



Descriptive analysis of binge eating in adult and adolescent females

Cara Bohon¹ · Brittany Matheson¹ · Hannah Welch¹

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Abstract

Purpose Provide qualitative descriptions of context and characteristics of binge eating in adults and adolescents to explore consistency in precipitating factors.

Method Open-ended, qualitative interviews were administered to an adult sample ($n = 24$) and an adolescent sample ($n = 20$) to collect details about the context in which two binge episodes occurred.

Results Factors and context of the binge episodes were similar between adults and adolescents. In contrast, the two binge episodes described by each individual were not consistent. Binge episodes were not strongly affect-driven or food cue-driven.

Conclusions Binge eating appears similar between adults and adolescents, which may have treatment implications. Similar treatment approaches may be used with both age groups and would benefit from covering a broad range of binge triggers rather than attempting to match individuals into an approach focused on particular triggers.

Level of evidence Level III, case-control analytic study.

Keywords Binge eating · Qualitative analysis · Context · Impulsive eating · Affect

Introduction

Binge eating is characterized by the consumption of an objectively large amount of food while experiencing a loss of control [1]. It is a relevant symptom for a number of eating disorders, including binge eating disorder (BED), bulimia nervosa (BN), anorexia nervosa – binge/purge type (AN-B/P), as well as other specified feeding and eating disorders. Lifetime prevalence rate is 4.9% of females for any binge eating behavior [2], and eating disorders broadly are associated with significant distress, psychosocial impairment, medical complications, and increased risk of suicide [3]. Treatments for binge eating to date only lead to recovery

in about 30–50% of individuals according to a systematic review of treatment studies [4], thus an improved understanding of the context in which binge eating occurs is vital to guide treatment improvements.

A number of studies published in the late 1980s and 1990s described antecedents, functions, calorie content, and characteristics of binge eating, with the goal to identify patterns that could drive treatment [5, 6]. Early attempts to understand binge eating behavior focused on affect regulation models [7–9], and subsequent studies examining these models employed the use of ecological momentary assessment to capture changes in negative affect and binge episodes [10, 11]. Later models included restraint theory, suggesting that dietary restriction led to hunger, which prompted binge eating [12]. One response to these two theories was to explore individual differences that led to the identification of subtypes of patients with bulimia nervosa or binge eating disorder differentiated by high levels of negative affect (while both subtypes had high dieting/restraint) [13–15]. Thus, both of these approaches appeared to be relevant, but perhaps not relevant to all individuals equally.

Importantly, studies of these models have used theory to select specific measures (assessing negative affect or restrained eating behavior, for example), which may bias results compared to open-ended reports. One benefit of

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✉ Cara Bohon
cbohon@stanford.edu

¹ Division of Child and Adolescent Psychiatry, Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, 401 Quarry Road, Stanford, CA 94305-5719, USA

collecting qualitative, descriptive reports of binge eating is capturing aspects that otherwise go unmeasured, such as location, planning, sources of food, and social influences. These qualitative reports could elucidate features that help us to (1) sort binge episodes into types that could further validate prior subtyping studies and guide treatment and (2) determine additional targets for treatment.

A few prior open-ended, descriptive studies exist. One interviewed 19 adult women who were obese and engaged in binge eating for almost 20 years [5]. Participants described feelings prior to, during, and after binge eating on a retrospective basis. Cognitive themes that arose in the interview included intentions to overeat and alter mood, which occurred prior to binge eating. Thoughts about loss of control occurred during binge eating, while after the binge, thoughts tended to be self-critical. Of the small sample, 100% reported negative emotion prior to and after binge eating, with a split between positive and negative affect during the binge. This study also found that mood change precipitated the binge episode in 63% of cases, followed by specific thoughts (26%) and hunger (11%). Factor analysis revealed two primary precipitating factors: one related to strong negative affect and another related to violating a rule to abstain from eating.

Another descriptive study interviewed 50 normal weight women who engaged in binge eating [6]. They identified two clusters of binge-promoting situations: solitary negative affect situations and social eating situations. Interestingly, although each participant reported on two binge episodes, those two episodes did not follow the same pattern of precipitating events, which does not support a subtyping or individual difference model, as that would suggest more within person consistency of the context (particularly negative affect) surrounding the binge episodes. A more recent qualitative study interviewed 24 women, 12 with binge eating disorder and 12 without, about binge eating or overeating episodes (Curtis & Davis, 2014). They found that there were addictive features of both binge eating episodes and overeating episodes. When binge eating was planned, it tended to extend over a longer period of time than initially intended. Additionally, binge eating was associated with a craving, nagging feeling.

A major limitation of these prior descriptive studies is that they are exclusively in adult samples. There is literature suggesting ways binge eating in childhood may differ from adulthood, including suggestions that restrained eating or dieting may not be associated with binge eating in younger individuals [16], yet we have no qualitative descriptions of binge eating outside of adult samples. Further, current treatments for binge eating in children or adolescents have involved adapting adult treatment to a younger population [17]. If binge eating in adolescence is qualitatively different from adulthood, adolescents may need a different treatment

approach. For example, adolescents may evidence more affect-driven binge eating due to greater emotional lability in that age group [18], thus requiring an affect-focused treatment. A recent paper describing a developmental model of binge eating indeed highlighted adolescence as a period when the intersection between heightened negative affectivity, impaired executive functioning, and elevated reward responsivity may lead to loss of control eating, which could become binge eating disorder if there is no intervention [19]. This suggests that understanding binge eating in adolescence may be critical for developing both early intervention and potential prevention programs to stop subthreshold binge eating from developing into an enduring disorder.

This study aimed to capture open-ended descriptions of the context surrounding recent binge episodes among young adult (Sample 1) and adolescent (Sample 2) females who engage in regular binge eating across diagnoses. We hypothesized that (1) binge episodes would be characterized by either an affect-driven impulsive nature in line with affect theory or a more food-cue, craving driven manner in line with restraint theory where restricted food intake enhances the reward value of food, (2) adolescents would describe more affect-related context of binge episodes than adults in line with developmental differences in emotion regulation, and (3) binge episodes would be more similar within person than between (e.g., people would show consistency in on characteristics describing their binge episodes) in line with subtyping approaches. Although a prior study did not find that binge episodes clustered together within an individual, the study first conducted a cluster analysis to define binge episodes as one of two clusters [6]. Perhaps by investigating different aspects of binge episodes separately, we will identify specific areas of consistency. In addition to these specific hypotheses, a primary aim of the study was to provide a qualitative description of binge episodes to evolve without a priori restrictions. Thus, we report on themes that came up during interviews as individuals described their binge episodes to better refine theories of binge eating to match real-world descriptions.

Methods

Participants

Sample 1

Sample 1 consisted of 24 young adult women (age 19–35 years) who reported at least 1 binge eating episode per week on average over the prior 3 months. Participants were enrolled in a larger study of brain function related to binge eating, but only data related to the qualitative report of binge eating are included here. Due to the neuroimaging

component of the primary study, participants were excluded if they were planning to become pregnant in the next 6 months, had unremovable metal on their body, a traumatic brain injury, claustrophobia, tattoos with certain ferrous inks, or if they were taking a dopaminergic psychotropic medication. Participants were recruited from the community, as well as online advertisements, websites such as Craigslist and Reddit, ClinicalTrials.gov, and through eating disorder clinics at Stanford University.

Sample 2

Sample 2 consisted of 20 adolescent girls (ages 14–18 years) who reported at least 1 episode of binge eating in the last 3 months. They were enrolled in a larger study of emotion regulation, brain function, and impulsive eating behaviors. Only data related to the qualitative report of binge eating are included here. The same exclusion criteria for Sample 1 was used for Sample 2. Participants were recruited from the community, as well as ClinicalTrials.gov. Additionally, participants were recruited from the eating disorder clinics at the Stanford University.

Measures

Binge context qualitative interview

The qualitative interview was developed by the first author, with components adapted from Grilo, Shiffman, and Carter-Campbell [6]. Additional questions were added through personal communication with experts in the field. The final interview consisted of 15 questions focused on context of a particular recent and salient binge episode (see Online Appendix). Questions were then repeated for a separate binge episode so that each participant provided two descriptions of recent binge episodes.

Clinical measure

The Eating Disorder Examination version 16 (EDE; [20]) was used to assess the eating disorder diagnosis, as well as provide scores on eating restraint, eating concern, shape concern, and weight concern. The EDE also provides a global score of symptom severity.

Procedure

Participants completed a brief telephone screen before presenting for the assessment. After obtaining informed consent or assent, the EDE was conducted by trained research staff, followed by the qualitative interview, which was audio-recorded and transcribed. Participants were prompted to elaborate on the context of the binge episodes described

during the EDE unless a different binge episode was more salient. Height and weight were recorded by research staff. The study was approved by the local institutional review board (IRB).

Data analytic plan

All participants described two recent binge eating episodes and responded to the questions for each episode separately. In Sample 1, a total of 48 binge eating episodes were reported across 24 participants. Two eating episodes were excluded for the following reasons: one episode was determined by the authors to not meet criteria for a binge; a second participant did not answer the questions for the second binge. For all other participants, two binge episodes were reported. Thus, analyses include 46 unique binge episodes in the adult sample (Sample 1). A total of 40 unique binge eating episodes were reported across 20 participants in the adolescent sample (Sample 2).

Interviews were transcribed by research assistants and a codebook was developed by the authors and research assistants. Two authors (BM and HW) independently rated all interviews. In addition to rating the individual responses to each item, the authors also created global codes taking a holistic view of the interview responses to describe precipitating and vulnerability factors for the binge episodes. Interrater reliability using Cohen's Kappa (Cohen, 1960) was calculated for all items included in the analyses. Descriptive statistics and frequencies are reported for interview items.

In analyses comparing consistency between participants' reports of binge episodes, individuals who only reported one binge eating episode ($n=2$) were excluded, which reduced total sample size in the adult sample to 44 binge episodes described by 22 participants. Pearson correlations were used to assess the relationship between binge 1 and binge 2 for continuous and dichotomous data. Chi-square goodness of fit analyses were used to assess relationships among categorical variables. SPSS version 26.0 was used in all analyses (IBM Corp. 2019) with $p < 0.05$ considered significant. A Bonferroni correction was used to control for multiple comparisons in the consistency analyses.

Results

Demographic and clinical measures

The racial/ethnicity breakdown is reported in Table 1 for all study participants. Means are listed with SD in parentheses. Using BMI standard weight status categories, the adult sample consisted of approximately 45.8% in the healthy weight range ($n=11$; BMI 18.5–24.9 kg/m²), 16.7% in the overweight range ($n=4$; BMI 25–29.9 kg/m²), and 37.5% in

Table 1 Sample characteristics

	Sample 1: adults (<i>n</i> = 24)	Sample 2: adolescents (<i>n</i> = 20)
Sex (% female)	100%	100%
Age (years)	25.50 (5.92)	16.45 (1.06)
Ethnicity		
Non-hispanic	79%	85%
Hispanic	21%	15%
Race		
Caucasian	54%	70%
Asian	33%	25%
African American/Black	13%	5%
BMI (kg/m ²)	29.78 (10.01)	24.27 (4.06)

the obese weight range (*n* = 9; BMI \geq 30.0 kg/m²). Diagnoses based on the EDE revealed that approximately 46% of adult participants met diagnostic criteria for BED (*n* = 11), 29% for BN (*n* = 7), 17% for BED of low frequency or duration (*n* = 4), and 8% for BN of low frequency or duration (*n* = 2). The number of objective binge episodes in the past three months ranged from 5 to 84 episodes, with an average weekly frequency of 2.95 ± 1.58 episodes. Two individuals reported engaging in compensatory behaviors following the described binge eating episode. One individual reported purging after both binge episodes whereas the other individual reported purging after one episode only. The majority (*n* = 19, 79%) of adult participants had at least 1 comorbid psychiatric condition based on the Mini International Neuropsychiatric Interview (MINI) [21]. These comorbidities included depression (*n* = 15), generalized anxiety disorder (*n* = 10), dysthymia (*n* = 4), post-traumatic stress disorder (*n* = 3), agoraphobia (*n* = 3), social phobia (*n* = 1), obsessive–compulsive disorder (*n* = 1), and alcohol dependence (*n* = 1). Eleven of the adults met criteria for more than one comorbid psychiatric condition.

In the adolescent sample, BMI was not available for one participant. Using BMI percentile categories as defined by CDC [22], 60% of the sample fell in the healthy weight category (*n* = 12), 25% in the overweight category (*n* = 5), 10% in the obese category (*n* = 2), and 5% missing (*n* = 1). Diagnoses based on the EDE revealed that 40% of participants met diagnostic criteria for BN (*n* = 8), 30% for BED (*n* = 6), 25% for BN of low frequency or duration (*n* = 5), and 5% for BED of low frequency or duration (*n* = 1). Participants reported an average of 2.24 ± 1.80 weekly objective binge eating episodes over the past three months. Total binge episodes in the past three months ranged from 3 to 70 episodes. Adolescents endorsed purging following a binge eating episode in 14 of the 40 reported episodes (35%); this information was not available for two binge episodes.

Eight adolescents reported having a comorbid psychiatric condition (asked via self-report, not a diagnostic assessment). These conditions included anxiety (*n* = 7), depression (*n* = 5), and obsessive–compulsive disorder (*n* = 1). Six adolescents reported more than one comorbid psychiatric condition.

Interrater reliability

Two authors independently coded each item. The average interrater reliability across all items demonstrated moderate agreement ($\kappa = 0.704 \pm 0.048$; $M \pm SE$). Given the wide range in agreement across items (-0.083 to 1), all three authors met and resolved every discrepancy across both samples. Resolved codes were used in all analyses.

Qualitative analysis

Context

In the adult sample (Sample 1), the majority of binge episodes occurred on a weekday (63%) and at home (76.1%). The binge episodes occurred in locations outside of the home (restaurant, dining hall, work, school, car) in sixteen of the reported eating episodes. Five binge episodes were reported to have occurred across multiple locations, leading to greater than 100% totals. Time of day varied, with evening reported most often (50%), followed by afternoon (28.3%), then morning and throughout the day (10.9% each). Activities prior to engaging in the binge episode also varied widely within the sample. Interpersonal activities, watching television or using devices with screens, working or studying, and already eating were the activities most commonly reported. Examples of other reported activities prior to the binge episode included driving, completing chores, moving, getting food, coming home, getting ready for the day, and doing nothing. Participants endorsed binge eating in the presence of others slightly more often than binge eating alone (52.2% versus 47.8%, respectively). When in the presence of others, participants reported that other individuals were also eating in 70.8% of the cases.

In the adolescent sample (Sample 2), the majority of binge episodes occurred on a weekday (65%) and at home (80%). Adolescents reported binge eating episodes occurred most often during the evening (57.5%) or afternoon (30%). Adolescents reported engaging in televisions shows/use of screens or already eating most often before the binge episode. In addition to working/studying, doing “nothing”, engaging in interpersonal activities, and transitioning from one activity to the next, adolescents also reported thinking/worrying about grades, being awake at night during a sleepover, and thoughts/rumination about self-harm. Participants reported that the binge eating episodes most

commonly occurred when they were alone (65%). When other people were present during the binge episode, participants reported that those individuals were also eating in almost two-thirds of the episodes. See Table 2 for additional information regarding context variables across both samples.

Hunger

On a 0–10 rating scale with 10 being most hungry, participants in the adult sample endorsed responses from 0 to 4 and 5 to 10 with nearly equal frequency, indicating that approximately half of the binges were associated with a low hunger rating ($n=22$) whereas the remaining binge episodes were associated with a higher hunger rating ($n=24$). The mean level of hunger reported across all binge episodes was 4.21 (SD 2.88). When asked to report the number of hours since last intake, participants most commonly reported eating either 0–1 h (21.7%) or 1–4 h before the binge episode (21.7%), followed by 4–8 h (19.6%), more than 12 but less than 24 h (19.6%), and 8–12 h (10.9%). This question was not answered by three participants (6.5%). However, hunger was rated as a precipitating factor to the binge in only ten of the reported binges (21.7%).

Among adolescent participants, participants endorsed a hunger rating of 0–4 and 5–8 with approximate equal frequency ($M=4.33$, SD 2.38). None of the participants in this sample endorsed a hunger rating of a nine or ten prior to the binge eating episode. When asked to report time they last ate prior to the binge, participants most commonly reported eating 1–4 h prior to the binge episode (37.5%), followed by 4–8 h (20%), 12–24 h (15%), 0–1 h (12.5%), and 8–12 h (12.5%). Only one participant (2.5%) reported last eating more than 24 h prior to the binge eating episode. Hunger was rated as a precipitating factor in 10 of the 40 binge eating episodes described by participants (25%).

Mood/affect

Negative affect was present before the binge in over half of the reported episodes in the adult sample (58.7%). Positive affect prior to the binge was endorsed less often, in only a quarter of binge episodes (28.2%). Both negative and positive affect were reported in four binge episodes. Participants also rated both negative and positive affect prior to the binge eating episode on a scale from 0 to 10, with 0 representing no affect and 10 representing the greatest level. Prior to the binge episode, participants endorsed an average negative affect rating of 4.34 (SD 2.76) and an average positive affect rating of 4.70 (SD 2.46).

Among adolescent participants, affective ratings revealed that negative affect was present before the binge in nearly two-thirds of reported episodes (62.5%). On a 0–10 scale, with ten representing the greatest negative affect,

participants rated negative affect prior to the binge on average to be 5.44 (SD 2.73). Positive affect prior to the binge was endorsed less often, in a little over one-third of binge episodes (35%). As such, positive affect scores prior to the binge episode were lower than negative affect scores, with an average of 4.14 (SD 2.37) on the 0–10 rating scale.

Specific events

Participants endorsed a specific event that triggered the binge episode in half or nearly half of the reported episodes (50% for adults; 47.5% for adolescents). Specific events for adult and adolescent participants varied greatly (see Table 2). Binge episodes that were triggered by multiple specific events (i.e., family stress and a particular mood) were coded under each event separately.

Binge characteristics

Adult participants reported food cravings in 29 of the reported binge episodes (63%). In contrast, participants endorsed seeing the food first (as opposed to craving) in 18 of the binge episodes (39.1%) (Note that although these were intended to be exclusive, with participants endorsing either craving or seeing the food first, at least one participant endorsed both experiencing a craving and seeing the food first. Thus, these percentages add up to more than 100%). For the majority of binge episodes, participants reported a “point of no return” where they felt they could no longer have stopped (82.6% of binges), with this occurring halfway through the binge most often (63.2%). Participants reported that they could not have done anything to stop once they started eating in 27 of the binge episodes (58.7%). Participants reported that they could have avoided the binge happening altogether in 58.7% of the episodes. Participants reported that they did something specific to try to stop binge eating in one-third of the episodes (30.4%), with distraction as the most common technique (57.1%), followed by avoiding certain foods (35.7%) and using other coping skills (7.1%).

Adolescent participants reported food cravings in 23 of the reported binge episodes (57.5%). Participants endorsed seeing the food first (as opposed to craving) in 19 of the binge episodes (47.5%). Two individuals endorsed a combination of experiencing a craving and seeing the food stimuli prior to the binge eating episode. For the majority of binge eating episodes, participants reported a “point of no return” where they felt they could no longer have stopped (75% of binge episodes). This feeling occurred halfway through the binge eating episode most often in this sample (50%). For the remaining binge eating episodes in which participants endorsed experiencing a “point of no return”, this occurred either after the first few bites of food (20%), after a bite of a

Table 2 Binge context variables

Context variables	Sample 1: adults (<i>N</i> = 46 binge episodes)		Sample 2: adolescents (<i>N</i> = 40 binge episodes)	
	Number of binge episodes ^b	%	Number of binge episodes ^b	%
Day of the week				
Weekday	29	63	26	65
Weekend	13	28.3	12	30
Holiday	2	4.3	0	0
Missing	2	4.3	2	5
Time of day				
Morning	5	10.9	3	7.5
Afternoon	13	28.3	12	30
Evening	23	50	23	57.5
Throughout the day	5	10.9	2	5
Location of binge^b				
Home	35	76.1	32	80
Restaurants/dining hall	10	21.7	3	7.5
Work/school	4	8.7	0	0
Car	2	4.3	0	0
Other	0	0	5	12.5
Presence of others				
Yes	24	52.2	14	35
No	22	47.8	26	65
When others were present, were they eating^a				
Yes	<i>n</i> = 24		<i>n</i> = 14	
Yes	17	70.8	9	64.3
No	2	8.3	4	28.6
Missing	5	20.8	1	7.1
Activity before binge eating				
Interpersonal activity	10	21.7	4	10
TV/computer/screens	9	19.6	14	35
Already eating	6	13	8	20
Working/studying	4	8.7	5	12.5
In transition	1	2.2	3	7.5
Nothing	0	0	4	10
Other	10	21.7	3	7.5
Missing	6	13.1	0	0
Specific events				
Yes	23	50	19	47.5
No	22	47.8	21	52.5
Missing	1	2.2	0	0
Type of specific event^{a,b}				
Work/school stress	<i>n</i> = 23		<i>n</i> = 19	
Work/school stress	5	21.7	6	31.6
Family stress	3	13	5	26.3
Particular mood/shift in mood	5	21.7	4	21.1
General stress	5	21.7	0	0
Social stress	1	4.3	3	15.8
Family stress plus shift in mood	1	4.3	0	0
Hunger	1	4.3	2	10.5
Substance use	1	4.3	0	0
Overeating	1	4.3	1	5.3
Not having anything to do	0	0	1	5.3

^aFollow-up question for participants that answered “yes” to the question immediately preceding it

^bTotal may be greater than 100% since multiple options could be selected for each binge eating episode

trigger food (10%), or prior to obtaining food (6.7%). This information was unavailable for four binge episodes (13.3%). Participants reported that they could not have done anything to stop once they started eating in more than half of the binge episodes (57.5%). Participants reported that they could have avoided the binge happening altogether for slightly more than half of the episodes (55%). Participants reported that they did something to try to stop binge eating in one-quarter of the episodes (25%), with coping skills (40%) as the most common technique, followed by distraction (20%), avoiding certain foods (20%), and using other strategies (20%).

In the adult sample, the majority of binge episodes reported occurred on impulse (*n* = 34; 73.9%), with fewer episodes reported as planned (*n* = 10; 21.7%) or a combination of planned and on impulse (*n* = 2; 4.4%). Most participants considered the eating episode a binge prior to eating (43.5%) or during the eating episode (43.5%), as opposed to after the eating episode ended. In the adolescent sample, the majority of binge episodes occurred on impulse (*n* = 33; 82.5%), with fewer episodes reported as planned or anticipated (*n* = 5; 12.5%) or a combination of planned and on impulse (*n* = 2; 5%). Most participants considered the eating episode a binge prior to eating (55%) or during the eating episode (32.5%), as opposed to after the eating episode ended (7.5%); responses were not available for two binge eating episodes (5%).

Food context variables

Adult participants reported obtaining food from the kitchen or fridge (*n* = 23) in half of the reported binge episodes, with restaurants (*n* = 7), dining hall/work buffets (*n* = 7), and grocery stores (*n* = 4) being the next most common responses. Although we asked about whether food was acquired specifically for the binge or not, these data were missing in a large percentage of cases, and when reported, responses were often unclear. Thus, we do not report those results.

Adolescent participants reported obtaining food from the kitchen or fridge most often (*n* = 31). Participants obtained food from other places less often, including restaurants (*n* = 8), grocery stores (*n* = 2), drawers or snack stashes (*n* = 2), and dining hall or buffets (*n* = 1). Four participants endorsed obtaining food from more than one place, such as a combination of food at home and food from a restaurant; thus totals add to greater than 100%. Participants rarely bought the food specifically for a binge episode (*n* = 37; 92.5%). Most commonly, participants endorsed obtaining the food for the binge immediately prior to the eating episode (*n* = 38; 95%). One participant endorsed that they acquired the food for the binge earlier in the day and one response was missing for this question.

Future binge considerations

Participants were asked to consider future binge eating episodes. Out of the 24 adult participants, 10 participants said they experience pleasure when thinking about a future binge, with 12 participants denying this feeling. Two participants did not clearly answer this question. Fourteen participants endorsed putting the future binge out of their mind, with only three people saying they do not engage in this thinking. Seven participants did not clearly answer this question. Among the 20 adolescent participants, only 5 participants endorsed experiencing pleasure when thinking about a future binge episode, whereas 15 participants denied this feeling. Twelve of the twenty adolescent participants endorsed putting the future binge out of their mind, with six participants denying doing so and two participants with missing data for this question.

Precipitating and vulnerability factors

Within the adult sample, affect was found to precipitate binge episodes most often (43.5%) followed by hunger (21.7%). Other precipitating factors, such as interpersonal stressors (10.9%), food rule violations (10.9%), and particular activity prior or during the binge episode (8.7%) were reported less frequently. Stress and negative affect were the two most commonly identified vulnerability factors, present in 45.7% and 41.3% of the binges reported in this sample, respectively. Positive affect appeared to be a vulnerability factor in only two binge episodes (4.3%). Tiredness was also commonly identified as a vulnerability in 19.6% of the episodes reported.

In the adolescent sample, affect was found to precipitate binge episodes most often (52.5%), followed by interpersonal stressors (25%) and hunger (25%). Rule violations (5%) and activities (2.5%) were rated as precipitating factors in a minority of binge eating episodes. In terms of vulnerability factors, negative affect (50%) and stress (37.5%) were rated most often, with positive affect (15%) and tiredness (12.5%) less frequently identified as vulnerabilities that may have contributed to the binge eating episode.

Correlations between Binge 1 and Binge 2

For the majority of variables across both samples, responses for binge 1 and binge 2 were unique and uncorrelated. After applying a Bonferroni correction for multiple testing, none of these correlations in the adult sample remained significant. In adolescents, after the application of a Bonferroni correction, only three variables were significantly correlated: hunger as a precipitating factor ($r = 0.572$, $p < 0.01$), where the food came from for the binge episode ($\chi^2 = 41.62$,

$p < 0.001$), and ability to avoid the binge episode ($r = 0.791$, $p < 0.001$).

Discussion

This is the first descriptive study of binge eating context and characteristics in both adult and adolescent samples. It is also the first study to examine consistency between binge episodes reported by the same individual on specific characteristics. Overall, our findings were consistent with earlier descriptive studies, and importantly, the adult and adolescent samples appeared very similar. The majority of episodes occurred on weekdays, in the evening, at home, and individuals obtained the food from their kitchens as opposed to going out to get food specifically for the binge episode. About half of the binge episodes occurred alone, and when others were present, they were usually eating, as well. Although negative affect was present for the majority of binge episodes, the overall ratings of affect were not high. There were no common activities or events that triggered binge episodes and no clear hunger drives. Additionally, most binge episodes were not driven by food cues, as most described a craving for food prior to seeing any food. Although adolescents attempted to stop binge eating at similar rates as adults, they used other coping skills more frequently than adults, who tended to use distraction. Our hypothesis that binge episodes would be distinguished between affect and cue-driven contexts in line with affect or restraint theories was not supported by the data, nor was our hypothesis that adolescents would report more affect-driven binge eating.

Contrary to our hypothesis, binge episodes reported by individuals in the studies were not consistent in terms of context, triggers, mood, hunger, and other variables gathered from the interview. This is in line with findings from Grilo and colleagues [6], and shows that this inconsistency is true even at the level of individual characteristics. This is somewhat surprising given that there were many more potential variables to align the two episodes in this study than in Grilo et al. After correction for multiple tests, there were no context variables that were significantly related between reported binges among adults and only three that were significant among adolescents (level of hunger, where the food came from, and the belief that they could avoid the binge). The lack of agreement and consistency between binge episodes is important because the subtyping models that group individuals according to negative affect may suggest that certain factors, like negative affect, drive binge eating for a particular individual, guiding treatment selection. However, if binge episodes are not consistent, then treatment approaches will have to be broader to address multiple factors or facets of binge eating.

Indeed, a goal of the present study was to explore the idea that individuals engaging in binge eating may be distinguished by binge characteristics, such as binge eating that is driven by emotions versus those driven by food cues. There is considerable evidence supporting this hypothesis, including a recent neuroimaging study showed that the relation between stress and binge eating during EMA differed based on neural response to a stress-based food task [23]. However, given that these descriptive reports of binge episodes did not show consistency within individuals, which is in line with prior research [6], attempts to use individual differences to guide treatments may fall short. Treatments that focus predominantly on affect or hunger or external food cues to stop binge eating in particular people (i.e., a treatment matching approach) are unlikely to impact all binge episodes for the individuals. Instead, an approach that includes all of these aspects may be needed.

Although these data do not support an individual difference model to guide treatment, they are in line with general affect and restraint theories of binge eating, given that negative affect and hunger were both frequently mentioned in these qualitative reports of binge episodes. An integrative approach will be vital for patients, as these data suggest that individuals have varying antecedents and context to their binge episodes. It is also interesting to note that these findings of a lack of consistent patterns between binge episodes within individuals was present across a sample of differing diagnoses. This sample intentionally included any recurrent binge eating regardless of diagnosis in line with both transdiagnostic theories of eating disorders [24] and evidence of diagnostic crossover [25], which suggest that binge eating in different diagnoses is likely more similar than it is different. Our sample was not large enough to explicitly investigate whether qualitative reports of binge episodes were different between diagnoses.

Although this study is novel in its descriptive and open-ended assessment of context and characteristics of binge episodes, it is not without limitations. First, both samples were small, with only 24 and 20 participants in the adult sample and adolescent sample respectively. Generalizability may thus be limited. However, it is important to note that findings were (1) fairly consistent between the two studies and (2) in line with prior descriptive studies. Second, we included a large number of variables in analyses due to the exploratory nature of the study. Therefore, statistical significance should be interpreted with caution. Third, open-ended interview questions were coded by the authors, which could introduce bias. To alleviate this concern, authors separately coded each interview and met to resolve all discrepancies. Interestingly, although authors were aware of the link between each binge episode (binge episodes were coded in the dataset with the participant ID and the binge episode number), this did not result in more consistency between the

two binge episodes. Fourth, this sample may not generalize to all females engaging in binge eating given that they were all participating in a neuroimaging study. Exclusion criteria related to neuroimaging, as well as decisions to participate in neuroimaging studies, may have biased the sample. However, we are not aware of any evidence of systematic differences between neuroimaging samples and other samples of females engaging in binge eating. Finally, although the separate investigation of adult and adolescent samples allows us to descriptively compare binge eating in adults and adolescents, there are important similarities and differences that should be noted. Sample 1 consisted of young adults, which may be more similar to adolescents than older adult samples. Adults had a higher BMI than adolescents and greater proportion of BED diagnoses. Because we did not directly/statistically compare the binge characteristics between samples, we cannot account for these differences formally. Additionally, the adult sample may have had higher rates of comorbid psychiatric conditions, which may have impacted their binge eating. Further, direct comparisons between samples on these comorbidities was not possible because the adolescent sample was asked about comorbidities with a simple self-report question rather than using a diagnostic assessment, as in the adult sample. Future research will benefit by taking comorbidity into account, as comorbidity indeed is the norm for individuals engaging in binge eating [26]. Despite these sample differences, the results from adults and adolescents were more similar than different. This may support the extension of adult treatments for adolescents with binge eating, although adaptations may still be needed given different lifestyle patterns and developmental needs (such as living with parents versus independently). Several recent studies have exclusively focused on correlates of binge eating among adolescents, including family negativity, alexithymia, and emotional functioning [27–31], the results of which could help identify what developmental or age-specific adaptations, if any, should be incorporated into existing interventions. However, these studies investigated factors at the level of the individual adolescent, rather than at the level of the binge episode, so further research will be needed to explore how these factors may fit into the context of specific binge eating episodes.

In sum, this hypothesis-generating, exploratory study used a descriptive approach to characterize binge eating in both adult and adolescent samples. Findings suggest that binge eating may appear similar in the two age groups, but binge episodes may vary within individuals. This has implications for treatment approaches that focus on specific triggers or context for binge eating. Specifically, although there may be a clinical inclination that someone engages in more affect-driven binge eating, this may be a consequence of how clinical interviews and evaluations draw out descriptions of binge context or how focused questions may result in biased

reports of binge triggers. For example, if someone reports high levels of emotion lability, clinicians may be more likely to ask about affective triggers of binge eating. Our findings suggest that most individuals report some degree of affect impacting their binge episodes, but also report hunger and other factors. Treatments that incorporate approaches to manage both affect and hunger and reward response to food cues may be needed for all individuals.

What is already known on this subject?

Existing qualitative studies on binge eating are limited. Current literature focuses on the role of affect and cognition before and after binge eating, finding that a change in mood and negative affect are common before binge eating episodes, and thoughts about loss of control and self-criticism occur during and after binge eating, respectively. One study found that two common precipitators of binge eating are negative affect and rule violation, though another study found that binge episodes within individuals often do not follow the same pattern of precipitating events.

What does this study add?

This is the first open-ended, qualitative study done in both adult and adolescent samples, and finds that characteristics of binge eating are similar in these two groups. It is also the first to examine the qualitative consistency in binge eating episodes within an individual, and finds that individuals report differences in binge eating episodes related to context, triggers, mood, hunger, and more. Given that current treatments distinguish individuals by binge characteristics, this has implications for how clinicians select treatments for binge eating and how they define treatment targets.

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Compliance with ethical standards

Conflict of interest The authors have no conflicts of interest to disclose.

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