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## Longitudinal Stability of Binge-Eating Type in Eating Disorders

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### Abstract

**Objective**—The purpose of this study was to examine the 2-year longitudinal stability of objective bulimic (binge eating) episodes (OBEs) and subjective bulimic (binge eating) episodes (SBEs) in a multisite eating disorders sample.

**Method**—Participants included 288 females with eating disorder symptoms who were assessed every 6 months using the Eating Disorder Examination.

**Results**—Markov modeling revealed considerable longitudinal variability between types of binge eating over 6-month time intervals with relatively higher probability estimates for consistency between OBEs and SBEs than specific transitions between types for the overall sample as well as for eating disorder diagnostic groups. Transition patterns examining all five time points indicated notable variability in binge-eating patterns among participants.

**Discussion**—These findings suggest that although longitudinal patterns of binge types are variable among individuals with eating disorders, consistency in OBEs and SBEs was the most common pattern observed.

### Keywords

eating disorders; binge eating; longitudinal assessment

### Introduction

Binge eating, as defined in the DSM-IV-TR,<sup>1</sup> is characterized by the consumption of an amount of food that is larger than most people would eat under similar circumstances as well as the subjective experience of loss of control or lack of control over eating. Binge eating is

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required for the diagnosis of bulimia nervosa (BN) and binge-eating disorder (BED; an example of eating disorder not otherwise specified in DSM-IV and included in the proposed criteria for DSM-5) as well as the binge-eating/purging subtype of anorexia nervosa (AN). Data from a variety of sources including feeding lab studies indicate that binge-eating episodes among individuals with BN and BED typically involve the ingestion of 1500–4500 calories.<sup>2,3</sup>

Naturalistic binge-eating data, however, highlight the considerable size range of self-reported binge-eating episodes,<sup>3</sup> suggesting that individuals with eating disorders may regard the consumption of smaller amounts of food (e.g., <100 calories) as binge-eating episodes. Beglin and Fairburn<sup>4</sup> as well as Telch et al.<sup>5</sup> have observed that in contrast to clinicians and researchers, patients with eating disorders reported that the experience of loss of control over eating was more important in determining whether they considered an eating episode to have been a binge than the amount of food actually consumed. The labeling of smaller amounts of food as a binge-eating episode may reflect the extent to which the individual is attempting to restrict overall food intake or avoid certain types of food and whether they believed that they have violated these attempts.<sup>6</sup>

The potential clinical importance of these “smaller” binge-eating episodes has been incorporated into the Eating Disorder Examination,<sup>6,7</sup> an investigator-based assessment interview that classifies overeating episodes considering both the subjective experience of loss of control and the clinical rater’s determination that the amount of food consumed was objectively large. The Eating Disorder Examination distinguishes objective bulimic (binge eating) episodes (OBEs), in which the amount of food consumed during the overeating episode is considered to be large according to a clinical rater and is accompanied by a sense of loss of control, from subjective bulimic (binge eating) episodes (SBEs), characterized by a sense of loss of control with the consumption of an amount of food that is not considered large by clinical rating standards. OBEs have been utilized diagnostically as the equivalent of DSM-IV binge eating episodes.<sup>7</sup>

In spite of this distinction between OBEs and SBEs and the DSM-IV requirement that the amount of food consumed be objectively large, considerable debate about the validity of the size distinction has ensued for over a decade<sup>3–5,8–18</sup> based on findings that individuals with SBEs only compared to those with OBEs have similar levels of severity in eating disorder and associated psychopathology as well as medical complications. Purging disorder,<sup>19</sup> characterized by purging behavior (e.g., self-induced vomiting and misuse of laxatives/diuretics) and, in many cases, SBEs in the absence of OBEs, has even been proposed as a diagnosis for inclusion in DSM-5 based on several studies supporting that it is independent from other eating disorders and is associated with comparable psychopathology, medical complications, and impairment.<sup>20</sup>

Notably, clinical and community studies have observed that OBEs and SBEs co-occur in individuals with a variety of eating-disorder diagnoses.<sup>17,18,21</sup> Although considerable research attention has been devoted to understanding differences between and clinical correlates of OBEs compared to SBEs, most of these investigations have been cross-sectional and relatively little is understood about their co-occurrence and longitudinal course. Hildebrandt and Latner<sup>21</sup> proposed the “binge drift” hypothesis, suggesting that over time and, particularly, over the course of treatment, OBEs tend to “drift” in size and become less frequent as SBEs become more frequent. In a sample of women with BED, these investigators found support for this hypothesis over 7 days of self-monitoring. Niego et al.<sup>17</sup> also observed that individuals with BED in a cognitive-behavioral therapy trial reported greater reductions in OBEs than SBEs at the start of treatment. Although crossover between binge types has been examined in the context of two treatment studies, the potential validity

of the binge drift hypothesis or alternative hypotheses (e.g., that SBEs evolve into OBEs or that binge types tend to remain stable over time) has not been examined in a large, diagnostically heterogeneous sample of individuals with eating disorders who were not enrolled in a treatment study.

In summary, previous research has indicated that individuals with eating disorders engage in different “sizes” of binge-eating episodes and that these varying binge types (i.e., OBEs and SBEs) appear to be clinically meaningful in the context of psychopathology, distress, and medical complications. In spite of the similarity in clinical correlates between OBEs and SBEs, understanding their distinction and longitudinal course remains important for a number of reasons. First, OBEs and SBEs may function as different types of mechanisms in the etiology and maintenance of eating disorders. For example, individuals who engage in OBEs originally and migrate to SBEs longitudinally may represent a different phenotype from individuals whose initial SBEs evolve into OBEs over time. Second, the distinction between binge types and their consistency over time has potential implications for treatment. Different longitudinal trajectories of binge-eating patterns may require different approaches to treatment, including intervention sequences and relapse prevention strategies. For these reasons, examining the course of OBEs and SBEs in a heterogeneous eating disorder sample—particularly a nontreatment seeking naturalistic sample—will be beneficial for understanding variability in eating-disorder phenotypes as well as providing information to guide etiological models and treatment development.

The purpose of this investigation was to examine the degree of stability and crossover between OBEs and SBEs over the course of 2 years in a longitudinal sample of individuals with eating disorders. The secondary aim of this study was to investigate binge-type stability within broadly defined diagnostic subgroups (AN, BN, and BED) as well as overall sample to determine potential differences in binge-type crossover among eating-disorder diagnoses.

## Method

### Participants

Participants included 288 females (age 14–55, average age = 31.8; 98% Caucasian) recruited at three different US sites: White Plains, New York; Palo Alto, California; Minneapolis, Minnesota. This sample was a subset of participants ( $N = 439$ ) from a larger longitudinal investigation described in previous studies<sup>22,23</sup> who were recruited from a variety of sources including community advertisements, participation in other research studies, and clinical referrals. This subsample of 288 participants was selected because of complete datasets for all five assessment points in the first 2 years of follow-up. At baseline, participants were required to meet full or subthreshold (partial) AN, BN, or BED DSM-IV criteria as determined by a priori definitions.<sup>a,23</sup> The sample included the following baseline diagnostic categories: broadly defined AN ( $n = 71$ ; full AN = 35 and partial AN = 36), broadly defined BN ( $n = 95$ ; full BN = 52 and partial BN = 43), and broadly defined BED ( $n = 122$ ; full BED = 87 and partial BED = 35). This study was approved by the Institutional Review Board at each of the three sites.

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<sup>a</sup>Partial AN: either (1) meets all DSM-IV criteria for AN in the past 12 months but not in the past month or (2) meets all DSM-IV criteria for AN in the past 6 months except that body weight is <90% of ideal/expected body weight and is accompanied by amenorrhea or both DSM-IV AN criteria B (intense fear of weight gain) and C (overvaluation of shape or weight, body image distortion, or denial of the seriousness of emaciation); Partial BN: either (1) meets all DSM-IV criteria for BN in the past 3 months except for the overvaluation of shape or weight OR (2) meets all DSM-IV criteria for BN except that binge eating and compensatory behaviors occur less than twice per week but occur on average at least once per month for the past 6 months; Partial BED: meets all DSM-IV criteria for BED except that binge eating occurs less than twice per week but occurs on average at least once per month for the past 6 months.

## Measures

The Eating Disorder Examination (version 12.0)<sup>7</sup> was used to assess the frequency of OBEs and SBEs in the 28 days before each assessment visit. The EDE is a widely used investigator-based interview that has extensive psychometric data supporting its reliability and validity.<sup>6,24</sup> As described earlier, OBEs were defined as the consumption of an unusually large amount of food (e.g., a gallon of ice cream or 50 cookies) within the context of an overeating episode. In contrast, SBEs were defined as a self-reported overeating episode in which the participant regarded herself as having overeaten, but the amount of food was not considered large by the clinical assessor (e.g., one cup of ice cream or five cookies). Both OBEs and SBEs were required to be accompanied by the subjective experience of loss of control as characterized by a sense of being unable to stop eating once started, feeling unable to resist eating in the presence of food, or the experience of being driven or compelled to eat. Participants were assessed by trained interviewers every 6 months over a 2-year time period. Interviewers were trained initially using didactics and role playing; teleconferencing and e-mail listserv were used to prevent site drift. Interrater reliability on subsamples from the broader longitudinal study was  $>.90$ ,<sup>22</sup> and test-retest reliability was  $>.70$ .<sup>25</sup>

## Statistical Analyses

First-order Markov modeling was used to create transition matrices with probability estimates of the likelihood of a binge type at a subsequent time point given a binge type at the previous assessment 6 months earlier. Binge types were classified into four categories: OBEs only; SBEs only; both OBEs and SBEs; and none (neither OBEs nor SBEs). In addition, binge-eating type patterns for all five time points were examined for frequencies of different patterns of stability and crossover by individual.

## Results

Baseline binge-type categorization of participants was as follows: none,  $n = 39$ ; OBE only,  $n = 88$ ; SBE only,  $n = 34$ ; both OBE and SBE,  $n = 127$ .

## Probability Estimates

As shown in Table 1, probability estimates for the stability within binge-eating types (OBEs, SBEs, and both OBEs/SBEs) among those who reported binge eating at subsequent 6-month time points were modest (0.36–0.68) for the full sample and within broadly defined eating-disorder diagnoses. Probability estimates for stability within binge-eating type were relatively higher than estimates for crossover between binge-eating types for the overall sample (0.43–0.47), as well as broadly defined AN (0.41–0.68), broadly defined BN (0.42–0.48), and broadly defined BED (0.36–0.44).

Notably, the relatively highest probability estimates were observed for the “none” category in the overall and diagnostic sample, suggesting a greater likelihood of the absence of binge eating at a subsequent time point given no binge eating at the previous time point compared to the likelihood of one binge type given its presence at the previous time point. In addition, in the overall sample as well as in the AN and BN groups, probability estimates were slightly higher for transitions from SBEs than OBEs or both OBEs/SBEs to the none category.

## Transition Patterns

As shown in Table 2, binge-eating type patterns examined by participant based on each data point for the 2-year time duration showed considerable variability. Among the 1024 possible patterns, few were seen at high frequency levels. Of the 288 participants, only 48 (16.7%)

showed consistency at each of the five time points and those were primarily individuals (presumably with AN) who reported no binge eating over the course of the 2 years.

## Discussion

The findings of this study indicate that binge-eating episodes, when analyzed by size using the EDE classification system (i.e., OBEs and SBEs), showed considerable variability in a 2-year longitudinal sample of females with eating disorders. Transition patterns between 6-month assessment interviews as well as over the full 2 years indicated that notable variability and crossover between OBEs, SBEs, and combined OBEs and SBEs was most typical and paralleled previous findings of high crossover among eating disorder diagnoses in this sample.<sup>22</sup> Although overall variability among binge types longitudinally was most prominent, some patterns of consistency were observed. Most notably, probability estimates revealed relatively higher likelihoods of consistency between type (e.g., OBE to OBE and SBE to SBE) than across type (e.g., OBE to SBE or SBE to OBE) both in the overall sample and within broadly defined eating disorder diagnoses.

In contrast to Hildebrandt and Latner<sup>21</sup> and Niego et al.,<sup>17</sup> these findings are not consistent with the binge drift hypothesis in which OBEs are thought to evolve into SBEs. These inconsistent findings may reflect the fact that these other two studies involved treatment interventions, whereas the current investigation included a heterogeneous sample of community members. Thus, the binge drift hypothesis, as suggested by Hildebrandt and Latner,<sup>21</sup> may be more applicable to change over the course of treatment than naturalistic course. Several other alternative explanations are possible, including the fact that the time duration of 6 months was too short to observe this pattern. The lack of support for the binge drift hypothesis in the current study may also reflect the diagnostic heterogeneity of this sample in contrast to the previous studies. The extent to which the binge drift phenomenon occurs in diagnostically heterogeneous samples can be observed in the context of both treatment and in longitudinal community samples and requires greater than a 6-month time interval to occur requires further study.

The results of this study suggest that the extent to which individuals with eating disorders experience clinically “small” binge-eating episodes, “large” episodes, or a combination of both varies over time regardless of diagnosis. Although examining course and recovery was not a primary objective of this investigation, these data nonetheless suggest that the presence of SBEs (compared to OBEs with or without SBEs) is slightly more predictive of an absence of binge eating 6 months later in AN and BN. Thus, although the binge drift hypothesis was not fully supported by these findings, the fact that small-sized binge-eating episodes were more likely to be followed longitudinally by abstinence from binge eating implies that the presence of SBEs alone might be an indication of future remission. If replication of these findings indicates that SBEs are, indeed, predictive of remission, the validity and potential clinical utility of distinguishing between large (OBE) and small (SBE) types of binge eating, or, alternatively, to consider binge size as one potentially valid aspect of binge-eating severity might be supported. However, the presence of SBEs combined with OBEs was not associated with a high probability of movement into the “none” category. This finding implies that the presence of SBEs with OBEs together may not be associated with an absence of binge eating longitudinally. Further research is necessary to determine whether helping patients and clients transition from OBEs to SBEs is a potentially useful aspect of treatment and whether the presence of simultaneous OBEs and SBEs is a unique prognostic indicator.

The findings of this investigation have several notable clinical implications. First, this study is consistent with previous investigations suggesting that individuals with eating disorder



symptoms often experience considerable variety in the size of their binge-eating episodes. Second, clinicians working with patients with eating disorders can expect that sizes of binge-eating episodes may vary over time (although consistency within binge type is also common). In addition, although the direction of causality cannot be inferred from the current investigation, a replication of these findings that can more fully identify causal mechanisms may indicate that focusing treatment efforts to reduce the size of binge episodes from OBEs to SBEs might be a useful step toward facilitating remission. Finally, these findings have implications to classification and can inform the potential value of including the size distinction in the binge-eating criteria of DSM-5. Although the findings of this study suggest that consistency between binge types longitudinally is notable and potentially support retaining the binge-size requirement in DSM-5, the relatively high crossover between binge types might also be interpreted as a limitation in the validity of the distinction between OBEs and SBEs.

In interpreting these findings, several limitations are notable. First, this sample included a subset of participants from a broader longitudinal study ( $N=439$ ), and the participants for the current study were selected, because their data sets were complete for all five assessments; for this reason, this subsample may be overrepresented by individuals who were particularly compliant with the assessment demands of the study, and this bias may have impacted binge-size stability estimates. Post hoc analyses using the full data set that included missing values revealed similar findings for transition probabilities, suggesting that this subsample was representative of the larger sample for the purposes of this study. Second, the participants in this study were all adult females who were primarily Caucasian, and, for this reason, results might not generalize to ethnically diverse, male, or adolescent populations. The analyses used in this study were based on diagnostically broad categories of AN, BN, and BED. Although these broader categories may have some advantages, including potentially greater relevance to DSM-5 criteria, these findings may not generalize to more narrow diagnostic categories (which could not be investigated in this study due to the high degree of diagnostic heterogeneity among the narrowly defined ED NOS group). In addition, the participants in this study may or may not have been receiving treatment in the community, and the potential effects of treatment on binge status could not be examined. The extent to which treatment may have influenced binge-eating type consistency or crossover cannot be determined. Although interrater and test-retest reliability estimates were high, measurement error may have falsely inflated or deflated binge-type consistency. In addition, the probability estimates used in this were based on 6-month time intervals. Consistency and crossover between OBEs and SBEs may show different patterns at shorter and longer intervals. Finally, this study only examined the longitudinal patterns of binge eating. Co-occurring purging as well as other compensatory behaviors and eating-disorder cognitions were not examined in these analyses. The extent to which individuals in the “no binge eating” category may still have been symptomatic with other types of eating disorder behaviors or cognitions is unknown and should be investigated in future research examining longitudinal patterns of eating-disorder symptoms.

Future studies should seek to replicate these findings using more diverse samples in terms of ethnicity, gender and age, variable time intervals, and comparisons between naturalistic and treatment samples, particularly within treatments that have been found to be efficacious for treating eating disorders (e.g., cognitive-behavioral therapy, interpersonal therapy, and dialectical behavior therapy<sup>26</sup>). Another needed focus of future research is on differences in longitudinal binge-eating patterns across eating-disorder diagnoses (e.g., replicating the finding of the current study indicating that individuals with AN who reported OBEs only or SBEs only had particularly high levels of stability) and implications of these differences in identifying valid diagnostic criteria as well as effective treatment strategies for specific types of eating disorders. In addition, binge eating should be examined dimensionally by

investigating the frequency of different types of episodes rather than the dichotomous presence or absence of binge eating that was used in the current study. These findings also highlight the importance of assessing both OBEs and SBEs over the course of treatment and at follow-up in treatment outcome studies<sup>21</sup> and longitudinal risk factor studies in order to better understand causal and maintenance mechanisms as well as effective treatment and prevention strategies.

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**TABLE 1**

Probability estimates of binge-type transitions over 6 month intervals (full sample and diagnostic subgroups)

	None	SBE only	OBE only	Both OBE/SBE
<i>Full sample (N = 288)</i>				
None	0.75	0.12	0.07	0.05
SBE only	0.21	0.47	0.11	0.21
OBE only	0.17	0.12	0.45	0.26
Both OBE/SBE	0.09	0.21	0.27	0.43
<i>Broadly defined anorexia nervosa (n = 71)</i>				
None	0.89	0.10	0.01	0.01
SBE only	0.22	0.61	0.02	0.15
OBE only	0.04	0.12	0.68	0.16
Both OBE/SBE	0.06	0.32	0.21	0.41
<i>Broadly defined bulimia nervosa (n = 95)</i>				
None	0.69	0.22	0.06	0.10
SBE only	0.22	0.42	0.12	0.25
OBE only	0.14	0.10	0.42	0.34
Both OBE/SBE	0.08	0.17	0.27	0.48
<i>Broadly defined binge-eating disorder (n = 122)</i>				
None	0.54	0.14	0.20	0.11
SBE only	0.19	0.36	0.21	0.24
OBE only	0.20	0.13	0.44	0.23
Both OBE/SBE	0.12	0.22	0.28	0.38

Notes: SBE, subjective bulimic (binge eating) episodes; OBE, objective bulimic (binge eating) episodes.

**TABLE 2**

Frequency of binge-type pattern by individual ( $N = 288$ ) across 2 years (all other frequencies  $< 3$ )

Frequency (%)	Time 1	Time 2	Time 3	Time 4	Time 5
	Baseline	6 months	12 months	18 months	24 months
26 (9.0)	None	None	None	None	None
10 (3.5)	Both OBE/SBE	Both OBE/SBE	Both OBE/SBE	Both OBE/SBE	Both OBE/SBE
7 (2.4)	SBE only	SBE only	SBE only	SBE only	SBE only
6 (2.1)	Both OBE/SBE	Both OBE/SBE	Both OBE/SBE	SBE only	SBE only
5 (1.7)	OBE only	OBE only	OBE only	OBE only	OBE only
4 (1.4)	Both OBE/SBE	None	None	None	None
4 (1.4)	Both OBE/SBE	OBE only	OBE only	OBE only	OBE only
4 (1.4)	Both OBE/SBE	OBE only	Both OBE/SBE	Both OBE/SBE	Both OBE/SBE
4 (1.4)	Both OBE/SBE	Both OBE/SBE	OBE only	OBE only	OBE only

SBE, subjective bulimic (binge eating) episodes; OBE, objective bulimic (binge eating) episodes.