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Determining Empirical Thresholds for “Definitely Large” Amounts of Food for Defining Binge-Eating Episodes

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Abstract

Binge episodes involve “definitely large” amounts of food, yet limited data exist regarding the upper limits of food consumption in non-binge eating episodes. Study 1 examined the concurrent validity of a self-report measure developed to measure “usual” food consumption. Results support good concurrent validity for most items across response versions. Study 2 identified the upper limits of normal food consumption (i.e., 85th percentile of participants’ largest reported usual servings). Thresholds differed across types of foods, and men reported higher thresholds than women for several foods. Type of food and gender should be considered when assessing for “definitely large” amounts of food.

Within the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (*DSM-5*), binge-eating episodes are defined as the consumption of an amount of food that is “definitely larger than what most individuals would eat,” accompanied by a sense of loss of control over eating (American Psychiatric Association, 2013). Whereas laboratory feeding studies suggest that individuals without eating disorders will consume around 850 kilocalories (kcal) in a laboratory meal (Walsh, Kissileff, Cassidy, & Dantzie, 1989), binge episodes in individuals with bulimia nervosa (BN) range from 3,000 to 4,500 kcal and binge episodes in individuals with binge eating disorder (BED) range from 1,515 to 2,963 kcal (Wolfe, Baker, Smith, & Kelly-Weeder, 2009). Likewise, diary studies indicate individuals without eating disorders consume an average of 470 kcal per meal (Davis, Freeman, & Garner, 1988) whereas self-identified binge-eating episodes range from an average of 1,173 to 2,799 kcal in BN and from 30 to 4,931 kcal in BED (Wolfe et al., 2009). Taken together, the majority of the evidence supports the definition of binge-eating episodes as consisting of an unusually large amount of food. However, in assessment, it can be difficult to discern the

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threshold where an amount of food is or is not definitely larger than what most people eat due to limited data on how much food people eat outside of binge-eating episodes. Most research uses guidelines set forth by the Eating Disorder Examination (Berg, Peterson, Frazier, & Crow, 2012; Cooper & Fairburn, 1987), which allow for variation in the interpretation of “definitely large.” Other research, particularly studies with a biological focus, uses a threshold of 1,000 kcal (Kaye et al., 2004; Keel, Wolfe, Liddle, De Young, & Jimerson, 2007). Food portions have increased over recent decades (Nielsen & Popkin, 2003), such that a third of fast food meals purchased exceed 1,000 kcal (Dumanovsky, Nonas, Huang, Silver, & Bassett, 2009). With changing food portions, it becomes important for both researchers and clinicians to understand the normal range of food consumption to ensure valid operational definitions of binge eating. Binge episodes are required for diagnoses of BN and BED, and thus the definition of binge eating impacts the reliability and validity of these diagnoses.

Despite its critical role in the accurate assessment of binge episodes, few studies have examined empirical thresholds for a “definitely large” amount of food. One approach to determining an empirical threshold for binge-eating episodes is to examine at what point or threshold a serving of food is “too large” or “unusually large” in general populations. Greeno and colleagues (1999) surveyed women with BED and age and weight-matched controls to examine perceptions of the threshold at which food becomes a “binge.” The threshold for a self-described binge-eating episode ranged from 500 to 800 kcal and varied by food type. However, this sample was primarily obese and results may not generalize to *most* people. In contrast to Greeno and colleagues’ (1999) sample of primarily obese participants, Arikian and colleagues (2012) specifically examined the “definitely large” criterion by assessing the largest amount of food that was not considered “unusually large” in a sample of college students, community members, and eating disordered individuals using the Eating Patterns Questionnaire (Keel, Chartier, Peterson, & Crow, 2000). Findings varied by food type. For example, the threshold for candy bars was approximately one and a half candy bars, while the threshold for cake was approximately two servings of cake. While this study produced empirical thresholds for a “definitely large” amount of food, it used the *averages* of largest servings individuals would consume. Importantly, an amount of food can be “above average” but still remain within the normal range. As such, thresholds from prior studies do not necessarily provide information on what is “definitely large” for *most* people. In addition, in the absence of a common metric across food amounts (e.g., kcal), Arikian et al.’s (2012) results are specific to findings for the specific foods examined, and not all binge episodes involve the foods examined.

The current study sought to determine thresholds for binge-eating episodes by demarcating the threshold of normal food consumption. Thus, eating episodes above this threshold would be “definitely larger” than most people would eat. Importantly, clinicians rely on self-report data from their patients to assess binge eating by using open-ended questions. The current study used self-report assessments to match methods used in clinical settings so that findings may best generalize to clinical settings. Though clinicians generally use open-ended questions regarding food intake, establishing norms requires large samples, and collecting data from a large sample quickly and easily is facilitated by the use of close-ended response

formats. Study 1 sought to examine the concurrent validity of the Eating Patterns Questionnaire (Keel et al., 2000; used in Arikian et al., 2012) by comparing open response to closed response formats for this assessment. If an open response format produces the same responses as a closed response format, the Eating Patterns Questionnaire represents a sound method for collecting data about food consumption in large samples. Study 2 assessed the largest amount of food most people would eat before considering it “unusually large” in a large college sample. Data were analyzed by serving (e.g., cups, number of sandwiches) and also using the common metric of kcal to evaluate whether 1,000 kcal would emerge as an empirical threshold. Given previous evidence that gender may influence thresholds for food consumption (Arikian et al., 2012), analyses examined women and men separately.

STUDY 1

In order to increase generalizability to clinical settings where open-ended questions are used, Study 1 tested the concurrent validity of two response formats of the Eating Patterns Questionnaire (Keel et al., 2000; used in Arikian et al., 2012).

METHODS

Participants—Fifty-six women and 31 men recruited from courses at a Northeastern university participated in a paper and pencil survey. Participants were, on average, 19.74 (1.13) years old, ranged 18–23 years, and identified as Caucasian (65.5%), African American (6.9%), Asian (16.1%), Hispanic (3.4%), Native American (1.1%), and Biracial/other (7.0%). The mean (*SD*) body mass index (BMI) for men (24.28 (3.53) kg/m², range = 18.64–32.09 kg/m²) was significantly higher than that of women’s (21.82 (2.96) kg/m², range = 17.11–33.65 kg/m²; $t(84) = 3.44, p < .001$). Though previous work suggests that BMI impacts food consumption (Arikian et al., 2012), we chose to include individuals across the weight spectrum as the sample was drawn from a normal population and thus represents normal variation. Those who completed the open response ($n = 14$ men, 29 women) did not significantly differ from those who completed the closed response ($n = 17$ men, 27 women) in age, ethnicity, or BMI (all p ’s $> .10$).

Procedure—To test the concurrent validity of two response formats for the Eating Patterns Questionnaire, two 20-item versions were administered, with one version offering a fully open response format and the other offering a semi-closed response version (see Appendix for semi-closed response survey). Participants received extra credit for their participation. The Institutional Review Board approved this study, and all participants gave informed consent before participating.

Measures

Demographics: Participants completed items about demographics including age, race/ethnicity, height, and weight.

Eating Patterns Questionnaire: The Eating Patterns Questionnaire (Keel et al., 2000; used in Arikian et al., 2012) was developed to assess the upper limits of normal food consumption. Items were developed to reflect the types of foods that are often reported in

binge-eating episodes. The questionnaire asked participants to rate “the *largest* quantity of food you would eat within a 2-hour period that would not be considered an *unusually large* amount of food for you to eat.” In the open response format, participants were asked to write their response. For the closed response format, participants were given the choice to either circle a quantity among given choices or write their own response if the amount was not included among the closed choices. Closed choices were anchored from a single serving size (e.g., ½ cup mashed potatoes) to a very large serving (e.g., 4 cups mashed potatoes) to ensure that the threshold for an objectively large amount of food fell within the reporting range and to ensure that floor and ceiling effects would not influence responses. Any amounts that were written in on the closed format questionnaire were then coded based on where they fell on the scale of provided options. Due to constraints regarding the feasibility of coding open response items, 20 items thought to be most representative of typical binge foods were selected for validation purposes from the larger 46-item questionnaire.

Data Analyses—Responses to the open response format were coded by research assistants using corresponding response options from the semi-closed response format, such that if a participant wrote that they ate 6 cookies, it was coded a 5 (see Appendix for coded responses). In order to capture what *most* people would consider the largest quantity of food they would consume within a 2-hour period before considering it an unusually large amount, the threshold for “most” was operationalized as the 85th percentile. Values occurring in less than 15% of the population represent an unusual response (Raiford, Weiss, Rolffhus, & Coalson, 2005), reflected by the use of this cut-off in establishing BMI norms across development (Field et al., 2003), defining variations from norms for internalizing and externalizing behaviors (Huisman et al., 2010), and determining clinically significant deviations in IQ scores (Sattler, 2001). Analyses focused upon the foods that appear to be more frequent binge foods. Following the procedure of Arikian and colleagues (2012), women and men were analyzed separately. Missing data were deleted list-wise, leading to a reduced sample size in some analyses. The data analysis for this article was generated using SAS software, Version 9.3 of the SAS System for Windows. Ninety-five percent confidence intervals were used for significance testing (i.e., $p < .05$).

RESULTS

Table 1 presents comparisons between closed and open response items in both women and men. Items indicated good concurrent validity for all food items in women, suggesting response format did not influence reported thresholds for women. In men, confidence intervals could not be calculated for the following open response items due to small sample size: pizza, pasta, mashed potatoes, cookies, ice cream, chocolate bars, and sheet cake. However, the 85th percentile for the open response for several of these items (cookies, ice cream, chocolate bars, and sheet cake) fell within the 95% confidence interval of the closed response items, supporting overlap between the two response formats. The 85th percentile for the open response items of pizza and mashed potatoes fell outside the 95% confidence interval for the closed response items. Because concurrent validity could not be determined for thresholds for pizza and mashed potatoes by response format, these items were not used in further analyses with men. Finally, confidence intervals could not be calculated for both the open response and closed response items of pasta due to small sample size. Because

concurrent validity could not be determined, pasta was not included in further analyses with men. As indicated in Table 1, the food items for which concurrent validity of empirical thresholds could be established for women included potato chips, pizza, pasta, macaroni and cheese, hamburgers, mashed potatoes, cookies, ice cream, chocolate bars, and sheet cake and, for men included potato chips, macaroni and cheese, hamburgers, cookies, ice cream, chocolate bars, and sheet cake. Thus, for both women and men, several food items that feature prominently in binge episodes can be evaluated based on responses to the closed format survey employed in this and prior research (Arikian et al., 2012).

STUDY 2

Study 2 examined the upper limits of normal food consumption in a large college sample of women and men. Participants did not overlap between Study 1 and Study 2.

METHODS

Participants—Participants were recruited from courses at two universities and included women ($n = 171$) and men ($n = 123$) with a mean (SD) age of 19.49 (2.25) years, range 17–44 years. Participants identified themselves as Caucasian (62.3%), African American (7.5%), Asian (16.4%), Hispanic (6.8%), and Biracial/other (7.0%). Women and men did not differ in age ($t(152.50) = 1.80, p = .07$) nor in ethnicity ($X^2(5) = 4.84, p = .44$). The mean BMI for men (23.41 (2.99) kg/m^2 , range = 17.23–33.00 kg/m^2) was significantly higher than the mean BMI for women (21.73 (2.66) kg/m^2 , range = 15.02–30.66 kg/m^2 , $t(289) = 5.07, p < .001$); however, both means fell within a healthy range. In the current sample, 9.5% of women and 5.7% of men had a self-reported BMI less than 18.5 kg/m^2 . The overweight range included 8.3% of women and 13.1% of men, and 1.2% of women and 3.3% of men fell in the obese range. We chose to include individuals across the weight spectrum as the sample was drawn from a normal population, and thus represents normal variation. Participants were not assessed for current or past eating disorder diagnosis.

Procedure—Students from courses at a selective Northeastern university and a Southeastern state university were invited to complete a paper and pencil survey about eating patterns and attitudes. Students received extra credit for participation. The Institutional Review Boards of both universities approved this study, and informed consent was given prior to participation.

Measures

Demographics: Participants completed items about demographics including age, race/ethnicity, height, and weight.

Eating Patterns Questionnaire: In the Eating Patterns Questionnaire (Keel et al., 2000; used in Arikian et al., 2012) ratings were established for 46 different food items using the semi-closed format. Only items typical of self-reported binge episodes that demonstrated concurrent validity with open response items were included in analyses (see Study 1). In addition to selecting a quantity of food, participants were asked to indicate “how often you

eat the quantity of food you indicated by circling the *average number* of times you ate that amount of food over the *past 6 months*.” Responses ranged from *never* to *1 per day*.

Data Analyses—The caloric content of items was calculated according to nutritional information presented in *Bowes and Church’s Food Values of Portions Commonly Used* (Pennington, 1998). The 1998 edition was used to ensure portions and caloric content reflected foods at the time data were collected. To assess convergent validity, calorie calculations according to *Bowes and Church’s* (Pennington, 1998) were then compared to a 2012 online resource of calorie counts (CalorieKing Wellness Solutions, 2012) that averaged caloric amount across all brands. On average, calorie calculations from the 2012 online resource were within 2.74% (range: .04% to 5.30%) of the 1998 nutritional information. Online information (i.e., average of caloric content across all commercially available brands) was not available for three food items: macaroni and cheese, cookies, and sheet cake. As described in Study 1, the threshold for “most” was operationalized as the 85th percentile. To ensure that responses represented an individual’s usual intake, specified amounts of food that were consumed less than once a month were excluded. This ensured that amounts were not biased by factors related to food preferences in which food intake may be limited due to disliking certain foods. This contributed to variation in sample size across food items. Women and men were analyzed separately. Missing data were deleted list-wise. Data were analyzed using SAS software, Version 9.3 of the SAS System for Windows. Ninety-five percent confidence intervals were used for significance testing (i.e., $p < .05$).

RESULTS

Empirical Thresholds for Women—Table 2 presents analyses of the upper limit of normal food consumption in women in terms of caloric content and number of servings. The caloric content of this threshold ranged from 413 kcal to 1,074 kcal, depending on food type. Only potato and corn chips had a threshold greater than 1,000 kcal. The upper limits of pizza, pasta, and macaroni and cheese were approximately 800 to 900 kcal. In contrast, thresholds for hamburgers, mashed potatoes, cookies, ice cream, chocolate bars, and sheet cake fell between 400 and 650 kcal. In terms of number of servings, the upper limit for macaroni and cheese, hamburgers, pizza, and chocolate bars was between one and a half and two servings. The upper limit for pasta, mashed potatoes, cookies, and ice cream was approximately four servings. Finally, the threshold for potato and corn chips was approximately six servings.

Empirical Thresholds in Men—Table 2 presents analyses of the upper limit of normal food consumption in men in terms of caloric content and number of servings. The caloric content of this threshold ranged from 466 to 1,611 kcal, again, depending on food type. The thresholds of both potato and corn chips and macaroni cheese were considerably greater than 1,000 kcal, with the threshold for chips approximately 1,600 kcal, whereas the threshold for macaroni and cheese was approximately 1,200 kcal. For hamburgers, cookies, ice cream, and sheet cake, the upper limits ranged from approximately 600 to 800 kcal. Chocolate bars had the lowest threshold of 466 kcal. In relation to number of servings, the upper limit for chocolate bars was two servings while the threshold for macaroni and cheese, hamburgers,

and sheet cake was between two and a half and three servings. Ice cream and cookies had upper limits between four and five servings. Finally, potato and corn chips had a threshold of approximately nine servings.

Gender Differences in Empirical Thresholds—Compared to women, men endorsed significantly larger thresholds for three food items: potato and corn chips, hamburgers, and sheet cake (all p 's < .05). Although women tended to endorse lower thresholds for all foods than men, women and men did not differ significantly in the thresholds for macaroni and cheese, cookies, chocolate bars, or ice cream. Because pizza, pasta, and mashed potatoes were not assessed reliably in men, comparisons could not be made between women and men on consumption of these foods. Taken together, when evaluating the upper limit of typical food consumption, results suggest that a higher threshold should be employed for men compared to women.

Replication of Thresholds Across Studies—Closed response thresholds from Study 2 were compared to thresholds obtained in Study 1 for evidence of consistency. For women, closed response thresholds did not differ significantly between Study 1 and Study 2. For men, closed response thresholds did not differ significantly. For hamburgers, we were unable to calculate a 95% confidence interval for the closed response option of Study 1. However, the 95% confidence interval for the open response hamburger item in Study 1 (4.75–11.05) overlapped with the closed response confidence interval from Study 2 (4.78–6.11), supporting replication across samples and formats.

DISCUSSION

The current study sought to identify the upper limit of typical food consumption in an effort to empirically define thresholds for what is “definitely more” than what most people would eat. The observed upper limits of normal food consumption suggest there is not a “one size fits all” definition for binge-eating episodes when assessing BN and BED. The threshold for what demarcates normality from abnormality differed by food type for both portion/serving size and for caloric content. Caloric measurements ranged from approximately 460 kcal to over 1,000 kcal. Similarly, reported thresholds varied by gender, with men endorsing a larger threshold for some, but not all, foods, replicating previous findings from Arikian et al. (2012) using the same measure. Taken together, findings suggest that both food type and gender should be considered when determining whether the amount of food consumed meets criteria for a DSM-5 binge-eating episode.

The caloric limits of normal food consumption for single food items (women's range 400–1,100 kcal) were lower than the caloric content of binge eating episodes reported in food diary studies (1,173–2,799 kcal) and observed in laboratory feeding studies (3,000–4,500 kcal), which often involve the consumption of multiple food items (Wolfe et al., 2009). Thus, binge-eating episodes in BN and BED appear to clearly exceed the threshold for normality observed in this study. It may be that the distribution of unusually large binge-eating episodes is much higher than the distribution of normal eating, explaining the utility of rules of thumb such as 1,000 kcal (Kaye et al., 2004; Keel et al., 2007). This discrepancy may also be explained by the tendency of individuals to consume larger quantities of food

when presented with a variety of foods compared to a single food item. Regardless, our findings suggest that definitions of subjective binge eating episodes (e.g., <1,000 kcal) may need to be refined. For example, eating three candy bars with an experience of loss of control, even if less than the previously used thresholds for 1,000 kcal, may represent an objective binge-eating episode. In addition to trying to refine thresholds for making categorical decisions regarding whether or not an amount of food is definitely larger than what most people would eat, future research should examine this feature dimensionally across the full range of episodes characterized by a loss of control over eating to understand how both size of episode and loss of control over eating relate to severity of eating pathology.

This study benefited from a number of strengths, including validation of the semi-closed format of the Eating Patterns Questionnaire against an open-response format and the administration of the Eating Patterns Questionnaire in a large sample. Replication of previous guidelines for defining binge-eating episodes in women (Greeno et al., 1999) adds confidence to our results. It appears that the limit of what most women report eating is similar to or less than the threshold for a self-described “binge” (e.g., 2 vs. 3 candy bars, 8 vs. 8–11 cookies). Our definition of “most” (the 85th percentile) allows more confidence in using thresholds to rate binge-eating episodes compared to other approaches (e.g., “average”) (Arikian et al., 2012). Our design allowed us to replicate our findings in two samples of college students, an age group that reflects the median age of onset for eating disorders (Hudson, Hiripi, Pope Jr., & Kessler, 2007). Though previous research has included eating disorder groups (Arikian et al., 2012; Greeno et al., 1999), the current study’s focus on a normal population is a strength in understanding the limits of *normal* food consumption. We were unable to locate any previously published thresholds for men. Thus, our study contributed much needed data for evaluating typical food consumption in men—a group whose eating could be over-pathologized if evaluated against norms for women.

Our study was not comprehensive. We were only able to address the validity of some food items due to the limited time resources for coding written responses and were unable to assess interrater reliability. As no clear “serving size” or “amount” of food emerged across different food types, our results are best interpretable in terms of kcal. Because the DSM-5 definition of binge eating does not specify a large amount of kcal but rather a large amount of food (American Psychiatric Association, 2013), our caloric results do not map neatly onto this definition. However, creating an empirical threshold is necessary to increase reliability. Replication of our results is needed, particularly as food portions continue to change over time. In addition, our focus on college students and use of a convenience sample may limit generalizability of findings to other populations. Specifically, college students may not be representative of the general population and our particular sample had a limited BMI range. As previous research suggests that food portions may be greater in overweight or obese populations (Arikian et al., 2012), our thresholds may underestimate food portions in the general population. Future research should ensure samples are representative of the general population’s weight distribution. We did not assess eating disorder status or eating pathology, and future research should examine the influence of eating pathology on food portions using a dimensional approach. Due to the complexity of creating items to assess

thresholds for a combination of foods, we were limited to assessment of thresholds for single food items, which provides limited guidance for binge-eating episodes that include multiple types of food. Of note, if one type of food reaches the threshold for a binge-eating episode, then the total amount of food across different items will be definitely larger than what most people would eat. Thus, findings may still hold relevance for some of these episodes.

In consideration of these findings, a threshold of 1,000 kcal may provide good specificity in identifying eating episodes that are definitely larger than what most women would eat. However, this rule of thumb may lack sensitivity, as individuals may consume less than 1,000 kcal (i.e., 3 candy bars is approximately 700 kcal) and still consume an amount of food that is definitely more than what most people would eat. Future research may wish to examine the utility of using number of portions as a heuristic, rather than kilocalories, in determining the limit of normal food consumption. It may be that individuals judge how much food they should or want to eat by number of portions, rather than the caloric content. This approach would also be useful in situations when individuals binge on foods with low caloric density (e.g., several heads of broccoli would exceed what most individuals would eat but would not exceed 1,000 kcal) and be more consistent with the DSM-5 definition of binge eating (“large amounts” of food) (American Psychiatric Association, 2013). Considering gender, food type, and number of portions as additional features when determining whether an amount of food is definitely larger than what most people would eat may contribute to more valid assessment of binge-eating episodes.

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APPENDIX: EATING PATTERNS QUESTIONNAIRE

Please respond to the following items by indicating the *largest* quantity of the given food you would eat within a 2 hour period that would *not* be an *unusually large* amount of food for you to eat. If the amount of food for you is not provided as a choice, write in your response above “other.”

1.	Chips (potato or corn—Family size bag [12 oz.] with or without dip)								
	1.5 chips	1/4 of bag	1/2 of bag	3/4 of bag	1 bag				
	2	4	6	8	10				other
2.	Pizza (large [12 slices])								
	2 slices	3 slices	6 slices	8 slices	1 pizza				
	2	4	6	8	10				other
3.	Pasta (one 12 oz. box, cooked, with or without sauce)								
	2 oz.	1/2 plate	1 plate	1.5 Plates	3 Plates				
	2	4	6	8	10				other
4.	Macaroni and cheese								
	1/4 box	1/2 box	3/4 box	1 box	2 boxes				
	2	4	6	8	10				other
5.	Mashed potatoes (one pot [quart size—4 cups] with or without gravy)								
	1/2 cup	1 cup	2 cups	3 cups	4 cups				
	2	4	6	8	10				other
6.	Hamburgers (fast food single patty with or without cheese)								
	1	2	3	4	5				
	2	4	6	8	10				other
7.	Eggs (scrambled, fried, hard boiled, in omelet)								
	2 eggs	3 eggs	4 eggs	5 eggs	6 eggs				
	2	4	6	8	10				other
8.	Pancakes/waffles (4 inch diameter) OR French toast/toast/bread (one slice) OR bagel (1/2)								
	2	4	6	8	12				
	2	4	6	8	10				other
9.	Cereal (Cheerios®, Corn Flakes®, one 9 oz. box has 8 cups)								
	1/2 cup	1 cup	2 cups	4 cups	1 box				
	2	4	6	8	10				other
10.	Fresh fruit (apple, orange, or banana)								
	1 piece	2 pieces	3 pieces	4 pieces	5 pieces				
	2	4	6	8	10				other
11.	Vegetables (green salad with or without dressing)								

1/4 plate	1/2 plate	3/4 plate	1 plate	2 plates	_____
2	4	6	8	10	other
12. Vegetables (carrot sticks, asparagus spears, celery stalks, zucchini spears [6 spears per zucchini])					
4	6	8	10	12	_____
2	4	6	8	10	other
13. American meal with dessert (4 courses—Entrée, vegetable, starch, and dessert)					
1 meal	1.25 meals	1.5 meals	1.75 meals	2 meals	_____
2	4	6	8	10	other
14. Chinese take-out (1 quart box chow mein with 4 egg rolls and 4 fortune cookies = 1 meal)					
1/4 meal	1/2 meal	1 meal	1.5 meal	2 meals	_____
2	4	6	8	10	other
15. Dessert—Cookies (store bought e.g., Oreo®, Chips A' Hoy®)					
2	4	8	12	24	_____
2	4	6	8	10	other
16. Dessert—Cake (sheet cake—9" × 13", 12 pieces)					
1 piece	2 pieces	3 pieces	4 pieces	5 pieces	_____
2	4	6	8	10	other
17. Dessert—Ice cream (one small scoop = 1/2 cup, one large scoop = 1 cup)					
1/2 cup	1 cup	1.5 cup	2 cups	2.5 cups	_____
2	4	6	8	10	other
18. Dessert—Chocolate (8 oz. chocolate bar, e.g., Hershey's Chocolate Bar®)					
1	2	3	4	5	_____
2	4	6	8	10	other
19. Dessert—Pastries (e.g., danishes, donuts, muffins, croissants, cinnamon buns)					
1	2	3	4	5	_____
2	4	6	8	10	other
20. Popcorn					
1 cup	2 cups	3 cups	6 cups	8 cups	_____
2	4	6	8	10	other

TABLE 1
 Comparison of Open Response and Closed Response Surveys in Women and Men

Food	Women			Men		
	Open response (n = 27–29) score (serving)	Closed response (n = 26–27) score (serving)	95% CI	Open response (n = 13–14) score (serving)	Closed response (n = 16–17) score (serving)	95% CI
Chips	5.83 (6 oz.)	5.32 (4.5 oz.)	4.50–7.17	9.30 (10.5 oz.)	4.38 (3 oz.)	6.32–12.28
Pizza	4.61 (5 slices)	4.48 (4.5 slices)	3.60–5.62	7.80 (8 slices)	5.74 (6 slices)	4.76–6.72
Pasta	8.28 (12 oz.)	7.32 (10 oz.)	6.86–9.69	9.30 (14 oz.)	8.30 (12 oz.)	
Macaroni and cheese	7.16 (.88 box)	5.65 (.75 box)	5.38–8.95	7.95 (1 box)	6.98 (.88 box)	5.16–10.74
Hamburgers	3.77 (2 burgers)	3.81 (2 burgers)	2.83–4.70	7.90 (4 burgers)	6.30 (3 burgers)	4.75–11.05
Mashed potatoes	5.28 (1.5 cups)	5.58 (2 cups)	4.67–5.88	8.90 (3.5 cups)	5.60 (2 cups)	4.20–7.00
Cookies	7.48 (10 cookies)	6.78 (10 cookies)	5.82–9.13	9.05 (18 cookies)	7.48 (10 cookies)	5.89–9.08
Ice cream	7.67 (2 cups)	7.99 (2 cups)	5.82–9.13	10.03 (3 cups)	8.73 (2.5 cups)	7.01–10.44
Chocolate bar	3.56 (2 bars)	3.13 (1.5 bars)	2.60–4.53	3.86 (2 bars)	3.84 (2 bars)	2.82–4.86
Sheet cake	3.85 (3 pieces)	4.80 (3.5 pieces)	3.10–4.60	7.05 (4.5 pieces)	5.45 (3.5 pieces)	3.06–7.83

Note: All values represent the 85th percentile. CI = Confidence Interval.

TABLE 2
Largest Food Servings for Young Adult Women and Men That Are Not Unusual

Food	Women				Men			
	n	Score (serving)	95% CI	Calories	n	Score (serving)	95% CI	Calories
Chips	84	5.63 (6 oz.)	4.83–6.42	1074	66	8.22 (9 oz.)	6.61–9.83	1611
Pizza	129	3.74 (3 slices)	3.42–4.05	795				
Pasta	150	6.29 (8 oz.)	5.69–6.89	892				
Macaroni and cheese	49	5.22 (5/8 box)	4.10–6.33	858	55	7.11 (7/8 box)	6.17–8.04	1201
Hamburgers	58	3.37 (1.5 burgers)	2.89–3.85	413	78	5.45 (2.5 burgers)	4.78–6.11	688
Mashed potatoes	96	5.52 (2 cups)	4.69–6.36	508				
Cookies	128	5.89 (8 cookies)	5.04–6.75	652	94	7.43 (10 cookies)	6.62–8.24	815
Ice cream	132	7.47 (2 cups)	6.43–8.50	572	98	8.27 (2 cups)	7.51–9.04	572
Chocolate bar	86	3.61 (2 bars)	3.09–4.13	466	68	4.32 (2 bars)	2.78–5.86	466
Sheet cake	90	1.93 (2 pieces)	1.68–2.18	492	58	3.06 (2.5 pieces)	2.32–3.80	738

Note: All values represent the 85th percentile. CI = Confidence Interval; sample size varies as function of those who eat the food at least monthly.