



Cognitive-behavioural therapy for adolescents with bulimic symptomatology: The acceptability and effectiveness of internet-based delivery

N. Pretorius^a, J. Arcelus^b, J. Beecham^{c,d}, H. Dawson^e, F. Doherty^f, I. Eisler^g, C. Gallagher^h, S. Gowers^f, G. Isaacsⁱ, E. Johnson-Sabine^h, A. Jones^j, C. Newell^k, J. Morris^e, L. Richards^h, S. Ringwood^l, L. Rowlands^f, M. Simic^g, J. Treasure^a, G. Waller^a, C. Williams^m, I. Yiⁿ, M. Yoshioka^a, U. Schmidt^{a,*}

^a Section of Eating Disorders, Institute of Psychiatry, King's College, Box 059, De Crespigny Park, London SE5 8AZ, United Kingdom

^b Leicester Eating Disorder Service, Brandon Mental Health Unit, Leicester General Hospital, United Kingdom

^c PSSRU, London School of Economics, United Kingdom

^d University of Kent, United Kingdom

^e Young People's Unit, Royal Edinburgh Hospital, Edinburgh, United Kingdom

^f University of Liverpool, Cheshire & Merseyside Eating Disorders Service for Adolescents, Cheshire & Wirral Partnership Trust, United Kingdom

^g Child and Adolescent Eating Disorders Service, South London and Maudsley NHS Trust, United Kingdom

^h St Ann's Eating Disorder Service, London, United Kingdom

ⁱ Media Innovations Limited, Airebank House, Leeds, United Kingdom

^j Eating Disorders Service, Truro Health Office, The Leats, Cornwall, United Kingdom

^k Kimmridge Court Therapy Service, Dorset Healthcare NHS Foundation Trust, Dorset, United Kingdom

^l **beat**, 103 Prince of Wales Road, Norwich, United Kingdom

^m Division of Community Based Sciences, Faculty of Medicine, University of Glasgow, United Kingdom

ⁿ Frimley Children's Centre, Frimley, England, United Kingdom

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ABSTRACT

Background: The evidence base for the treatment of adolescents with bulimia nervosa (BN) is limited.

Aims: To assess the feasibility, acceptability, and clinical outcomes of a web-based cognitive-behavioural (CBT) intervention for adolescents with bulimic symptomatology.

Method: 101 participants were recruited from eating disorders clinics or from **beat**, a UK-wide eating disorders charity. The programme consisted of online CBT sessions ('Overcoming Bulimia Online'), peer support via message boards, and email support from a clinician. Participants' bulimic symptomatology and service utilisation were assessed by interview at baseline and at three and six months. Participants' views of the treatment package were also determined.

Results: There were significant improvements in eating disorder symptoms and service contacts from baseline to three months, which were maintained at six months. Participants' views of the intervention were positive.

Conclusions: The intervention has the potential for use as a first step in the treatment of adolescents with bulimic symptomatology.

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Introduction

Bulimia nervosa (BN) and related partial disorders (eating disorder not otherwise specified (EDNOS)) typically have their onset in adolescence, and are common in young females. BN frequently has a chronic, relapsing course, with a major impact on sufferers' health and quality of life. Cognitive-behavioural therapy (CBT) is the treatment of choice for adults with this disorder, based on a significant body of research (National Collaborating Centre for

Mental Health, 2004). It has been suggested that, suitably tailored to their developmental stage and needs, CBT might also be an effective treatment for adolescents with BN or EDNOS (Wilson & Sysko, 2006). As yet, the evidence base for treatment of adolescents with BN is extremely limited and consists of only two randomised controlled trials (RCTs), both of which evaluated family therapy against other treatments (Le Grange, Crosby, Rathouz, & Leventhal, 2007; Schmidt et al., 2007). Early intervention for adolescents with BN is highly desirable, to prevent chronicity and suffering. However, many adolescents dislike talking to adults in authority, and may prefer self-help to more traditional routes of care (Oliver, Pearson, Coe, & Gunnell, 2005). One of the two existing RCTs on adolescents with BN compared individual cognitive-behavioural

* Corresponding author. Tel.: +44 20 7848 0181; fax: +44 20 7848 0182.

E-mail address: u.schmidt@iop.kcl.ac.uk (U. Schmidt).

guided self-care with family therapy (Schmidt et al., 2007). Patients allocated to guided self-care treatment showed earlier improvement on bingeing, but otherwise no differences in clinical outcomes compared to those receiving family therapy. However, individual treatment appeared to be more acceptable to young people, as a significant proportion of those eligible for participation (28%) cited not wanting to involve their families as their main reason for non-participation.

As many adolescents are computer literate and socialise well via electronic means, one way of offering treatment to them in a format that is appealing, accessible and reproducible is to deliver CBT via the internet. This approach fits in with clinical priorities (Lewis et al., 2003) and the NICE eating disorders guidelines (National Collaborating Centre for Mental Health, 2004), as it encourages the use of self-help. In adults with BN, binge eating disorder and partial syndromes, CBT delivered via interactive CD-ROMs or the internet has had promising outcomes (Fernández-Aranda et al., 2008; Sanchez-Ortiz et al., submitted for publication; Schmidt et al., 2008; Shapiro et al., 2007).

The aim of the present study was to assess the feasibility, acceptability, and clinical outcomes of a web-based CBT package for adolescents with bulimic symptomatology. We hypothesised that adolescents would improve in bulimic symptomatology, that they would use services less after completing the intervention, and that improvement would be maintained at follow-up.

Method

Participants

Participants were recruited from consecutive referrals to one of nine UK specialist eating disorders clinics or from **beat** (Beating eating disorders – formerly the Eating Disorders Association), a large UK-wide charity specialising in providing resources to people with eating disorders and their carers. Recruitment was carried out from the two sources in order to maximise the number of participants in the study. Recruitment took place over an 18 month period during 2006 and 2007. Clinic patients were assessed by a clinician before being referred to the treatment study. Participants from **beat** were recruited via an advertisement on the **beat** website and newsletter, and undertook a brief screening assessment over the telephone to ensure eligibility for the study.

One hundred and one adolescents (98 females, 3 males) were entered into the study. Participants had to fulfil DSM-IV (American Psychiatric Association, 1994) criteria for BN ($N = 61$) or Eating Disorder Not Otherwise Specified with bulimic features (EDNOS-BN) ($N = 40$). EDNOS-BN was defined as participants who met all criteria for bulimia nervosa except that their episodes of binge eating and inappropriate compensatory behaviours (vomiting, abuse of laxatives, or diuretics, or excessive exercise) occurred, on average, less than twice a week (or for a duration of less than three months), or they used compensatory behaviours in the absence of objective binge eating (ie. the presence of subjective binge eating or purging only). Any definition of adolescence is somewhat arbitrary, as psychosocial and physiological maturational factors need to be taken into account. Age bounds from as low as 10 to as high as 24 have been used previously (Virginia Department of Health, 2006). As premenarchal onset of BN is rare (Kent, Lacey, & McCluskey, 1992) we chose a lower age band of 13 for inclusion. We chose an upper band of age 20, when brain development comes to completion (Keverne, 2004). Exclusion criteria were: binge eating disorder; body mass index (BMI) below the 10th centile for age and sex; drug or alcohol dependence; psychosis; acute suicidality; pregnancy; having a serious physical condition (e.g., diabetes); or having received CBT for BN in the previous six months. There were

87 **beat** referrals, 26 of which met exclusion criteria and were therefore not included in the study. Sixty-eight people from clinics were regarded as eligible for the study and were offered the programme. Of these, 28 rejected the programme when offered because of motivation or privacy issues ($N = 4$), ambivalence about their problem ($N = 3$), a preference for face-to-face contact ($N = 4$), non-specific reasons ($N = 11$), or because they had moved away ($N = 6$). Eligible adolescents gave their written informed consent to be involved in the study. Parental consent was obtained for participants under 16 years old. A letter was sent to the General Practitioner (GP) of consenting **beat** participants to inform them of their patient's study participation and to ask about any concerns the GP might have related to this.

Outcome measures

Eating disorders examination (Fairburn & Cooper, 1993)

The EDE is a widely used semi-structured investigator-led clinical interview with known psychometric properties, which assesses eating disorder behaviours and attitudes over the previous 3 months. This interview was used to determine diagnosis and measure the severity of bulimic symptoms. The EDE global score and the frequency of objective binges and vomiting over the previous 28 days were used as primary outcomes. We administered the EDE over the telephone, as has previously been done in other studies using this instrument (Wade, Bergin, Tiggemann, Bulik, & Fairburn, 2006). In general there appears to be excellent agreement between diagnostic interviews administered by telephone or face-to-face (Rohde, Lewinsohn, & Seeley, 1997).

Eating disorders examination questionnaire (Fairburn & Beglin, 1994)

This is a self-report version of the EDE that has been shown to have good reliability (Luce & Crowther, 1999). It measures the same subscales and behaviours as the EDE, over the previous 28 days only.

Treatment expectations and experience of treatment

Prior to starting treatment, participants were asked to complete a brief online 'Treatment Expectation' questionnaire, which was developed by the authors and consisted of three questions related to participants' expectations of the usefulness of computerised self-help to themselves and others, and their confidence using a computer. A second "Experience of Treatment" questionnaire was sent to participants after treatment in order to ascertain treatment acceptability. This questionnaire was developed by the authors and consisted of open-ended questions that asked participants for their "liked" and "disliked" elements of the four components of the programme (online sessions, workbooks, email support, and message boards).

Client Service Receipt Inventory (CSRI; Beecham & Knapp, 2004)

A modified version of this measure was used to record contact with services, professionals and other sources of support over the three months prior to each interview. The numbers of contacts with services (usually one professional during any one contact) were summed in five discrete categories: additional school supports; hospital accident and emergency or outpatient attendances; primary care (GP, dentist, optician); specialist support (dietician, individual and family therapists, psychiatrists, psychologists); and social care (social worker, family centre). A count of the total service contacts included all these categories. Inpatient care was excluded as only one person recorded a hospital stay (for one day) at the three-month interview, and only four people at the six-month interview (total 11 days). This approach implicitly assumes that contact with any professional or service carries the same weight

(impact on outcome), regardless of professional group or length of contact. However, the generally low levels of use of any particular service in the three months preceding baseline assessment and the exploratory nature of this study make this approach more feasible than a separate consideration of each service. We have also reported data on the number of times participants sought help from friends or relatives (informal) or from semi-formal sources of support (other websites, self-help groups, telephone help-lines, voluntary organisations, books or magazines), extra family expenditure due to bulimia, and days missed from school or work due to bulimia.

Web-based CBT intervention

This intervention consisted of three components.

*The Overcoming Bulimia Online programme (Williams, Aubin, Cottrell, & Harkin, 1998)*¹

This consists of eight interactive, multi-media, web-based CBT sessions for BN, combining cognitive-behavioural, motivational, and educational strategies. It has been piloted in a CD-ROM format in two cohort studies in adults with BN, with good outcomes (Bara-Carril et al., 2004; Murray et al., 2007), and a recent randomised controlled trial in adults with BN (Schmidt et al., 2008). The package was adapted for the current study to suit adolescents by altering some of the language and examples presented in the online sessions. Each session took 30–40 min to complete. Feedback was provided to participants based on the self-assessments within each session. Workbooks, homework, and an “Anxiety Control Training” (ACT) audio session (Snaithe, 1998) accompanied each web-based module, and instructions for their use were incorporated into the sessions. Eight brief workbooks summarised the key session content. The ACT sound files were made available on CD, as well as an electronic MP3 file download.

Electronic message (bulletin) boards for participants and parents

Peer support was available for participants via electronic message boards, which were moderated daily by study researchers or clinicians to ensure safety and appropriateness of posts. Separate message boards and web-based material on how best to support the adolescent were also available for parents (if they were involved).

E-mail support

Participants had a named email therapist who provided flexible weekly support and advice via email. Email support therapists were clinicians with experience in CBT who were working in specialist eating disorders clinics, or people from **beat** who were trained and experienced in providing email support for people with eating disorders. Email support is provided as part of **beat's** help-line services, which is accredited by the UK Mental Health Helplines Partnership (MHHP) Quality Standard. This standard covers the training, supervision and procedural systems of the service.

Procedure

Participants completed the EDE and CSRI over the telephone with one of three trained researchers (NP, LR, PC) at baseline, three

months and six months. Other clinical information such as height, weight and antidepressant use was also assessed at these times. BMI was calculated by dividing participants' weight (in kilograms) by their height (in metres) squared. Demographic information was obtained at the baseline assessment. Telephone interviews were carried out in order to access people from all over the UK. Participants completed the self-report EDE-Q if they were not able to complete the telephone EDE at three or six months. After the baseline assessment, participants were sent the website address, login details, ACT-CD and workbooks via email or post, and an introductory email was sent from the email support therapist. Participants were encouraged to complete one online CBT session per week, and to use the email support and message boards for support. Study researchers were available for technical support. Participants were informed that they would be contacted again after three and six months for re-assessment, and were sent reminders via email before being contacted for the re-assessments. Participants who did not complete the three-month follow-up assessment were contacted to remind them of the six-month follow-up assessment. Participants were advised to contact their General Practitioner or local Accident and Emergency Department in times of crisis, and a study crisis protocol was followed. If parents were involved, they were sent login details for access to the parents' message boards and resources.

After logging in to the programme for the first time, participants were required to complete baseline questionnaires before commencing the first CBT session, including the Treatment Expectation Questionnaire. The Experience of Treatment Questionnaire was sent to participants to complete after three months. If participants felt they needed further treatment after three months, clinic participants were referred back to their referring specialist clinic, and **beat** participants were given advice about how to access further treatment.

Statistical analyses

The data were analysed using SPSS for Windows (v.15.0). In order to calculate the difference in baseline variables between clinical and **beat** participants, independent sample *t*-tests were used for continuous variables and chi-squared tests were used for categorical variables. Paired *t*-tests were used to test changes in the number of service contacts over time. To determine differences in bulimic symptomatology and BMI over time, a repeated measures linear mixed effects random intercept model was used (Landau & Everitt, 2004). A mixed effects model includes all available data on each participant and has been recommended as an intent-to-treat analysis in longitudinal studies with multiple missing values (Chakraborty & Gu, 2009). In order to include data from participants who completed the EDE-Q instead of the EDE at three or six-month follow-up, a bivariate linear regression equation was calculated to predict participants' baseline EDE scores from their baseline EDE-Q scores. A simple imputation procedure was then conducted in order to calculate EDE values from the EDE-Q values at three and six months.

Results

Baseline demographics, clinical information and treatment expectations

Sixty-one (60.4%) adolescents had a diagnosis of BN and 40 (39.6%) had EDNOS-BN. There was no difference in proportions of BN and EDNOS-BN between clinic and **beat** participants ($p = .369$). Most participants were Caucasian ($N = 88$; 88%), nine were of 'other' or 'mixed' ethnicity, and ethnicity data were missing for four

¹ CW who developed the package was a member of the research team. This added the advantage of familiarity of the package and its delivery and experience in evaluation of such resources. To address any issues of potential conflict of interest the team as a whole planned that all data were collected independent of Dr Williams, who had no access to the data and was not involved in the analysis. The final paper reflects the view of all authors.

participants. The average time participants had spent in full-time education was 13.1 years ($SD = 1.6$ years). Thirteen (12.9%) participants had been prescribed an antidepressant medication at the time of baseline assessment, 52 (51.5%) participants were not taking an antidepressant, and information on antidepressant use was missing for 35 (34.7%) participants. Significantly more ($p < .03$) clinic participants (47.5%) consented to involve their parents than **beat** participants (26.2%). Twenty-five (24.8%) participants' parents were involved in the study (33% of clinic participants; 20% of **beat** participants; $p < .163$). Table 1 shows further demographic information, baseline bulimic symptomatology, and treatment expectation results.

Participants recruited from **beat** were significantly older than clinic participants. There were no significant baseline differences in bulimic symptomatology between **beat** and clinic participants. In terms of treatment expectations, **beat** participants considered self-help materials to be significantly more useful for themselves than clinic participants, but overall all participants expected self-help materials to be useful for themselves and for others, and were highly confident in using a computer.

Baseline service use

Baseline service utilisation is shown in Table 2. At entry into the programme, as might be expected, the clinic participants had significantly more contacts with any service or professional (10.6 contacts v 6.4, $p = .025$) than the **beat** participants, but they were also less likely to have sought help from semi-formal or informal sources (8.6 times v 27.8, $p < .001$). There were no other significant differences between these groups. On average, the sample had eight service contacts in the three months prior to the baseline interview, and sought help from family and friends 20 times and semi-formal supports 23 times.

Treatment uptake and compliance

Seventeen (17%) participants completed no web-based sessions. For those participants who had completed at least one session, the median number of sessions completed after 3 months and after 6 months was three out of a possible eight. There were no significant differences in symptom severity between participants who completed no sessions and those who completed at least one session (objective bingeing: $p = .798$; vomiting: $p = .823$; global EDE score: $p = .198$). Participants who completed between four and

eight sessions had statistically higher ($p < .05$) baseline eating concern subscale scores ($M = 3.9$; $SD = 1.1$) than those who completed fewer than four sessions ($M = 3.4$; $SD = 1.5$). The median number of emails sent by participants to the email support therapist was two (range: 0–42). 15% of participants did not send any emails to their email support therapist. For those participants who sent at least one email, the median number of emails sent was three.

Clinical outcomes

Fifty-two (51.5%) participants completed the three-month follow-up assessment interview, 63 (62.3%) completed the six-month assessment, and 70 (70%) completed at least one follow-up assessment. Of these, eight completed the self-report EDE-Q instead of the EDE (one at three months, and seven at six months) as it was more convenient for them than the telephone interview. There were no differences in baseline symptom severity between participants who completed no follow-up assessments and those participants who completed at least one follow-up assessment.

Change in bulimic symptomatology

Table 3 shows the results of the linear mixed model analysis for objective binge episodes, vomit episodes, laxative episodes, global EDE score, and BMI, combining data for clinical and **beat** participants given their baseline similarities. There were significant main effects of time for objective binge episodes, vomit episodes, and global EDE score. Post hoc tests showed that there were significant improvements from baseline to three months on all three variables (p -values between 0.001 and 0.003) and these gains were maintained at six-months follow-up. There was a significant main effect for episodes of laxative use, with post hoc tests showing significant improvements from baseline to six months ($p < .03$). There was also a significant main effect of time for BMI, which was significantly lower at three months than at baseline ($t = 2.71$; $p < .01$). However, there was no significant difference between participants' BMI at baseline and at six months ($t = 0.03$; $p = .973$). All four EDE subscales (dietary restraint, eating concern, shape concern and weight concern) also showed significant improvements over time (full details available from the authors).

The proportion of participants at the different time points who were free of bingeing, vomiting, and laxative use (over the preceding month) were as follows: baseline: 1/101 (1%); three months: 5/52 (10%); and six months: 11/63 (17%) for the completer

Table 1
Means (standard deviations) of baseline characteristics of total sample, clinic participants, **beat** participants, and independent sample t -tests testing differences between the subgroups.

| | Total sample ($N = 101$) | Clinic ($N = 40$) | beat participants ($N = 61$) | t | p |
|--|----------------------------|---------------------|---------------------------------------|------|-------|
| Demographic details | | | | | |
| Age (years) | 18.8 (1.6) | 18.1 (1.6) | 19.3 (1.4) | 4.12 | 0.001 |
| BMI | 22.2 (3.9) | 22.9 (5.4) | 21.8 (2.3) | 1.27 | 0.211 |
| Duration of illness (years) | 3.0 (1.6) | 3.6 (2.6) | 2.8 (1.7) | 1.20 | 0.244 |
| Bulimic symptomatology | | | | | |
| Global EDE score ^a | 3.9 (1.1) | 4.1 (1.1) | 3.8 (1.2) | 1.22 | 0.226 |
| Objective binges in last 4 weeks | 22.2 (20.5) | 18.1 (14.4) | 24.9 (23.4) | 1.80 | 0.074 |
| Vomit episodes in last 4 weeks | 34.1 (41.3) | 31.1 (43.0) | 35.5 (40.4) | 0.53 | 0.600 |
| Laxative episodes in last 4 weeks | 3.4 (13.3) | 1.0 (2.8) | 5.0 (16.8) | 1.8 | 0.076 |
| Treatment expectation | | | | | |
| Treatment usefulness (self) ^b | 1.3 (1.0) | 1.5 (0.8) | 1.1 (1.0) | 2.15 | 0.034 |
| Treatment usefulness (others) ^b | 1.4 (0.8) | 1.5 (0.8) | 1.3 (0.8) | 1.06 | 0.292 |
| Confidence using a computer ^b | 6.0 (1.1) | 5.8 (1.3) | 6.1 (1.0) | 1.44 | 0.153 |

^a The Global EDE score represents the average of the four EDE subscales: restraint, eating concern, shape concern and weight concern.

^b Treatment usefulness is rated on a five-point Likert scale: 0 = a lot to 4 = not at all. Confidence using a computer is rated on an eight-point Likert scale: 0 = least confident to 7 = most confident.

Table 2

Service contacts, other supports and days off work or school in the 3 months prior to the baseline interview.

| | Full sample (N = 101) | Clinic sample (N = 40) | beat participants (N = 61) |
|---|-----------------------|------------------------|----------------------------|
| Mean no. contacts (% using service ^a) | | | |
| Additional school services | 1.3 (32%) | 1.4 (0–24) | 1.1 (0–8) |
| Hospital A&E and outpatient attendance | 0.7 (30%) | 1.2 (0–12) | 0.5 (0–4) |
| Primary care | 2.9 (84%) | 3.5 (0–16) | 2.6 (0–13) |
| Specialist care | 2.9 (53%) | 3.9 (0–26) | 2.1 (0–13) |
| Social care services | 0.3 (5%) | 0.7 (0–24) | 0.0 (0–1) |
| All service contacts | 8.1 (92%) | 10.6 (1–49) | 6.4 (0–34) |
| Mean number of time help sought from | | | |
| Semi-formal supports | 23.0 (91%) | 18.0 (0–290) | 26.4 (2–176) |
| Friends and family members | 20.1 (74%) | 8.6 (0–60) | 27.8 (0–100) |
| Out-of pocket expenditure (£ sterling) | £141.63 | £61.88 (£0–£420) | £193.89 (£0–£1810) |
| Days taken off work because of illness | 1.1 (n = 58) (0–7) | 1.2 (n = 17) (0–6) | 1.1 (n = 35) (0–7) |
| Days missed from school because of illness | 4.5 (n = 26) (0–30) | 5.4 (n = 31) (0–20) | 3.8 (n = 44) (0–30) |

^a Percentage of young people using at least one of the services in each group.

sample, and baseline: 1/101 (1%); three months: 6/101 (6%); six months: 12/101 (12%) for the intent-to-treat sample. The completer sample included those participants who provided follow-up data, and the intent-to-treat sample included all participants who were entered into the study, substituting the last observed value for missing data. The proportion of participants who were either abstinent from, or in the sub-clinical range of, bingeing, vomiting, and laxative use over the preceding month were as follows: baseline: 9/101 (9%); three months: 20/52 (38%); and six months: 22/63 (35%) for the completer sample, and baseline: 9/101 (9%); three months: 25/101 (25%); six months: 29/101 (29%) for the intent-to-treat sample. We defined 'sub-clinical' participants as those whose episodes of bingeing, vomiting, and laxative use occurred, on average, less than twice per week, but one of these compensatory behaviours was present at least once a week.

Programme acceptability

Thirty-four participants completed the Experience of Treatment Questionnaire. Table 4 shows a list of liked and disliked elements of the components of the programme (web-based CBT sessions; message boards; email support; workbooks). Overall, participants' comments regarding the treatment were positive. Many participants liked the convenience and the information provided by the online package and the workbooks. Some participants found the sessions repetitive and impersonal, and disliked the talking commentary on each page (even though this could be turned off). Others reported some difficulty with motivation. Regarding the workbooks, participants liked their convenience and being able to reiterate the online sessions, and disliked the large size, repetitiveness, and lack of prompts related to their use. Regarding the email support, participants liked feeling as though someone cared about them, the information it provided, and its personal and convenient nature. Others reported that the replies were not instant or frequent enough. Regarding the message boards, many participants liked the feeling of belonging to a group and being able to share experiences, and their accessibility and anonymity.

Table 3

Estimated means and standard errors, and results of the repeated measures linear mixed effects analysis of objective binge episodes, vomit episodes, and global EDE scores over the previous month at baseline, three and six months.

| | Baseline (N = 101) | 3 months (N = 52) | 6 months (N = 63) | F | P |
|--------------------------|--------------------|-------------------|-------------------|-------|-------|
| Objective binge episodes | 22.2 (2.0) | 12.4 (2.6) | 12.7 (2.4) | 8.16 | 0.001 |
| Vomit episodes | 34.1 (4.1) | 19.2 (4.4) | 19.0 (3.3) | 6.69 | 0.002 |
| Laxative episodes | 3.4 (1.3) | 2.7 (1.2) | 1.1 (0.5) | 6.33 | 0.014 |
| Global EDE score | 3.9 (0.1) | 2.9 (0.2) | 3.1 (0.2) | 21.52 | 0.001 |
| Body Mass Index | 22.2 (0.4) | 21.7 (0.4) | 22.2 (0.4) | 4.34 | 0.018 |

Disliked elements of the message boards included the lack of use by other participants, technical problems, and the perception of some posts as unhelpful.

Use of services and supports

Mirroring the clinical outcome findings, the service use data showed a reduction in number of contacts with any service or professional between baseline and three months - 8.1 contacts over the three months prior to the baseline interview, reducing to 5.7 at the 3-month interview ($p = .035$; $N = 51$). The number of contacts reduced *within* each of the five service categories, but this was statistically significant for only the additional school supports - a mean of 1.3 contacts recorded at the baseline interview, and 0.33 for the 3-month interview ($p = .001$). These contacts relate to the last full term prior to the interview. Table 2 shows that about a third of the participants used additional school support at baseline. For those with data at 3 months ($N = 47$), there was a reduction in the number of times help was sought from semi-formal supports (24.7 v. 12.3, $p = .024$) and from family and friends (24.4 v. 14.4, $p = .05$), however the mean number of times help was sought from family and friends decreased for the **beat** group ($N = 33$; mean = 15.4 times) and increased for the clinic sample ($N = 15$; mean = 16.7 times). Extra family expenditure (as rated by adolescents) due to bulimia (on items such as food, childcare, and medication) also reduced significantly (£140.31 v £57.68, $p = .005$). Days missed from school or work reduced, but not significantly so. The reductions in contacts with services and professionals, contacts with semi-formal and informal sources, and family expenditure were maintained over time, with no statistically significant increases or decreases in the figures.

Discussion

This study assessed the practicalities of implementing the Overcoming Bulimia Online web-based CBT package for adolescents with bulimia nervosa, and demonstrated the clinical

Table 4
Results of the Experience of Treatment Questionnaire: a list of “liked” and “disliked” elements of each of the four components of the web-based treatment programme: 1) online sessions; 2) email support; 3) message boards; and 4) workbooks.

| | Liked | Disliked |
|-----------------|--|---|
| Online sessions | <ul style="list-style-type: none"> - Information about triggers/causes/damage ($n = 13$) - Convenience ($n = 9$) - Anxiety control training (ACT) ($n = 4$) - Useful having summary & review of previous session ($n = 3$) - Rules/goal-setting ($n = 2$) - The voiceover ($n = 2$) - Interactive approach and different media ($n = 1$) - Clearly set out, calm blue colouring ($n = 1$) - Simple methods of answering questions ($n = 1$) - No human contact ($n = 1$) - Less intimidating than face-to-face ($n = 1$) - Good to do while on waiting list ($n = 1$) | <ul style="list-style-type: none"> - Repetitive ($n = 5$) - Impersonal ($n = 4$) - Felt unmotivated ($n = 4$) - Talking commentary ($n = 4$) - Unable to pause half way through a session ($n = 2$) - Commitment and time taken ($n = 1$) - Felt overwhelmed ($n = 1$) - Writing letters ($n = 1$) - Pictures of food were too triggering ($n = 1$) - Auto-plays of voice & video ($n = 1$) - Assertiveness and motivation training not relevant ($n = 1$) - Food diary too difficult ($n = 1$) - Disliked being online; preferred using workbooks ($n = 1$) - Some phrases were patronising ($n = 1$) - Hospital anxiety and depression scale ($n = 1$) - Monotonous, tedious, long-winded ($n = 1$) |
| Email support | <ul style="list-style-type: none"> - Nice to know someone is there/cared/I hadn't been forgotten ($n = 9$) - Good, clear, advice & explanations ($n = 6$) - Personal ($n = 4$) - Emailing when felt low/stressed or if needed someone to talk to ($n = 4$) - Responses were always quick ($n = 2$) - Sharing feelings with a trained professional who understands ($n = 2$) - Anonymity/privacy ($n = 2$) - Reassuring ($n = 2$) - Can respond to specific feelings and worries ($n = 1$) - Emailing was more helpful than the actual sessions ($n = 1$) - Non-judgemental ($n = 1$) - Trusted email supporter ($n = 1$) | <ul style="list-style-type: none"> - Replies not instant/often enough ($n = 5$) - Did not meet email supporter in person ($n = 2$) - Advice lacked practical help or suggestions ($n = 2$) - Felt pressurised to contact back or to complete further sessions when had no time ($n = 2$) - Felt as though was taking up email supporter's valuable time ($n = 1$) - Titles in emails ($n = 1$) - Didn't feel email supporter knew me or could help ($n = 1$) |
| Message boards | <ul style="list-style-type: none"> - Feeling part of a group/not alone ($n = 11$) - Accessibility ($n = 3$) - Could share problems/opinions ($n = 2$) - Can be anonymous and read posts without having to post ($n = 2$) - “Great idea” ($n = 1$) - Notifications of who else is online ($n = 1$) - Seeing parents' viewpoints ($n = 1$) - Able to be honest ($n = 1$) | <ul style="list-style-type: none"> - No people used them at same time ($n = 6$) - Unsure how to use them ($n = 2$) - Not working when logged in ($n = 2$) - People can drag each other down and fuel negative thoughts ($n = 2$) - Couldn't relate because: was overweight ($n = 1$), too old ($n = 1$) or symptoms worse than others ($n = 1$) - Unhelpful and disturbing comments posted about food diaries/self-harm ($n = 1$) - No-one seemed interested in any one else ($n = 1$) - Too personal ($n = 1$) |
| Workbooks | <ul style="list-style-type: none"> - Being able to reiterate/reflect on what learned from internet ($n = 9$) - Keeping a record for future use ($n = 6$) - Convenience ($n = 5$) - Writing things down ($n = 2$) - Colour-coded ($n = 2$) - Charts and printed out information ($n = 2$) - Detailed ($n = 1$) - Accessible ($n = 1$) - Preferred workbooks to internet ($n = 1$) - Being able to focus on the parts relevant to self ($n = 1$) - Very clear, lots of space to write answers ($n = 1$) - Can be honest ($n = 1$) | <ul style="list-style-type: none"> - Too big/not discreet ($n = 6$) - Repeated the online work ($n = 5$) - Too school/university-like ($n = 2$) - Not enough prompts as to when and how they should be used ($n = 2$) - Feel overwhelmed ($n = 1$) - Not monitored closely so was easy to put off doing it ($n = 1$) - The exercises ($n = 1$) - Impersonal ($n = 1$) - Aimed at younger teenagers ($n = 1$) |

outcomes. The programme had a good uptake, and the adolescents showed a significant decrease in episodes of objective binge eating and vomiting, as well as in eating attitudes up to the six-month follow-up, despite fairly low post-treatment remission rates. The service use data mirrored the clinical findings. Regarding the acceptability of the programme, although many participants did not complete all of the online sessions, many of them valued the accessibility and convenience of the web-based sessions, message boards, email and workbooks. Below we discuss the findings in more detail, and put them into a broader context.

Recruitment, uptake and adherence

Adolescents rather than adults are the majority of those presenting to primary care with bulimic disorders (Currin, Schmidt, Treasure, & Jick, 2005). However, such cases were not commonly found in the participating eating disorder services in this study,

suggesting that adolescents are not referred on from primary care as often as adults. More participants accepted the offer of the web-based CBT through the self-help organisation (**beat**). It may be that many adolescents with bulimia nervosa prefer to access information and treatment through less formal sources - perhaps due to embarrassment, lack of knowledge about symptoms or treatment options, or feeling that their primary care support is inadequate. Many participants cited the accessibility, convenience, and confidentiality of the web-based intervention as attractive attributes of the programme. Even so, the sample had a mean age of 18 years, suggesting that cases who are even younger might need to be recruited through other routes (e.g., school counsellors) in order to be able to access this form of intervention.

The participants completed a median of only three web-based sessions out of a possible eight. It might be that the programme was too long, or that it was not helpful enough to engage participants beyond three sessions. More research is needed to determine the

optimal number of sessions needed by participants and factors that may increase treatment compliance. For example, it may be useful to incorporate motivational strategies into the online sessions, or include periodic phone calls to participants from therapists over the course of treatment. Based on this finding, we are looking at reducing the number of web modules in the package to three core sessions, with additional optional components. Many used the workbooks, message boards and ACT-CD in addition to the modules themselves, which probably contributed to the efficacy of the programme. While use of these components of the programme was not systematically measured, the treatment satisfaction data indicate that these elements were valued and useful to participants. Many participants seemed to like the fact that someone cared about them and was available if they needed support - a feeling that might have been present regardless of whether or not participants used the email support.

Parental involvement in the study was optional, and the majority of adolescents did not take up this offer. This is in marked contrast to what happens in the treatment of adolescents with anorexia nervosa, where parents are usually involved.

Symptom improvement

While there were significant overall improvements in bulimic behaviour and cognitions after completion of the web-based programme, most participants were still symptomatic after three and six months. Levels of remission were similar to those in a recent study of manual-based guided self-help in this age group (Schmidt et al., 2007), suggesting that internet-based delivery results in similar outcomes.

Some participants reported that they regarded the programme as a stepping-stone in accessing further treatment, providing them with the knowledge and confidence to seek further help or to tell a parent or a teacher about their illness. Having said that, the data on service utilisation at the six-month interview suggest an overall decrease in use of services, rather than an increase. The data also illustrate the important role of semi-formal and informal sources of support, used by almost all the sample (98%) at baseline. Family and friends were the most commonly cited sources, with 70% of the **beat** group and 80% of the clinic group seeking help from this source. The **beat** group sought help from family and friends more often than did the clinic group, but by the 3-month interview the mean number decreased for the **beat** group and increased for the clinic sample. This may imply that the web-based CBT is encouraging clinic participants to seek additional support among family and friends, whereas the **beat** group used the programme more as a replacement for help from friends and family, perhaps indicating a readiness to move on to other treatments. The small sample sizes mean we can do no more than raise questions, but these findings suggest there is scope to explore issues around the readiness to accept help from different sources as part of the spectrum of being ready to accept formal treatment. Further research into this treatment is required to better to understand its impact on services, supports, school and work and to evaluate its cost-effectiveness.

Strengths and limitations

Only a handful of studies have explored the use of CD-ROM or web-based interactive programmes prevention for women at risk of an eating disorder (Jacobi et al., 2007; Taylor et al., 2006) or treatment of adults with BN (Carrard et al., 2006; Fernández-Aranda et al., 2008; Sanchez-Ortiz et al., submitted for publication; Schmidt et al., 2008), but they have had promising results. Although it is not as powerful as individual therapy, the accessibility and increased service capacity of this approach may mean

that it is clinically justified. However, more research needs to be done to determine factors that may increase treatment compliance, and for whom it might be most effective in helping to reduce bulimic symptomatology and motivate to seek further treatment. This study is the first to use this approach with adolescents, and adds to the very limited literature on the treatment of bulimia nervosa in adolescents.

This study has limitations that should be considered. First, this was an uncontrolled study in which the intervention was not compared against other types of treatment or against a waiting list control group. Second, a substantial number of participants did not complete the follow-up interviews, and it was therefore not possible to determine the clinical outcomes for these participants. However, our 6-month follow-up rates are comparable to those of other treatment studies with minimally selected BN patients (e.g., Palmer, Birchall, McGrain, & Sullivan, 2002; Schmidt et al., 2007). There were no baseline differences in bulimic symptomatology between those participants who completed no follow-up assessments and those who completed at least one follow-up assessment, so it is not clear which features distinguished participants who dropped out of the study from those who continued. As all assessments were conducted over the telephone, participants did not meet with the study researchers at any point, rendering it easier to detach from the study, consequently affecting participants' retention in the study. It is possible that introducing intermittent face-to-face meetings or phone calls would increase participant engagement and retention in the study, and this could be incorporated into future studies. Third, although we offered support for the package in several ways (email and message board), it is unclear whether these supports are as effective as face-to-face or telephone supports. A recent MRC-funded review of self-help in depression has confirmed that supported self-help is more effective than unsupported self-help, and that telephone and face-to-face support are equally efficacious (Gellatly et al., 2007). Fourth, the self-referring nature of the young people recruited from **beat** may have been associated with higher levels of motivation than that of the clinic participants.

Conclusion

In conclusion, this study has demonstrated the feasibility of the Overcoming Bulimia Online web-based intervention for adolescents with bulimic symptomatology. It demonstrated a level of acceptability to participants, and some effectiveness in producing and maintaining reductions in bulimic symptomatology. In line with NICE guidelines (National Collaborating Centre for Mental Health), this approach may have the potential to be used as a first step in intervention for adolescents with bulimic symptomatology. The web-based intervention may help some adolescents with BN and related partial disorders to get better, while functioning as a stepping-stone to further treatment for others. More research needs to be undertaken in order to determine who benefits most from the intervention and which components are beneficial, and to compare the efficacy, costs and cost-effectiveness of the web-based treatment with other forms of treatment. A randomised controlled study that controls for the effect of support would be the next logical step.

Declaration of interest

Christopher Williams and Media Innovations Ltd have intellectual property rights in the web-based treatment investigated in this study. Media Innovations did not provide funding or other support for the study.

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