

Effectiveness of adult day treatment for eating disorders

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Abstract

Purpose – *The purpose of this paper is to assess the effectiveness of day treatment programmes for adults with eating disorders by comparing, evaluating and synthesizing published pre- and post-treatment outcomes.*

Design/methodology/approach – *A systematic review was undertaken of publications containing quantitative outcome data relating to weight restoration among underweight patients, reduction in binge and purge/vomit symptoms, decrease in eating disorder psychopathology and improvement in psychological functioning.*

Findings – *This systematic review of pre- and post- treatment outcomes from 15 studies revealed large effect sizes relating to increase in Body Mass Index (BMI), reduction in symptoms and decrease in depression. Medium effect sizes were observed for improvement in self-esteem and reduction in anxiety and medium-large effect sizes were generally observed for attitude-change, although a small effect size was identified for perfectionism.*

Practical implications – *This systematic review indicates that day treatment for adults is effective in increasing BMI among underweight patients, reducing binge, purge/vomit symptoms and eating disorder psychopathology and improving psychological functioning. Further research is required to investigate whether gains are cost-effective and sustainable over the longer term, and how day treatment programmes can improve outcomes for patients who are vulnerable to non-response and drop-out.*

Originality/value *To date, reviews of day treatment for adults with eating disorders have focused upon comparisons of treatment approach and structure and neglected to assess outcomes. Therefore this review fills a gap in existing literature*

Keywords *Outcomes, Eating disorder, Adult day treatment, Anorexia nervosa, Bulimia nervosa, Day treatment programme*

Paper type *Literature review*

Introduction

Background

Eating disorders are potentially fatal mental illnesses, characterized by disturbance in eating habits, weight-control behaviour and body-image resulting in clinically significant impairment of physical health and psychosocial functioning (Goss and Fox, 2012). Evidence supports a multi-factorial aetiology for eating disorders, comprising genetic, physiological and neurochemical factors as well as psychological and sociocultural influences (Atalayer *et al.*, 2013). Disordered eating usually begins during adolescence, and can pursue a chronic course, leading to profound and extensive health and social consequences, including long-term disability, family dysfunction and disruption to education and vocational functioning (Treasure *et al.*, 2010). Furthermore, the economic impact related to treatment, lost productivity and benefit claims is estimated at £1.26 billion per year in England alone (Henderson, 2012). Ambivalence and barriers to change can make progress towards recovery fraught for sufferers and care-providers alike (Geller *et al.*, 2012), rendering the quest for effective treatments important.

Classification of eating disorders

Eating disorders are commonly diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association (APA), 2013), which currently classifies eating disorders into three main categories: anorexia nervosa (AN), bulimia nervosa (BN) and binge-eating disorder (BED). There are also two further categories replacing the DSM-4 (APA, 2000) "Eating Disorder Not Otherwise Specified" (EDNOS) category, "Other Specified Feeding and Eating Disorder" and "Unspecified Feeding and Eating Disorder", which accommodate any eating disordered conditions which are clinically significant, but which fall outside the exact criteria for AN, BN and BED. Nevertheless, the diagnosis of eating disorders is complex because there is substantial overlap across the range of diagnostic categories in terms of symptoms and associated behaviours (Treasure *et al.*, 2010). Characterized by a "core psychopathology" in which the importance of shape, weight and eating, and their control are over-evaluated (Fairburn, 2008), eating disorders are commonly measured for severity with reference to these attitudes and their associated features (including low body-weight, psychological distress, binge-eating and behaviours which compensate for food-intake, such as dietary restriction and self-induced vomiting). As a result of this core psychopathology, sufferers tend to migrate between the various diagnostic categories over the course of time, usually as the individual's control over eating deteriorates (Fairburn *et al.*, 2003). Due to blurring of the distinction between specific eating disorder categories, a transdiagnostic approach is often taken which seeks to address the characteristic core psychopathology (Fairburn *et al.*, 2003).

Treatment of eating disorders

Guidelines published by the National Institute for Clinical Excellence in the UK recommend that most patients with eating disorders should be treated as outpatients, using evidence-based therapies such as cognitive behavioural therapy, interpersonal therapy and (for adolescents) family-based therapy (National Collaborating Centre for Mental Health, 2004). Intensive treatment approaches (i.e. day treatment or inpatient treatment) tend to be delivered mainly via group therapy, provide more containment and are generally reserved for patients whose health has been compromised because they are severely underweight; they binge and/or purge frequently; and/or they have not responded to less intensive forms of treatment (Olmsted *et al.*, 2007). Although inpatient treatment is more common for AN than for BN, both diagnoses are usually accepted into day treatment programmes (DTPs) and the diagnostic mix within group therapy has generally been viewed as beneficial both to patients, and to the overall therapeutic effect (Olmsted *et al.*, 2007). Patients who have a clinical eating disorder resembling AN or BN are treated on most DTPs, however those suffering from BED are sometimes excluded (Lammers *et al.*, 2007). Treating eating disorders is tortuous and costly (Meads *et al.*, 2001); DTPs are perceived as providing the major clinical benefits associated with high-intensity inpatient treatment while also remaining cheaper and enabling the transfer of skills from clinic to home-environment because patients return home every evening and weekend (Zipfel *et al.*, 2002). DTPs represent a progression from the traditional dichotomous approach to treating eating disorders (i.e. inpatient or outpatient treatment) towards the continuum-of-care model, and "a different, more middle ground, way of thinking" (Willinge *et al.*, 2012, p. 362). Treatment goals generally include: medical stabilization; weight restoration; symptom disruption; normalization of eating; therapeutic exploration of perpetuating factors; development of coping, interpersonal and affect-regulation skills; initiation of a process of social and vocational rehabilitation (Olmsted *et al.*, 2009).

Current study

Research evaluating the effectiveness of DTPs for eating disorders is limited. An early review (Zipfel *et al.*, 2002) describes the treatment approach, structure and quantitative outcomes (cognitive, behavioural and physiological) of DTPs but is limited in focus to three programmes. More recent reviews (Abbate-Daga *et al.*, 2009; Lammers *et al.*, 2007) have included a larger number of centres, but have restricted their focus to comparisons of treatment approach and structure and neglected to assess outcomes. Similarly, Willinge *et al.* (2012) focus on the purpose and performance of DTPs for eating disorders, but do not include a comprehensive comparison of outcome data. This review aims to address these gaps by comparing, evaluating

and synthesizing published outcome data in relation to the effectiveness of adult DTPs in changing attitudes and behaviour, improving psychological functioning and facilitating weight restoration among patients with eating disorders.

Method

Study inclusion criteria

A systematic review was undertaken of publications containing quantitative outcome data relating to the effectiveness of DTPs for adults with eating disorders, with body mass index (BMI), symptom-frequency, attitude and psychological measures taken pre- and post-intervention. Studies were selected according to a Population, Exposure, Setting and Outcome (PESO) algorithm depicted in Table I.

Search methods for identification of reviews

Electronic Searches. The following electronic databases were searched between 1984 (launch-date for DTPs) and March 2014:

- OVID – MEDLINE.
- OVID – British Nursing Index.
- OVID – EMBASE.
- OVID – PsycINFO.
- OVID – HMIC.
- Elsevier Science Direct.
- Google-Scholar.
- PubMed.
- Wiley Online Library.
- EBSCO.

Data collection and analysis

Selection of reviews. The titles and abstracts of all potentially suitable studies were inspected by review authors (Z.H. or K.W.) independently. The full text of articles meeting the inclusion criteria were retrieved and reviewed independently by both authors.

Study exclusion criteria. Articles in languages other than English were excluded, as were articles related to the treatment of adolescents but not adults. Articles were also excluded if it was not possible to separate DTP outcomes from inpatient or outpatient outcomes, if it was not possible to calculate effect sizes across all measures, and/or if outcome data presented within the publication were subsumed within a more recent publication. In cases where more than one publication related to the same DTP, detailed checks were taken to ensure that there was no overlap between study-samples. If this could not be ascertained from published information, then confirmation was sought from the corresponding authors of the publications in question. In the case of two publications relating to the Sydney West Area Eating Disorders Day Treatment Programme (Ashley and Crino, 2010; Crino and Djokvucic, 2010) it was not possible to make contact with the authors therefore both publications were included in the systematic review. One article by Nowoweiski *et al.* (2011) met the criteria for inclusion in this review, but was later

Table I PESO algorithm	
<i>Population</i>	<i>Adult</i>
Exposure	“Eating disorder” or anorexia or bulimia or “binge eating”
Setting	“Day treatment” or “day program**” or “day hospital” or “day patient” or “partial hospital**”
Outcome	Outcome or impact or effect or result

excluded on the basis of methodological concerns. In particular, the sample size was extremely small (six participants) and the choice of an attitudes-measure using a target time-frame of the previous 28-day period was inappropriate for a study which only lasted 28 days in total. Therefore it was impossible to ascertain whether the findings reported (which included a post-treatment deterioration among participants in some aspects of eating disorder psychopathology) were a reflection of the unsuitability of the measures, the small sample size, the brevity of the intervention, or a combination of these and other factors.

Data extraction and management. Data from each article were extracted independently by both authors.

Data synthesis. Effect sizes (Cohen's d [1]; Cohen, 1988) were calculated[2] to assess the effect of DTPs (admission-to-discharge) relating to the following outcomes:

- effectiveness at promoting weight restoration among underweight patients, measured by BMI change;
- effectiveness at reducing binge and vomit/purge symptoms among patients displaying these symptoms, measured by frequency per month;
- effectiveness at improving psychological functioning, measured by changes in depression, self-esteem and anxiety;
- effectiveness at changing attitudes measured by the Eating Disorder Inventory (EDI; EDI-II; EDI-III; Garner, 1991, 2004; Garner and Olmsted, 1984); and
- effectiveness at changing attitudes measured by the Eating Disorder Examination (EDE; Cooper and Fairburn, 1987; Fairburn and Cooper, 1993) or its abbreviated self-report version, the Eating Disorders Examination Questionnaire (EDE-Q; Fairburn and Beglin, 1994).

Results

Study selection

In total, the initial search produced 1,861 publications, from which 15 articles were identified as meeting the inclusion criteria for this systematic literature review (Figure 1).

Study characteristics

Table II details the study characteristics (articles identified 1-15) in terms of research-design, total number of participants, diagnostic sub-types, premature termination rates (where reported), programme duration and treatment intensity.

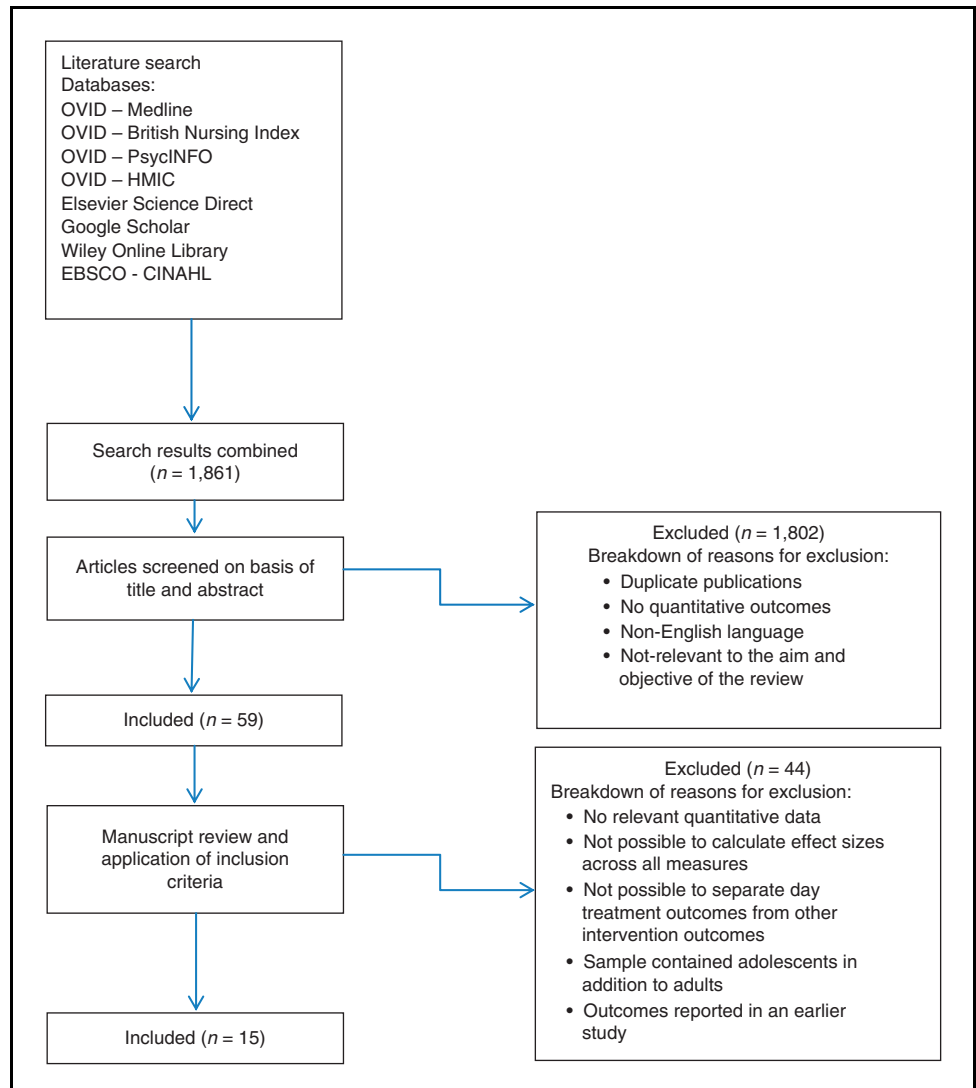
Participants

Collectively, the 15 studies analysed data from 15 DTPs and included 1,618 participants diagnosed with an eating disorder. Of these participants, some were underweight (therefore were assessed for BMI change) and/or displayed binge/purge symptoms (therefore were assessed for change in symptom-frequency), though exact numbers within these sub-groups were not always reported. Where gender was reported, samples were predominantly female, mean age (years) ranging from 22 [8,10] to 27 [12,14]. Four studies were conducted in Germany [4,10,14,15], three in Australia [5,7,8], two a-piece in Canada [1,3], and the UK [2,11]; one in USA [6], Holland [9], Italy [13] and South Korea [12]. One of the UK studies [2] collected and amalgamated data from four separate DTPs. The following DTPs were the focus of more than one distinct study included in this review: Sydney West Area Eating Disorders Day Treatment Programme [5,7]; the Munich Treatment Centre for Eating Disorders [10,15] and the University Clinic in Freiberg [4,14].

Aims

All studies aimed to investigate the effectiveness of DTPs for adults with eating disorders and included data related to at least one of the target-outcomes of this review, though specific research aims and objectives varied between studies. Six studies compared the effectiveness of

Figure 1 Flow diagram showing the study selection process for inclusion within the review



treatment interventions of differing intensities [2,3,4,6,12,14] and four explored associations between outcomes and other parameters such as biological variables [13], group cohesion [7], intra- and interpersonal factors [2] and motivation and BMI [11]. Three studies aimed to test the hypothesis that DTPs would lead to improvements in the outcomes assessed [5,7,8], three made predictions about the possible factors associated with outcome-levels [2,7,11] and the remaining nine studies did not make any predictions concerning the direction of outcomes.

Study designs

All studies recruited participants from routine referrals to DTPs. Two studies involved randomized-controlled trials (RCTs) [4,12]. One comparative study used a matched sample of inpatients [14] but the remaining comparative studies [2,3,6] did not allocate participants to groups. The remaining nine studies did not utilize a control or comparative group.

Quality assessment

The two studies using RCTs [4,12] did not employ blinding. Threats to external validity included small sample size and selection-bias (particularly pertinent for private clinics) though it is

acknowledged that effectiveness research undertaken in naturalistic circumstances has the advantage of high ecological validity. Most studies reported problems relating to missing or incomplete data [1,2,3,4,9,10,11,14,15]. Some studies adopted a reporting style which was not conducive to determining effect sizes across all measures, for example failure to separate underweight patients from non-underweight patients for the purpose of analysing BMI change [11,12] and/or failure to separate patients displaying binge/purge symptoms from those without for the purpose of analysing symptom-change [12]. Moreover, very few studies included a specific intention-to-treat analysis or analysis of non-completers' outcomes [1,4,10,11].

Premature termination

Premature termination (or drop-out) rates were assessed differently from study to study but where reported these ranged between 0 and 41 per cent (Table II). In relation to the definition of drop-out, some DTPs considered patients to have "completed" if they had participated in the minimum adequate (therapeutic) duration of treatment, the level of which varied between studies from four weeks [3,4] to six weeks [1]. It was assumed that all other studies defined non-completion/premature termination/drop-out of treatment as a failure to complete the entire programme. A "cohort effect" was reported in one study [3], suggesting increased drop out from DTPs now compared to approximately two decades ago, perhaps due to increasing availability of alternative treatments.

Analysis and synthesis of results

Table III summarizes admission-to-discharge DTP effects related to BMI-change among underweight participants, reduction of binge/vomit behaviours, improvement in psychological functioning and attitude-change associated with eating disorder psychopathology.

BMI change among underweight participants. In the five studies where underweight participants were not reported as a separate group [5,9,10,13,15], data reported in relation to BMI change among AN patients were analysed as an alternative. Among underweight patients, BMI increased consistently following DTP across all ten studies where this was assessed [2,3,5-10,13,15], with a large effect generally. One large naturalistic cohort study of admission-to-discharge outcomes undertaken over two decades found that four-day and five-day DTPs produced similar results in terms of weight restoration [3]. This led the authors to speculate that, in relation to weight restoration, there may be a "critical threshold of required support" (p. 8) that enables underweight patients who are motivated towards recovery to restore their weight, but that beyond this threshold, specific differences in treatment intensity may have less of an effect [3].

Symptom-frequency change among participants with binge/vomit behaviours. Seven studies reported pre- and post-treatment changes in binge and purge/vomit symptoms [3,5-8,10,12] and revealed that symptoms decreased with mainly large effect sizes being reported. However, reported frequencies at discharge for binge and purge/vomit symptoms generally remained within the clinical parameters (i.e. at least once weekly) specified by the DSM-5 (APA, 2013). In terms of optimum treatment intensity for facilitating reduction of compensatory symptoms one study found that a five-day DTP was more effective than a four-day DTP at enabling patients to become abstinent from binge/vomit symptoms [3]. Results from an RCT showed that BN patients had similar outcomes whether treated as inpatients or day patients. However, individuals treated as inpatients deteriorated following discharge, whereas those treated as day patients seemed better able to sustain and build on the improvements made during treatment [4]. One study reported that at baseline, treatment completers and non-completers had comparable levels of eating, depression and anxiety symptoms and their motivation towards treatment was similar [1]. Even after the first week, symptom-reduction rates were comparable. However, from week 2 onwards, non-completers conformed to a pattern of worsening symptoms. By contrast, patients who responded well to treatment improved rapidly and consistently. Overall, the first half of treatment was found to be determinant in respect of symptom-change, with the second half of treatment important for stabilization [1].

Table II Characteristics of studies (with identification numbers) included within the review

	Study design	Total number of participants	Diagnosis of participants (DSM-4)	Premature termination rate	Treatment programme duration (weeks)	Treatment intensity (days per week)
1	Bégin <i>et al.</i> (2013)	61	54% AN 35% BN 11% EDNOS	18%	12	5
2	Goddard <i>et al.</i> (2013)	16	100% AN	6%	18	4+
3	Olmsted <i>et al.</i> (2013)	801	28% AN 35% BN 37% EDNOS	17%	6-12	4-5
4	Zeeck <i>et al.</i> (2011)	22	100% BN	0%	12+	5
5	Ashley and Crino (2010)	56	48% AN 18% BN 34% EDNOS	16%	12	4
6	Ben-Porath <i>et al.</i> (2010)	38	18% AN 53% BN 29% EDNOS	Not specified	10+	5
7	Crino and Djokvucic (2010)	36	45% AN 22% BN 33% EDNOS	8%	12	4
8	Willinge <i>et al.</i> (2010)	58	57% AN 15% BN 28% EDNOS	24%	4+	5
9	Exterkate <i>et al.</i> (2009)	193	46% AN 39% BN 15% EDNOS	38%	26	5
10	Fittig <i>et al.</i> (2008)	199	50% AN 50% BN	Not specified	16	7
11	Jones <i>et al.</i> (2007)	34	62% AN 21% BN 17% EDNOS	41%	12	4
12	Kong (2005)	25	28% AN 43% BN 29% EDNOS	8%	8-14	4
13	Manara <i>et al.</i> (2005)	46	52% AN 48% BN	11%	16-24	5
14	Zeeck <i>et al.</i> (2004)	18	100% BN	Not specified	12+	5
15	Gerlinghoff <i>et al.</i> (1998)	65	26% AN 65% BN 9% EDNOS	Not specified	12	7

Notes: DSM 4, Diagnostic and Statistical Manual of Mental Disorders (4th rev. ed.) (APA, 2000); AN, anorexia nervosa; BN, bulimia nervosa; EDNOS, eating disorder not otherwise specified

Change in psychological functioning. Measures used to assess psychological functioning varied between studies (Table III). Depression symptoms consistently decreased following DTP, with large effect sizes mainly identified across the 14 studies where this was measured [1-8,10-15]. Self-esteem increased following DTP in the five studies where this could be assessed [3,7,8,11,12], with a medium effect size mainly identified between pre- and post-DTP means. Medium effect sizes were also generally noted between pre- and post-DTP means in

Table III Effectiveness at increasing BMI among underweight patients, reducing symptoms among patients displaying binge/purge behaviours (frequency per month), improving psychological functioning and changing attitudes between admission and discharge (Cohen's *d* – Cohen, 1988)^a

Study I.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BMI change	Unable to assess	-0.54	-1.72	Not stated	-0.99	-1.11	-0.73	-0.99	-2.22	-1.55	Unable to assess	Not stated	-1.82	Unable to assess	-2.71
Binge frequency on admission	Not assessed	Not assessed	47.4 (44.0)	Not assessed	24.5 (39.6)	15.5 (18.9)	50.4 (47.5)	21.2 (33.9)	Not assessed	Unable to assess monthly frequency	Not reported	39.2 (15.8)	Not assessed	Not assessed	Unable to assess
Binge frequency at discharge	Not assessed	Not assessed	4.4 (11.4)	Not assessed	6.7 (15.3)	5.8 (6.9)	13.0 (21.1)	3.0 (5.3)	Not assessed	Unable to assess monthly frequency	Not reported	9.3 (7.1)	Not assessed	Not assessed	Unable to assess
Binge change	Not assessed	Not assessed	1.33	Not assessed	0.58	0.70	1.05	0.77	Not assessed	1.42	Not reported	2.51	Not assessed	Not assessed	Unable to assess
Vomit frequency on admission	Not assessed	Not assessed	74.2 (105.9)	Not assessed	33.0 (58.5)	22.2 (24.2)	77.8 (75.9)	9.1 (16.7)	Not assessed	Unable to assess monthly frequency	Not reported	24.6 (23.3)	Not assessed	Not assessed	Unable to assess
Vomit frequency at discharge	Not assessed	Not assessed	6.0 (14.1)	Not assessed	12.6 (28.7)	6.9 (9.1)	23.8 (30.5)	0.7 (1.4)	Not assessed	Unable to assess monthly frequency	Not reported	2.5 (5.1)	Not assessed	Not assessed	Unable to assess
Vomit change	Not assessed	Not assessed	0.90	Not assessed	0.44	0.86	0.97	0.73	Not assessed	1.73	Not reported	1.34	Not assessed	Not assessed	Unable to assess
Depression change	0.95 ^b	0.35 ^c	0.86 ^b	0.68 ^d	0.50 ^c	0.96 ^b	0.61 ^c	0.40 ^c	Not assessed	1.09 ^d	0.76 ^b	0.92 ^b	1.57 ^b	0.72 ^d	1.06 ^d
Self-esteem change	Not assessed	Not assessed	-0.53 ^e	Not assessed	Not assessed	Not assessed	0.39 ^f	0.80 ^e	Not assessed	Not assessed	-0.28 ^{ns}	-0.69 ^e	Not assessed	Not assessed	Not assessed
Anxiety change	0.44 ^g	0.14 ^c	Not assessed	Not assessed	0.46 ^c	Not assessed	0.48 ^c	0.60 ^c	Not assessed	0.68 ^d	Not assessed	Not assessed	1.19 ^d	0.24 ^d	0.67 ^d
Bulimia change ^h	Not assessed	Not assessed	1.25	1.75	0.55	0.75	Not assessed	0.79	Not assessed	0.73	Not reported	1.36	1.90	1.40	2.05
Body dissatisfaction change ⁱ	Not assessed	Not assessed	0.17	Not assessed	Not assessed	0.58	Not assessed	1.08	Not assessed	1.04	Not reported	0.71	1.08	0.41	0.88
Drive for thinness change ^h	Not assessed	Not assessed	0.76	0.86	0.56	0.76	0.55	1.10	Not assessed	1.87	Not reported	0.88	1.87	0.74	1.49
			0.55							1.06		0.87	1.82	0.59	1.02

(continued)

Table III

Study I.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ineffectiveness change ^h	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not reported	Not assessed	Not assessed	Not reported	Not reported	Not reported	Not reported	Not reported
Perfectionism change ⁱ	Not assessed	Not assessed	0.19	Not assessed	Not assessed	Not assessed	Not assessed	0.85	Not assessed	-0.18	Not reported	0.35 ^{ns}	0.56	0.24	0.29
Interpersonal distrust change ^h	Not assessed	Not assessed	0.38	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	0.84	Not reported	0.84	0.79	0.38	0.32
Interceptive awareness change ⁱ	Not assessed	Not assessed	0.63	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	1.02	Not reported	0.75	2.22	0.53	1.06
Maturity fears change ^h	Not assessed	Not assessed	0.22	Not assessed	Not assessed	Not assessed	Not assessed	0.75	Not assessed	0.77	Not reported	0.85	0.74	-0.09	0.92
Dietary restraint change ^h	Not assessed	0.18	Not assessed	Not assessed	Not assessed	0.68	Not assessed	0.60	Not assessed	Not assessed	Not reported	Not reported	Not reported	Not reported	Not reported
Eating concern change ^l	Not assessed	0.83	Not assessed	Not assessed	Not assessed	0.69	Not assessed	0.90	Not assessed	Not assessed	Not reported	Not reported	Not reported	Not reported	Not reported
Shape concern change ^l	Not assessed	0.67	Not assessed	Not assessed	Not assessed	0.49	Not assessed	1.0	Not assessed	Not assessed	Not reported	Not reported	Not reported	Not reported	Not reported
Weight concern change ^l	Not assessed	1.07	Not assessed	Not assessed	Not assessed	0.74	Not assessed	0.90	Not assessed	Not assessed	Not reported	Not reported	Not reported	Not reported	Not reported

Notes: ns, statistically non-significant result, with α set at 0.05. ^aCohen's *d* (Cohen, 1988); <0.2 = small effect; <0.5 = medium effect; <0.8 = large effect; ^bBeck Depression Inventory (Beck, 1978; Beck *et al.*, 1961, 1996); ^cDepression, Anxiety and Stress Scale (Lovibond and Lovibond, 1995); ^dThe Symptoms Checklist (Derogatis, 1977); ^eRosenberg Self-Esteem Scale (Rosenberg, 1965); ^fLow Self-Esteem subscale of the Eating Disorder Inventory; ^gBeck Anxiety Inventory (Beck *et al.*, 1988); ^hEating Disorders Inventory (Gamer *et al.*, 1983; Garner, 1991, 2004); ⁱEating Disorders Examination Questionnaire (Cooper and Fairburn, 1987; Fairburn and Beglin, 1994; Fairburn and Cooper, 1993)

relation to anxiety, with anxiety symptoms decreasing post-treatment across the nine studies where this was assessed [1,2,5,7,8,10,13-15]. However, analysis of changes in anxiety during DTP on a week-by-week basis revealed that significant decreases were apparent only during weeks 1 and 2, with a gradual increase in anxiety emerging during the last third of treatment [1].

Attitude change. Changing attitudes as measured by the EDI revealed mainly large effect sizes in pre- and post-treatment changes across all studies in relation to bulimia [3-6,8,10,12-15], drive for thinness [3-8,10,12-15], ineffectiveness [3,10,12-15] and interoceptive awareness [3,10,12-15], and medium-large effect sizes for changes in attitudes related to body dissatisfaction [3,6,8,10,12-15], interpersonal distrust [3,10,12-15] and maturity fears [3,8,10,12-15]. A small effect size in pre- and post-treatment changes was identified in relation to perfectionism [3,8,10,12-15].

Analysis of the effectiveness of changing attitudes as measured by the EDE-Q revealed medium-large effect sizes in relation to changes in shape concerns, weight concerns and eating concerns [2,6,8] and small-medium effect sizes in relation to dietary restraint [2,6,8].

Comparing DTP outcomes with inpatient/outpatient treatment outcomes. Three studies compared DTP outcomes with inpatient treatment outcomes [2,4,14]. One of these studies employed a naturalistic between-participants design and found that AN adult patients discharged from DTPs ($n = 15$) evidenced smaller improvements in BMI and quality of life than AN adult patients discharged from inpatient treatment ($n = 137$), but that eating disorder psychopathology reduced with comparable or larger effect sizes among the DTP group [2]. An RCT [4] reflected results reported in an earlier matched-participants study [14] at the same treatment centre, finding that BN patients discharged from a DTP had comparable outcomes with BN patients discharged from inpatient treatment, but that the DTP group continued to improve following discharge [4,14]. Three months post-treatment, more inpatients had deteriorated than DTP patients; after 12 months DTP patients evidenced a significantly higher reduction in symptoms than inpatients; after 36 months there was no significant difference in symptomology between the groups, though the trend was towards better DTP outcomes [4].

Two studies compared DTP outcomes with outcomes from outpatient treatment [6,12]. One naturalistic study in which more severely ill individuals were treated in a DTP found that both outpatients ($n = 17$) and DTP patients ($n = 38$) made significant improvements in eating disorder attitudes between admission and discharge, but that only DTP patients experienced a significant reduction in depression and drive for thinness [6]. Furthermore, an RCT demonstrated significantly greater improvements in attitudes, symptoms, BMI, depression and self-esteem among participants randomized to a DTP compared to participants randomized to an outpatient intervention [12].

Predictors of DTP outcomes. One study found that eating disorder symptoms at discharge were predicted by eating disorder symptoms on admission, level of patients' confidence to change, patients' social quality of life and level of carers' expressed emotion among 107 participants with AN [2]. However the study utilized a mixed sample initially comprised of 161 adolescent and adult inpatients and 16 adult DTP patients from a range of treatment centres and did not specify how many (if any) DTP patients were included in the regression analysis which identified these predictors of outcome [2]. Other studies found (respectively) that participants' BMI and motivation on admission influenced their ability to complete a DTP [11], psychometric test scores were correlated with biological indicators among DTP patients [13] and compatibility of patients within a DTP therapy group was associated positively with levels of attendance and treatment response [7].

Discussion

This review aimed to evaluate the effectiveness of DTPs for eating disorders in relation to BMI, binge/purge and vomit symptoms, anxiety, depression, self-esteem and eating disorder psychopathology. There is strong evidence that DTPs are effective in improving all these variables among adults with eating disorders. Moreover, RCTs have demonstrated DTPs to be more effective than outpatient treatment and of similar effectiveness as inpatient care at enabling patients with eating disorders to make improvements. Nevertheless, on discharge from DTPs, mean binge and purge/vomit symptom frequencies generally remain within the clinical parameters specified by DSM-5. With regard to binge/vomit symptom reduction, depression

and body dissatisfaction, a higher intensity DTP produced better outcomes (Olmsted *et al.*, 2013) though four-day DTPs can result in large effect sizes for symptom reduction (Crino and Djokvucic, 2010; Kong, 2005; Olmsted *et al.*, 2013) and decrease in depression (Kong, 2005). In relation to achieving weight restoration, the assertion that there may be a “critical threshold” (Olmsted *et al.*, 2013, p. 8) of therapeutic support necessary appears to be supported by the results from DTPs of varying intensities, indicating that underweight patients are generally able to increase their weight significantly during admission to day treatment, and with large effect sizes.

In terms of patients’ engagement with treatment in DTPs, Bégin *et al.* (2013) found that the first half of the programme was determinant in relation to symptom-change, and that better respondents to treatment reached the non-clinical cut-off point more rapidly, regardless of baseline levels of eating, depression, anxiety and motivation. This finding reflects earlier evidence that DTP patients who are quick to engage with treatment have better outcomes (Olmsted *et al.*, 1996). Premature termination rates from DTPs fall in the range 0-41 per cent, which is lower than those typically reported by inpatient units (ranging from 20 to 53 per cent; Huas *et al.*, 2011; Kahn and Pike, 2001; Masson *et al.*, 2007; Surgenor *et al.*, 2004; Vandereycken and Pierloot, 1983; Woodside *et al.*, 2004; Zeeck *et al.*, 2005).

This review has several strengths. In particular, it provides a much-needed update and synthesis of quantitative outcomes in the field of adult DTPs for eating disorders, which until now had been lacking within the literature. Furthermore, this review has combined data across studies, therefore estimating treatment effects more precisely than is possible within a single study. However, there are also limitations. The main limitation of this review is that patient demographics, and the definitions of premature termination and remission, are not the same across studies. The approach and focus of the studies varied, and qualitative comparison of programme-effectiveness was restricted by variations in study-design, small numbers of studies employing the EDE/EDE-Q, lack of transparency in the presentation of treatment outcomes and grouping of participants, as well as differences in treatment conditions and study limitations (such as small sample size, high attrition rates and absence of intention-to-treat analyses).

This review provides evidence for the effectiveness of adult DTPs in reducing some psychological, behavioural and physiological features associated with eating disorders. However, further research is required in order to investigate whether the improvements gained from treatment are sustainable over the longer-term, to examine the cost-effectiveness of day treatment and to identify how to engage better with day-patients who are vulnerable to treatment drop-out and non-response.

Notes

1. $d > 0.8$ is considered a large effect size, $d > 0.5$ medium and $d > 0.2$ small.
2. Cohen (1988) suggests ways of calculating effect sizes for pre-/post-comparisons. In the current study, Cohen’s d was assessed using the following formula:

$$d = \frac{M_{\text{pre}} - M_{\text{post}}}{SD_{\text{pool}}(\text{pre, post})}$$

where the pooled standard deviation is calculated as follows:

$$s_{\text{pooled}} = \sqrt{\frac{(n_t - 1)s_t^2 + (n_c - 1)s_c^2}{n_t + n_c}}$$

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