Published in final edited form as:

Int J Eat Disord. 2015 July ; 48(5): 527–531. doi:10.1002/eat.22412.

Examining Associations between Negative Urgency and Key Components of Objective Binge Episodes

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Abstract

Objective—Negative urgency (NU; tendency to act impulsively when experiencing negative emotions) is a risk factor for binge eating, although few studies have examined interviewer-assessed objective binge episodes (OBEs). Moreover, research has not investigated how NU relates to the core components of OBEs: loss of control (LOC) eating and objective overeating (OO). Understanding the relationship between NU and these core components will enhance etiologic models of eating disorder development. Thus, the current study examined associations between NU, OBEs, and the components of OBEs by comparing levels of NU in women with OBEs, LOC eating only, and OO only to women with no pathological eating.

Method—Participants were 612 women who endorsed lifetime OBEs (5.4%), LOC eating outside of OBEs (5.7%), OO only (2.8%), or none of these eating episodes (85.9%).

Results—Women with OBEs, LOC only, and OO only had significantly higher levels of NU than women without these episodes, suggesting that NU is associated with both the LOC and OO components of OBEs.

Discussion—NU relates to the spectrum of pathology present in women with OBEs. Future research should examine the mechanisms underlying these associations, including impaired behavioral/psychological control and/or increased reward sensitivity in response to negative affect.

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Disclosure of Conflict

The authors have no financial or other conflicts of interest to disclose.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIMH.

Keywords

binge eating; loss of control eating; objective overeating; negative urgency

Negative urgency (NU; tendency to act impulsively when experiencing negative emotions) is a critical trait-based risk factor for binge eating (1). NU is one of five factor-analytically derived personality pathways to impulsive behavior (2). A meta-analysis found that, of these personality pathways, NU demonstrated the strongest relationship with binge eating (3). In longitudinal research, NU prospectively predicted increases in binge eating in college women and middle school girls (4; 5), and NU shares genetic underpinnings with binge eating (6).

Importantly, most research has used questionnaire measures of binge eating in community samples (for exceptions, see 7; 8), and whether NU predicts interviewer-assessed objective binge episodes (OBEs) is unclear. Confirming relations with OBEs determined via interviews is critical, given poor convergence of interview and questionnaire measures of binge eating in non-clinical samples (9; 10). Further, research has not investigated the relationship between NU and the two defining features of OBEs: loss of control (LOC) eating and objective overeating (OO). Examining differential associations between NU and these independent binge eating components not only helps to isolate the precise mechanisms that link NU to OBEs but also has implications for a range of pathological eating issues.

Given the above, the current study compared levels of NU in women from the community with OBEs, LOC eating only, and OO only to women with no pathological eating. The study aims were to: 1) confirm that NU is associated with interviewer-assessed OBEs; and 2) examine whether NU is related to both LOC and OO components of OBEs.

METHODS

Participants

Participants were 612 same-sex female twins (ages 15–25; see Table 1) drawn from the *Twin Study of Hormones and Behavior across the Menstrual Cycle* within the Michigan State University Twin Registry (11). Given the parent study's focus on hormones, several exclusion criteria (e.g., use of hormonal contraceptives) were necessary (12). Nonetheless, participants did not meaningfully differ on binge eating or impulsivity when compared to participants from previous studies without similar exclusion criteria (average Cohen's $d = .11$). Participants were demographically representative of the recruitment region (see Table 1).

Measures

Structured Clinical Interview for *DSM-IV* Axis I Disorders (SCID-I; 13)—A modified SCID-I was used to assess lifetime presence of LOC eating and OO, with the presence of both LOC and OO indexing OBEs.¹ Modifications were made to enhance

¹For details of SCID training and reliability procedures, see 14.

symptom probes for use with a community sample (e.g., detailed assessment of food consumed during OO episodes, multiple questions assessing LOC; see Appendix A). Threshold cases met full criteria for the consumption of a large amount of food in a short period of time (i.e., 1000 calories) and/or LOC over eating (i.e., multiple behavioral and psychological indicators), with subthreshold cases at a diminished level of severity for amount of food eaten (i.e., 600–999 calories) or LOC (i.e., fewer behavioral indicators but significant psychological distress). Caloric thresholds were based on OO definitions employed in previous research (i.e., 1000 calories) (15) as well as data on the largest amount of food most women consume before classifying the amount as unusually large (i.e., 413–1074 calories across food types) (16).

Thirty-three (5.4%) women met threshold or subthreshold criteria for lifetime OBEs, 35 (5.7%) women endorsed LOC eating over normal amounts of food, and 18 (2.9%) women described discrete OO episodes without LOC. Women who denied these behaviors (526/612; 85.9%) were classified as the “no pathological eating (PE)” group. Inter-rater reliability estimates for OBEs, LOC, and OO were excellent (κ 's = .78–.87), and women with interviewer-assessed OBEs had significantly higher scores on validated self-report measures of binge eating (e.g., Eating Disorder Examination-Questionnaire) than those without OBEs (t 's = 5.50–8.97; p 's < .001). Further, the presence of OBEs was associated with significant impairment: 91% endorsed significant disgust, depression, or guilt after OBEs, and 59% reported marked distress over binge eating. The majority endorsed undue influence of weight/shape on self-evaluation (81.8%), and 66.7% met threshold or subthreshold (i.e. all diagnostic criteria endorsed, but one or two symptoms present at a subthreshold level; e.g., OBEs 2x/month for 1 year) criteria for bulimia nervosa (BN) or binge eating disorder.

The UPPS-P Impulsive Behavior Scale (17)—The UPPS-P is a self-report questionnaire assessing five impulsive personality traits, defined as an individual's typical pattern of thinking/acting. Twelve items assess NU (example: When I am upset, I often act without thinking). Items are rated on a 4-point scale (disagree strongly-agree strongly), and are averaged to obtain a NU score (range: 1 to 4; α = .86).

Body mass index (BMI)—BMI (weight (in kilograms)/height (in meters) squared) was calculated from weight and height measured using a digital scale and wall-mounted ruler, respectively.

Statistical Analyses

Generalized linear mixed models (GLMMs) were used to compare the PE groups on demographic and clinical characteristics as well as on NU. GLMMs account for the non-independent twin data by nesting a level 1 variable (individual) within a level 2 variable (family). GLMM linear regressions (normal distribution with identity link) and binary logistic regressions (binomial distribution with logit link) were used to examine continuous and categorical outcomes, respectively. To examine differences in NU, PE group was entered as a four-level independent variable, and NU was the dependent variable. Given group differences on BMI (see below), BMI was covaried.

RESULTS

Table 1 presents demographic and clinical characteristics for the four PE groups. Groups significantly differed on BMI, with the OBE group having the highest BMI and the OO group having the lowest BMI. Average monthly frequency of PE episodes was significantly higher in the OBE compared to the OO group. Notably, 93% of participants with PE episodes reported at least monthly episodes when they were most frequent.

Table 2 presents mean levels of NU across the four PE groups. Consistent with research in eating disorder samples (7; 8), NU was significantly higher in women with OBEs compared to women without PE ($d = .84$). Women with LOC only and OO only also had significantly elevated levels of NU compared to the no PE group (d 's = .76 and .59, respectively), suggesting that both LOC and OO are related to NU.^{2,3,4}

DISCUSSION

This study extends previous research by examining: 1) the relationship between NU and interviewer-assessed OBEs, and 2) both LOC eating and OO components of OBEs. In a large community sample, we found that groups of women endorsing lifetime OBEs, LOC eating in the absence of OO, and OO unaccompanied by LOC all had significantly higher levels of NU than women without PE. In addition to confirming that NU is associated with OBEs, findings suggest that both core features of binge eating are related to a tendency to act impulsively when experiencing negative emotions.

It is possible that relationships between LOC eating and NU reflect impairments in behavioral control over eating when upset, whereas OO-NU associations may represent increased sensitivity to rewarding effects of food in the presence of negative affect. Brain regions involved in inhibitory control and reward sensitivity are altered in individuals with binge eating (18), and initial evidence suggests that negative affect may increase the rewarding value of food in individuals with BN (19). However, these food-related processes have not been directly connected to NU. Future psychobiological research should investigate the mechanisms linking NU to LOC and OO using neurocognitive tasks and neuroimaging.

In addition to advancing our understanding of NU-OBE associations, findings are relevant for other dysregulated eating behaviors. LOC eating, independent of amount of food consumed, is associated with impairment and comorbidity (20), and NU may influence the development of LOC eating and associated eating disorders (e.g., purging disorder; 18). Further, NU's effects on OO may relate to obesity and constructs such as "food addiction" (21). Future studies using longitudinal designs can clarify whether NU increases risk for the dysregulated eating spectrum.

²We also examined whether NU levels were greater in women reporting any LOC (i.e., with or without OO; $n = 68/612$; 11.1%) or any OO (i.e., with or without LOC; $n = 51/612$; 8.3%). Consistent with results reported in the text, women in these revised categories had significantly higher NU scores than women with no PE (r 's = 5.32–6.84; p 's < .001).

³Given the large discrepancy in sample size for the no PE group compared to the three PE groups, we conducted a post-hoc analysis in which we randomly selected 35 participants without PE. Similar to analyses in the full sample, the 35 randomly selected participants without PE had significantly lower levels of NU than women with OBEs, LOC, and OO (F (df) = 7.23 (3, 117); $p < .001$).

⁴A post-hoc analysis revealed an identical pattern of results when only women with current PE were included in analyses (data available upon request).

Our study has several strengths. First, our interview assessment of OBEs confirms and extends most previous research that has examined NU-binge eating associations using questionnaires. Second, our large community sample contained a sufficient number of individuals to fully dissociate LOC and OO components of OBEs. Finally, demonstrating elevated NU in non-treatment seeking women with OBEs confirms findings from treatment-seeking samples (8) and is critical, given that maladaptive personality traits are elevated in treatment-seeking compared to non-treatment seeking individuals with eating disorders (22).

Limitations include the relatively small size of the PE groups, especially in comparison to the no PE group. Future studies with larger samples are needed to confirm differences between PE and no PE groups and to examine potential differences among PE groups, as our study was under-powered for the latter. Further, our cross-sectional design precludes drawing conclusions about whether NU prospectively predicts interviewer-assessed OBEs, LOC, or OO. Given that participants were predominantly Caucasian females, results may not generalize to males and racial/ethnic minorities. Finally, categorical assessments of LOC and OO limited our ability to investigate relationships between NU and the full spectrum of these symptom dimensions. Future research that examines frequency of these eating episodes and that uses continuous symptom assessments (e.g., 23) will further enhance our understanding of the risk posed by NU for pathological eating.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This research was supported by grants from the National Institute of Mental Health (NIMH; R01 MH082054 to Drs. Klump, Burt, Keel, Sisk, Neale & Boker and T32 MH018269 to Dr. Racine).

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Table 1
Demographic and Clinical Characteristics of the No Pathological Eating and Pathological Eating Groups.

	No PE (N=526)	OBEs (N=33)	LOC only (N=35)	OO only (N=18)	F (df)
Age					0.03 (3, 608)
M (S.E.)	17.95 (0.12)	17.97 (0.14)	17.96 (0.14)	17.94 (0.16)	
Range	15–25	15–24	16–22	15–24	
Race, n (%)					1.06 (3, 608)
Caucasian	430 (81.7)	31 (93.9)	32 (91.4)	15 (83.3)	
African/American	64 (12.2)	0	2 (5.7)	3 (16.7)	
Asian/Pacific Islander	3 (0.6)	1 (3.0)	0	0	
Native American	2 (0.4)	0	0	0	
Multiracial	27 (5.1)	1 (3.0)	1 (2.9)	0	
Ethnicity, n (%)					0.53 (3, 608)
Non-Hispanic	481 (91.4)	30 (90.9)	30 (85.7)	18 (100.0)	
Hispanic	45 (8.6)	3 (9.1)	5 (14.3)	0	
Body mass index					4.13 (3, 597)**
M (S.E.)	23.56 (0.30) _a	25.24 (0.71) _b	23.24 (0.66) _{a,c}	21.62 (0.87) _c	
Range	15.41–46.06	18.17–46.49	15.64–39.88	17.15–34.20	
PE Frequency (per month)					2.48 (2, 79)
M (S.E.)	--	11.10 (1.50) _a	8.09 (1.49) _{a,b}	5.57 (2.12) _b	
Median (MAD)	--	12.00 (8.00)	4.00 (3.00)	4.00 (2.50)	
Range		0.50–44	0.08–28	1–20	
Threshold Status, n (%)					1.43 (2, 83)
Threshold Case	--	16 (48.5)	25 (71.4)	8 (44.4)	
Subthreshold Case	--	17 (51.5)	10 (28.6)	10 (55.6)	
Current Status, n (%)					0.26 (2, 80)
Current Symptoms	--	24 (72.7)	23 (65.7)	11 (61.1)	
Past Symptoms	--	9 (27.3)	12 (34.3)	7 (38.9)	

Note. PE = pathological eating; OBEs = objective binge episodes; LOC = loss of control over eating; OO = objective overeating; Groups were compared using Generalized Linear Mixed Models in order to account for the non-independence of the twin data. Alphabetic subscripts that differ represent pairwise differences between the groups at $p < .05$.

 $p < .01$

Table 2
Levels of Negative Urgency in the No Pathological Eating and Pathological Eating Groups.

	No PE (N=526)	OBEs (N=33)	LOC only (N=35)	OO only (N=18)	F (df)
Negative Urgency					18.35 (3, 593)***
M (S.E)	1.98 (0.03) _a	2.49 (0.09) _b	2.45 (0.09) _b	2.34 (0.12) _b	
Range	1.00–3.50	1.25–3.42	1.00–3.58	1.33–3.67	

Note. PE = pathological eating; OBEs = objective binge episodes; LOC = loss of control over eating; OO = objective overeating; Groups were compared using Generalized Linear Mixed Models in order to account for the non-independence of the twin data. Body mass index was included as a covariate. Alphabetic subscripts that differ represent pairwise differences between the groups at $p < .05$.

 $p < .001$