



BRIEF REPORT

International Journal of
EATING DISORDERS

Food insecurity and bulimia nervosa in the United States

Janet A. Lydecker PhD¹ | Carlos M. Grilo PhD^{1,2} ¹Department of Psychiatry, Yale School of Medicine, New Haven, CT²Department of Psychology, Yale University, New Haven, CT

Correspondence

Janet A. Lydecker, Yale School of Medicine,
301 Cedar Street, New Haven, CT 06519.
Email: janet.lydecker@yale.edu

Funding information

National Institute of Diabetes and Digestive
and Kidney Diseases, Grant/Award Number:
K24 DK070052

Abstract

Background: Food insecurity occurs when access to food is limited by financial hardship. Yet, paradoxically, food insecurity is associated with overeating, with emerging evidence that it may be related to disordered eating. A recent report found that food insecurity was associated with binge-eating disorder (BED), but it is not yet known whether food insecurity is also associated with bulimia nervosa (BN).

Methods: Participants were 873 respondents recruited online who completed a battery of established measures and were categorized into three study groups: healthy-weight (HW), BED, and BN. Hierarchical logistic regressions evaluated the extent to which low and very low food security were associated with BN compared with HW and BED study groups.

Results: Low and very low food security were both associated with increased likelihood of BN group membership compared with HW but not BED.

Conclusions: Our findings suggest that food insecurity is associated with BN and also suggest that food insecurity's association with BN is similar to that for BED. These findings highlight the need for greater clinical and research attention to associations between food insecurity and eating disorders that include binge eating to inform eating-disorder prevention and treatment.

KEYWORDS

binge eating, binge-eating disorder, bulimia nervosa, food insecurity, overeating, weight

1 | INTRODUCTION

Food insecurity is "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" (Bickel, Nord, Price, Hamilton, & Cook, 2000). Food insecurity can change dietary patterns because of perceptions of the amount or quality of food available to members of a household. Food insecurity may also have a cyclical pattern where access to food is limited and then abundant (e.g., due to paycheck or food stamp timing; Bruening, MacLehose, Loth, Story, & Neumark-Sztainer, 2012). The cycle of dietary restriction and overconsumption is also characteristic of binge eating in both bulimia nervosa (BN) and binge-eating disorder (BED), although dietary restriction is traditionally conceptualized as internally-motivated for weight loss (Fairburn, 2008). We recently reported, in a survey study of 1,251 US adults, that food insecurity was associated

with BED and obesity (without comorbid eating disorders; Rasmussen, Lydecker, Coffino, White, & Grilo, 2018). A previous study of 503 adults seeking food from food pantries reported that food-insecurity severity was associated with binge-eating frequency, eating-disorder psychopathology, and compensatory-behavior frequency (vomiting, laxative/diuretic use, and excessive exercise; Becker, Middlemass, Taylor, Johnson, & Gomez, 2017).

Despite the potential overlap in function between restriction related to food insecurity and internally-motivated restriction for weight loss, and research reporting associations with BED (Rasmussen et al., 2018) and weight-compensatory behaviors (Becker et al., 2017), no research has investigated whether food insecurity is related to BN as defined by the *Diagnostic and Statistical Manual for Mental Health Disorders, 5th edition* (DSM-5; American Psychiatric Association, 2013). Thus, the current study aimed to extend our previously published work (Rasmussen et al., 2018) by examining the relationship between food insecurity and

BN. We hypothesized that food insecurity would be associated with membership in the BN study group compared with HW and further hypothesized that this relation would persist after adjusting for demographic characteristics (age, sex, education, and race/ethnicity). We also sought to explore whether food-security status was associated with membership in BN compared with BED study groups.

2 | METHODS

2.1 | Participants

Survey respondents ($N = 873$) were English- and Spanish-speaking individuals from the U.S. who responded to an advertisement to “share your opinions about eating, weight, and health” (“encuesta sobre la alimentación, el peso y la salud”) on Mechanical Turk and completed measures in English or Spanish. All participants were assessed concurrently. Mechanical Turk yields data with comparable reliability and validity as other recruitment sources such as psychology student subject pools (Buhrmester, Kwang, & Gosling, 2011) and has been used in many studies, including those focusing on food security (Darling, Sato, van Dulmen, Flessner, & Putt, 2018; Leung, Musicus, Willett, & Rimm, 2017). The current study was restricted to U.S. respondents due to potentially contrasting food environments between the U.S. and other countries. The study was approved by the institutional review board. All participants provided informed consent prior to the online survey.

2.2 | Measures

2.2.1 | Measure of food security

The *USDA Household Food Security Survey Module: Six-Item Short Form* assessed financial influences on food consumption over the previous 12 months. Item-level scoring as described in the original measure (National Center for Health Statistics, 2008) characterized respondents as: “food secure” (no signs of difficulty affording regular, nutritious meals; total = 0–1), “low food security” (modified food quality, variety, or desirability to satisfy hunger; total = 2–4), and “very low food security” (reduced food adequacy or quality to the point of repeated instances of physiological hunger; total = 5–6).

2.2.2 | Measures of eating-disorder features

The *Questionnaire on Eating and Weight Patterns-5* (QEWP-5) assessed eating-disorder behaviors and cognitive features aligned with DSM-5 diagnoses of BN and BED (Yanovski, Marcus, Wadden, & Walsh, 2015). The QEWP-5 followed the QEWP-R (developed for DSM-IV), which demonstrated adequate validity discriminating between individuals with and without binge eating in community (Nangle, Johnson, Carr-Nangle, & Engler, 1994) and primary care (Barnes, Masheb, White, & Grilo, 2011) settings. The Spanish-language version (S-QEWP-R; Elder, Paris, Anez, & Grilo, 2008) updated as S-QEWP-5, was used for Spanish-speaking participants. The binge-eating frequency item from the *Eating Disorder Examination-Questionnaire* (EDE-Q; Fairburn & Beglin, 1994), also available

in Spanish-language version (Elder & Grilo, 2007), assessed objective binge-eating frequency over the previous 28 days.

2.3 | Algorithms

Study groups were created using QEWP-5 and body mass index (BMI; calculated from self-reported height and weight). Figure 1 depicts the creation of study groups. BED study group criteria were: at least weekly binge-eating episodes (eating an unusually large amount of food and perceiving eating to be out of control) over the past 3 months (“1 episode per week” through “14 or more episodes per week”), at least moderate distress about overeating and feeling out of control (“moderately” through “extremely”), and denial of weekly compensatory behaviors over the past 3 months. Individuals in the BED group did not have BMI limitations. BN study group criteria were: at least weekly binge-eating episodes over the past 3 months (“1 episode per week” through “14 or more episodes per week”), at least weekly compensatory behaviors over the past 3 months (vomiting, laxative misuse, diuretic misuse, fasting, excessive exercise, diet pill misuse; “1 episode per week” through “14 or more episodes per week”), at least moderate overvaluation of weight and shape (“among the main things” or “the most important things”), and BMI >18.5 kg/m². Individuals in the healthy-weight group denied weekly binge eating (“no” or “less than 1 episode per week”), compensatory behaviors, and had a BMI 18.5–24.9 kg/m². The majority of participants in the BN study group reported distress about binge eating ($n = 69$ of 78), although this was not an exclusion factor in algorithms because it is not in DSM-5 diagnostic criteria.

2.4 | Statistical analysis

Differences in participant characteristics by group (HW, BED, and BN) were examined using chi-square tests for categorical variables (sex, education level, and race/ethnicity) and analyses of variance (ANOVAs) for

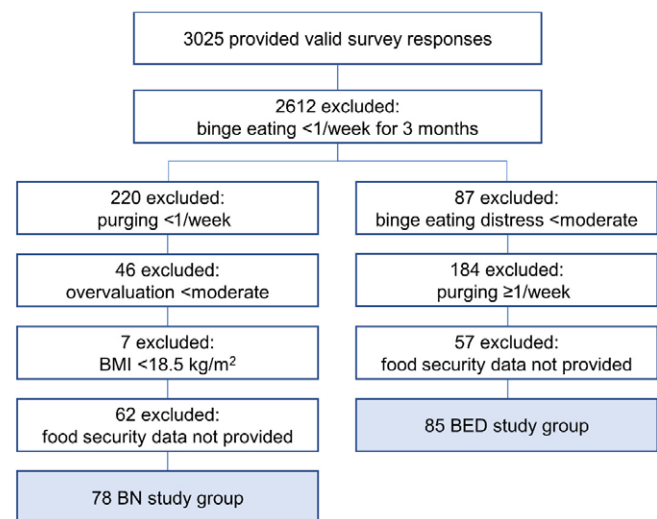


FIGURE 1 Inclusion and exclusion from bulimia nervosa and binge-eating disorder study groups [Color figure can be viewed at wileyonlinelibrary.com]

continuous variables (age and BMI). Chi-square tests assessed associations between study groups and food-security status (food security, low food security, and very low food security). Hierarchical logistic regressions evaluated associations between food-security status (food security, low food security, and very low food security) and study groups (HW vs. BN group and BED vs. BN group) after adjusting for variance due to age, sex, education, and race/ethnicity. Reference groups for categorical variables were male (sex), high school (education), non-Hispanic White (race/ethnicity), and food security (food-security status).

3 | RESULTS

The participant group had 873 individuals categorized as HW ($n = 710$), BED ($n = 85$), and BN ($n = 78$). Data on HW and BED groups were previously published (Rasmussen et al., 2018) but are used here to provide relevant comparison groups for analyses of food security and BN. Table 1 summarizes differences across HW, BED, and BN groups.

Both low and very low food security were significantly more common in the BN study group than HW but did not differ significantly from BED. Within the BN study group, 28.2% ($n = 22$) of respondents had low food security and 25.6% ($n = 20$) of respondents had very low food security.

Overall, individuals with very low food security ($M = 2.20$, $SD = 5.65$; $p = .032$) and low food security ($M = 2.56$, $SD = 5.25$; $p = .001$) had greater binge-eating frequency than individuals with food security ($M = 1.24$, $SD = 4.06$), $F(2,870) = 6.48$, $p = .002$, $\eta_p^2 = .015$. Binge-eating frequency did not differ significantly by food-security status within the BN study group ($ps > .05$).

Hierarchical logistic regressions evaluated the extent to which low and very low food security contributed to study group classification and are summarized in Table 2 (BN vs. HW; BN vs. BED). Sex, age,

education, and race/ethnicity were entered in Step 1. Food-security status was entered in Step 2 (reference group: food security). Low food security (OR 2.48, CI 1.39–4.42) and very low food security (OR 3.06, CI 1.64–5.70) were associated with BN compared with HW and made a significant contribution beyond demographic variables entered in Step 1, $\chi^2(2) = 16.20$, $p < .001$. Neither low food security (OR 1.05, CI 0.48–2.27) nor very low food security (OR 1.77, CI 0.75–4.16) was associated with increased likelihood of BN group membership compared with BED.

4 | DISCUSSION

Previous studies, conducted with different participant groups in the US, reported that food insecurity was associated with binge eating (Becker et al., 2017; Bruening et al., 2012) and was unexpectedly associated with weight-compensatory behaviors (Becker et al., 2017). Our previous study extended this new emerging literature by finding that low and very low food securities were significantly associated with both BED and obesity versus a healthy-weight comparison group (Rasmussen et al., 2018). Findings from the current study extend earlier work further by showing that food insecurity is associated with BN as well as greater binge-eating frequency. Our findings that food-security status did not distinguish between BN and BED study groups, together with previous findings that food-security status for BED versus HW had effect sizes that were similar to those for food-security status and BN versus HW in the current study, suggest that the association of food insecurity with BN is similar to its association with BED.

Individuals with low and very low food security were more likely to be classified in the BN study group compared with the HW *but not* BED comparison group. Our findings extend the previous study by

TABLE 1 Demographic characteristics of participants in bulimia nervosa, binge-eating disorder, and healthy-weight groups

Characteristic	BN ($n = 78$)	BED ($n = 85$)	HW ($n = 710$)	p^a	Post hoc tests ^b
Age (years)	31.58 \pm 9.64	34.44 \pm 10.15	34.16 \pm 11.29	.134	ns
Sex				.561	
Male	24 (30.77%)	23 (27.06%)	232 (32.68%)		ns
Female	54 (69.23%)	62 (72.94%)	478 (67.32%)		ns
Ethnicity				.004	
Non-Hispanic White	44 (56.41%)	62 (72.94%)	461 (64.93%)		BN < BED
Hispanic/Latino	28 (35.90%)	18 (21.18%)	146 (20.56%)		BN > HW, BED
Non-Hispanic other	6 (7.69%)	5 (5.88%)	103 (14.51%)		HW > BED
BMI (kg/m^2)	30.82 \pm 9.25	33.41 \pm 8.54	22.12 \pm 1.71	<.001	BED > BN > HW
Education				.291	
High school	14 (19.95%)	10 (11.76%)	76 (10.70%)		ns
Some college	22 (28.21%)	33 (38.82%)	225 (31.69%)		ns
College degree	29 (37.18%)	32 (37.65%)	272 (38.31%)		ns
Post-college	13 (16.67%)	10 (11.76%)	137 (19.30%)		ns

Note. Table values are mean \pm SD for continuous variables and n (column %) for categorical variables. BN = bulimia nervosa; BED = binge-eating disorder; HW = healthy weight (noneating-disordered); BMI = body mass index. BMI was calculated using self-reported height and weight.

^a p value is for ANOVA (continuous variables) or chi-square test (categorical variables).

^bPost-hoc tests for continuous variables used a Tukey HSD correction for multiple comparisons; ns = not significant.

TABLE 2 Hierarchical logistic regression: Multivariable associations between food-security status, binge-eating disorder, and bulimia nervosa

	Step 1		Step 2	
	<i>p</i>	OR (95% CI)	<i>p</i>	OR (95% CI)
HW versus BN				
Female	.594	1.15 (0.69–1.92)	.625	1.14 (0.68–1.92)
Age	.075	0.98 (0.95–1.00)	.144	0.98 (0.96–1.01)
Hispanic	.010	1.97 (1.17–3.32)	.011	1.99 (1.17–3.37)
Non-Hispanic/non-White	.221	0.58 (0.24–1.39)	.191	0.55 (0.23–1.35)
Some college	.042	0.47 (0.23–0.97)	.079	0.51 (0.24–1.08)
College	.131	0.59 (0.29–1.17)	.468	0.77 (0.37–1.58)
Post-college	.143	0.54 (0.24–1.23)	.400	0.70 (0.30–1.61)
Low food security			.002	2.48 (1.39–4.42)
Very low food security			<.001	3.06 (1.64–5.70)
BED versus BN				
Female	.704	1.15 (0.55–2.40)	.637	1.19 (0.57–2.49)
Age	.091	0.97 (0.94–1.01)	.092	0.97 (0.94–1.01)
Hispanic	.029	2.36 (1.09–5.08)	.021	2.50 (1.15–5.44)
Non-Hispanic/non-White	.405	1.72 (0.48–6.15)	.372	1.79 (0.50–6.41)
Some college	.060	0.37 (0.13–1.04)	.076	0.39 (0.14–1.10)
College	.360	0.63 (0.24–1.69)	.546	0.73 (0.27–2.01)
Post-college	.762	0.83 (0.25–2.73)	.959	0.97 (0.29–3.25)
Low food security			.908	1.05 (0.48–2.27)
Very low food security			.191	1.77 (0.75–4.16)

Note. Step 1 variables included sex, age, race/ethnicity, and education level. Food insecurity variables (low and very low food security) were entered in Step 2 to assess whether they influenced BN group membership above and beyond the effect of demographic variables entered previously. Bolded values indicate significance, $p < .05$. Reference groups for categorical variables were male (sex), White (race/ethnicity), high school (education), and food security (food insecurity).

Becker et al. (2017) that reported associations between food insecurity severity and weight-compensatory behaviors among food pantry users that were contrary to their hypotheses; specifically, our findings suggest significant associations with BN relative to a HW control. Interestingly, our analyses revealed that neither low nor very low food security was associated with BN relative to the BED comparison group. This suggests that food insecurity may not necessarily contribute to the presence/absence of compensatory behaviors, and other factors may distinguish those who binge from those who binge and purge. Future research should investigate how patients perceive the function of weight-compensatory behaviors.

Our findings here suggest that restriction, even when stemming from food insecurity, might play a role in increasing or maintaining binge eating and BN psychopathology. We emphasize, however, that our findings are cross-sectional and preclude statements about directionality or causality and that longitudinal research is needed to better understand these associations. Moreover, study groups contained respondents who reported core features of BN and BED on established self-report questionnaires, but diagnoses were not confirmed with a clinical interview. Eating-disorder psychopathology and food insecurity were self-reported; however, research suggests that the current study's measures converge reasonably well with clinician assessments (Berg et al., 2012; Elder &

Grilo, 2007; Keenan, Olson, Hersey, & Parmer, 2001). Moreover, there are relative strengths and limitations to both self-report and interview assessments for capturing different aspects of eating behaviors (Udo & Grilo, 2018). Notably, generalizability to those outside of the US is uncertain, and generalizability to the US population is limited because our sample was an internet community sample and not nationally representative.

With the above caveats in mind, we cautiously suggest that food insecurity has the potential to complicate treatment for BN or BED. Indeed, the "food-stamp cycle" as a potential mechanism for the association between food insecurity and binge eating suggests that cyclical access to food may inadvertently help to maintain disordered eating by impeding regular eating patterns (Cook, 2002; Dinour, Bergen, & Yeh, 2007). Future clinical research should address prevention and intervention for food-insecure individuals who might be vulnerable to BN and BED, as well as whether current treatments for BN and BED need to be adapted beyond assessing for food insecurity (e.g., additional problem-solving around regular access to meals).

In summary, our findings suggest that low and very low food security are associated with BN but do not distinguish between BN and BED study groups. These findings emphasize food insecurity as a pressing public health issue with the potential to harm the mental health of low-income Americans. Therefore, policy-makers and health-care

professionals should be aware of food insecurity and its potential to complicate prevention and intervention efforts with individuals with eating disorders; these findings contribute to the ongoing and increasing dialogue about the global burden of food insecurity (Perez-Escamilla, 2017). Development of preventative interventions and evaluation of the effectiveness of psychiatric treatments for eating disorders in this vulnerable group of individuals facing food insecurity is a key clinical research and health care priority.

ACKNOWLEDGMENTS

This research was supported, in part, by National Institutes of Health grant K24 DK070052. The authors report no conflicts of interest.

ORCID

Janet A. Lydecker  <https://orcid.org/0000-0001-6425-514X>

Carlos M. Grilo  <https://orcid.org/0000-0003-0245-3444>

REFERENCES

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Barnes, R. D., Masheb, R. M., White, M. A., & Grilo, C. M. (2011). Comparison of methods for identifying and assessing obese patients with binge eating disorder in primary care settings. *International Journal of Eating Disorders*, 44, 157–163. <https://doi.org/10.1002/eat.20802>
- Becker, C. B., Middlemass, K., Taylor, B., Johnson, C., & Gomez, F. (2017). Food insecurity and eating disorder pathology. *International Journal of Eating Disorders*, 50, 1031–1040. <https://doi.org/10.1002/eat.22735>
- Berg, K. C., Stiles-Shields, E. C., Swanson, S. A., Peterson, C. B., Lebow, J., & Le Grange, D. (2012). Diagnostic concordance of the interview and questionnaire versions of the eating disorder examination. *International Journal of Eating Disorders*, 45, 850–855. <https://doi.org/10.1002/eat.20948>
- Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. T. (2000). *Guide to measuring household food security*. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service.
- Bruening, M., MacLehose, R., Loth, K., Story, M., & Neumark-Sztainer, D. (2012). Feeding a family in a recession: Food insecurity among Minnesota parents. *American Journal of Public Health*, 102, 520–526. <https://doi.org/10.2105/AJPH.2011.300390>
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, 6, 3–5. <https://doi.org/10.1177/1745691610393980>
- Cook, J. T. (2002). Clinical implications of household food security: Definitions, monitoring, and policy. *Nutrition in Clinical Care*, 5, 152–167.
- Darling, K. E., Sato, A. F., van Dulmen, M., Flessner, C., & Putt, G. (2018). Development of a measure to assess parent perceptions of barriers to child weight management. *Childhood Obesity*, 14, 89–98. <https://doi.org/10.1089/chi.2017.0171>
- Dinour, L. M., Bergen, D., & Yeh, M. C. (2007). The food insecurity-obesity paradox: A review of the literature and the role food stamps may play. *Journal of the American Dietetic Association*, 107, 1952–1961. <https://doi.org/10.1016/j.jada.2007.08.006>
- Elder, K. A., & Grilo, C. M. (2007). The Spanish language version of the eating disorder examination questionnaire: Comparison with the Spanish language version of the eating disorder examination and test-retest reliability. *Behaviour Research and Therapy*, 45, 1369–1377. <https://doi.org/10.1016/j.brat.2006.08.012>
- Elder, K. A., Paris, M., Anez, L. M., & Grilo, C. M. (2008). Loss of control over eating is associated with eating disorder psychopathology in a community sample of Latinas. *Eating Behaviors*, 9, 501–503. <https://doi.org/10.1016/j.eatbeh.2008.04.003>
- Fairburn, C. G. (2008). *Cognitive behavior therapy and eating disorders*. New York: Guilford Press.
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, 16, 363–371.
- Keenan, D. P., Olson, C., Hersey, J. C., & Parmer, S. M. (2001). Measures of food insecurity/security. *Journal of Nutrition Education*, 33(Suppl 1), S49–S58.
- Leung, C. W., Musicus, A. A., Willett, W. C., & Rimm, E. B. (2017). Improving the nutritional impact of the supplemental nutrition assistance program: Perspectives from the participants. *American Journal of Preventive Medicine*, 52, S193–S198. <https://doi.org/10.1016/j.amepre.2016.07.024>
- Nangle, D. W., Johnson, W. G., Carr-Nangle, R. E., & Engler, L. B. (1994). Binge eating disorder and the proposed DSM-IV criteria: Psychometric analysis of the questionnaire of eating and weight patterns. *International Journal of Eating Disorders*, 16, 147–157.
- National Center for Health Statistics. (2008). *US Household Food Security Survey Module: Six-Item Short Form*. Hyattsville, MD: National Center for Health Statistics.
- Perez-Escamilla, R. (2017). Food security and the 2015-2030 sustainable development goals: From human to planetary health: Perspectives and opinions. *Current Developments in Nutrition*, 1, e000513. <https://doi.org/10.3945/cdn.117.000513>
- Rasmussen, G., Lydecker, J. A., Coffino, J. A., White, M. A., & Grilo, C. M. (2018). Household food insecurity is associated with binge-eating disorder and obesity. *International Journal of Eating Disorders*, 52, 28–35. <https://doi.org/10.1002/eat.22990>
- Udo, T., & Grilo, C. M. (2018). Reply to: Insight may limit identification of eating disorders. *Biological Psychiatry*. <https://doi.org/10.1016/j.biopsych.2018.11.014>
- Yanovski, S. Z., Marcus, M. D., Wadden, T. A., & Walsh, B. T. (2015). The questionnaire on eating and weight Patterns-5: An updated screening instrument for binge eating disorder. *International Journal of Eating Disorders*, 48, 259–261. <https://doi.org/10.1002/eat.22372>

How to cite this article: Lydecker JA, Grilo CM. Food insecurity and bulimia nervosa in the United States. *Int J Eat Disord*. 2019;1–5. <https://doi.org/10.1002/eat.23074>