

RESEARCH ARTICLE

Evaluation of a Guided Internet Self-Treatment Programme for Bulimia Nervosa in Several European Countries

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Abstract

Objective: The purposes of this study were to evaluate the use of an online guided self-treatment programme for bulimia nervosa (BN) and to determine predictors of outcome. Data were collected in four European countries where the programme was simultaneously used.

Method: One hundred and twenty-seven BN or subthreshold BN female patients (mean age of 24.7 years) participated in a 4-month intervention using a CBT based online-guided self-help programme. Contact during the treatment period included weekly e-mails with a coach.

Assessment: Measures included the Eating Disorders Inventory-2 (EDI-2) and the Symptom Check List-Revised (SCL-90R).

Results: Severity of eating disorders symptoms and general psychopathology improved significantly. Twenty-three per cent of patients were symptom free at the end of treatment. The dropout rate was 25.2%. A better score of general psychological health was a predictor of a better outcome.

Conclusions: This study encourages further developments and research on innovative therapy approaches, particularly for those disorders such as BN, with difficult therapy and unclear prognosis. Copyright © 2010 John Wiley & Sons, Ltd and Eating Disorders Association.

Keywords

eating disorders; self-help; Internet; bulimia nervosa; cognitive behaviour therapy

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Introduction

Bulimia nervosa (BN) is a disabling condition with severe health consequences. The efficacy of cognitive behaviour therapy (CBT) for BN is well documented,

and CBT is currently considered as the treatment of choice (Mitchell, Agras, & Wonderlich, 2007). Clinical evidence also supports the use of CBT based self-help programmes, as an early intervention for BN (NCCMH, 2004). Advantages of self-help treatments previously

cited include that they are cost-effective and available with less delay, make treatment possible for people living far from treatment centres or working full time, at their own pace and in their own time. As demonstrated in previous reports, self-treatment might be sufficient for many patients to recover from their disorder and might allow precious therapist resources to be directed to people with the greatest need (Fernandez-Aranda, Alvarez-Moya *et al.*, 2009). A recent review of the literature confirms the potential of 'pure' or guided self-help interventions in the treatment of eating disorders (Perkins, Murphy, Schmidt, & Williams, 2006). The guided form implies that self-treatment is delivered in conjunction with monitoring and encouragement by a health care professional (Gould & Clum, 1993).

Increasingly, new media and Internet technology are being deployed to enhance the delivery of self-help interventions for a wide range of disorders with promising results: For instance depression (Christensen, Griffiths, & Korten, 2002; Clarke *et al.*, 2002), anxiety (Kenwright, Liness, & Marks, 2001) or post-traumatic stress disorder (Lange, Rietdijk, Hudcovicova, van de Ven, Schrieken, & Emmelkamp, 2003).

Eating disorders are also being treated with the help of these new forms of computerized therapy, using either CD-ROM or the Internet. An online CBT-based prevention programme successfully reduced body and shape concern in groups of students at risk for eating disorders (Jacobi *et al.*, 2007; Taylor *et al.*, 2006). A randomized controlled trial comparing the efficacy of a 10-week CD-ROM intervention, group CBT treatment and people on a waiting list for binge eating disorder had comparable reduction in binge days between group CBT treatment and 10-week CD-ROM (Shapiro, Reba-Harrelson, Dymek-Valentine, Woolson, Hamer, & Bulik, 2007). Participants of both interventions also showed greater symptoms reduction compared to those remaining on the waiting list. A CD-ROM with eight modules of CBT for BN, evaluated without guidance, showed positive outcomes (Bara-Carril *et al.*, 2004). A web-based version was used with adolescents in an uncontrolled study (Pretorius *et al.*, 2009). A good uptake and a reduction of bulimic symptoms were found, similar to improvements with a guided self-help manual in young people. In a randomized controlled trial, the efficacy of the CD-ROM version appeared to be enhanced by a higher

adherence to treatment, which might be helped by guidance from a health-care professional (Schmidt *et al.*, 2008). The relative effectiveness of guidance in the use of self-treatment manuals was already mentioned in a study comparing a pure and a guided form of self-help for binge eating disorder with a waiting list (Carter & Fairburn, 1998). Both forms of self-treatment had an impact on binge eating and other eating disorder features but guidance helped with compliance and improved outcome. E-mails were used in eating disorders treatment to deliver therapy (Robinson & Serfaty, 2008) or in association with a CBT self-help manual and an online private discussion forum (Ljotsson, Lundin, Mitsell, Carlbring, Ramklint, & Ghaderi, 2007), in two randomized controlled trials with BN and binge eating disordered patients. After E-mail Bulimia therapy, supervised by CBT trained and experienced psychotherapists, fewer patients than those in waiting list still met eating disorder diagnostic criteria (Robinson & Serfaty, 2008). Compared to a control group, participants' eating disorder and secondary symptoms were reduced after a 12-week CBT self-help manual with e-mails, and improvements persisted after a 6-month follow-up (Ljotsson *et al.*, 2007). E-mails seem to be a valuable way of treating and supporting patients with eating disorders.

To our knowledge, the European SALUT project designed the first web-based self-treatment programme for BN. This project took place between 2001 and 2004. At that time, the use of the Internet was becoming widespread among people and for the first time, technology could support such a programme. To combine self-treatment with Internet technology was not only innovative when the SALUT project began but also enhanced the advantages of self-help thanks to more individually tailored monitoring, with automatic feed-back generated by the programme or the opportunity to send an e-mail to one's coach at any time. The Internet could also help to easily reach those patients who are often ashamed of their disorder (Shapiro, Berkman, Brownley, Sedway, Lohr, & Bulik, 2007).

A multi-site evaluation of this online programme for BN, used with guidance, was conducted in the framework of the SALUT European project. Four countries took part in the SALUT project and have already published results. Each country adopted a slightly different focus or method. Switzerland pub-

lished early results on EDI-2 and SCL-90R evolution, as well as participants' satisfaction reports, after 4 months of use of the online programme (Carrard, Rouget, Fernandez-Aranda, Volkart, Damoiseau, & Lam, 2006). Expert ratings added more information to the results obtained with self-rated questionnaires in Sweden (Nevonen, Mark, Levin, Lindstrom, & Paulson-Karlsson, 2006). In Spain, the online programme was compared to a waiting list (Fernandez-Aranda, Nunez *et al.*, 2009). Results analysis of the German study focused on depression (Liwowsky, Cebulla, & Fichter, 2006). Results can be summarized as follows: Eating disorder and general psychological health, measured by self-rated questionnaires, improved. Binge eating and purging behaviours decreased after using the programme for 4 months. Moreover, bingeing and vomiting abstinence rates were better with the Internet self-treatment programme compared to a waiting list. A statistically and clinically significant improvement was also observed for depression, a frequently associated comorbidity. Overall participants expressed good satisfaction with the online programme, found it easy to use and underlined that guidance, delivered by weekly e-mail contacts, was a predominant factor that helped them complete the 4-month programme (Carrard *et al.*, 2006; Fernandez-Aranda, Nunez *et al.*, 2009; Liwowsky *et al.*, 2006; Nevonen *et al.*, 2006).

The specific goals of this study were two-fold: (a) To evaluate the use of a CBT guided self-treatment programme for BN, delivered with the Internet, by means of a European data set; (b) to determine predictors of outcome and dropout.

Patients and method

Participants

Each centre had common inclusion and exclusion criteria: Full diagnosis BN purging type or eating disorder not otherwise specified (EDNOS), bulimic type, as defined by DSM-IV (APA, 1994). Exclusion criteria were current CBT, drug or alcohol addiction, severe depression, or recent suicide attempt, BMI lower than 17.5 or higher than 40.

Entry into the study was between October 2002 and October 2004. Recruitment modes differed in each country. In Germany and Switzerland, participants were mainly recruited from the Internet, with newspapers articles and advertisements. In Sweden, women from the study centre waiting list were asked to take part in the study. In Spain, participants were consecutive referrals for assessment and treatment at the study centre. The common database that was constituted with data from the four countries initially contained 141 subjects. Fourteen participants were then removed because of exclusion criteria or missing data. A chart detailing the participants' flow is displayed below (Figure 1). The final sample of the study consisted of 127 participants.

Design and procedure

Data of the four European countries taking part in SALUT project were pooled between Switzerland (Geneva University Hospitals, Geneva and Psychiatric Institute of Valais Romand, Monthey), Spain (University Hospital of Bellvitge, Barcelona), Sweden (Queen

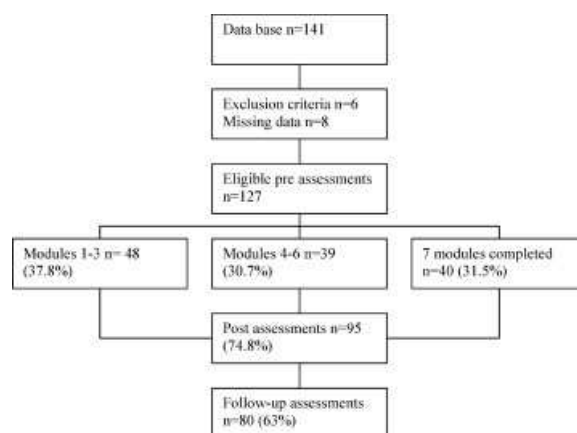


Figure 1 Flow chart of available data collected in the four countries

Silvia Children's Hospital, Göteborg) and Germany (Klinik Roseneck, Prien).

In these five centres, treatment length was 4 months with a 2-month follow-up. Three evaluation sessions were carried out in a face-to-face setting, before and after the self-treatment programme, and after the follow-up period. Informed and written consent was obtained from all the participants. In each country, ethical committees approved the studies.

Guidance was a mandatory weekly e-mail contact with a 'coach', who was a psychologist or a psychiatrist, during the 4-month self-treatment programme. Participants were asked to write an e-mail at least once a week, even if everything went fine. They could write more than one e-mail a week, but they were told that their coach would answer only once a week (and not more). Coaches had to monitor progress, answer questions, and provide general support and encouragement, but no psychotherapy '*per se*'. They were trained by the first author to give standardized guidance. This was an open study without a control group. Participants were considered as dropouts after 4 weeks without any connection or e-mail contact. Their access to the programme was cancelled and they did not take part in the next evaluation session.

Self-treatment programme

The Internet self-treatment programme was conceived specifically for BN, purging subtype, by P. Rouget and I. Carrard. The programme included seven sequential modules based on classical CBT principles, with online exercises and theoretical parts explaining the techniques.

- Module 1. Prepare for change: Explore your motivation to change with exercises; CBT model of BN maintenance.
- Module 2. Observe yourself: With a food diary to complete online during the whole course of the programme. Participants had to record meals, episodes of bingeing and self-induced vomiting on a daily basis. In case of a binge episode, they were asked to think about emotions or situations that could have worked as triggers. An automatic feedback with graphs and charts was generated from data entered in the diary. Evolution graphs showing progress reinforced participants' work.

- Module 3. Change your behaviour: Plan your meal time, eat regularly; identify behavioural strategies to prevent binges.
- Module 4. Change the way you think: Pinpoint automatic thoughts and emotions; challenge automatic negative thoughts; apply these techniques to body shape dissatisfaction.
- Module 5. Solve your problems: With classical problem-solving technique in six steps.
- Module 6. Assert yourself: assertiveness techniques illustrated by examples on how to say no and how to state a demand, saying 'I' and expressing one's emotions, with empathy and persistence if needed.
- Module 7. Prevent relapse: Review the acquired techniques and some tips in case of lapse.

A character called 'Sarah' gave examples of how to proceed with the exercises. Sarah was a fictitious student suffering from BN. She shared her thoughts throughout the programme with participants. This online programme was primarily designed to be used with guidance. Diary feedback and other programme exercises were accessible by the coach, who through this could be informed of what was done by participants and tailor their advice or support accordingly.

The programme was translated from French into Spanish, Swedish and German with cultural adjustments such as varying meal times between northern and southern European countries. These modifications were sparse and the programme can be considered as similar in each country. Particular attention was given to security and data protection. Participants could access the web-programme only with a pseudonym and a password and all personal information on patients was stored separately in accordance with the data protection procedures of each institution. A secured messaging module allowed coaches and patients to exchange messages without exposing their e-mail address.

Measures

To maintain data consistency, each centre had to use at least three core instruments. EDI-2 and SCL-90R questionnaires were chosen to evaluate clinical outcome, because translated and standardized versions were available in each country. The third questionnaire

(QATA) was designed for collecting case history and user satisfaction.

- EDI-2 (Eating Disorder Inventory-2) (Garner, Olmsted, & Polivy, 1983): Widely used self-report measure for the assessment of symptoms, attitudes and behaviours associated with eating disorder. It is subdivided into 11 subscales: Drive for thinness, bulimia, body dissatisfaction, ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, maturity fears, asceticism, impulse regulation, social insecurity.
- SCL-90R (Symptom Checklist-90-Revised) (Derogatis, 1977): Self-report instrument frequently used to assess a broad range of psychopathological symptoms. This test measures nine primary symptom dimensions: somatization, obsession–compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. A Global Severity Index (GSI) can be used as a summary of the test.
- QATA: This questionnaire collects data on socio-demographic facts, patient history, past and current symptoms. BN symptoms such as frequency of binge episodes, self-induced vomiting and excessive physical activity were rated with an ordinal six-point scale from 0 = never to 5 = several times a day. Importance of weight for self-esteem was assessed with an ordinal four-point scale, from 0 = not important to 3 = extremely important. Questions on users' satisfaction and subjective usefulness were added at post and follow-up evaluations. A series of questions were asked to evaluate the seven Internet programme modules on how enjoyable, easy and useful was each module, using scales from 0 (not at all) to 6 (very pleasant, very easy and very useful). Specific parameters such as diary and diary feedback usefulness, ease of use of programme, programme and e-mail contact usefulness were assessed on a scale from 0 (not at all) to 6 (extremely). The first version of the QATA questionnaire was devised in French and discussed between SALUT partners, improved and then translated into other partners' languages.

Statistical analyses

The statistical package SPSS 15.0 was used. Pre- and post-treatment differences were assessed with *t*-tests for paired samples. Effect sizes (Cohen's *d*) were calculated as the mean difference between pre- and

post-treatment divided by the pooled standard deviation. Effect sizes were defined as: $\leq .20$ = low effect; around $.50$ = medium effect; $\geq .80$ = high effect.

Clinical improvement between pre- and post-treatment was calculated to assess a proportion of participants coming back to a 'functional norm' after the Internet self-treatment programme. A cut-off was designed as the mid-point between normative data for the instrument and the patients' sample data, using the method exposed by Jacobson and Truax (1991). Percentages of patients that were on the dysfunctional side of the cut-off at pre-treatment and crossed the cut-off at post-treatment were reported as 'clinically improved'.

Backward stepwise multiple regression was used to explore predictors of change over the online self-treatment programme. A delta corresponding to the subtraction between post-evaluation and baseline scores of the EDI-2 Bulimia subscale was calculated and used as dependant variable. Backward stepwise logistic model explored predictors for dropout. Probability for stepwise entry and removal were $.05$ and $.10$, respectively. Compliance and outcome indicators were correlated to potentially associated variables with Pearson's correlations.

It also seemed relevant to evaluate differences that might be due to various recruitment modes or to dissimilarities between centres in order to describe the study sample at best. One-way ANOVA was used to evaluate differences between each country baseline. However, no pair-wise comparisons were conducted, since comparisons between countries was not a goal of the study. Pre- and post-treatment differences were assessed with *t*-tests for paired samples for each country separately, as it was conducted for the global sample.

Results reported here include only data from the pre- and post- (4 months later) treatment evaluation. Analyses showed no differences between data collected after 4 months of self-treatment programme or after 2 more months of follow-up, but the dropout rate was much higher after 6 months than after 4 months.

Results

Participants flow through the study

Figure 1 shows the participants' flow through the three assessments and the module reached by each participant at post-evaluation or drop out. Modules 1–3 were put together because they dealt with behavioural

techniques targeting specifically the eating disorder. Modules 4–6 tackled skills that were more general and module 7 completed the whole sequence with relapse prevention techniques.

Baseline characteristics

The mean age of the 127 women who took up the self-treatment programme was 24.7 (range 18–43 years, $SD = 5.1$); the mean BMI was 21.5 (range 17.5–33.7, $SD = 2.9$). Seventy per cent were single, 45.7% had a job and 35.4% were students. In the whole sample, 76.4% participants met the diagnostic criteria for BN, purging type. The rest of the sample included three people (2.3%) with BN non-purging type and 27 people with an EDNOS (21.3%). Average illness duration was 8.4 years ($SD = 5.4$) and 70% of participants had had previous treatment for their eating disorder.

Country samples were different on some aspects. Age, BMI characteristics and baseline data (EDI-2

subscales and SCL-90R GSI) of each country are presented in Table 1.

Differences emerged at baseline between samples regarding participants' age and BMI. The percentage of patients meeting the BN purging type diagnostic criteria differed according to the countries. Concerning EDI-2 subscales and SCL-90R GSI, differences were found for drive for thinness, interoceptive awareness, social insecurity and asceticism subscales. Countries also differed regarding SCL-90R GSI level. The four countries displayed heterogeneous results on scales assessing BN symptoms severity, notably binge eating and excessive physical activity.

Treatment outcomes

Pooled data

Paired samples *t*-tests were performed to evaluate evolution over time of the EDI-2 subscales and the SCL-

Table 1 Baseline characteristics (Mean (SD)) by country

	GERMANY <i>N</i> = 20	SPAIN <i>N</i> = 31	SWEDEN <i>N</i> = 34	SWITZERLAND <i>N</i> = 42	<i>p</i>
Age	30.0 (6.3)	24.4 (3.7)	20.8 (1.7)	25.5 (4.6)	<.001
BMI	20.7 (1.9)	22.7 (3.6)	22.2 (2.4)	20.5 (2.6)	.002
% BN purging type	95.0%	67.7%	58.8%	88.1%	.003 (chi-square)
Drive for thinness	9.8 (5.7)	14.0 (6.0)	14.6 (4.2)	13.4 (5.4)	.012
Bulimia	7.7 (5.0)	9.9 (5.5)	8.8 (5.8)	10.9 (4.9)	.121
Body dissatisfaction	15.0 (7.8)	17.0 (7.8)	17.1 (7.0)	14.6 (7.8)	.384
Ineffectiveness	7.1 (5.5)	10.5 (6.6)	10.7 (5.9)	10.6 (7.8)	.213
Perfectionism	5.6 (4.7)	5.5 (4.3)	5.6 (4.5)	7.8 (4.8)	.084
Interpersonal distrust	4.2 (3.3)	5.3 (4.1)	4.4 (4.6)	5.4 (4.4)	.588
Interoceptive awareness	7.7 (5.7)	10.6 (6.0)	13.4 (6.2)	11.3 (6.0)	.011
Maturity fears	4.4 (3.6)	8.6 (5.8)	7.6 (6.1)	5.3 (5.0)	.011
Asceticism	3.8 (1.9)	6.8 (4.2)	8.2 (3.7)	7.2 (2.8)	<.001
Impulse regulation	4.7 (3.7)	7.2 (5.5)	5.8 (4.2)	5.8 (5.1)	.291
Social insecurity	4.7 (3.0)	8.1 (4.0)	5.9 (3.5)	6.4 (3.4)	.005
SCL-90R Global Severity Index	0.8 (0.5)	1.7 (0.7)	1.5 (0.5)	1.2 (0.5)	<.001
Binge eating frequency	3.4 (1.1)	3.5 (1.0)	2.7 (1.5)	3.6 (1.0)	.016
Self-induced vomiting frequency	3.8 (0.9)	3.0 (1.5)	3.0 (1.6)	3.6 (1.1)	.079
Physical activity frequency	1.1 (1.5)	1.3 (1.6)	2.1 (1.6)	1.1 (1.4)	.042

Note: BMI, Body Mass Index; BN, bulimia nervosa.

Table 2 Treatment outcomes ($n = 95$) for EDI-2 subscales and SCL-90R GSI

	Pre-treatment means (SD)	Post-treatment means (SD)	p	Cohen's d	Clinically improved %
Drive for thinness	13.2 (5.7)	10.2 (6.1)	<.001	0.43	33.8
Bulimia	9.3 (5.4)	4.6 (4.6)	<.001	0.74	45.7
Body dissatisfaction	15.9 (7.3)	13.2 (7.9)	<.001	0.30	39.3
Ineffectiveness	10.1 (6.6)	6.9 (6.0)	<.001	0.40	32.1
Perfectionism	6.2 (4.4)	5.1 (3.9)	<.001	0.22	46.3
interpersonal distrust	4.8 (4.0)	3.4 (3.1)	<.001	0.30	29.4
Interoceptive awareness	11.3 (6.4)	7.2 (5.9)	<.001	0.53	39.1
Maturity fears	6.4 (5.5)	4.9 (4.4)	<.001	0.24	10.3
Asceticism	6.9 (3.7)	4.7 (3.2)	<.001	0.50	47.0
Impulse regulation	6.2 (4.9)	4.2 (4.6)	<.001	0.35	49.2
Social insecurity	6.3 (3.4)	4.9 (3.3)	<.001	0.31	47.5
SCL-90R Global Severity Index	1.3 (0.6)	1.0 (0.7)	<.001	0.39	41.4

90R GSI. Table 2 shows that the largest effect was found for the Bulimia subscale, with 45.7% of the participants considered as clinically improved. A medium effect emerged for interoceptive awareness and asceticism subscales. Smallest effects were related to perfectionism and maturity fears while the remaining EDI-2 subscales Cohen's d stood between 0.30 and 0.40. Forty per cent of the sample could be considered as clinically improved regarding the SCL-90R GSI.

T -tests were performed to assess the evolution of BN symptoms such as frequency of binge episodes, self-induced vomiting and excessive physical activity between pre- and post-treatment. Significant differences emerged with improvement of all three symptomatic behaviours over time (Table 3).

Participants were categorized into two groups. The 'improved group' had to have improvements of the frequency of binge episodes and of self-induced vomiting. Moreover, the excessive physical activity score could not have become worse. The 'unimproved group' was stable or had increased symptoms. Excessive physical activity was reckoned in this calculation because of the observation in the Swedish study that patients tended to switch from one compensatory behaviour (e.g. self-induced vomiting) to another one (e.g. excessive physical activity) after the self-treatment

programme (Nevonen et al., 2006). Fifty-two per cent ($n = 43$) of participants could be classified in the 'improved group'. Twenty-three per cent ($n = 19$) of the participants showed no symptoms anymore at the end of the self-treatment programme.

Concerning the importance of weight for self-esteem, a significant difference ($t(93) = 3.3$, $p < .01$) between pre- ($M = 1.78$, $SD = 0.8$) and post-treatment ($M = 1.47$, $SD = 0.8$) was found, while the mean BMI was stable between baseline ($M = 21.2$, $SD = 2.5$) and post-treatment ($M = 21.5$, $SD = 2.5$).

Results for each country

The same analyses were run country by country. Results varied among countries. In summary, Switzerland was the country that showed the most consistent pattern of significant differences for all scales. The EDI-2 Bulimia was the only subscale that showed a positive and significant improvement over time in all countries, with the interoceptive awareness subscale significantly improved in three countries and close to significance in the fourth (in Spain). Drive for thinness and body dissatisfaction, two other scales central for eating pathology, were significant or close to significance in each country, except body dissatisfaction subscale in

Table 3 Bulimia nervosa (BN) symptoms evolution (Means (SD)) ($n = 82$)

BN symptoms	Pre-treatment	Post-treatment	$t(81)$	p
Binge eating frequency	3.2 (1.2)	2.4 (1.3)	4.8	<.001
Self-induced vomiting frequency	3.3 (1.3)	2.1 (1.6)	7.4	<.001
Physical activity frequency	1.6 (1.6)	0.9 (1.4)	4.5	<.001

Spain. The same pattern was found regarding SCL-90R GSI results. Bulimia symptoms such as binge eating and vomiting frequency improved significantly in all countries, except in Sweden.

Predictors of outcome and dropout

A delta between post-evaluation and baseline EDI-2 Bulimia values was calculated and considered as an indicator of change. This delta was used as dependant variable in a multiple regression analysis run with backward method. The baseline EDI-2 subscales, SCL-90R GSI, BMI and illness duration were introduced in the analysis as predictors, as well as the EDI-2 Bulimia subscale as covariate. The SCL-90R GSI ($\beta = -0.725$, $t = -8.6$, $p < .001$) was retained as a predictor in addition to the EDI-2 Bulimia subscale ($\beta = 0.178$, $t = 2.1$, $p = .037$). A better psychological health at intake predicted an improvement of symptoms of BN at post-evaluation. The negative relationship between the EDI-2 Bulimia subscale and the measure of change reflected the fact that participants with higher scores at baseline could reach higher change over the self-treatment programme than those with lower scores.

Subsequently, a logistic binary regression was used with backward method, with the dropout or completer status at post-evaluation as dependent variable and baseline EDI-2 subscales, SCL-90R GSI, BMI and illness duration as predictors. No predictors were retained in the model.

Dropout

Thirty-two participants (25.2%) dropped out of the online programme during the 4 months of self-treatment and did not attend the post-evaluation. Dropout rates varied between countries: 5% in Germany ($n = 1$), 11.8% in Sweden ($n = 4$), 35.7% in Switzerland ($n = 15$), 38.7% in Spain ($n = 12$).

Participants who dropped out of the study before the second assessment spent an average of 44.5 days in the programme ($SD = 7.5$). Half of dropouts (53.1%) reached module 3 and only 37.6% of them persisted in module 4. Finally, 3.1% (one participant) entered module 5 but did not reach the 6th module.

Compliance

Two indicators of compliance were considered: The module reached at the time of post-evaluation and

a ratio comparing the food diary days completed by participants and the total number of diary days that should have been completed.

The last module of the Internet self-treatment programme was reached by 42.2% of the 4-month completers: 8.5% of subjects stopped at module 2, 16.8% at module 3, 15.8% at module 4, 13.7% at module 5 and 3.2% at module 6. Pearson's correlations between the module reached at the post-evaluation and baseline measures for EDI-2 subscales, SCL-90R GSI, illness duration and BMI showed a negative relationship with SCL-90R GSI ($r = -0.21$, $p < .05$). Pearson's correlations were also calculated between the ratio of completed diary days and baseline measures. No relation between these variables emerged. Finally, correlations were run between both indicators of compliance and the measure of change of the EDI-2 Bulimia subscale between pre- and post-intervention. A negative relationship between the number of days completed in the food diary and the change of Bulimia subscale ($r = -0.23$, $p < .05$) was found. The more days were completed in the diary, the larger was the improvement of BN symptoms at post-treatment.

User satisfaction and access patterns

Each module was evaluated by participants on how pleasant, easy and useful it was. Except for module 4, targeting cognitive restructuring, which was judged as more difficult ($M = 2.5$, $SD = 1.6$), all means stood above the mean of 3, meaning that the seven modules were evaluated as pleasant (for each module Means from 3.4 to 4.4), easy (Means from 2.5 to 4.0) and useful (Means from 4.5 to 5.2).

Participants also evaluated specific parameters of the programme. All results were above the mean of 3. The diary was evaluated as useful ($M = 4.0$, $SD = 2.0$) as well as its feedback ($M = 3.5$, $SD = 2.0$), the programme was judged easy to use ($M = 4.9$, $SD = 1.4$) and useful ($M = 3.7$, $SD = 2.0$) and the e-mail contact was considered as useful ($M = 4.4$, $SD = 1.7$).

Analysis of access patterns showed that 65% of all Internet connections occurred during weekdays and 35% of the connections were made on the weekends. The hour with the most connections was from 9:00 PM to 10:00 PM for the total sample and for all countries separately, except in Switzerland where it was from 7:00 AM to 8:00 AM.

Discussion

The objectives of this paper were to pool samples from five centres located in Spain, Germany, Sweden and Switzerland to assess the use of a guided Internet self-treatment programme for BN and to determine predictors of outcome and dropout. The data pooling from the five different centres covered a population with a wide range of age and BMI and consequently different manifestations of the illness with different profiles on EDI-2 subscales and SCL-90R GSI. Samples differed despite common inclusion and exclusion criteria among countries. It is likely to be due to recruitment mode and to type of treatment proposed in each centre. Even if this could be considered as a drawback, especially if the study was designed to evaluate efficacy, this can also be seen as an advantage, since it allows a broader perspective, more representative of a population of patients met in a clinical setting. This can bring new elements regarding the use of a web-based self-treatment programme and particularly regarding the determination of predictors of outcome and dropout, thanks to the large sample size.

Evaluation of the use of the Internet self-treatment programme

One hundred and twenty-seven women were included in the analyses. Among them, 76.4% met the DSM-IV diagnostic criteria of BN purging type, the rest meeting EDNOS criteria.

After 4 months of guided Internet self-treatment programme, a positive outcome was found for eating disorders dimensions, measured by the EDI-2 and for general psychopathology, as shown by the SCL-90R GSI. Medium effect sizes were found on most of the EDI-2 subscales. On average 40% of subjects (between 10.3 and 49.2%) showed clinical improvement on EDI-2 subscales and SCL-90R GSI.

BN symptoms such as frequency of bingeing, self-induced vomiting and excessive physical activity decreased significantly. The weight stayed the same but the importance of weight for self-esteem, which is a diagnostic criterion for BN, decreased. Fifty-two per cent of participants had less binge episodes and less self-induced vomiting, without any increase of excessive physical activity. Twenty-three per cent of participants were symptom-free at the end of the online self-treatment programme. As a comparison, in an article

on treatment efficacy for BN, abstinence rates varied from 12 to 50% with self-help methods (Mitchell *et al.*, 2007). Results were similar after follow-up, showing some stability, even if the time between post-evaluation and follow-up was only 2 months.

Evolution over time was also examined among the countries. An improvement of the EDI-2 Bulimia subscale, which was the main target of the self-treatment programme, was found in each country, as well as a tendency for interoceptive awareness, related to a better attention to emotions and sensations. Significant *p*-values were in a larger number in Swiss results than in other countries, which would argue in favour of a cultural advantage. The online programme was designed in Switzerland and then translated with a minimum of adjustments. It is conceivable that more freedom should be left in translations. However, other explanations can be mentioned for these results as well, such as recruitment difference or cases mix, as it was said regarding baseline results between samples. Participants in the study were recruited in diverse ways (community, waiting list, new referrals) and this is likely to account for the majority of these differences. These results variety underlines the importance of evaluating the Internet self-treatment programme in a randomized controlled study, to assess its efficacy for different types of population.

Predictors of outcome

The general psychological health measured by the SCL-90R GSI was a predictor of outcome. A better psychological health led to a positive change of BN symptoms over the 4 months of Internet self-treatment programme. This finding would speak in favour of proposing preferentially the Internet programme to patients without too severe psychological co-morbidities. The SCL-90R GSI contains various scales of psychological health, notably some that are known to complicate heavily BN treatment: Obsession-compulsion, interpersonal sensitivity, depression, hostility dimensions that can be related in a certain way to clinical perfectionism, core low self-esteem, mood intolerance and interpersonal difficulties, identified by Fairburn and colleagues as real obstacles for change (Fairburn, Cooper, & Shafran, 2003). It was decided to focus on EDI-2 subscales in this study and not on SCL-90R dimensions. It would be interesting to search in

that direction using additional variables in order to explore further which patients' profile better respond to the online self-treatment programme or not and which modules could be developed or adjusted to better suit more severe patients' needs.

Dropout

Overall, 74.8% of participants completed the 4-month web-based self-treatment programme. The dropout rate was 25.2%. This number is comparable to other studies using self-help treatments for eating disorders, showing rates between 0 and 69.2% (Sysko & Walsh, 2008). High dropout rates are common in patients suffering from eating disorders, even in face-to-face settings (Wilson, 1996).

No predictors were retained in the model to explain the difference between dropouts and participants who completed the second evaluation. This shows the importance of exploring the dropout dimension with additional parameters.

Reasons for dropout were seldom known and were not recorded in the database. Participants could simply not be traced anymore and there was no attempt to get satisfaction questionnaires from them. Rarely some explanations such as 'new job' or 'move to another place' were given. Dropouts stayed in the programme for an average of 1.5 months. Knowing that the account access was cancelled after 4 weeks without any connection, it shows that these participants did not benefit much from the online self-treatment programme content. They dropped out mainly around module 3, which is behavioural and focused on the eating disorder, requiring a real commitment to therapy.

Non-participation in follow-up assessments can alter results most likely in favour of the evaluated treatment. This could also be an explanation to the particularly good results found in Switzerland, where the dropout rate was high. People who were not quickly satisfied with the online self-treatment programme could easily go to some other available places, since the choice of therapist is free in this country. Some research addressed the dropout issue to better identify what was the evolution of dropouts and the reasons that guided their choice to withdraw from treatment (Bjork, Bjork, Clinton, Sohlberg, & Norring, 2009; Bjork, Clinton, & Norring, 2006). Surprisingly, results showed that people who choose to quit had results rather similar to completers when assessed at follow-up (Bjork

et al., 2009). In this last study, however, participants could benefit from several months of therapy before abandonment, and their decision could even be understood as rational because they could have reached a valid improvement. On the contrary, in our research, because of the short average time spent in the self-treatment programme, hypotheses would most likely be that either the online delivery or the cognitive behavioural techniques did not suit these participants, rather than a possibility of remission.

Compliance of participants

Analyses on compliance showed that less than half participants had finished all seven modules of the programme. Even a quarter of participants only completed the first three of them, which were behavioural modules. The reached module was not linked with perfectionism, as we would have thought: The demand to do things in a too perfect way might have stopped participants at the first modules. The programme completion was linked with better psychological health at baseline. Compliance might be enhanced, as previously mentioned, by the development of new modules. Then, the number of days completed in the diary, as a compliance indicator, was correlated with the change of BN symptoms. The more compliant participants were with the diary, the better were their scores on the Bulimia subscale in the end. The food diary is a key exercise of CBT for eating disorders. The computerized version was well appreciated by participants, who found it useful, as well as the feedback that was automatically generated from it. It was a better indicator of outcome than the module reached at post-assessment. The imposed requirement upon participants to complete the seven modules of the programme can be called into question. A more individualized approach according to each patient specific needs might be more desirable.

Importance of guidance with the online programme

Dropout rates varied considerably between centres, ranging from 5 to 38.7%. Several factors might influence this rate such as recruitment mode, various baseline results, different percentages of full BN diagnosis or treatment availability in the local centre after the web-based programme. Among all these

factors, the weekly e-mail guidance might play a role. Coaches' training was done in a similar manner, but no strict guidelines were given. In the SALUT Swedish study, coaches were interviewed on their different way of proceeding, because patients' completion rates between coaches varied markedly. One of the coaches had a much higher proportion of people completing the seven modules of the programme than the others (Nevonen *et al.*, 2006). The interviews revealed that this 'coach provided more support to her participants than the other two and had a more therapeutic approach, which probably resulted in more completers'. In a similar way, the German coach, who had the lowest dropout rate of the study, explained monitoring her participants in a more diligent way than any other coach did. Guidance would guarantee relationship and compliance but not necessarily improvement. The recommendations given to coaches for guidance were flexible. Some patients did not rely on e-mails while others would tell important parts of their life and this led to important differences between e-mails exchanges, in content and size, from only formal to really personal, and from totally laconic to very long. In order to standardize the procedure, a detailed and explicit reference manual for coaching actions should be developed. The stake would be to guide people who may be able to benefit from the programme sufficiently, but not to waste resources for people who should be referred to another treatment setting. A comparison of the web-based self-treatment programme used with or without guidance would be interesting to see how outcomes change with less guidance. It is important to emphasize that following a self-treatment programme with such a minimum support is hard for participants.

Internet self-treatment programme advantages

Many advantages were previously mentioned concerning the transfer of self-help treatments to the Internet. In this study, a third of the connections to the programme took place on weekends, and the most preferred hours were in the evening (9:00–10:00 PM) or in the morning (7:00–8:00 AM), when it would not have been possible to consult a psychotherapist. There is definitely a practical side of the Internet interface for people who work the whole week. Participants'

satisfaction levels were good concerning most of the modules, the programme usefulness and the e-mail support, as well as the ease of use of the programme. Self-help treatments are generally recommended as first line treatment but 70% of participants had already had treatment before. This brings other perspectives to the use of a web-based self-treatment programme: As a first line treatment, but also as an alternative if symptoms continue after a first treatment. BN has a high relapse rate and it is useful to have various treatment options.

Limitations and future studies

Results of this first European study assessing the use of an Internet self-treatment programme have to be taken with caution. This is an uncontrolled study without a comparison group and as a next step, a randomized controlled study would be necessary to give strength to these results and to evaluate efficacy of the Internet self-treatment programme. Moreover, a longer follow-up would allow an evaluation of patients' progress. More information on possible predictors of outcome should be collected, including supplementary factors known to be related to outcome, such as self-esteem, or related to guidance process such as e-mail frequency or e-mail content. It would be interesting to know more about outcome predictors, but also about the specificity of each module, to determine which treatment composition works better and whether other modules should be developed.

This European study showed that an online self-treatment programme for BN was well accepted, useful and gave promising results. These results are encouraging to go on in studying the contribution of new technologies in the field of eating disorders treatment.

Conflict of interest

Tony Lam is director of Netunion, a provider of health management software.

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