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Current and Emerging Directions in the Treatment of Eating Disorders

Tiffany A. Brown and Pamela K. Keel

Department of Psychology, Florida State University, Tallahassee, FL. Corresponding author email: brown@psy.fsu.edu

Abstract: Eating disorders are a significant source of psychiatric morbidity in young women and demonstrate high comorbidity with mood, anxiety, and substance use disorders. Thus, clinicians may encounter eating disorders in the context of treating other conditions. This review summarizes the efficacy of current and emerging treatments for anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). Treatment trials were identified using electronic and manual searches and by reviewing abstracts from conference proceedings. Family based therapy has demonstrated superiority for adolescents with AN but no treatment has established superiority for adults. For BN, both 60 mg fluoxetine and cognitive behavioral therapy (CBT) have well-established efficacy. For BED, selective serotonin reuptake inhibitors, CBT, and interpersonal psychotherapy have demonstrated efficacy. Emerging directions for AN include investigation of the antipsychotic olanzapine and several novel psychosocial treatments. Future directions for BN and BED include increasing CBT disseminability, targeting affect regulation, and individualized stepped-care approaches.

Keywords: anorexia nervosa, bulimia nervosa, binge eating disorder, eating disorders, therapy, medication, intervention, treatment

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Current and Emerging Directions in the Treatment of Eating Disorders

Eating disorders are debilitating syndromes characterized by aberrant eating patterns and pervasive problems with body image. Recent lifetime prevalence estimates in women are 0.9% for anorexia nervosa (AN), 1.5% for bulimia nervosa (BN), and 3.5% for binge eating disorder (BED).¹ These disorders represent a significant public health problem because they are associated with distress, disability, and increased risk of death.² Additionally, eating disorders have high comorbidity with mood, anxiety, and substance use disorders.¹ Thus, clinicians may encounter patients with eating disorders while treating other conditions. While significant advances in identifying maintenance factors for these disorders, including thin-ideal internalization, body dissatisfaction, perfectionism, and negative affect,³ have contributed to advances in treatment development, definitively efficacious treatments remain largely unidentified. The purpose of this review is to identify for those outside the field of eating disorders what treatments currently work best as well as emerging directions in the treatment of eating disorders.

While several reviews have been published summarizing current treatments for AN,⁴ BN,⁵ and BED,⁶ the scope of these papers was limited to articles published during or prior to 2005. Given the treatment field's continual growth over the past five years, particularly for BED, the present review extends and updates previous reviews by incorporating studies published through 2010. Further, to our knowledge, no study has systematically examined the effect of current treatments on primary outcomes (e.g., those related to the eating disorder) and secondary outcomes (e.g., those not directly related to the eating disorder, such as depression or anxiety) separately for each disorder. Given that second wave treatments were originally designed to treat depression and anxiety and clinicians not specializing in eating disorders may be most familiar with these treatments and outcomes in these domains, it would be clinically informative to assess whether treatments help alleviate these symptoms when the eating disorder is the focus of treatment. Finally, our review examines how current treatment findings are informing future treatment directions and describes several treatment trials that are currently underway in the field.

Methods

Journal articles were identified through searching PubMed and PsychINFO databases for articles published during or after 2000 using the following search terms: medication, atypical antipsychotics, antidepressants, selective serotonin reuptake inhibitors, randomized controlled trial (RCT), treatment, therapy, cognitive behavioral therapy, dialectical behavior therapy, interpersonal psychotherapy, psychodynamic, family therapy, behavioral weight loss, combined interventions, anorexia nervosa, bulimia nervosa, binge eating disorder, and eating disorder. Additional articles for the search period were identified by reviewing the reference lists of relevant articles. Articles spanning psychopharmacological interventions, psychosocial interventions, and combined psychopharmacological and psychosocial interventions were included to extend previous reviews within the field and to provide a comprehensive picture of treatment outcome.^{5,6} The first author identified articles for inclusion from electronic searches, and the second author reviewed the list for inclusion and provided additions based on her prior reviews of this literature. Inclusion criteria for the current directions section were broad and included any controlled trials published in peer-reviewed journals from 2000 to 2010, inclusive. Exclusion criteria for current directions included: articles published prior to 2000, open label medication trials, and non-randomized trials. Importantly, seminal articles published prior to 2000 are described in the text for historical context but are not included in tables. Trials included in the emerging directions section were identified through searching ongoing clinical trials from the International Standard Randomised Controlled Trial Registry, the Australian New Zealand Clinical Trials Registry, as well as reviewing abstracts presented at recent international conferences on eating disorders, including the International Conference on Eating Disorders (Austria, 2010 and Miami, 2011) and the Eating Disorders Research Society Meeting (Cambridge, 2010 and Edinburgh, 2011).

Our search identified 43 articles, 13 of which described treatment for AN, 13 for BN, and 17 for BED. Information regarding sample size, proportion of female participants, recruitment source, diagnostic/inclusion criteria, exclusion criteria, duration and setting of treatment conditions, primary outcomes,



secondary outcomes, and results for primary and secondary outcomes, are summarized in Tables 1–3. To allow comparisons across articles, primary and secondary outcomes were identified *a priori* and uniformly applied across articles. Primary outcomes included any measures directly related to the central symptoms and diagnostic criteria for AN, BN, and BED within the Diagnostic and Statistical Manual (DSM-IV-TR)⁷ as these would be used to determine presence versus remission from the eating disorder. Primary outcomes for AN included weight restoration or weight gain (depending upon the methods used to assess weight outcome), and concerns about weight, shape, and eating. Those for BN included binge and purge frequency and weight and shape concerns, and those for BED included binge frequency and associated eating disorder cognitions. Secondary outcomes for all disorders included features often associated with each disorder, but not related directly to eating disorder diagnosis, including depressive and anxiety symptoms,⁸ psychosocial functioning,^{1,9} and, for BN and BED, changes in weight.

Current Directions

Anorexia Nervosa

Psychopharmacological Interventions

Given the medical severity and complications occurring in low weight AN patients, five out of the six studies reviewed examined medication as an adjunct to inpatient, day treatment, or outpatient programs. Thus, it is important to note that the standard for testing treatment efficacy is typically more rigorous for AN than for other eating disorders, as the question is not whether medication improves outcome compared to placebo, but whether medication improves outcome beyond treatment as usual (TAU). While several classes of medication have been evaluated in AN, few trials have found positive results.¹⁰

Antidepressants

Given that AN has been associated with serotonin dysregulation and is often comorbid with depression and obsessive-compulsive disorder,⁸ several studies have examined the efficacy of Selective Serotonin Reuptake Inhibitors (SSRIs), which have the advantage over tricyclics of being generally well-tolerated.^{11–13} Results have provided little

evidence for the usefulness of SSRIs in weight gain or in reducing anxiety or depression.^{11,14} Other studies have examined whether fluoxetine may help prevent relapse. Kaye and colleagues¹² conducted a 52-week trial (n = 39) and found that 20 mg fluoxetine was more likely to prevent relapse compared to placebo after inpatient hospital treatment. Further, fluoxetine was associated with improved weight, eating-related cognitions, anxiety, and obsessive-compulsive symptoms in this trial. However, results from this trial were not replicated. In a 52-week RCT of 93 patients, Walsh and colleagues¹⁵ found no advantage for 20 mg fluoxetine in preventing relapse after weight restoration. Overall, antidepressants have not been effective in improving the primary outcome for AN: weight. Further, there is limited evidence for whether antidepressants are effective in improving secondary outcomes, such as anxiety and depression, in underweight patients with AN.

Atypical Antipsychotics

Atypical antipsychotics help reduce anxiety, agitation, psychosis, and have the side effect of weight gain in the treatment of psychotic disorders,¹⁶ suggesting that this class of drugs may be useful in the treatment of AN. Olanzapine has been the most systematically studied atypical antipsychotic and provides the most promise in the pharmacological treatment of adult AN. A growing body of evidence has found that olanzapine improves weight-related outcomes over placebo.^{17–19} One study found that this effect may depend on diagnostic subtype. Brambilla et al¹⁸ reported no differences between olanzapine and placebo for 30 AN patients after 3 months; however, when patients were stratified by subtype, olanzapine significantly increased body mass index (BMI) for individuals with the binge-purge subtype (ANbp), but not the restricting subtype (ANr). Olanzapine also has demonstrated benefits in improving secondary outcomes including reductions in obsessional thinking and rumination,^{17,20} compulsive rituals, and depression.¹⁸ Further, olanzapine has been generally well-tolerated, with the most common side effect being mild drowsiness.^{17,18,20} Atypical antipsychotics also have been recently examined in adolescents with AN, but studies have not supported its efficacy in adolescents.^{21–23}



Table 1. Interventions for Anorexia Nervosa.

Author	N (% female)	Recruitment source	Diagnostic/inclusion criteria	Exclusion criteria	Tx conditions (duration and setting)	Primary outcome assessed	Secondary outcome assessed	Primary results	Secondary results
Psycho pharmacological Interventions									
Antidepressants									
<i>Fluoxetine</i>									
Kaye et al. ¹²	39 (100)	Inpatient ED Program responders	DSM-IV ANr		52 weeks Outpatient 20 mg – FLX – PL	Weight change for relapse prevention, YBOCS-EDS	HRSD, YBOCS, HARS	FLX had significant change in weight, in HARS, YBOCS-ED from pre-post tx, PL did not greater tx completion for FLX vs. PL (63% vs. 16%) FLX = PL	FLX had significant change in HARS, HRSD from pre-post tx, PL did not
Walsh et al. ¹⁵	93 (100)	Weight restored patients with AN	DSM-IV AN (w/o amenorrhea), 16–45 years old, BMI > 19		52 weeks Outpatient 20–80 mg – FLX + CBT – PL + CBT	Time to relapse			
Antipsychotics									
<i>Olanzapine</i>									
Mondraty et al. ²⁰	15 (–)	Inpatient psychiatric unit	DSM-IV AN		Inpatient – 46 ± 31 days OLZ (10 mg) – 53 ± 31 days CPZ (20 mg)	Anorectic rumination (Padua inventory), weight		OLZ > CPZ	
Brambilla et al. ¹⁸	30 (100)	ED center referrals	DSM-IV AN > 18 years old	Serious psychiatric or medical condition	3 months Outpatient – CBT + OLZ (2.5–5 mg) – CBT + PL	BMI, EDI, YBC-EDS	HRSD, TCI, Buss-Durkee rating scale (aggression)	OLZ > PL on YBC-ED compulsions, on BMI for ANbp only	OLZ > PL on HRSD, TCI-persistence
Bissada et al. ¹⁷	34 (100)	ED tx center referrals	DSM-IV AN (w/o amenorrhea), BMI < 17.5	Serious psychiatric or medical condition, suicidality, concurrent tx	10 weeks Day hospital – OLZ (2.5–10 mg) – PL	BMI	PAI, YBOCS	OLZ > PL	OLZ > PL on YBOCS obsessions



Attia et al. ¹⁹	23 (96)	Community recruitment	DSM-IV AN w/o amenorrhea, >16 years old, 19 > BMI > 14	Severe medical or psychiatric problem	8 weeks Outpatient – OLZ (mean: 7.95 mg) – PL (mean: 8.75 mg)	BMI, EDI, YCB-EDS, BSQ	BAI, BDI	OLZ > PL on BMI	OLZ = PL
Psychosocial Interventions									
<i>Psychodynamic</i>									
Dare et al. ²⁶	84 (74)	Community referrals	DSM-IV AN, >18 years old	Serious psychiatric or medical condition	1 year Outpatient – FOC – CAT – FT – TAU	M-R scales, weight		FOC, FT > TAU CAT = TAU on weight	
<i>Cognitive Behavioral Therapy</i>									
Pike et al. ³⁰	33 (100)	Inpatient tx responders	DSM-IV ANr, 18–45 years old, >90% IBW	Severe comorbid psychopathology	50 sessions Outpatient – CBT – NUT	Relapse rate, time to relapse, M-R scales		CBT > NUT	
McIntosh et al. ³³	56 (100)	Community referrals	DSM-IV AN, 17–40 years old, BMI < 19	Severe psychiatric or medical condition	20 sessions Outpatient – CBT – IPT – NST	Global anorexia nervosa rating, BMI, weight, EDE, EDI	GAF	CBT = IPT CBT = NST On global rating CBT = NST > IPT on EDE restraint	NST > IPT = CBT
<i>Interpersonal Psychotherapy</i>									
McIntosh et al. ³³	56 (100)	Community referrals	DSM-IV AN, 17–40 years old, BMI < 19	Severe psychiatric or medical condition	20 sessions Outpatient – CBT – IPT – NST	Global anorexia nervosa rating, BMI, weight, EDE, EDI	GAF	CBT = IPT NST > IPT On global rating CBT = NST > IPT on EDE restraint	NST > IPT = CBT
<i>Family Based Therapy</i>									
Eisler et al. ⁴⁰	40 (98)	Community referrals	DSM-IV or ICD-10 AN		Mean of 16 sessions (flexible dose) Outpatient – CFT – SFT	M-R scales, EDI, EAT	RSES, SMFQ, MOCI	SFT > CFT for families with high EE CFT > SFT on EDI	CFT > SFT on MOCI, SMFQ
Geist et al. ¹³¹	61 (100)	Community referrals to specialist tx center	DSM-IV AN < 90% IBW, 12–17 years old	Suicide risk, serious psychiatric or medical condition	8 sessions Outpatient – FT – FGP	Weight, EDI	CDI, BSI, FAM-III	FT = FGP	FT = FGP

(Continued)



Table 1. (Continued)

Author	N (% female)	Recruitment source	Diagnostic/inclusion criteria	Exclusion criteria	Tx conditions (duration and setting)	Primary outcome assessed	Secondary outcome assessed	Primary results	Secondary results
Dare et al. ²⁶	84 (74)	Community referrals	DSM-IV AN, >18 years old	Serious psychiatric or medical condition	1 year Outpatient – FOC – CAT – FT – TAU	M-R scales, weight		FOC, FT > TAU on weight	
Lock et al. ³⁹	86 (90)	Pediatric referrals	DSM-IV AN (≥1 menstrual cycle missed), 12–18 years old	Serious psychiatric or medical condition, additional tx	Outpatient – STFT (10 sessions) – LTFT (20 sessions)	EDE, BMI, YBC-EDS	KSADS, CBCL, family functioning scale	STFT = LFT	STFT = LFT
Lock et al. ³⁷	121 (91)	Community clinic referrals	DSM-IV AN w/o amenorrhea, 12–18 years old, living with family, IBW < 86%	Serious psychiatric or medical condition, previous FT, AFT tx	24 sessions Outpatient – FT – AFT 6 and 12 month follow-up	Remission rate, BMI percentile		FT = AFT on remission rate FT > AFT on BMI At follow-up: FT > AFT on remission rate FT = AFT on BMI	
Psychopharmacological + Psychosocial Interventions									
Walsh et al. ¹⁵	93 (100)	Weight restored patients with AN	DSM-IV AN (w/o amenorrhea) 16–45 years old, BMI > 19		52 weeks Outpatient 20–80 mg – FLX + CBT – PL + CBT	Time to relapse		FLX + CBT = PL + CBT	
Brambilla et al. ¹⁸	30 (100)	ED center referrals	DSM-IV AN >18 years old	Serious psychiatric or medical condition	3 months Outpatient – CBT + OLZ (2.5–5 mg) – CBT + PL	BMI, EDI, YBC-EDS	HRSD, TCI, Buss-Durkee rating scale (aggression)	CBT + OLZ > CBT + PL on eating disorder compulsions, on BMI for ANbp only	CBT + OLZ > CBT + PL HRSD, TCI-persistence

Note: Greater than symbol (>) refers to significantly better outcome.

Abbreviations: AFT, Adolescent Focused Therapy; AN, Anorexia Nervosa; BDI, Beck Depression Inventory; BED, Binge Eating Disorder; BMI, Body Mass Index; BN, Bulimia Nervosa; BSI, Brief Symptom Inventory; CBCL, Child Behavior Checklist; CBT, Cognitive Behavioral Therapy; CDI, Children's Depression Inventory; CFT, Conjoint Family Therapy; CGI, Clinical Global Impression; EAT, Eating Attitudes Test; ED, Eating Disorder; EDI, Eating Disorders Inventory; EDE, Eating Disorders Examination; FAM-III, Family Assessment Measure; FGP, Family Group Psychoeducation; FLX, Fluoxetine; FLV, Fluvoxamine; FT, Family-Based Therapy; FOC, Focal therapy; g, Group Therapy; GAF, Global Assessment of Functioning; HRSD, Hamilton Rating Scale for Depression; IPT, Interpersonal Psychotherapy; K-SADS, Kiddie Schedule of Affective Disorders; LTFT, Long Term Family Therapy; MOCI, Maudsley Obsessive Compulsive Index; M-R, Morgan-Russell Outcome; NST, Nonspecific Supportive Therapy; NUT, Nutritional Counseling; PAI, Personality Assessment Inventory; PL, Placebo; RSES, Rosenberg Self Esteem Scale; SFT, Separated Family Therapy; SMFQ, Short Mood and Feelings Questionnaire; STFT, Short Term Family Therapy; TFEQ, Three Factor Eating Questionnaire; TOP, Topiramate; WL, Wait List Control; YCB-EDS, Yale Cornell Brown ED Scale.

Table 2. Interventions for Bulimia Nervosa.

Author	N (% female)	Recruitment source	Diagnostic/inclusion criteria	Exclusion criteria	Tx conditions (duration and setting)	Primary outcome assessed	Secondary outcome assessed	Primary results	Secondary results
Psycho pharmacological Interventions									
Antidepressants									
<i>Fluoxetine</i>									
Walsh et al. ⁵⁰	22 (100)	Poor responders to outpatient CBT or IPT	DSM-III-R BNP		8 weeks Outpatient 60 mg – FLX – PL	Binge, purge episodes in last month, EDE, TFEQ	RSES, BMI, BDI	FLX > PL	FLX = PL
Romano et al. ⁴⁹	150 (98)	Outpatient FLX treatment responders	DSM-IV BNP > 18	Serious psychiatric condition, previous external treatment >4 weeks	52 weeks outpatient relapse prevention 60 mg – FLX – PL	Time to relapse, binge/purge frequency, YCB-EDS	CGI, PGI	FLX > PL	FLX > PL
<i>Fluvoxamine</i>									
Milano et al. ⁴⁴	12 (100)		DSM-IV BN		12 weeks Outpatient 200 mg – FLV – PL	Binge/purge episodes	Body weight	FLV > PL	FLV > PL
<i>Sertraline</i>									
Milano et al. ⁴⁶	20 (100)	Outpatient	DSM-IV BNP 24–36 years old		12 weeks Outpatient 100 mg – SER – PL	Binge/purge episodes	% body weight reduction	SER > PL	SER > PL
Psychosocial Interventions									
<i>Interpersonal Psychotherapy</i>									
Agras et al. ⁵⁴	220 (–)	Outpatient	DSM-III-R BNP, >18 years old	Severe psychiatric or psychiatric condition, current AN, current tx, pregnancy	19 sessions Outpatient – CBT – IPT 1 year follow-up	Recovery and remission rate, binge/purge frequency, EDE	SCL-90-R, RSES, IIP, SAS	CBT > IPT on % remitted and recovered, binge/purge frequency, dietary restraint At follow-up: CBT = IPT	At follow-up: CBT = IPT

(Continued)



Table 2. (Continued)

Author	N (% female)	Recruitment source	Diagnostic/inclusion criteria	Exclusion criteria	Tx conditions (duration and setting)	Primary outcome assessed	Secondary outcome assessed	Primary results	Secondary results
<i>Cognitive Behavioral Therapy</i>									
Agras et al. ⁵⁴	220 (-)	Outpatient	DSM-III-R BNP, >18 years old	Severe psychical or psychiatric condition, current AN, current tx, pregnancy	19 sessions Outpatient – CBT – IPT 1 year follow-up	Recovery and remission rate, binge/purge frequency, EDE	SCL-90-R, RSES, IIP, SAS	CBT > IPT on % remitted and recovered, binge/purge frequency, dietary restraint At follow-up: CBT = IPT	CBT = IPT At follow-up: CBT = IPT
Carter et al. ⁶¹	85 (100)	Waitlist for tx at hospital-based clinic	DSM-IV BNP (≥ 1 episode/week)	<17 years old, pregnant, medical illness, current psychosocial tx, BMI < 18	8 weeks – CBTsh – NSTsh – WL	Frequency of binge and compensatory behaviors, EDI, EDE	RSES, BDI, IIP	CBTsh = NSTsh = WL Simple time effects: CBTsh and NSTsh both had significant decreases in binge/compensatory behaviors over time; WL did not	CBTsh = NSTsh NSTsh = WL
Bailer et al. ⁵⁹	81 (-)	Community outpatient	DSM-IV BNP >17 years old	Medical instability, severe suicidality	18 weeks Outpatient – gCBT – GSH 1 year follow-up	Monthly frequency of binge/purge episodes, EDI	BDI	gCBT = GSH At follow-up: Guided self-help > gCBT in remission rate	gCBT = GSH
Schmidt et al. ⁵⁶	85 (-)	Community referrals	DSM-IV BN or EDNOS (<2 episodes per week; or purging only), 13–20 years old	BMI < 10th percentile, substance dependence, severe mental illness	13 weeks Outpatient – Family Therapy (FT) – CBTgsh	Abstinence from binge eating, vomiting, EATATE, EDE, ORFI	Health costs	CBTgsh > FT on abstinence of binge eating at 6 months CBTgsh = FT on abstinence of binge eating at 12 months, purging at 6, 12 months	CBTgsh = FT



Dialectical Behavior Therapy Safer et al. ⁶⁵ 31 (100)	Community	Adapted DSM-IV BNp (≥ 1 episode/week), 18–65 years old	BMI < 17.5, psychosis, suicidality, active drug/alcohol abuse, concurrent tx	20 sessions Outpatient – DBT – WL	Frequency of binge/purge episodes	BDI, NMRS, EES, multi-dimensional personality scale, PANAS, RSES	DBT > WL	DBT = WL
Weight Loss Treatment Burton and Stice ¹³² 85 (100)	University and community outpatient	Adapted DSM-IV BN (≥ 1 episode/week), 18–55 years old	Treatment in past month, BMI < 19, serious medical or psychiatric condition	Outpatient 6 sessions – HDI – WL	Remission status, binge/compensatory episodes (EDE)	BMI, SAS, health care utilization scale	HDI > WL	HDI > WL for reduction in BMI, health care utilization
Family Based Therapy LeGrange et al. ⁶⁸ 80 (–)	Community and outpatient referrals	DSM-IV BN (≥ 1 episode/week) for 6 months, 12–19 years old	Substance dependence, BMI < 17.5	20 sessions outpatient – FBT – Supportive Psychotherapy (SPT)	Remission rate (EDE)	K-SADS, BDI, RSES, tx suitability	FT > SPT	FT > SPT on vomiting, compensatory behavior frequency, EDE subscales
Schmidt et al. ⁵⁶ 85 (–)	Community referrals	DSM-IV BN or EDNOS (<2 episodes per week; or purging only), 13–20 years old	BMI < 10th percentile, substance dependence, severe mental illness	13 weeks Outpatient – Family Therapy (FT) – CBTgsh	Abstinence from binge eating, vomiting, EATATE, EDE	ORFI, health costs	CBTgsh > FT on abstinence of binge eating at 6 months CBTgsh = FT on abstinence of binge eating at 12 months, purging at 6, 12 months	CBTgsh = FT
Psycho pharmacological + Psychosocial Interventions								
Mitchell et al. ⁷¹ 91 (100)	Community and outpatient clinic	DSM-III-R BN (≥ 3 episodes/week) > 18 years old, >85% IBW	Serious medical condition, adverse reaction to fluoxetine	16 weeks Outpatient – FLX 60 mg – PL – SH + FLX – SH + PL	Frequency of binge, vomit episodes, EDQ, EDI	HRSD, CGI, PGI	FLX > PL on vomiting SH + FLX, SH + PL > FLX, PL on vomiting	FLX > PL on CGI, PGI

(Continued)



Table 2. (Continued)

Author	N (% female)	Recruitment source	Diagnostic/inclusion criteria	Exclusion criteria	Tx conditions (duration and setting)	Primary outcome assessed	Secondary outcome assessed	Primary results	Secondary results
Walsh et al. ⁷²	91 (100)	Community	DSM-IV BNP (≥ 1 episode/week), 18–60 years old, BMI > 17.5	Pregnancy, serious medical or psychiatric illness, concurrent tx	16 weeks Outpatient – FLX – PL – FLX + CBTgsh – PL + CBTgsh	Frequency of binge, vomit episodes, EDE	BDI, SCL-53,	FLX > PL On frequency of binge, vomit episodes, EDE dietary restraint CBTgsh = FLX	FLX > PL CBTgsh = FLX

Note: Greater than symbol (>) refers to significantly better outcome.

Abbreviations: AN, Anorexia Nervosa; BDI, Beck Depression Inventory; BED, Binge Eating Disorder; BMI, Body Mass Index; BN, Bulimia Nervosa; BT, Behavior Therapy; CBT, Cognitive Behavioral Therapy; CGI, Clinical Global Impression; CTRL, Control group; DBT, Dialectical Behavior Therapy; EDI, Eating Disorders Inventory; EDE, Eating Disorders Examination; EES, Emotional Eating Scale; FLX, Fluoxetine; FT, Family-Based Therapy; g, Group Therapy; gsh, Guided Self Help; HDI, Healthy Diet Intervention; HRSD, Hamilton Rating Scale for Depression; IIP, Inventory of Interpersonal Problems; IMP, Imipramine; IPT, Interpersonal Psychotherapy; K-SADS, Kiddie Schedule of Affective Disorders, Negative Mood Regulation Scale; ORFI, Oxford Risk Factor Inventory; NST, Nonspecific Supportive Therapy; PANAS, Positive and Negative Affectivity Scale; PL, Placebo; PGI, Patient Global Improvement; RSES, Rosenberg Self Esteem Scale; SAS, Weissman Social Adjustment Scale; SCL-90, Symptom Checklist; SER, Sertraline; SH, Self Help; SIB, Sibutramine; SM, Self-Monitoring; SPT, Supportive Psychotherapy; TFEQ, Three Factor Eating Questionnaire; TOP, Topiramate; VAS, Visual Analog Scale; WL, Wait List Control; YCB-EDS, Yale Cornell Brown Eating Disorder Scale.

Psychosocial Interventions

Psychodynamic Psychotherapy

Psychodynamic therapy has been examined in AN due to the interpretation that AN developed as an effort to exert control over one's environment in the context of dysfunctional family/interpersonal relationships.²⁴ However, studies have not supported its efficacy compared to other active treatments.^{24–27} One study of 84 patients found that a 1-year, time-limited, focal psychoanalytic therapy produced better weight outcome compared to TAU, but did not differ from family therapy.²⁶ Studies examining Cognitive Analytic Therapy (CAT), a combination psychoanalytic and cognitive behavioral therapy, have failed to find differences in weight gain between CAT and TAU,²⁶ and a more traditional form of behavior therapy.²⁵

Cognitive Behavioral Therapy (CBT)

CBT for AN has focused on dysfunctional beliefs about food, body image, and the influence of weight/shape on self-evaluation, along with the influence of these thoughts on restricted food intake. The American Psychological Association (APA) task force²⁸ concluded only “modest/controversial support” exists for the use of CBT in AN. CBT has been superior to nutrition-based interventions in improving eating attitudes and weight outcomes²⁹ and reducing relapse.³⁰ However, these studies have been criticized because dietary interventions do not provide a demanding comparison group for AN treatment.³¹ Supporting this criticism, other studies have failed to find differences between CBT and TAU³² or alternative treatments, such as interpersonal psychotherapy or nonspecific supportive clinical management.³³ Thus, there has been limited support for the efficacy of CBT in adults with AN. This limited support may reflect the extreme cognitive rigidity associated with patients with AN,³⁴ which may impede progress with the cognitive component of treatment.

Interpersonal Psychotherapy (IPT)

Only one RCT has investigated the efficacy of IPT in AN. McIntosh et al.³³ compared 20 sessions of IPT to CBT and nonspecific supportive clinical management in 56 patients, and found that clinical management was superior to IPT on global outcome (a 1–4 severity rating scale with 1 being in remission and 4 meeting full

Table 3. Interventions for Binge Eating Disorder.

Author	N (% female)	Recruitment source	Diagnostic/inclusion criteria	Exclusion criteria	Tx conditions (duration and setting)	Primary outcome assessed	Secondary outcome assessed	Primary results	Secondary results
Psychopharmacological Interventions									
Antidepressants									
<i>Fluoxetine</i>									
Arnold et al. ⁷⁶	60 (93)	Community advertisement	DSM-IV BED (≥ 3 episodes/week), 18–60 years old, $> 85\%$ IBW	Pregnancy, AN, relevant and severe medical or psychiatric condition, recent tx	6 weeks Outpatient 20–80 mg – FLX – PL	Weekly binge frequency, % reduction in binge frequency	Weight, BMI, CGI, HRSD	FLX $>$ PL On weekly binge frequency	FLX $>$ PL On BMI, weight, CGI
<i>Fluvoxamine</i>									
Pearlstein et al. ⁷⁹	20 (85)	Community advertisement/referral	DSM-IV BED	Concurrent tx	12 weeks Outpatient Up to 150 mg – FLV – PL	Binge eating frequency, EDE	Weight, HRSD, CGI, SCL-90, BDI	FLV = PL	FLV = PL
<i>Citalopram</i>									
McElroy et al. ⁷⁸	38 (95)	Community advertisement	DSM-IV BED (≥ 3 episodes/week), 18–60 years old, $> 85\%$ IBW	Pregnancy, AN, relevant and severe medical or psychiatric condition, recent tx	6 weeks Outpatient 20–60 mg – CIT – PL	Frequency of binge days and episodes, YBOC-BE	BMI, weight, CGI, HRSD	CIT $>$ PL	CIT $>$ PL On weight, CGI
<i>Sertraline</i>									
McElroy et al. ⁷⁷	34 (94)	Outpatients	DSM-IV BED (≥ 3 episodes/week), 18–60 years old, $> 85\%$ IBW	Current AN, psychosis, mania, severe suicidality, concurrent tx	6 weeks Outpatient 50–200 mg (mean: 187 mg) – SER – PL	% decrease in binge frequency	CGI, BMI, HRSD	SER $>$ PL	SER $>$ PL On CGI, BMI
Other									
<i>Topiramate</i>									
McElroy et al. ⁸⁰	61 (–)	Community advertisement	DSM-IV-TR BED (≥ 3 episodes/week), 18–60 years old, BMI $>$ 30	Substance use disorder, severe psychiatric, medical condition, concurrent tx	14 week Outpatient 25–600 mg – TOP – PL	Binge episodes and days in last week	CGI, YBOCS, HRSD, BMI, weight, % body fat	TOP $>$ PL	TOP $>$ PL On BMI, weight CGI, YBOCS

(Continued)



Table 3. (Continued)

Author	N (% female)	Recruitment source	Diagnostic/inclusion criteria	Exclusion criteria	Tx conditions (duration and setting)	Primary outcome assessed	Secondary outcome assessed	Primary results	Secondary results
McElroy et al. ⁸¹	394 (86)	Outpatients from private and university settings	DSM-IV BED (≥ 3 episodes/week), 18–65 years old, 30 < BMI < 50	Significant medical condition, psychosis, depression, concurrent tx	16 weeks Outpatient Up to 400 mg – TOP – PL	Binge eating days and episodes per week, YBOCS-BE, TFEQ	BMI, CGI, BIS-11, SDS, HRSD, MADRS	TOP > PL	TOP > PL On BMI, CGI, BIS-11, SDS
<i>Sibutramine</i> Appollinario et al. ⁸²	60 (88)	Community advertisement	DSM-IV BED, 18–60 years old, BMI 30–45	Pregnancy, BN, serious medical or psychiatric condition, concurrent tx	12 weeks Outpatient 15 mg – SIB – PL	Frequency of binge days in past week, body esteem scale	BDI, weight	SIB > PL On frequency of binge days	SIB > PL
Milano et al. ⁸³	20 (100)	Outpatient	DSM-IV BED, 24–36 years old		12 weeks Outpatient 10 mg/kg/day – SIB – PL	Frequency of binge days, body esteem scale	Weight	SIB > PL	SIB > PL
Wilfley et al. ⁸⁴	304 (90)	Community outpatient advertisement	DSM-IV BED, 18–65 years old, BMI < 45	Serious medical or psychiatric condition, concurrent tx, AN,	24 weeks Outpatient 15 mg – SIB – PL	Frequency of binge episodes and days per week, TFEQ	Weight, BMI, global improvement, IWOQL	SIB > PL	SIB > PL On weight, BMI, global improvement
Psychosocial Interventions									
<i>Cognitive Behavioral Therapy</i>									
Wilfley et al. ⁸⁹	162 (83)	Community advertisement	DSM-IV BED, 18–65 years old, BMI 27–48	Pregnancy, concurrent tx, severe psychiatric conditions	20 sessions Outpatient – gCBT – gIPT 1 year follow-up	Recovery, EDE, Binge eating days/episodes		gCBT = gIPT Follow-up: gCBT = gIPT	
Hilbert and Tuschien-Caffier ⁸⁶	28 (100)	Community advertisement	DSM-IV-TR BED (≥ 1 episode/week)	Concurrent tx, suicidality, psychosis, substance dependence, pregnancy	19 sessions – CBT body exposure (CBT-E) – CBT cognitive restructuring (CBT-C)	EDE weight and shape concern, BSQ, EDE restraint, eating concerns	BDI	CBT-E = CBT-C	CBT-E = CBT-C



Grilo and Masheb ⁸⁸	90 (79)	Community advertisement	DSM-IV BED, 18–60 years old, BMI > 27	Concurrent tx, serious medical or psychiatric conditions, pregnancy	12 weeks Outpatient – CBTgsh – BWLgsh – Self-monitoring (CTRL)	Remission over the past month, EDE-Q, TFEQ, frequency of binge eating	BDI, RSES, BMI	CBTgsh > BWLgsh, CTRL on remission CBTgsh > BWLgsh on frequency of binge eating, hunger BWLgsh > CBTgsh on increasing restraint BWL > IPT, CBTgsh on reducing BMI, body weight BWL > CBTgsh on dietary restraint On bingeing: 1-year follow-up: BWL = IPT = CBTgsh 2-year follow-up: IPT, CBTgsh > BWL	CBTgsh = BWLgsh	
Wilson et al. ⁹⁰	208 (85)	Community advertisement and clinic referrals	DSM-IV BED, >18 years old, BMI 27–45	Concurrent tx, serious medical or psychiatric conditions, pregnancy	24 weeks – IPT – BWL – CBTgsh – 1 and 2 year follow-up	Binge eating days per month, weight, EDE	BDI, RSES, SAS,	BWL > IPT, CBTgsh on reducing BMI, body weight BWL > CBTgsh on dietary restraint On bingeing: 1-year follow-up: BWL = IPT = CBTgsh 2-year follow-up: IPT, CBTgsh > BWL	IPT = BWL = CBTgsh	
Grilo et al. ⁹¹	125 (67)	Community advertisement	DSM-IV BED, 18–65 years old, BMI 30–55	Concurrent tx, serious medical or psychiatric conditions	16 sessions Outpatient – CBT – BWL – CBT + BWL (32 sessions for combined) – 6, 12 month follow-up	Abstinence from binge eating, EDE	BDI, BMI	BWL = CBT + BWL = CBT on bingeing At follow-up: CBT > BWL on binge eating	BWL, CBT + BWL > CBT on BMI	
<i>Dialectical Behavior Therapy</i>										
Telch et al. ⁹²	44 (100)	Community advertisement	DSM-IV BED, 18–65 years old	Concurrent tx, suicidality, psychosis, substance abuse, pregnancy	20 weeks Outpatient – DBT – WL	Binge days and episodes, EDE, BES, EES	Weight, BDI, PANAS, NMRS, RSES	DBT > WL On binge days and episodes, on emotional eating in response to anger	DBT = WL	

(Continued)



Table 3. (Continued)

Author	N (% female)	Recruitment source	Diagnostic/inclusion criteria	Exclusion criteria	Tx conditions (duration and setting)	Primary outcome assessed	Secondary outcome assessed	Primary results	Secondary results
<i>Weight Loss Treatment</i>									
Grilo and Masheb ⁸⁸	90 (79)	Community advertisement	DSM-IV BED, 18–60 years old, BMI > 27	Concurrent tx, serious medical or psychiatric conditions, pregnancy	12 weeks Outpatient – CBTgsh – BWLgsh – Self-monitoring (CTRL)	Remission over the past month, EDE-Q, TFEQ, frequency of binge eating	BDI, RSES, BMI	CBTgsh > BWLgsh, CTRL on remission CBTgsh > BWLgsh on frequency of binge eating, hunger BWLgsh > CBTgsh on increasing restraint	CBTgsh = BWLgsh
Wilson et al. ⁹⁰	208 (85)	Community advertisement and clinic referrals	DSM-IV BED, > 18 years old, BMI 27–45	Concurrent tx, serious medical or psychiatric conditions, pregnancy	24 weeks – IPT – BWL – CBTgsh – 1 and 2 year follow-up	Binge eating days per month, weight	BDI, RSES, SAS	BWL > IPT, CBTgsh on reducing BMI, body weight 1 year follow-up: BWL = IPT = CBTgsh on binge eating 2-year follow-up: IPT, CBTgsh > BWL on binge eating	BWL > CBTgsh on increasing dietary restraint
<i>Interpersonal Psychotherapy</i>									
Wilfley et al. ⁸⁹	162 (83)	Community advertisement	DSM-IV BED, 18–65 years old, BMI 27–48	Pregnancy, concurrent tx, severe psychiatric conditions	20 sessions Outpatient – gCBT – gIPT 1 year follow-up	Recovery, EDE, binge eating days, episodes		gCBT = gIPT Follow-up: gCBT = gIPT	
Wilson et al. ⁹⁰	208 (85)	Community advertisement and clinic referrals	DSM-IV BED, > 18 years old, BMI 27–45	Concurrent tx, serious medical or psychiatric conditions, pregnancy	24 weeks – IPT – BWL – CBTgsh – 1 and 2 year follow-up	Binge eating days per month, weight, EDE	BDI, RSES, SAS	BWL > IPT, CBTgsh on reducing BMI, body weight	IPT = BWL = CBTgsh



BWL >
 CBTgsh
 on dietary
 restraint
 On bingeing:
 1-year
 follow-up:
 BWL = IPT
 = CBTgsh
 2-year
 follow-up:
 IPT, CBTgsh
 > BWL

Psychopharmacological + Psychosocial Interventions

Grilo et al. ⁹⁵	50 (88)	Community outpatient	DSM-IV BED, 35–60 years old, BMI > 30	Concurrent tx, severe medical or psychiatric condition, pregnancy	12 weeks, outpatient – CBTgsh + PL – CBTgsh + orlistat (860 mg)	Remission, binge episodes per month, EDE	BDI, RSES, weight loss, weight loss > 5%	CBTgsh + ORL > CBTgsh + PL on weight loss
Grilo et al. ⁹³	108 (78)	Community outpatient	DSM-IV BED, 18–60 years old, 100%–200% IBW	Concurrent tx, severe medical or psychiatric condition, pregnancy	16 weeks Outpatient 60 mg – CBT + FLX – CBT + PL – FLX – PL	Remission (abstinence from binge eating in last month), EDE-Q, TFEQ, BSQ	BDI, BMI	CBT + FLX, CBT + PL > FLX, PL CBT + PL > FLX on binge episodes, EDE-Q, cognitive restraint, BSQ CBT + FLX > FLX binge episodes, EDE-Q, hunger, disinhibition

Note: Greater than symbol (>) refers to significantly better outcome.

Abbreviations: AN, Anorexia Nervosa; BDI, Beck Depression Inventory; BED, Binge Eating Disorder; BES, Binge Eating Scale; BIS-11, Barrett Impulsivity Scale; BMI, Body Mass Index; BN, Bulimia Nervosa; BSQ, Body Shape Questionnaire; BT, Behavior Therapy; BWL, Behavioral Weight Loss; CBT, Cognitive Behavioral Therapy; CBTsh, Cognitive Behavioral Therapy self-help; CGI, Clinical Global Impression; CIT, Citalopram; CT, Cognitive Therapy; CTRL, Control group; DBT, Dialectical Behavior Therapy; DES, Desipramine; ED, Eating Disorder; EDE, Eating Disorders Examination; EDE-Q, Eating Disorders Examination Questionnaire; EES, Emotional Eating Scale; FLX, Fluoxetine; FLV, Fluvoxamine; FCI, Food Craving Index; g, Group Therapy; gsh, Guided Self Help; HRSD, Hamilton Rating Scale for Depression; IBW, Ideal Body Weight; IIP, Inventory of Interpersonal Problems; IWOQL, Impact of Weight on Quality of Life-Lite; IPT, Interpersonal Psychotherapy; MADRS, Montgomery Asberg Depression Rating Scale; NMRS, Negative Mood Regulation Scale; ORL, Orlistat; PANAS, Positive and Negative Affectivity Scale; PL, Placebo; RSES, Rosenberg Self Esteem Scale; SAS, Weissman Social Adjustment Scale; SCL-90, Symptom Checklist; SER, Sertraline; SFT, Separated Family Therapy; SDS, Sheehan Disability Scale; SH, Self Help; SIB, Sibutramine; TFEQ, Three Factor Eating Questionnaire; TOP, Topiramate; WL, Wait List Control; YBOCS-BE, Yale-Brown Obsessive Compulsive Scale-Binge Eating.



criteria for AN). IPT did not differ from the clinical management group on weight gain, and scores on restraint favored clinical management. IPT and CBT did not differ on global outcome or weight gain, and IPT was associated with worse restraint scores and a lower proportion of individuals rated as “significantly improved” compared to CBT. At five-year follow-up, no differences were found on any outcome measures between clinical management, CBT, and IPT.³⁵ Thus, although individuals treated with IPT may continue to improve after treatment completion, there is no evidence that IPT has been superior to alternative treatments or TAU for AN.

Family Based Therapy

Family based therapy has been shown to be the most effective psychosocial treatment for children and adolescents with AN and has been rated as having “strong research support” by the APA task force.²⁸ Indeed, studies have found that family based therapy was associated with improvements in BMI and eating attitudes compared to TAU²⁶ and active, alternative treatments.^{24,36,37} Family based treatment may succeed because it balances the benefits of a controlled environment for producing weight gain with the external validity of achieving these gains within the home environment. The effectiveness of family based therapy is specific to younger patients.³⁶ A follow-up study found that the superiority of family based therapy over individual therapy persisted after 5-years.³⁸ Further, in 86 outpatients, short-term family based therapy (10 sessions over 6 months) was as effective as long-term family based therapy (20 sessions over 12 months).³⁹ However, the two largest family based therapy studies ($n = 84$ ²⁶ and $n = 121$ ³⁷), establishing improvements in weight over alternative treatments, have utilized the 12-month intervention.^{26,37} While strong evidence has supported familial involvement in the treatment of adolescent AN, the level of family involvement may depend on parental characteristics. When 40 families of adolescents with AN were stratified for level of maternal criticism, patients with high maternal criticism had significantly better outcome in separated family therapy compared to conjoint family therapy, while no differences were found for patients with low maternal criticism.⁴⁰ In sum, family based therapy represents a first line treatment for children/younger adolescents with AN.

Psychopharmacological and Psychosocial Interventions

To our knowledge, no studies have systematically compared medication alone, psychosocial treatment alone, and their combination to test whether combined treatments have advantages over single treatments in AN. This is likely due to the poor evidence base for psychopharmacological and psychosocial treatments in AN and ethical constraints on examining psychopharmacological intervention of unknown efficacy alone. Despite this limitation, some hypotheses may be developed based upon results from adjunctive medication trials and psychosocial treatments. Although the original aim of Pike et al.³⁰ was not to investigate the additional effects of medication on psychosocial treatment, they found differential responses to medication between CBT and nutritional counseling. Within the CBT condition, 7/8 individuals who met criteria for “good outcome” were prescribed an antidepressant, compared to 4/10 individuals who did not meet criteria for “good outcome.” In contrast, medication was unassociated with outcome for those randomized to nutritional counseling. Due to a lack of studies systematically comparing combination and single treatments, there is no conclusive evidence that combination treatments are associated with better outcome than psychosocial treatment alone.

Summary

To date the most effective treatments for AN have included the use of olanzapine as an adjunct to treatment for adults with AN, and family based therapy for adolescents with AN. For olanzapine administered in an inpatient setting, 87% of patients achieved weight restoration compared to 56% of the placebo group.¹⁷ However, less is known about how well olanzapine works on an outpatient basis. For adolescent outpatients, approximately 41% achieved weight restoration with family based therapy.^{37,40} These results highlight the need for novel psychosocial treatments for adults and better knowledge about the outpatient efficacy of olanzapine.

Bulimia Nervosa

Psychopharmacological Interventions Antidepressants

Given that affective disturbances have been commonly associated with BN,⁴¹ early pharmacological treatments focused on tricyclic antidepressants,



and showed efficacy in decreasing binge episodes compared to placebo.^{42,43} However, these medications were associated with adverse side effects. Thus, current psychopharmacological research has focused on SSRIs. While fluvoxamine^{44,45} and sertraline⁴⁶ have been shown to be superior to placebo for reducing binge/purge frequency, relatively few studies have focused on these SSRIs. In contrast, several studies have examined the efficacy of fluoxetine. Overall, 60 mg of fluoxetine has been successful in reducing binge/purge frequency as well as eating disorder cognitions including weight concern, food preoccupation, restraint, and drive for thinness,^{47–50} and has been well-tolerated.⁴⁹ 60 mg fluoxetine also has been shown to be superior to 20 mg of fluoxetine in reducing binge/purge frequency.⁴⁷ There has been mixed support for fluoxetine's efficacy in reducing depressive symptoms in patients with BN, with some studies finding no differences between fluoxetine and placebo^{48,50} and others favoring fluoxetine.⁴⁷

One study examined the efficacy of fluoxetine in preventing relapse in 150 patients with BN after successful outpatient fluoxetine treatment.⁴⁹ The authors found that 52 weeks of 60 mg fluoxetine significantly reduced relapse rate compared to placebo (33% vs. 51%, respectively) and increased time to relapse (i.e., was associated with sustained remission). Those treated with fluoxetine also showed greater improvements in eating-related preoccupations and rituals. Thus, fluoxetine has been effective in reducing binge/purge frequency and eating-related symptoms in BN, but may not be efficacious for reducing depressive symptoms.

Psychosocial Interventions

Cognitive Behavioral Therapy

There has been strong support for CBT in reducing binge/purge behaviors both compared to control conditions⁵¹ and other active treatments including psychodynamic therapy,^{52,53} IPT,^{54,55} and family therapy.⁵⁶ Further, a meta-analysis of treatments in BN found that CBT had larger effect sizes than medication for reducing binge frequency (CBT = 1.28, medication = 0.66), purge frequency (CBT = 1.22, medication = 0.39), disordered eating attitudes (CBT = 1.35, medication = 0.71), and depression (CBT = 1.31, medication = 0.73).⁵⁷ CBT, delivered in 16–20 sessions over 4–5 months, has

received an “A” grade by the National Institute for Clinical Excellence (NICE) in the UK.⁵⁸ CBT has been effectively delivered in group and guided self-help formats.^{56,59} The efficacy of CBT may be due to the well-developed symptom maintenance models for BN. Within the CBT model, binge eating and subsequent purging are consequences of extreme dietary restraint; thus, reducing dietary restraint by regularizing the patient's meal pattern results in reductions in binge/purge frequency.⁶⁰ However, there is less support for CBT improving secondary symptoms such as depression, social adjustment, self-esteem, interpersonal problems, and global psychiatric symptoms, beyond alternative treatments,^{54,59,61} likely because CBT for BN focuses specifically on cognitions and behaviors related to the eating disorder.

Dialectical Behavior Therapy (DBT), a combination of CBT and mindfulness-based techniques, has been investigated for the treatment of BN, due to a strong association between BN and interpersonal problems,⁶² impulsivity,⁶³ and affective dysregulation.⁶⁴ Safer and colleagues⁶⁵ compared 20 sessions of DBT adapted for BN to a waitlist condition in 31 patients and found that DBT significantly decreased binge/purge frequency; however, DBT was not associated with any improvements in affect regulation or self-esteem compared to the waitlist condition. In addition, it remains unclear whether DBT is superior to standard CBT for BN.

Interpersonal Psychotherapy

Interest in IPT as a treatment for BN emerged as a consequence of early comparisons of CBT and psychodynamic psychotherapy. IPT, a short-term form of psychodynamic therapy focused on current relationships, was initially used as a control treatment to highlight the specific efficacy of CBT.⁵⁵ However, results showed that IPT was also associated with improvements in remission compared to behavioral therapy without a cognitive component.⁵⁵ This led to further investigation of IPT as a viable treatment option for BN. IPT has been shown to be superior to waitlist in reducing binge episode frequency;⁶⁶ however, IPT has been associated with inferior remission rates compared to CBT at end of treatment.^{54,55} At 1-year^{54,55} and 5-year follow up,⁶⁷ IPT was as effective as CBT in facilitating remission and ameliorating secondary symptoms, including general



psychiatric symptoms, social adjustment, and depressive symptoms.^{54,55} Thus, IPT and CBT appear to be equally effective for achieving remission long-term, but CBT facilitates remission more rapidly. Given that patients with BN have poor psychosocial functioning,⁹ improving interpersonal functioning may eventually help the patient to cope with life stressors more effectively instead of relying on maladaptive coping mechanisms, such as dietary restriction, bingeing, and purging.

Family Based Interventions

In contrast to strong evidence for the efficacy of family based interventions for adolescents with AN, mixed evidence has emerged for the role of family based therapy in the treatment of adolescent BN.^{56,68} Having parents take control of or monitor their child's binge/purge behaviors may be difficult given the secretive nature of these behaviors as well as their tendency to emerge at an older age. Despite these challenges, Le Grange et al.⁶⁸ found 20 sessions of family based therapy was superior to supportive psychotherapy on remission rates, and reductions in compensatory behaviors, dietary restraint, and eating, weight, and shape concerns in a sample of 80 patients with BN and related EDNOS. However, in a similar sized sample, Schmidt and colleagues⁵⁶ found that 13 weeks of family therapy was inferior to CBT on abstinence from binge eating at 6-month follow-up, and no differences in binge frequency were found between treatments at 12-month follow-up. Thus, further research is needed to elucidate the effectiveness of family based therapy in adolescent BN.

Psychopharmacological and Psychosocial Interventions

Given the efficacy of CBT and fluoxetine in the treatment of BN, several studies have examined combined treatments to determine whether the use of medication as an adjunct to CBT provides any further improvement over CBT alone. Overall, no differences have emerged between combined treatments and CBT alone for reducing binge/purge frequency.⁶⁹⁻⁷² However, there has been some evidence that the addition of antidepressant medication may improve depressive symptoms above CBT alone.^{72,73} Walsh and colleagues⁷² compared 16 weeks of CBT guided self-help with placebo, CBT guided

self-help with fluoxetine, fluoxetine alone, and placebo alone in 91 patients. CBT plus placebo, CBT plus fluoxetine, and fluoxetine alone were equivalent in reducing binge/purge frequency, but interventions with fluoxetine showed greater improvements in depressive symptoms compared to placebo interventions. Importantly, in this and other trials, CBT was designed to address symptoms of BN rather than depression. Thus, it is unclear whether findings would hold if CBT for depression were offered for those with comorbid mood disorders. Within the depression literature, antidepressant medication has been found to enhance reductions in depression associated with CBT, particularly for more complex cases;⁷⁴ thus, it is likely that the addition of fluoxetine to treatment for patients with BN and comorbid mood disorders would be efficacious even if they were treated with CBT for depression. Overall, results from these studies support the use of CBT as a first line treatment for BN.

Summary

The most effective current treatments for BN include CBT and 60 mg fluoxetine. However, even with the strong evidence base for the superiority of both fluoxetine and CBT over alternative treatments, remission rates have remained low. For fluoxetine approximately 20% of patients achieved remission,^{48,50} while 40% achieved remission with CBT across trials.^{51,54,55,59,75} These results highlight the continued need for treatment refinement and implementation within this group.

Binge Eating Disorder Psychopharmacological Interventions Antidepressants

Similar to results in BN, SSRIs reduce binge frequency in BED compared to placebo.⁷⁶⁻⁷⁸ Positive findings have emerged across a range of different medications (i.e., fluoxetine, fluvoxamine, citalopram, sertraline) with limited focus on replication of positive findings for specific formulations. Thus, more studies replicating findings for specific medications are needed. Mixed results have emerged for the usefulness of SSRIs in decreasing weight or BMI for obese binge eaters, with some studies finding positive results⁷⁶⁻⁷⁸ and others reporting no difference between SSRIs and placebo.⁷⁹ None of the



reviewed studies found evidence that SSRIs were superior to placebo in reducing depressive symptoms in BED.^{76–79}

Several other medications have shown promise in the treatment of BED. Two studies of 61⁸⁰ and 394⁸¹ patients with BED found positive results for topiramate in reducing binge frequency, binge days, and weight.^{80,81} However, approximately 15%–20% of the treatment groups withdrew due to adverse side effects^{80,81} including problems with memory and depression.⁸¹ Studies examining sibutramine, an appetite suppressant, showed promise in early trials.^{82–84} Appolinario and colleagues⁸² found that 12 weeks of sibutramine produced significant decreases in binge frequency compared to placebo in 60 outpatients; further, individuals on medication had significant reductions in weight, while the placebo group experienced increased weight. Of note, in October 2010, the US Food and Drug Administration (FDA) recommended against the prescription of sibutramine due to evidence of serious cardiovascular adverse events.⁸⁵ Thus, the current state of psychopharmacological directions in the treatment of BED remains focused on serotonergic agents.

Psychosocial Interventions

Cognitive Behavioral Therapy

CBT has been shown to improve binge abstinence rates compared to no treatment^{86,87} and self-monitoring control.⁸⁸ However, there has been mixed evidence for the efficacy of CBT in reducing binge frequency compared to alternative treatments.^{88,89} One study found that CBT led to greater reductions in binge frequency, greater remission rates, and reduced hunger compared to behavioral weight loss (BWL) treatment.⁸⁸ However, CBT does not differ from IPT in reducing binge eating or increasing remission.^{89,90} These results appear to mirror similarities in remission rates between CBT and IPT for BN, and may be a function of similar models of factors maintaining binge eating in both BN and BED. Two studies^{86,87} examined the comparative efficacy of guided self-help (self-help manual plus weekly meetings with a therapist), pure self-help (self-help manual only), and traditional therapist-led CBT. Supporting the efficacy of alternative forms of treatment delivery, no differences in binge frequency were found between guided self-help, pure self-help, and traditional CBT.^{86,87}

Thus, CBT appears to have efficacy for reducing binge frequency but does not appear to contribute to weight loss in BED.^{90,91} Further, CBT contributes to similar levels of improvement in other secondary outcomes, including depressive symptoms, self-esteem, and social adjustment, compared to alternative treatments.^{88,90,91}

To date, only one study⁹² of 44 patients has investigated the efficacy of DBT compared to waitlist control for the treatment for BED. Twenty weeks of DBT was successful in decreasing binge days, binge frequency, EDE weight, shape, and eating concerns, as well as emotional eating in response to anger compared to no treatment. However, DBT did not produce greater improvement than waitlist on secondary outcomes including weight loss, depressive symptoms, and negative affect regulation. While results show promise in improving primary outcomes, comparisons against active interventions are needed.

Weight Loss Treatment

BWL treatments have been investigated as a means of helping patients with BED gain control over their food intake and reduce their weight. These programs have helped facilitate weight reduction but have mixed results for reducing binge eating, probably due to the more direct focus on weight loss as opposed to binge eating. Indeed, BWL did not differ from a self-monitoring control condition⁸⁸ in producing binge abstinence and has been found to be inferior to CBT at treatment end⁸⁸ and 2-year follow-up.⁹⁰ Although CBT outperforms BWL in reducing binge frequency, BWL has been shown to be superior to both CBT and IPT in reducing BMI and weight⁹⁰ and superior to CBT in increasing dietary restraint, which may help facilitate weight loss for obese binge eaters.^{88,90} In contrast, BWL does not appear to differ from alternative treatments on depressive symptoms, self-esteem, or social adjustment.^{88,90}

Interpersonal Psychotherapy

IPT has produced similar reductions in binge eating compared to alternative treatments.^{89,90} Wilfley et al⁸⁹ found no differences in binge abstinence, binge days, or binge frequency between 20 sessions of group IPT and group CBT in a sample of 162 outpatients, both at end of treatment and 1-year follow-up. Similarly,



Wilson and colleagues⁹⁰ compared 208 patients and found no differences in frequency of binge days between 24 weeks of IPT, CBT, and BWL at end of treatment or 1-year follow-up. However, at 2-year follow-up both IPT and CBT were superior to BWL. Thus, support exists for IPT's efficacy in the treatment of BED, and IPT appears to produce equivalent outcomes to those found for CBT.

Psychopharmacological and Psychosocial Interventions

In terms of combined treatments, studies investigating CBT and antidepressant medications have found no evidence for increased efficacy over CBT alone.^{93,94} Indeed, Grilo and colleagues⁹³ studied 108 individuals with BED and found that after 16 weeks, CBT plus fluoxetine and CBT plus placebo did not differ in producing remission from binge eating, and both were superior to fluoxetine or placebo alone. Further, CBT plus fluoxetine did not have additional benefits in ameliorating secondary outcomes, including depression or BMI, compared to CBT alone. One study of 50 patients found that 12 weeks of guided self-help CBT combined with the weight loss drug orlistat was associated with significantly greater remission rates and weight loss than CBT plus placebo,⁹⁵ highlighting a potential future direction for intervention.

Summary

The best treatments to date for BED have included CBT and IPT. Remission rates from BED for each of these treatments have been higher than remission rates for AN or BN. Within studies that have compared CBT and IPT, approximately 82% of individuals treated with CBT and 80% of those treated with IPT achieved remission.^{89,90} While these remission rates appear high, it is notable that other studies that have examined CBT alone or compared with other treatments have produced lower estimates of remission.^{88,91,96}

Emerging Directions

Table 4 provides a list of clinical trials that are currently underway or only recently completed. This table includes 13 studies focused on AN, 7 focused on BN, and 9 focused on BED. Across studies, 6 of 29 (21%) are trials focused on psychopharmacological

interventions, representing one-sixth of the trials for AN, approximately half of the trials for BED, and none of the trials for BN.

Anorexia Nervosa

Emerging directions in the treatment of AN center mostly on expanding our knowledge regarding the usefulness of atypical antipsychotics and developing more efficacious psychosocial treatments for adults with AN, including those aimed at relapse prevention (see Table 4). Given the promising findings from trials involving olanzapine in increasing weight and improving cognitive symptoms of AN in adults, a 16-week, multi-site, double-blind, placebo-controlled outpatient trial of 160 adults with AN is currently underway to examine the effectiveness of olanzapine (2.5–10 mg) vs. placebo. This collaboration will increase knowledge about the outpatient efficacy of olanzapine, address limitations of small samples in previous studies (i.e., $n = 15\text{--}34$),^{17–20} and help identify the best dose.⁹⁷

Given the paucity of efficacious psychosocial treatments for adults with AN, the National Institute of Mental Health established a request for applications that funded the development and evaluation of four novel treatments. These treatments were designed to target specific vulnerabilities for AN in older adolescents and adults.^{98–101} They include a couples-based treatment (UCAN),^{100,102,103} cognitive remediation therapy (CRT),^{98,104} emotion acceptance behavior therapy (EABT),⁹⁹ and food exposure and response prevention therapy (AN-EXRP).^{101,105} While these trials are ongoing at the time of this review, preliminary results appear encouraging.

Uniting couples in the treatment of AN (UCAN) focuses on the patient in her interpersonal/social context, with the aim of maximizing social support and addressing issues of marital adjustment, communication, and sexual functioning.¹⁰⁶ Given the strong support for family based therapy in children/young adolescents with AN, this treatment functions as a developmentally appropriate extension for adults with AN through a focus on couple, rather than family, functioning. Two integral aspects of family based therapies for adolescents have been the focus on engaging caregivers in the support and reinforcement of the refeeding process and improvement of overall family functioning. Within family



Table 4. Emerging Directions in Treatment.

Treatment	Authors/PI	Sample (N/anticipated N)	Study design	Tx conditions
Anorexia Nervosa				
Olanzapine	Kaplan, Marcus, Attia, and Guarda ⁹⁷	Adults (160)	RCT	16 weeks Olanzapine vs. PL
Testosterone	Klibanski ¹³³	Adults (90)	RCT	24 weeks Transdermal testosterone vs. PL
Uniting Couples in the treatment of anorexia nervosa (UCAN)	Bulik et al ^{100,102,103}	Adults (32)	RCT	UCAN + CBT vs. Unstructured supportive therapy + CBT
Cognitive remediation therapy (CRT)	Lock et al ¹⁰⁴	Adults (46)	RCT	6 months CBT vs. CBT + CRT
Emotional acceptance behavior therapy (EABT)	Wildes and Marcus ¹⁰⁷	Adults (5)	Case series	24 weeks EABT
Exposure and response prevention (AN-EXRP)	Steinglass ¹⁰⁵	Adults (9)	Open series	12 sessions over 4 weeks AN-EXRP
Internet-based relapse prevention	Fichter et al ¹⁰⁸	Adults (258)	RCT	9 months Internet-based relapse prevention vs. TAU
Loughborough eating disorder activity therapy (LEAP)	Touyz et al ¹⁰⁹	Adults (19)	Open trial	8 sessions LEAP
LEAP	Hay ¹¹⁰	Adults (200)	RCT	Outpatient 8 sessions LEAP + 6–8 months CBT vs. 8–10 months CBT
Family therapy	Eisler ¹¹²	Adolescents (400)	RCT	12 months Inpatient treatment vs. outpatient family therapy vs. multi-day family treatment
Family therapy	Gowers ¹¹¹	Adolescents (167)	RCT	6 months Specialized outpatient family treatment vs. general outpatient treatment (TAU) vs. inpatient treatment
Bulimia Nervosa				
Internet-based CBT	Sanchez-Ortiz et al ¹¹⁷	Adults (76)	RCT	12 weeks Internet CBT vs. WL
Internet-based CBT	Bulik ¹³⁴	Adults (180)	RCT	20 weeks Internet CBT vs. face-to-face CBT

(Continued)



Table 4. (Continued)

Treatment	Authors/PI	Sample (N/anticipated N)	Study design	Tx conditions
Telemedicine CBT	Mitchell et al ¹¹⁶	Adults (128)	RCT	20 sessions Telemedicine CBT vs. face-to-face CBT
Text messaging	Shapiro et al ¹¹⁸	Adults (31)	Non-randomized pilot	12 weeks CBT + text message self-monitoring
Integrative cognitive affective therapy (ICAT)	Wonderlich et al ¹¹⁹	Adults (21)	Non-randomized pilot	16 weeks ICAT
CBT-enhanced (CBT-E)	Fairburn et al ¹²⁰	Adults (154)	RCT	20 weeks CBT vs. CBT-E vs. WL
Stepped-care approach	Mitchell et al ¹²¹	Adults (293)	RCT	20 sessions Stepped-Care vs. CBT + FLX
Binge Eating Disorder				
Bupropion	White ¹²³	Adults (68)	RCT	8 weeks Bupropion vs. PL
Pramipexole	Steffen ¹²⁴	Adults (8)	Open label trial	Pramipexole
Armodafinil	McElroy ¹²⁵	Adults (60)	RCT	Armodafinil vs. PL
Acamprosate	McElroy et al ¹²⁹	Adults (40)	RCT	Acamprosate vs. PL
Dialectical behavior therapy	Chen et al ¹²⁶	Adults (5)	RCT	24 weeks DBT vs. WL
Dialectical behavior therapy	Chen ¹³⁵	Adults (100)	RCT	DBT vs. CBT vs. guided self help
Integrative response therapy (IRT)	Robinson ¹³⁶	Adults (100)	RCT	10 sessions Group IRT vs. group CBT guided self-help
Bariatric surgery	Wadden et al ¹²⁷	Adults (85)	Non-randomized	Bariatric surgery vs. BWL
Stepped-care approach	Grilo ¹³⁰	Adults (175)	RCT	Stepped-Care vs. BWL

Abbreviations: BWL, Behavioral Weight Loss; CBT, Cognitive Behavioral Therapy; FLX, Fluoxetine; PL, Placebo; RCT, Randomized Controlled Trial; TAU, Treatment as Usual; WL, Waitlist Control.



based therapy, improved communication and family functioning serves to increase support within the environment and help the adolescent stay healthy, and improvement on the part of the patient contributes to improved family relationships. This sense of teamwork and focus on improved communication translates well to couples approaches, and is an important part of UCAN. Preliminary findings^{102,103} indicated impressive outcomes associated with both UCAN and the supportive couples' therapy control condition. Although there was no significant difference between treatment conditions, retention, weight recovery, and remission exceeded levels observed in prior RCTs for outpatient treatment in adult patients with AN, suggesting partner involvement was beneficial.

CRT stems from neuropsychological research showing that individuals with AN exhibit weak central coherence, cognitive rigidity, and deficits in set shifting. These deficits are associated with an overly detail-oriented focus, which both maintains the disorder and interferes with traditional treatments, as patients often have difficulty grasping the therapeutic "big picture".³⁴ CRT targets these deficits through the use of cognitive exercises to improve thinking process skills and cognitive flexibility. This not only helps improve core cognitive symptoms of the disorder, but also enhances patients' ability to engage in and benefit from therapies that directly target the eating disorder. Preliminary results¹⁰⁴ support the acceptability of the treatment and improved performance on cognitive tasks for patients randomly assigned to receive CRT. The effects of improved cognitive processes on treatment engagement or outcome have not yet been reported.

EABT focuses on the role anorectic symptoms play in facilitating emotional avoidance. The treatment draws influence from several "third wave" treatments including acceptance and commitment therapy, DBT, and mindfulness-based cognitive therapy.¹⁰⁷ EABT focuses on techniques to enhance emotional awareness and increase important relationships and activities for the patient outside of the eating disorder.¹⁰⁷ In a recent case series, 3 of the 4 patients enrolled showed modest improvements in weight gain in an outpatient setting and additional improvements in anxiety, depression, and emotional avoidance were observed.¹⁰⁷

AN-EXRP draws from similarities between AN and obsessive-compulsive disorder, including irrational fear/avoidance of food and extreme behaviors to manage these fears. Under this model, Steinglass and colleagues¹⁰⁵ developed a treatment to confront patients' anxiety around eating-related situations. These sessions begin with psychoeducation about the treatment and focus on developing an individualized hierarchy of feared foods, eating situations, and ritualized behaviors. Patients are then exposed slowly over time to each feared food situation, starting with the least feared item. Subjective ratings of anxiety are assessed immediately before, during, and after each exposure. The key aspect of exposure is the patient's direct experience of, and habituation to, the anxiety as well as the disconfirmation of her feared consequences regarding eating. Steinglass and colleagues¹⁰⁵ conducted a 4-week open series of AN-EXRP as an adjunct to inpatient treatment and found that decreases in anxiety over course of treatment were significantly associated with greater caloric intake in the post-treatment meal. However, change in weight was not reported, likely due to the inpatient setting of the study and success of normalizing weight in all participants.

In addition to trials conducted with the US, a German group¹⁰⁸ has developed an internet-based relapse prevention program for AN. The program allows patients to receive daily information regarding healthy behaviors and pitfalls to avoid, report their symptoms, receive feedback about progress, and encouragement to contact their counselor for additional support if symptoms increase. Preliminary findings¹⁰⁸ indicate that the interactive program was both successful in reducing relapse and contributed to further weight gain, suggesting its possible efficacy as an active treatment, compared to TAU.

Given the role that extreme exercise plays in maintaining the cognitive symptoms of AN, the Loughborough Eating Disorders Activity Therapy (LEAP)¹⁰⁹ was developed as an adjunct to CBT to promote healthy attitudes toward exercise behavior. The program is structured around four core themes of psychoeducation about "healthy/non-excessive" exercise, guided discovery, cognitive skills, and relapse prevention. Preliminary data from 19 patients showed that 8 sessions of LEAP as an augment to inpatient treatment were successful in reducing anxiety, depression,



extreme exercise and extreme beliefs about exercise. A double-blind international RCT is currently underway to examine the efficacy of LEAP enhanced CBT in the outpatient treatment of AN.¹¹⁰

In addition to treatments focused on adults, given the success of family based therapy for adolescents,³⁷ two large trials are examining the cost-effectiveness of family based therapy modalities. Gowers and colleagues¹¹¹ conducted a cost-effectiveness study in 167 patients and found that specialized outpatient family treatment was more cost-effective than general outpatient and inpatient treatment. Eisler and colleagues¹¹² are currently conducting a large-scale, 12-month trial (n = 400) of multi-family day treatment compared to individual inpatient and outpatient family therapy. Multi-family day treatment is more intensive than outpatient treatment and is administered in group format. Group formats have advantages over single-family formats, including increased cost-effectiveness and increased opportunities for families to share their experiences with one another. Pragmatic studies such as these provide useful clinical information, given the often high cost of eating disorder treatment.¹¹¹

Bulimia Nervosa

Despite the strong body of evidence supporting the efficacy of CBT in the treatment of BN, most individuals who suffer from BN do not receive CBT.¹¹³ This partly reflects challenges in training adequate numbers of therapists to provide CBT as well as therapists' concerns regarding the utility of CBT for the patients they treat. Despite attempts from initiatives to increase dissemination of CBT for anxiety and depression (i.e., Improving Access to Psychological Therapies (IAPT) in the UK;¹¹⁴ Increasing Access to CBT in Canada),¹¹⁵ these organizations do not provide services for eating disorders. Thus, emerging treatments are focusing on modalities that will allow CBT to reach a broader proportion of individuals with BN, and therapy content that will address a broader range of patient concerns. These include treatments using innovative technology and those incorporating affective components (see Table 4).

The efficacy of CBT delivered through alternative modes, including telemedicine, internet-based therapy, and the use of text messages, is being studied to increase dissemination. Mitchell and colleagues¹¹⁶ found that CBT delivered over the phone was equivalent to CBT

delivered face-to-face for producing abstinence from bingeing and purging, and both conditions were well-accepted by patients. Another study of 76 patients with BN examined the efficacy of internet-based CBT compared to waitlist and found greater improvements within the treatment group on binge-eating frequency, dietary restraint, weight, shape, and eating concerns, anxiety, and depression.¹¹⁷ A recent study examined the feasibility of using text messages as a self-monitoring tool within group CBT and found that participants' adherence to the text self-monitoring was high (86%) and the text message self-monitoring received more favorable ratings compared to other forms of self-monitoring (e.g., paper and pencil diaries).¹¹⁸

Given that Safer and colleagues⁶⁵ found initial support for the use of DBT in BN, emerging treatment directions also focus on affective regulation and interpersonal functioning. Integrative Cognitive Affective Therapy (ICAT)¹¹⁹ combines emotion-focused and interpersonal elements with traditional CBT. An initial pilot study of 21 patients with threshold or subthreshold BN found significant reductions in number of binge and purge episodes per week, with 70% of the sample achieving abstinence from bingeing and 65% achieving abstinence from purging. A recent enhanced version of CBT, CBT-E,¹²⁰ also incorporates modules on mood intolerance, clinical perfectionism, low self-esteem, and interpersonal difficulties that can be flexibly implemented based on the symptom configuration of the patient. Initial results have shown nearly identical remission rates between CBT-E and CBT overall. However, more complex cases with greater psychiatric comorbidity had lower global eating pathology in CBT-E, as compared to traditional CBT, while the reverse was true for less complex cases.

Emerging directions in combined treatments for BN focus on creating individualized treatment plans using a stepped-care approach. This approach layers treatments and medications in a triage method, based on response to previous treatment. Mitchell and colleagues¹²¹ compared CBT to a stepped-care approach. Both treatments added fluoxetine after 6 sessions for predicted non-responders. The stepped-care approach began with supervised self-help, which helps increase accountability and adherence beyond traditional self-help, but still increases feasibility by reducing therapist workload. Supervised self-help was



followed with CBT with a therapist for individuals who did not achieve abstinence from bingeing and purging using self-help. Results showed that while remission did not differ between groups at treatment end, the stepped-care approach had larger reductions in binge and compensatory episodes, depressive symptoms, and eating-related obsessions and compulsions at 1-year follow-up compared to the CBT only group. Studies utilizing stepped-care provide an important avenue for creating more individualized treatments that can improve global outcome for a greater number of patients at a lower cost.

Binge Eating Disorder

BED is associated with high rates of comorbid psychopathology, particularly mood and Cluster B personality disorders.¹²² BED is also associated with obesity and many patients are motivated to seek treatment to control their eating and to lose weight. However, current treatments either reduce binge eating or weight, but not both. Thus, emerging directions largely focus on investigating treatments that incorporate affect regulation skills and novel medications^{123–125} or treatments (bariatric surgery) that decrease appetite or promote weight loss (see Table 4).

Given the promising results for the potential efficacy of DBT in BED,⁹² Chen and colleagues¹²⁶ conducted a preliminary trial of DBT in a mixed sample of 3 BN and 5 BED outpatients with comorbid borderline personality disorder. They found that DBT produced large effect sizes in decreasing binge frequency (Cohen's $d = 1.07$), Eating Disorder Examination scores ($d = 1.66$), and increasing global adjustment ($d = 0.92$) compared to waitlist. This study, along with similar trials currently underway, provides an encouraging direction for more direct incorporation of associated personality features in the treatment of BED.

Mechanical interventions to reduce gastric capacity, including bariatric surgery, are being examined in obese individuals with BED to evaluate the effect of surgery on both weight and binge eating. A recent non-randomized study compared BED participants who received bariatric weight loss surgery to a lifestyle modification program similar to BWL.¹²⁷ The authors found that both groups had significant and equivalent reductions in binge frequency, and the bariatric surgery group had a larger reduction in body weight 1-year post treatment (22.1% vs. 10.3%, respectively). However, it is impor-

tant to note that one recent study found that 12% of individuals with premorbid eating pathology who underwent bariatric surgery developed self-induced vomiting post-surgery.¹²⁸ Thus, bariatric surgery represents a possible avenue for treatment of obese binge eaters; however, RCTs are needed to accurately compare treatment efficacy and safety.

Similarities between BED and addictive disorders also have led to the recent investigation of acamprosate, a glutamate antagonist used in the treatment of alcohol dependence. McElroy and colleagues¹²⁹ found that patients receiving acamprosate reduced the number of binge days per week, BMI, food cravings, and obsessive-compulsive symptoms related to binge eating, compared to placebo.

Emerging directions in the use of combined interventions for BED involve using a stepped-care approach, similar to BN. These approaches have developed in response to research showing that CBT has been effective for treating binge eating, but not weight loss, while BWL has been effective in reducing weight, with less clear outcomes for binge eating. A current study by Grilo and colleagues¹³⁰ is underway comparing BWL to a stepped-care approach. The stepped-care intervention will begin with BWL and then follow a decision tree based on early response with possible additions of CBT guided self-help and an appetite suppressant. Regardless of the outcome, results will help clarify more efficient and individualized treatment options for both early responders and treatment-resistant patients.

Conclusions

In summary, strong research support exists for family based therapies in the treatment of adolescent AN, while for adults, initial research supports the use of olanzapine in increasing weight and reducing anorectic cognitions. For BN, both 60 mg fluoxetine and CBT have a large empirical evidence base in reducing binge and purge episode frequency. Currently, treatments for BED have had difficulty in improving *both* binge eating and weight loss, with CBT and IPT producing similar positive results. Disappointingly, the most efficacious treatments are not available to most patients seeking treatment. Further, many patients who receive these treatments do not respond, and relapse occurs in a substantial minority of treatment responders. While several gaps in the current treatment literature



exist, the field is making substantial efforts to develop novel interventions to address these limitations. However, treatment development and evaluation remain lengthy and slow processes. For example, there was a substantial time lapse between the original 1987 report of the efficacy of family based therapy for adolescents with AN³⁶ and the recent large-scale RCT confirming this result in 2010.³⁷ Understanding these and similar trends can better help us evaluate progress and move the field forward. An exciting avenue for progress is the use of technology to increase dissemination of eating disorder-specific interventions as these might be most accessible for clinicians encountering eating disorders in patients with mood, anxiety, or substance use disorders.

Author Contributions

Conceived and designed the experiments: TAB, PKK. Analysed the data: TAB. Wrote the first draft of the manuscript: TAB. Contributed to the writing of the manuscript: TAB, PKK. Agree with manuscript results and conclusions: TAB, PKK. Jointly developed the structure and arguments for the paper: TAB, PKK. Made critical revisions and approved final version: PKK. All authors reviewed and approved of the final manuscript.

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