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Family mealtime negativity and adolescent binge-eating: A replication and extension study in a community sample

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Abstract

Objective: To explore differences in family mealtime characteristics and family mealtime emotions among adolescents who report engaging in binge-eating in comparison to those who do not.

Method: Adolescents (N=495) recruited from UK schools/colleges reported on their family mealtime frequency and atmosphere, family mealtime emotions, anxiety, depression and eating psychopathology.

Results: No significant differences were found between adolescents who reported binge-eating (n=32 boys; n=82 girls) and those who did not (n=196 boys; n=185 girls) on family mealtime frequency or mealtime atmosphere scores. However, boys and girls who binge-eat reported significantly lower levels of positive family mealtime emotions and significantly higher levels of family mealtime anxiety and anger (girls only), compared with their peers who did not report binge-eating.

Discussion: Adolescents who binge-eat experience significantly greater negative emotional responses to family mealtimes than their peers. Further research should explore *why* these experiences are more negative, including broader familial factors and interactions.

Keywords: Mealtime emotions; Disordered eating; Anxiety; Anger; Family meals

Family mealtime negativity and adolescent binge-eating: A replication and extension study in a community sample

1. Introduction

Binge Eating Disorder (BED) has the highest lifetime prevalence of any eating disorder among adolescents (Smink, van Hoeken, Oldehinkel, & Hoek, 2014). However, many adolescents engage in binge-eating at a lower, sub-clinical level (e.g., Touchette et al., 2011). Engaging in binge-eating episodes during adolescence has been associated with dieting, unhealthy weight control behaviors and depression (e.g., Neumark-Sztainer et al., 2007) and is a risk factor for overweight/obesity (Sonneville et al., 2013). Binge-eating can persist into adulthood (Goldschmidt, Wall, Zhang, Loth & Neumark-Sztainer, 2016). Consequently, it is important to increase understanding of the factors which may be associated with this eating behavior among adolescents.

The interpersonal model of binge-eating (Wilfley, MacKenzie, Welch, Ayres & Weissman, 2000) postulates that social problems can cause negative affect which then leads to binge-eating or loss of control (LOC) eating to relieve that affect (Elliott et al., 2010). One pertinent social situation is family mealtimes which have been associated with adolescent emotion and psychopathology (White et al., 2015).

While family mealtimes are typically beneficial for adolescents (e.g., Neumark-Sztainer, Wall, Story & Fulkerson, 2004), no significant links have been reported between family mealtime frequency or atmosphere (perception of enjoyment and communication) and adolescent binge-eating (e.g., Gan, Mohamad, & Law, 2018; Neumark-Sztainer et al., 2004; Sierra-Baigrie, Lemos-Giráldez, & Fonseca-Pedrero, 2009). The lack of significant findings could suggest that family mealtimes are not important with respect to adolescent binge-eating. However, it is plausible that important components of family mealtimes have not been considered. Family mealtimes are multidimensional experiences which might not be adequately captured via assessments that simply focus on how often they occur or a teen's

perception of enjoyment and communication. The importance of exploring feelings about mealtimes as a potential factor related to health and weight outcomes has already been outlined (Skeer, Sonnevile, Deshpande, Goodridge & Folta, 2018), and, given the importance of negative affect in relation to binge-eating (e.g., Haedt-Matt & Keel, 2011), this makes a compelling case for why emotions related to the mealtimes should be considered.

Different patterns of affect are related to different eating experiences among young women who binge-eat (Deaver, Miltenberger, Smyth, Meidinger & Crosby, 2003). Specifically, during a “regular” meal, the level of affect (assessed as a rating of pleasure-displeasure) is more negative among women who binge-eat than controls (Deaver et al., 2003). This could suggest that other eating environments (outside binge-eating episodes), such as mealtimes, may be more emotional experiences for individuals who binge-eat. However, Deaver et al. (2003) provide little information about what constitutes a “regular” meal and, specifically, who is present. During shared family meals, it has been reported that adolescents experience a range of emotions, including positive and negative (anxiety-related and anger-related) mealtime emotions (White et al., 2015). Little is known about the emotional experiences of family mealtimes within the context of adolescent binge-eating.

In summary, previous research has found no relationships between family meal frequency or atmosphere with binge-eating, but these have not focused on emotions and it remains unclear whether adolescents who binge-eat emotionally experience family mealtimes differently from those who do not binge-eat. Therefore, this study aims, first, to replicate past research and examine differences in family mealtime frequency and atmosphere between adolescents who report binge-eating versus those who do not. It is hypothesised that family mealtime frequency or atmosphere will not differentiate the two groups. The second aim is to extend past research and explore family mealtime emotions (positive and negative) among adolescents with and without binge-eating. It is hypothesised that those who binge-eat will report more negative and less positive family mealtime emotions compared to those who do not binge-eat.

2. Method

2.1. Participants

Adolescents (N=495; 228 boys, 267 girls; mean age 15.9 years (range=14.5-18.6; SD=1.11) recruited from five UK secondary schools and sixth form colleges participated. This included 22 participants who reported currently or previously seeking help or receiving treatment for their eating behaviour; eight of whom reported receiving an eating disorder diagnosis. The sample was predominantly White British/White Other (78.5%). Mean self-reported BMI Z-score was 0.05 (n=340; range=-6.68-4.17; SD=1.25), indicating generally healthy BMIs.

2.2. Measures and procedures

Following institutional ethical approval, parental consent was sought for participants under 18 (via opt-out letters sent to parents, or the school/college providing consent in loco parentis). Participants themselves provided informed consent before completing the following measures online or on paper.

2.2.1. Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008)

The EDE-Q version 6.0 comprises 22 attitudinal questions and six questions assessing key eating disordered behaviors (e.g., objective binge-eating episodes, laxative misuse). An alternative factor structure has been proposed for use in research with adolescents (White, Haycraft, Goodwin, & Meyer, 2014) which comprises three subscales: Shape and Weight Concern (10 items); Restriction (5 items); and Preoccupation and Eating Concern (7 items). Higher scores indicate greater levels of eating psychopathology. A global score can be calculated using the mean of the subscale scores. Reliability in the current sample was very good ($\alpha > 0.87$) for all subscales.

2.2.2. Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983)

There are 14 questions in the HADS comprising two seven-item subscales; one relating to Anxiety and one to Depression. Higher scores indicate higher levels of anxiety and depression. It is psychometrically sound to use with adolescents (White, Leach, Sims, Atkinson & Cottrell, 1999). Reliability in the current sample was good for Anxiety ($\alpha=0.82$) and moderate for Depression ($\alpha=0.70$).

2.2.3. Mealtime Emotions Measure for Adolescents (MEM-A; White et al., 2015)

The MEM-A is a 13-item measure of adolescents' mealtime emotions. Questions assess how often certain emotions occur during family mealtimes with responses on a seven-point Likert scale (1=never to 7=always). The MEM-A comprises three subscales. Two subscales relate to negative mealtime emotions (Anxiety-related and Anger-related), with higher mean scores indicating more negative mealtimes. The third subscale relates to positive emotions, with higher mean scores representing more positive mealtime emotions. Reliability in the current sample was acceptable ($\alpha >0.77$) for all subscales.

2.2.4. Project-EAT Family Mealtime Questions (Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000)

Family meal frequency: Participants reported how often all or most of their family ate together in the past seven days. Response options were: never; 1-2 times; 3-4 times; 5-6 times; 7 times; or more than 7 times. Midpoints of the response categories were used to calculate mean scores (Neumark-Sztainer et al., 2000).

Family mealtime atmosphere: Four questions assessed communication and enjoyment of family meals using a four-point Likert scale (1=strongly disagree to 4=strongly agree). Higher mean scores represent a more positive family mealtime atmosphere ($\alpha=0.84$).

2.3. Data analysis

Shapiro-Wilk tests identified all variables to be non-normally distributed and so non-parametric tests were used. Gender differences in eating psychopathology are extensively

acknowledged (e.g., Mond et al., 2014), and preliminary Mann-Whitney U-tests highlighted higher scores reported by girls across all EDE-Q subscales within the current sample (all $Z \geq 8.246$, $p < .001$). Additional Mann-Whitney U-tests revealed that girls scored higher on MEM-A Anxiety-related ($Z = 2.670$, $p = .008$) and Anger-related ($Z = 1.993$, $p = .046$) mealtime emotions. Consequently, analyses were conducted separately for girls and boys.

To identify adolescents who binge-eat, participants were assigned into one of two groups based on their responses to EDE-Q question 14 (assessing the number of *times* they had eaten an unusually large amount of food accompanied by a feeling of loss of control). Participants were categorised as “binge-eating” if they answered ≥ 1 on EDE-Q question 14 (adolescents who reported engaging in ≥ 1 episode of binge-eating with loss of control over the last 28 days: $n = 32$ boys (range of episodes = 1-28); $n = 82$ girls (range of episodes = 1-26)), or “without binge-eating” if they did not report this behavior over the last 28 days ($n = 196$ boys; $n = 185$ girls). The proportion of adolescents reporting binge-eating is comparable to, albeit slightly higher than, previous research with 16-18-year-old adolescents (Mond et al., 2014).

Mann-Whitney U-tests were conducted to examine the hypothesised differences in mealtime scores (Project-EAT, MEM-A) among adolescents with and without binge-eating. A significance value of $p < .05$ was adopted.

3. Results

3.1. Sample characteristics and psychopathology

Mean scores, standard deviations and Mann-Whitney U results for age, BMI Z-scores, EDE-Q and HADS for boys and girls with and without binge-eating are shown in Table 1. Median values for EDE-Q behaviors (Objective Binge-eating Episodes; Self-induced vomiting; Laxative misuse; Excessive exercise) for boys and girls who did not report binge-eating were all 0.00 episodes. Among adolescents who did report binge-eating, median values were only above 0.00 for Excessive exercise (boys = 5.00; girls = 4.00) and Objective Binge-eating Episodes (boys = 4.00; girls = 3.00).

TABLE 1 HERE

BMI Z-scores were significantly higher for boys who binge-eat compared with those who do not; no significant BMI Z-score differences were found for girls. Significant differences were also found for all EDE-Q attitudinal and HADS scores, with both boys and girls who binge-eat reporting higher levels of eating disordered attitudes and higher levels of anxiety and depression than those who do not. Significant differences were also reported for EDE-Q behaviors with adolescents who binge-eat reporting higher levels of Objective Binge-eating Episodes, Self-induced vomiting, Excessive exercise and Laxative misuse (boys only).

3.2. Binge-eating and family mealtimes

No significant differences were found for Project-EAT mealtime frequency or atmosphere scores between the binge-eating and without binge-eating groups for both boys and girls (Table 2). However, boys who binge-eat reported significantly higher levels of MEM-A Anxiety and significantly lower levels of MEM-A Positive mealtime emotions, compared to boys who do not binge-eat. No significant differences were reported among boys for MEM-A Anger. For girls, significant differences were reported for all MEM-A scores, with girls who binge-eat reporting significantly more negative mealtime emotions related to both anxiety and anger, and less positive mealtime emotions compared with girls without binge-eating.

TABLE 2 HERE

4. Discussion

This study replicated and extended past research by examining differences in family mealtime frequency, atmosphere and emotions between boys and girls who reported engaging in binge-eating compared to those who did not. Family mealtime frequency and perception of mealtime atmosphere were not significantly different between the binge-eating and without binge-eating groups. However, the binge-eating group reported higher levels of

family mealtime anxiety and mealtime anger (girls only), and lower levels of positive emotions compared to their peers. These findings support the study hypotheses.

Frequent family meals can protect against adolescent disordered eating (Langdon-Daly & Serpell, 2017), yet the current findings, and lack of support from previous findings (e.g., Neumark-Sztainer et al., 2004), suggest this may not be as straightforward in relation to binge-eating. The current study highlights that rather than mealtime regularity or communication and enjoyment during these occasions, the emotional experience of family mealtimes may be particularly important in relation to binge-eating among adolescents. While emotions are often heightened around binge-eating episodes (Haedt-Matt & Keel, 2011), the current findings suggest that other eating environments, such as family mealtimes, may also be emotional experiences for individuals who binge-eat. This highlights an important area for further research in relation to the occasion and the broad range of emotions that are experienced during this time, and also the need to consider gender differences in relation to this (specifically regarding mealtime anger).

Adolescents who reported recently engaging in at least one binge-eating episode also reported significantly higher levels of eating psychopathology, anxiety and depression compared to their non-binge-eating peers. This suggests that binge-eating may be a marker of more severe adolescent psychopathology and supports previous research highlighting the importance of LOC eating in relation to eating and weight problems among youth (Shomaker et al., 2010). With the focus of family mealtimes typically on food and eating, the current findings support literature recognising the strong negative emotional responses to food and eating within the eating disorders (e.g., disgust (Hay & Katsikitis, 2014)). It could be that within such a food-focused and social setting, elevated eating and body concerns (as seen among individuals who binge-eat) may lead to a heightened negative emotional experience of mealtimes.

Also noteworthy, in line with the interpersonal model of binge-eating (Wilfley et al., 2000), is that family mealtimes may be experienced more negatively by adolescents who binge-eat due to the social aspects. This may reflect difficulties with family dynamics or interactions. For example, poorer levels of family cohesion and functioning have been associated with binge-eating within community and clinical adolescent samples (Gan et al., 2018; Tetzlaff, Schmidt, Brauhardt & Hilbert, 2016). The current study did not explore wider familial factors and further research is needed to explore the types of interactions which occur during family mealtimes and how these may be related to mealtime emotions and binge-eating behaviors.

The study recruited a reasonable sample of participants from a range of UK education settings. While the sample sizes differed between adolescents with and without binge-eating, this disparity likely reflects typical disordered eating presentation within the community and is comparable to previous adolescent research (Mond et al., 2014). However, it should be acknowledged that self-report surveys might over-estimate reports of binge-eating, due to reduced clarity with definitions such as loss of control (Fairburn & Beglin, 1994; Wolk, Loeb, & Walsh, 2005).

The sample being predominately white British limits generalizability. Additionally, no causality can be assumed from this cross-sectional study; binge-eating may occur in response to a negative family environment or, alternatively, adolescents who binge-eat may perceive their family environment as more negative (Neumark-Sztainer, Wall, Story, & Fulkerson, 2004). Furthermore, other psychopathology, such as elevated levels of anxiety and depression found among young people who binge-eat (e.g., Elliott et al., 2010), may also contribute to the increased negative experience of mealtimes, although again causality cannot be determined. Recent mealtime research within the context of eating disorders has utilised ecological momentary assessments (EMA) to explore changes in emotions across mealtimes (e.g., Levinson et al., 2018). While the use of EMA was beyond the scope of our study, the

current findings importantly highlight different mealtime emotions which could be assessed via EMA in future research with both clinical and community samples.

5. Conclusion

Adolescents who binge-eat experience family mealtimes more negatively than those who do not. Further research is essential to understand more about mealtime experiences within the context of binge-eating, such as the nature of mealtime interactions. Additionally, a wider range of emotions should be assessed when conducting mealtime research. Further knowledge of emotional responses to food-related situations may help with developing emotion regulation strategies to create more positive eating experiences. Finally, the elevated levels of psychopathology reported among adolescents engaging in binge-eating compared to their peers highlights that this behavior may be a marker for wider psychological problems and further research is needed to understand factors related to binge-eating among teens.

References

- Deaver, C. M., Miltenberger, R. G., Smyth, J., Meidinger, A., & Crosby, R. (2003). An evaluation of affect and binge eating. *Behavior Modification, 27*(4), 578–599. <https://doi.org/10.1177/0145445503255571>
- Elliott, C. A., Tanofsky-Kraff, M., Shomaker, L. B., Columbo, K. M., Wolkoff, L. E., Ranzenhofer, L. M., & Yanovski, J. A. (2010). An examination of the interpersonal model of loss of control eating in children and adolescents. *Behaviour Research and Therapy, 48*(5), 424–428. <https://doi.org/10.1016/j.brat.2009.12.012>
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of Eating Disorders : Interview or Self-Report Questionnaire ?, *16*(4), 363–370.
- Fairburn, C. G., & Beglin, S. (2008). Eating disorder examination questionnaire (EDE- Q 6.0). In C. G. Fairburn (Ed.), *Cognitive Behavior Therapy and Eating Disorders*. New York: Guildford Press.
- Gan, W. Y., Mohamad, N., & Law, L. S. (2018). Factors associated with binge eating behavior among Malaysian adolescents. *Nutrients, 10*(1). <https://doi.org/10.3390/nu10010066>
- Goldschmidt, A. B., Wall, M. M., Zhang, J., Loth, K. A., & Neumark-Sztainer, D. (2016). Overeating and binge eating in emerging adulthood: 10-year stability and risk factors. *Developmental Psychology, 52*(3), 475. <https://doi.org/10.1037/dev0000086>
- Haedt-Matt, A. A., & Keel, P. K. (2011). Revisiting the affect regulation model of binge eating: A meta-analysis of studies using ecological momentary assessment. *Psychological Bulletin, 137*(4), 660–681. <https://doi.org/10.1037/a0023660>
- Hay, P., & Katsikitis, M. (2014). Emotional responses to images of food in adults with an eating disorder: a comparative study with healthy and clinical controls. *Eating*

Behaviors, 15(3), 371–4. <https://doi.org/10.1016/j.eatbeh.2014.04.016>

Langdon-Daly, J., & Serpell, L. (2017). Protective factors against disordered eating in family systems: a systematic review of research. *Journal of Eating Disorders*, 5, 12.

<https://doi.org/10.1186/s40337-017-0141-7>

Levinson, C. A., Sala, M., Fewell, L., Brosof, L. C., Fournier, L., & Lenze, E. J. (2018). Meal and snack-time eating disorder cognitions predict eating disorder behaviors and vice versa in a treatment seeking sample: A mobile technology based ecological momentary assessment study. *Behaviour Research and Therapy*, 105(March), 36–42.

<https://doi.org/10.1016/j.brat.2018.03.008>

Mond, J., Hall, A., Bentley, C., Harrison, C., Gratwick-Sarll, K., & Lewis, V. (2014). Eating-disordered behavior in adolescent boys: Eating disorder examination questionnaire norms. *International Journal of Eating Disorders*, 47(4), 335–341.

<https://doi.org/10.1002/eat.22237>

Neumark-Sztainer, D., Story, M., Ackard, D., Moe, J., & Perry, C. (2000). Family Meals Among Adolescents: Findings from a Pilot Study. *Journal of Nutrition Education*, 32(6), 335–340. [https://doi.org/10.1016/S0022-3182\(00\)70593-0](https://doi.org/10.1016/S0022-3182(00)70593-0)

Neumark-Sztainer, D. R., Wall, M. M., Haines, J. I., Story, M. T., Sherwood, N. E., & van den Berg, P. A. (2007). Shared risk and protective factors for overweight and disordered eating in adolescents. *American Journal of Preventive Medicine*, 33(5), 359–369.

<https://doi.org/10.1016/j.amepre.2007.07.031>

Neumark-Sztainer, D., Wall, M., Story, M., & Fulkerson, J. a. (2004). Are family meal patterns associated with disordered eating behaviors among adolescents? *The Journal of Adolescent Health : Official Publication of the Society for Adolescent Medicine*, 35(5), 350–9. <https://doi.org/10.1016/j.jadohealth.2004.01.004>

Shomaker, L. B., Tanofsky-Kraff, M., Elliott, C., Wolkoff, L. E., Columbo, K. M., Ranzenhofer,

- L. M., ... & Yanovski, J. A. (2010). Salience of loss of control for pediatric binge episodes: Does size really matter?. *International Journal of Eating Disorders*, 43(8), 707-716. <https://doi.org/10.1002/eat.20767>
- Sierra-Baigrie, S., Lemos-Giráldez, S., & Fonseca-Pedrero, E. (2009). Binge eating in adolescents: its relation to behavioural problems and family-meal patterns. *Eating Behaviors*, 10(1), 22–8. <https://doi.org/10.1016/j.eatbeh.2008.10.011>
- Skeer, M. R., Sonnevile, K. R., Deshpande, B. R., Goodridge, M. C., & Folta, S. C. (2018). Going beyond frequency: A qualitative study to explore new dimensions for the measurement of family meals. *Journal of Child and Family Studies*, 27(4), 1075-1087. <https://doi.org/10.1007/s10826-017-0967-2>
- Smink, F. R. E., van Hoeken, D., Oldehinkel, A. J., & Hoek, H. W. (2014). Prevalence and severity of DSM-5 eating disorders in a community cohort of adolescents. *The International Journal of Eating Disorders*, 47(6), 610–9. <https://doi.org/10.1002/eat.22316>
- Sonneville, K. R., Horton, N. J., Micali, N., Crosby, R. D., Swanson, S. A., Solmi, F., & Field, A. E. (2013). Longitudinal associations between binge eating and overeating and adverse outcomes among adolescents and young adults: Does loss of control matter?. *JAMA Pediatrics*, 167(2), 149-155. <https://doi.org/10.1001/2013.jamapediatrics.12>
- Tetzlaff, A., Schmidt, R., Brauhardt, A., & Hilbert, A. (2016). Family functioning in adolescents with binge-eating disorder. *European Eating Disorders Review*, 24(5), 430-433. <https://doi.org/10.1002/erv.2462>
- Touchette, E., Henegar, A., Godart, N. T., Pryor, L., Falissard, B., Tremblay, R. E., & Côté, S. M. (2011). Subclinical eating disorders and their comorbidity with mood and anxiety disorders in adolescent girls. *Psychiatry Research*, 185(1-2), 185-192. <https://doi.org/10.1016/j.psychres.2010.04.005>

- White, H. J., Haycraft, E., Goodwin, H., & Meyer, C. (2014). Eating disorder examination questionnaire: factor structure for adolescent girls and boys. *International Journal of Eating Disorders, 47*(1), 99–104. <https://doi.org/10.1002/eat.22199>
- White, H. J., Haycraft, E., Wallis, D. J., Arcelus, J., Leung, N., & Meyer, C. (2015). Development of the Mealtime Emotions Measure for adolescents (MEM-A): Gender differences in emotional responses to family mealtimes and eating psychopathology. *Appetite, 85*, 76–83. <https://doi.org/10.1016/j.appet.2014.11.011>
- White, D., Leach, C., Sims, R., Atkinson, M., & Cottrell, D. (1999). Validation of the Hospital Anxiety and Depression Scale for use with adolescents. *The British Journal of Psychiatry, 175*(5), 452-454. <https://doi.org/10.1192/bjp.175.5.452>
- Wilfley, D. E., MacKenzie, K. R., Welch, R. R., Ayres, V. E., & Weissman, M. M. (2000) *Interpersonal Psychotherapy for Group*. New York: Basic Books.
- Wolk, S. L., Loeb, K. L., & Walsh, B. T. (2005). Assessment of patients with anorexia nervosa: Interview versus self-report. *International Journal of Eating Disorders, 37*(2), 92–99. <https://doi.org/10.1002/eat.20076>
- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica, 67*(6), 361–370. <https://doi.org/10.1111/j.1600-0447.1983.tb09716.x>

Table 1: Mean values (and standard deviations) for age, BMI Z-scores, EDE-Q and HADS scores for boys and girls who reported binge-eating and those who did not report binge-eating, and Mann-Whitney U-test of difference scores.

	Boys			Girls		
	Binge-eating n = 32	Without binge-eating n = 196	Mann Whitney U Z score	Binge-eating n = 82	Without binge-eating n = 185	Mann Whitney U Z score
Sample characteristics						
Age	15.7 (1.16)	15.9 (1.15)	1.41	16.1 (1.04)	15.9 (1.08)	1.18
BMI Z-scores	0.79 (1.59)	0.14 (1.25)	2.11*	0.05 (1.22)	-0.25 (1.09)	1.76
EDE-Q attitudes						
Shape and Weight Concern	2.12 (1.73)	0.68 (1.06)	5.15***	3.83 (1.73)	2.35 (1.83)	5.60***
Restriction	1.41 (1.39)	0.50 (0.96)	5.30***	2.84 (1.70)	1.48 (1.59)	5.93***
Preoccupation and Eating Concern	1.33 (1.42)	0.26 (0.59)	6.66***	2.01 (1.35)	0.74 (1.03)	7.89***
Global	1.63 (1.36)	0.46 (0.71)	5.96***	2.93 (1.41)	1.50 (1.33)	6.84***
EDE-Q behaviors						
Objective Binge-eating Episodes	8.75 (10.3)	0.00 (0.00)	15.0***	5.34 (5.51)	0.00 (0.00)	16.0***
Vomiting	6.03 (17.2)	0.00 (0.00)	7.33***	0.59 (2.64)	0.18 (1.99)	3.30***
Laxatives	4.84 (11.3)	0.00 (0.00)	7.56***	0.21 (1.00)	0.22 (2.16)	1.18
Excessive Exercise	10.4 (14.5)	2.56 (5.28)	5.12***	6.34 (7.75)	4.14 (8.00)	3.91***
HADS						
Anxiety	9.09 (4.57)	5.63 (3.84)	3.94***	8.95 (4.80)	6.81 (3.86)	3.39***
Depression	6.39 (4.67)	3.83 (2.74)	2.99**	4.99 (3.99)	3.67 (2.92)	2.22*

EDE-Q = Eating Disorder Examination Questionnaire; HADS = Hospital Anxiety and Depression Scale.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Table 2: Mean values (and standard deviations) and one-tailed Mann-Whitney U-test of difference scores for Project-EAT and MEM-A scores for boys and girls who reported binge-eating and those who did not report binge-eating.

	Boys			Girls		
	Binge-eating n = 32	Without binge- eating n = 196	Mann Whitney U Z score	Binge-eating n = 82	Without binge- eating n = 185	Mann Whitney U Z score
Project-EAT						
Mealtime Frequency	4.37 (3.16)	5.15 (3.10)	1.35	5.20 (2.90)	5.10 (2.99)	0.19
Mealtime Atmosphere	2.77 (0.85)	2.89 (0.70)	0.61	2.88 (0.67)	2.87 (0.72)	0.20
MEM-A						
Anxiety	1.93 (1.26)	1.46 (0.86)	2.46**	2.10 (1.25)	1.48 (0.65)	3.47***
Anger	2.41 (1.58)	2.00 (1.20)	1.22	2.67 (1.50)	2.05 (1.13)	3.25***
Positive	4.89 (1.45)	5.44 (1.27)	1.99*	5.03 (1.35)	5.40 (1.20)	2.11*

Project-EAT = Project Eating Among Teens; MEM-A = Mealtime Emotions Measure for Adolescents.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.