257)		
	N	Trust body (%)	Stop full (%)	N	Trust body (%)	Stop full (%)
Overall	1030	74.8 ^a	79.1	1250	64.8 ^a	76.4
<i>Race</i>						
White	519	74.2	75.8 ^a	573	65.1	76.2
Black/African American	153	82.1	90.8 ^b	266	68.4	78.6
Hispanic/Latino	67	75.1	86.7 ^{bc}	66	61.8	78.2
Asian American	203	72.1	77.0 ^{ac}	236	63.6	78.9
Native American/Indian	34	63.9	61.3 ^d	39	54.6	67.1
Mixed/other	43	70.8	84.1 ^{abc}	52	65.1	63.3
		$p = .18$	$p < .01$		$p = .60$	$p = .13$
<i>Socioeconomic status</i>						
Low	164	65.4 ^a	78.0	232	61.8	76.0
Lower-middle	189	78.3 ^b	82.7	226	62.6	78.7
Middle	247	74.2 ^b	76.7	328	67.0	77.0
High-middle	247	76.5 ^b	82.2	264	65.2	72.1
High	135	78.5 ^b	77.0	162	66.2	75.5
		$p = .04$	$p = .39$		$p = .69$	$p = .51$
<i>Body mass index</i>						
Normal	442	85.9 ^a	82.3 ^a	630	75.1 ^a	82.2 ^a
Overweight	357	70.8 ^b	80.6 ^a	297	60.3 ^b	73.5 ^b
Obese	210	58.6 ^c	68.8 ^b	305	47.5 ^c	67.2 ^b
		$p < .01$	$p < .01$		$p < .01$	$p < .01$

Note: Aspects of intuitive eating were assessed using two variables, trust body ("I trust my body to tell me how much to eat.") and stop full ("I stop eating when I am full."). Proportions given represent the percentage that agreed or strongly agreed. Chi-square tests of significance identified differences in each aspect of intuitive eating by socio-demographic variable. p values indicate differences in the proportion reporting each aspect of intuitive eating within each subgroup (race, SES, & BMI) for each gender.

^a More men than women reported trusting their body to tell them how much to eat ($p < .01$).

^{a,b,c,d} Within variables, categories that do not share a superscript differ significantly ($p < .05$).

Table 2
Odds of reporting each disordered eating behavior by intuitive eating practice.

	Chronic dieting OR (95% CI)	Unhealthy weight control OR (95% CI)	Extreme weight control OR (95% CI)	Binge eating OR (95% CI)
<i>Males</i>				
Trust body	0.26 (0.13, 0.53) [*]	0.68 (0.48, 0.95) [*]	0.19 (0.11, 0.33) [*]	0.41 (0.23, 0.71) [*]
Stop full	1.08 (0.49, 2.39)	0.81 (0.56, 1.17)	1.11 (0.61, 2.01)	0.44 (0.24, 0.81) [*]
<i>Females</i>				
Trust body	0.58 (0.38, 0.87) [*]	0.55 (0.41, 0.72) [*]	0.62 (0.45, 0.85) [*]	0.45 (0.31, 0.65) [*]
Stop full	0.62 (0.41, 0.95) [*]	0.75 (0.55, 1.02)	0.81 (0.58, 1.14)	0.34 (0.23, 0.48) [*]

Note. Aspects of intuitive eating were assessed using two variables, trust body ("I trust my body to tell me how much to eat.") and stop full ("I stop eating when I am full."). Odds are for those who agreed or strongly agreed that they do each intuitive eating practice, compared to those that disagreed or strongly disagreed; analyses are adjusted for both intuitive eating variables, ethnicity/race, age, SES, and weight status.

^{*} $p < .05$.

males reported trusting their bodies to tell them how much to eat than did females. Both aspects of intuitive eating were inversely associated with BMI in both genders. Males and females who reported that they trust their body to tell them how much to eat had lower odds of utilizing all disordered eating behaviors compared to those that did not. In contrast, fewer associations were found between stopping eating when full and disordered eating behaviors.

To our knowledge, the current study is the first to examine aspects of intuitive eating across socio-demographic characteristics in a general sample of young adults. Few differences in intuitive eating patterns were found across socio-demographic characteristics with the exception of gender. Interestingly, approximately 60–80% of participants within the current study report trusting their body to tell them how much to eat and/or stopping eating when full. The prevalence of these aspects of intuitive eating among this sample is quite high, especially considering that 50–80% of overweight and obese participants report at least one of the measured aspects of intuitive eating. One explanation for this is that our measure of intuitive eating is limited to only two items from the 21-item Intuitive Eating Scale, which when measured individually, rather than additively, finds a much higher prevalence of these particular aspects than we might have found if we had measured intuitive eating as a complete construct. When considering the high percentages of overweight and obese participants who report these aspects of intuitive eating, we must recognize that the dominant food environment and lifestyles within our society are not always conducive to or allowing of food choices and eating behaviors that honor the body's physiologic cues and needs. Young adults must operate in a world where certain foods are not always easily available and where schedules do not always allow for eating when hunger arises. Individuals may feel as though they trust their body to tell them when to eat or that they normally stop eating when they are full. However, if they are not able to honor their body's cues due to environmental structures, they might eat what and when they can, whether they are hungry or not, leading to weight gain over time.

Findings from the current study suggest that these aspects of intuitive eating are associated with lower BMI. In both young adult males and females, the report of each aspect of intuitive eating was less common in higher BMI categories. These findings, from a large population-based sample of young men and women, reinforce similar conclusions from previous studies conducted in samples of young women from general education classes at a western U.S. university (Hawks et al., 2005; Smith & Hawks, 2006; Tylka, 2006), as well as more diverse samples of females of varying ages within U.S. and New Zealand (Augustus-Horvath & Tylka, 2011; Madden et al., 2012). Additionally, the findings from the current study suggest that the inverse association between BMI and intuitive eating is present also in larger, diverse samples of both young women and men. The cross-sectional nature of the current study

does not allow for an interpretation of whether these aspects of intuitive eating lead to a normal BMI, or rather that individuals of normal BMI are more likely to trust their body signals regarding feelings of hunger and satiety. In all likelihood, the relationship is of a bi-directional nature.

The current study found that those who reported that they trust their body to tell them how much to eat had lower odds of dieting and all disordered eating behaviors, yet those that reported that they stop eating when they are full only had lower odds of reporting binge eating (both genders) and chronic dieting (females only). Findings from the current study regarding the association between trusting one's body to tell one how much to eat and disordered eating behaviors are in line with findings of previous studies of young women attending college or weight loss programs (Bacon et al., 2005; Polivy & Herman, 1992; Smith & Hawks, 2006; Tylka, 2006; Tylka & Wilcox, 2006). Although further research is needed, findings from the current study, in conjunction with previous studies, suggest the importance of helping young people develop a trust in their body's ability to tell them how much to eat and to stop eating when they are full. Thus, these findings highlight the importance of a clinician's assessment of the ability of young adults to eat intuitively, as well as their non-physical (emotional and environmental) motivators for eating. Information gained from such an assessment can then be used to help young people to recognize and trust their body's physical hunger and satiety cues and move towards eating more intuitively, which has been associated with improved emotional outcomes. Clinicians need to acknowledge the difficulty in utilizing these principles of intuitive eating within a society that is abundant in easily accessible, calorically dense foods. Therefore, it may be most effective to provide individual guidance to help young people to find the balance between trusting their bodies (e.g., practices of mindfulness) and in ensuring that the food choices that are most readily available include healthy options (e.g., improvements in the food quality within one's environment). Anti-obesity policy and programming efforts that currently focus on dietary restriction might find more holistic success in moving their focus towards improving the food environment and encouraging the understanding and trust of one's own physical hunger and satiety cues, thereby promoting eating behaviors that have positive physical and emotional health effects.

Study strengths and limitations should be taken into account in interpreting findings. The population-based nature of the study sample is an important strength. Its large size, inclusion of both genders, and diversity of race/ethnicity and SES allow for greater generalizability than has been possible from other studies examining intuitive eating. However, the cross-sectional nature of the data is a study limitation, as it does not allow for assessment of temporality. Additionally, the chronic dieting and unhealthy and extreme weight control behavior measures did not include an exhaustive list of behaviors that might be considered as disordered eating, which is a limitation of the study. However, these scales have been

repeatedly used and tested within the Project EAT sample and considered appropriate for this population. Similarly, the original validated Intuitive Eating Scale (Tylka, 2006) was adapted to meet the needs of the current study (i.e. limited space, formatting requirements, and the need to minimize respondent burden on a comprehensive survey). Only two items were used; these were drawn from the Intuitive Eating Scale's "eating for physical rather than emotional reasons" and "reliance on internal hunger and satiety cues," given that these two components have been found to make unique contributions to various measures of well-being, including low levels of eating disorder symptomatology (Tylka & Wilcox, 2006). While each of these items have adequate item-total correlations with their respective subscales (trust body, $r = .58$; stop full, $r = .54$; Tylka, 2006), they provide only a limited representation of intuitive eating. Additionally, slight changes to wording (i.e. omitting "not overstuffed" from the item on feeling full) and response options (i.e. omitting a neutral category) may limit comparability with other research using these intuitive eating items and contribute to the findings reported here.

Given the significant inverse associations of intuitive eating with weight status (Augustus-Horvath & Tylka, 2011; Bacon & Aphramor, 2011; Bacon et al., 2005; Hawks et al., 2005; Madden et al., 2012; Smith & Hawks, 2006; Tylka, 2006; Tylka & Wilcox, 2006) and disordered eating behaviors (Bacon & Aphramor, 2011; Bacon et al., 2005; Polivy & Herman, 1992; Smith & Hawks, 2006; Tylka, 2006; Tylka & Wilcox, 2006) found in the current study and in previous studies of more limited samples, further research in this area is warranted. Research on intuitive eating is needed in other large, diverse samples to assess generalizability of current conclusions and should examine longitudinal associations to explore the temporality of the association. Additionally, investigations regarding the impact of factors, such as fatigue and stress, on a person's ability to listen to their physical cues and of the intention to lose weight on the physical and emotional effects of intuitive eating would provide useful information relevant to the design of programs addressing weight management, disordered eating, or more general nutrition-related goals. The development of intervention studies, which examine the impact of training in intuitive eating on both intuitive eating scores and physical and emotional health outcomes of participants, are also needed. If future research confirms the positive impact of intuitive eating on weight, weight-related behaviors, and emotional health, this information could be used to inform the development of interventions aimed at promoting healthy weight and weight-related behaviors among young people.

While future research on intuitive eating is certainly needed, findings from the current study in conjunction with previous studies provide preliminary data suggesting that intuitive eating may have some benefits in terms of both weight and disordered eating behaviors. At the very least, the absence of intuitive eating may serve as a marker for the presence of disordered eating behaviors. Thus, health care providers may want to consider asking young adults if they feel they can trust their body to tell them how much to eat. The current study highlights the potential value of shifting our focus on weight-related concerns from dieting and weight loss to health behavior change and intuitive eating. Limited, but important, evidence suggests that intuitive eating strategies and skills can be re-learned and sustained (Bacon et al., 2005; Cole & Horacek, 2010). Intuitive eating may prove a healthier and more innate alternative to current strategies of dieting and weight loss.

References

- Augustus-Horvath, C. L., & Tylka, T. L. (2011). The acceptance model of intuitive eating. A comparison of women in emerging adulthood, early adulthood, and middle adulthood. *Journal of Counseling Psychology*, 58, 110–125.
- Avalos, L. C., & Tylka, T. L. (2006). Exploring a model of intuitive eating with college women. *Journal of Counseling Psychology*, 53, 486–497.
- Bacon, L., & Aphramor, L. (2011). Weight science. Evaluating the evidence for a paradigm shift. *Nutrition Journal*, 10, 9. <http://dx.doi.org/10.1186/1475-2891-10-9>.
- Bacon, L., Stern, J. S., Van Loan, M. D., & Keim, N. L. (2005). Size acceptance and intuitive eating improve health for obese, female chronic dieters. *Journal of the American Dietetic Association*, 105, 929–936.
- Birch, L. L., & Fisher, J. O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics*, 101(S2), 539–550.
- Birch, L. L., & Fisher, J. O. (2000). Mothers' child-feeding practices influence daughters' eating and weight. *American Journal of Clinical Nutrition*, 71, 1054–1061.
- Birch, L. L., Fisher, J. O., & Davison, K. K. (2003). Learning to overeat. Maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. *American Journal of Clinical Nutrition*, 78, 215–220.
- Birch, L. L., Johnson, S. L., Andresen, G., Petersen, J. C., & Schulte, M. C. (1991). The variability of young children's energy intake. *New England Journal of Medicine*, 324, 232–235.
- Cachelin, F. M., & Regan, P. C. (2006). Prevalence and correlates of chronic dieting in a multi-ethnic U.S. community sample. *Eating and Weight Disorders*, 11, 91–99.
- Carper, J. L., Fisher, J. O., & Birch, L. L. (2000). Young girls' emerging dietary restraint and disinhibition are related to parental control in child feeding. *Appetite*, 35, 121–129.
- Centers for Disease Control. (2010). *Defining Overweight and Obesity*. Retrieved from <<http://www.cdc.gov/obesity/defining.html>>.
- Centers for Disease Control. (2012). *Youth Risk Behavior Surveillance – United States, 2011. Morbidity and Mortality Weekly Report*, 61 (SS-4), 1–162. Retrieved from <<http://www.cdc.gov/mmwr/pdf/ss/ss6104.pdf>>.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Cole, R. E., & Horacek, T. (2010). Effectiveness of the My Body Knows When intuitive-eating pilot program. *American Journal of Health Behavior*, 34, 286–297.
- Eisenberg, M. E., Berge, J., Fulkerson, J. A., & Neumark-Sztainer, D. (2011). Weight comments by family and significant others in young adulthood. *Body Image*, 8, 12–19.
- Faith, M. S., Scanlon, K. S., Birch, L. L., Francis, L. A., & Sherry, B. (2004). Parent-child feeding strategies and their relationships to child eating and weight status. *Obesity*, 12, 1711–1722.
- Field, A. E., Aneja, P., Austin, S. B., Shrier, L. A., de Moor, C., & Gordon-Larsen, P. (2007). Race and gender differences in the association of dieting and gains in BMI among young adults. *Obesity*, 15, 456–464.
- Field, A. E., Haines, J., Rosner, B., & Willett, W. (2010). Weight-control behaviors and subsequent weight change among adolescents and young adult females. *American Journal of Clinical Nutrition*, 69, 1264–1272.
- Fisher, J. O., & Birch, L. L. (1999). Restricting access to palatable foods affects children's behavioral response, food selection, and intake. *American Journal of Clinical Nutrition*, 76, 226–231.
- Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among US adults, 1999–2008. *Journal of the American Medical Association*, 303, 235–241.
- Fomon, S. J. (1993). *Nutrition of normal infants*. St. Louis, MO: Mosby-Yearbook.
- Galloway, A. T., Fiorito, L. M., Fracis, L. A., & Birch, L. L. (2006). "Finish your soup". Counterproductive effects of pressuring children to eat on intake and effect. *Appetite*, 46, 318–323.
- Gillen, M. M., Markey, C. N., & Markey, P. M. (2012). An examination of dieting behaviors among adults. Links with depression. *Eating Behaviors*, 13, 88–93.
- Hawks, S. R., Madanat, H. N., & Christley, H. S. (2008). Psychosocial associations of dietary restraint. Implications for healthy weight promotion. *Ecology of Food and Nutrition*, 47, 450–483.
- Hawks, S., Madanat, H., Hawks, J., & Harris, A. (2005). The relationship between intuitive eating and health indicators among college women. *American Journal of Health Education*, 36, 331–336.
- Hawks, S. R., Madanat, H. N., Merrill, R. M., Goudy, M. B., & Miyagawa, T. (2003). A cross-cultural analysis of 'motivation for eating' as a potential factor in the emergence of global obesity in Japan and the United States. *Health Promotion International*.
- Keel, P. K., Baxter, M. G., Heatherton, T. F., & Joiner, T. E. Jr., (2007). A 20-year longitudinal study of body weight, dieting, and eating disorder symptoms. *Journal of Abnormal Psychology*, 116, 422–432.
- Kroon Van Diest, A. M., & Tylka, T. L. (2010). The Caregiver eating messages scale. Development and psychometric investigation. *Body Image*, 7, 317–326.
- Larson, N., Neumark-Sztainer, D., Story, M., van den Berg, P., & Hannan, P. J. (2011). Survey development for assessing correlates of young adults' weight behavior. *American Journal of Health Behavior*, 35, 712–725.
- Little, R. J. A. (1986). Survey non-response adjustments for estimates of means. *International Statistical Review*, 54, 137–139.
- Madden, C.E.L., 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*, 2012 March 23:1–8. (Epub ahead of print).
- Mann, T., Tomiyama, J. A., Wretling, E., Lew, A., Samuals, B., & Chatman, J. (2007). Medicare's search for effective obesity treatments. Diets are not the answer. *American Psychologist*, 62, 220–233.
- McCracken, M., Jiles, R., & Blanck, H. M. (2007). Health behaviors of the young adult U.S. population. Behavioral Risk Factor Surveillance System, 2003. *Preventing Chronic Disease*, 4, A25.

- Neumark-Sztainer, D., Croll, J., Story, M., Hannan, P. J., French, S., & 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*, 963–974.
- Neumark-Sztainer, D., Wall, M., Guo, J., Story, M., Haines, J., & Eisenberg, M. (2006). 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*, 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*, 1004–1011.
- Neumark-Sztainer, D., Wall, M. M., Story, M., & Perry, C. L. (2003). Correlates of weight-control behaviors among adolescents. Implications for prevention programs. *Health Psychology*, *22*, 88–98.
- Neumark-Sztainer, D., Wall, M., Story, M., & Standish, A. R. (2012). Dieting and unhealthy weight control behaviors during adolescence. Do they predict changes in weight 10 years later? *Journal of Adolescent Health*, *50*, 80–86.
- Patrick, H., & Nicklas, T. A. (2005). A review of family and social determinants of children's eating patterns and diet quality. *Journal of the American College of Nutrition*, *24*, 83–92.
- Polivy, J., & Herman, P. C. (1992). Undieting. A program to help people stop dieting. *International Journal of Eating Disorders*, *11*, 261–268.
- Rubinstein, G. (2006). The big five and self-esteem among overweight dieting and non-dieting women. *Eating Behaviors*, *7*, 355–361.
- Scaglioni, S., Salvioni, M., & Galimberti, C. (2008). Influence of parental attitudes in the development of children eating behaviour. *British Journal of Nutrition*, *99*(S1), S22–S25.
- Shavers, V. (2007). Measurement of socioeconomic status in health disparities research. *Journal of National Medical Association*, *99*, 1013–1023.
- Smith, T., & Hawks, S. R. (2006). Intuitive eating, diet composition, and the meaning of food in healthy weight promotion. *American Journal of Health Education*, *37*, 130–136.
- Swami, V., Frederick, D. A., Aavik, T., Alcalay, L., Ailik, J., Anderson, D., et al. (2010). The attractive female body weight and female body dissatisfaction in 26 countries across 10 world regions. Results of the International Body Project 1. *Personality and Social Psychology Bulletin*, *36*, 309–325.
- Swami, V., & Tovee, M. J. (2005). Female physical attractiveness in Britain and Malaysia. A cross-cultural study. *Body Image*, *2*, 115–128.
- Theim, K. R. (2007). Effects of dieting history saliency on self-esteem and perceived body image on college women. *Appetite*, *49*, 272–341.
- Tribole, E., & Resch, E. (1995). *Intuitive eating. A recovery book for the chronic dieter*. New York: St. Martin's Press.
- Tylka, T. L. (2006). Development and psychometric evaluation of a measure of intuitive eating. *Journal of Counseling Psychology*, *53*, 226–240.
- 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*, 474–485.
- Wharton, C. M., Adams, T., & Hampl, J. S. (2008). Weight loss practices and body weight perceptions among US college students. *Journal of American College Health*, *56*, 579–584.
- Williams, L., Germov, J., & Young, A. (2007). Preventing weight gain. A population cohort study of the nature and effectiveness of mid-age women's weight control practices. *International Journal of Obesity*, *31*, 978–986.
- Wyatt, S. B., Winters, K. P., & Dubbert, P. (2006). Overweight and obesity. Prevalence, consequences and causes of a growing public health problem. *American Journal of the Medical Sciences*, *331*, 166–174.
- Yanovski, S. (1993). Binge eating disorder. Current knowledge and future directions. *Obesity*, *1*, 306–324.