Internet Interventions 2 (2015) 419–428

Contents lists available at ScienceDirect

Internet Interventions

journal homepage: www.invent-journal.com/

StudentBodies-eating disorders: A randomized controlled trial of a coached online intervention for subclinical eating disorders☆

Jenine Saekow [a], Megan Jones [b,c,*], Elise Gibbs [a], Corinna Jacobi [d], Ellen E. Fitzsimmons-Craft [e], Denise Wilfley [f], C. Barr Taylor [b,g]

[a] PGSP-Stanford PsyD Consortium at Palo Alto University, 1791 Arastradero Road, Palo Alto, CA 94304, USA
[b] Psychiatry and Behavioral Sciences, Stanford University, 401 Quarry Road, Stanford, CA 94304, USA
[c] Lantern, 589 Howard Street, San Francisco, CA 94105, USA
[d] Institut für Klinische Psychologie und Psychotherapie, Technische Universität Dresden, Dresden, Germany
[e] Department of Psychiatry, Washington University School of Medicine, St. Louis, MO 63110, USA
[f] Departments of Psychiatry, Medicine, Pediatrics, and Psychology, Washington University School of Medicine, St. Louis, MO 63110, USA
[g] Palo Alto University, 1791 Arastradero Road, Palo Alto, CA 94304, USA

ARTICLE INFO

Article history:
Received 25 June 2015
Received in revised form 17 October 2015
Accepted 23 October 2015
Available online 2 November 2015

Keywords:
Eating disorders
Internet
Prevention
Guided self-help
Stepped care
Coaching
College students

ABSTRACT

Objective: Eating disorders and subclinical eating disorders are serious and disabling diseases with high prevalence rates on college campuses. Many symptomatic students are never screened nor formally diagnosed with an eating disorder and do not receive mental health treatment.
Method: This pilot study examines the feasibility, acceptability, and short-term efficacy of a 10-week online intervention, *StudentBodies-Eating Disorders*, designed to reduce eating disorder symptoms, related psychopathology, and weight and shape concerns. A total of 65 participants were randomized to the online intervention or waitlist control.
Results: Results indicate that for study completers, the intervention had large effects for reduction of eating-related psychopathology ($d = 1.5$), weight concerns ($d = .7$), and psychosocial impairment ($d = .7$). Those who completed it rated the program very acceptable. This pilot study suggests the potential efficacy of *StudentBodies-Eating Disorders* as a self-help intervention for subclinical eating disorders in a non-clinical setting.

1. Introduction

Eating disorders (EDs) are common and disabling diseases affecting a significant proportion of individuals, with lifetime prevalence rates as high as 6.1% in adolescents and 5.9% for adult women (Hudson et al., 2007; Swanson et al., 2011). EDs are associated with considerable medical and psychological consequences (Massey-Stokes, 2009; Roerig et al., 2002), contributing to markedly higher health care costs, such as more outpatient psychotherapy, more emergency room visits (Striegel-Moore et al., 2003), and longer hospital stays as compared to healthy individuals (Robergeau et al., 2006). Thus, highly scalable, cost-effective, evidence-based interventions are essential to developing a model of care for EDs, which can then be applied to address other mental health problems (Ybarra and Eaton, 2005). Fortunately, early detection and treatment predicts better outcome (Agras, 2001). In order to accomplish this, prevention and early-intervention programs must focus on reducing established modifiable risk factors, such as dieting and weight and shape concerns. When coupled with negative affect, teasing, and compensatory behaviors, the risk of developing an ED increases significantly (Jacobi et al., 2011; Taylor et al., 2006). These risk factors have been shown to predict future eating pathology (Field et al., 1999; Killen et al., 1996; Stice, 2001; Wertheim et al., 2001; Wichstrøm, 2000) and, if present, should be concurrently addressed in preventive interventions.

A large proportion of ED prevention research, either in person or Internet-delivered, has focused on targeted prevention, in which individuals exhibiting eating disorder risk factors are assigned to an intervention (Ciao et al., 2014). A smaller number of studies has examined indicated prevention programs, which aim to reduce symptoms and cease symptom progression among individuals who already present with ED symptoms but do not meet full criteria for diagnosis (Ciao et al., 2014). Addressing subclinical symptoms is important because when treatment is delayed, individuals with subclinical EDs are likely to experience disease progression, poorer prognosis, and greater likelihood of relapse (Yager et al., 2006). To effectively actualize ED prevention within a defined population, interventions spanning universal,

☆ Research Support: This work was partially funded by the 2013 Academy for Eating Disorders Student Research Grant.
* Corresponding author at: Lantern, 589 Howard Street, 2nd Floor, San Francisco, CA 94105, USA.
E-mail address: drmegjones@gmail.com (M. Jones).

http://dx.doi.org/10.1016/j.invent.2015.10.004

targeted, and indicated prevention, with as-needed clinical referral, are needed.

Evaluation of prevention effects is typically done within a defined population and should target participants at key developmental periods associated with symptom onset and progression (e.g., adolescence and early adulthood). University-aged students are an ideal population for targeted and indicated prevention programs because adolescent and young adult females are at the highest risk for EDs and have a high prevalence of eating disorders (Eisenberg et al., 2011; Striegel-Moore et al., 2003). Universities face the challenge of serving the mental health needs of these students, and ED appropriate services are lacking at most universities (Eisenberg et al., 2012). Thus, evaluating the feasibility, acceptability, and effectiveness of an Internet-delivered intervention for reducing ED symptoms and preventing symptom progression is an important step toward closing the gap in access to effective mental health services. Evaluation of implementation in university settings also has high relevance for other educational and health care delivery systems, serving the preventive and treatment needs of a defined population.

Bauer and colleagues evaluated an Internet-based prevention and early intervention program (*Appetite for Life*) and publications to date describe a model of university-based, online screening and personalized stepped care Internet-delivered prevention, but to date have reported no results for ED prevention effects (Bauer et al., 2009; Lindenberg et al., 2011). Both the Bauer et al. and Lindenberg et al. papers report low adherence: 16.7% of all users used the monitoring module in the program and 20.5% of the users only used this feature once. The Bauer et al. model is similar to the *Healthy Body Image Program* (Jones et al., 2014), which also involves comprehensive online screening, targeted and indicated prevention, and referral. However, the interventions included in *Healthy Body Image Program* have a substantial evidence-base as described below.

Paxton et al. (2007) compared the effects of an Internet-based versus face-to-face cognitive-behavioral therapy (CBT) ED prevention program and found slightly favorable results for the face-to-face intervention (*Set Your Body Free*; Paxton et al., 2007). Stice et al. (2012) found no difference between a face-to-face, group-delivered, dissonance-based ED prevention program (*The Body Project*), and an Internet-based version of the same program (Stice et al., 2012). However, both the Paxton et al. and Stice et al. studies had small samples sizes and no definite conclusions can be drawn from these studies.

The *StudentBodies* programs are the most extensively studied Internet-delivered ED prevention programs. In the US, a randomized controlled trial with 480 women showed the *StudentBodies* program decreased the onset of clinical and subclinical EDs in participants with an elevated body mass index or those who reported compensatory behaviors at baseline (Taylor et al., 2006). Over the last decade, more than ten randomized controlled trials have been conducted on the *StudentBodies* prevention program and results consistently demonstrate moderate and sustained improvements in ED-related attitudes and behaviors among participants in the US and Germany (Beintner et al., 2012).

The most striking results for the potential efficacy of Internet interventions for ED indicated prevention and symptom reduction come from two studies conducted in Germany. The first study evaluated an Internet-delivered CBT-based program, *StudentBodies* + (*SB* +), with 126 women with ED symptoms (e.g., binge eating, vomiting, restrictive eating) and eating disorder not otherwise specified symptoms in a randomized controlled trial comparing *SB* + to waitlist control (Jacobi et al., 2012). At 6-month follow-up, *SB* + participation was associated with significant reductions in ED psychopathology, subjective and objective binges, and purging episodes but – at least for some outcomes – less effective for participants with restrictive eating (Völker et al., 2014). The second study, involving *StudentBodies-AN* (*SB-AN*), adapted *SB* + to target subclinical symptoms of anorexia nervosa (AN) (Ohlmer et al., 2013). *SB-AN* included more interactive support, such as individualized weekly feedback from a mental health specialist, and in the pilot study, yielded significant reductions in some ED symptoms.

Importantly, results from the two German studies using *SB* + and *SB-AN*, indicated high program engagement and adherence: 88.9% of all *SB-AN* participants completed some or all of the program and measures and the overall compliance rate for *SB* + was 66.2%. Given the strong evidence-base of the *SB* + and *SB-AN* programs and remarkably high adherence in *SB-AN*, this program was selected for evaluation with English-speaking participants and modified to broaden the scope to address all subclinical EDs (Ohlmer et al., 2013).

The present study builds upon previous research on *SB-AN* and *SB* + by creating an Internet-based program designed to help female college students reduce AN and bulimia nervosa (BN) symptom progression, reduce weight and shape concerns, enhance body image, promote healthy weight regulation, and increase knowledge about the risks associated with EDs. This pilot study provides insight regarding the feasibility and short-term efficacy of online, guided self-help programs.

2. Methods

2.1. Participants

Participants were selected based on positive screens for DSM-5 subclinical AN, BN, binge eating disorder (BED), or purging disorder. Inclusion criteria were: 1) females age 18–25 years, 2) access to a computer with an Internet connection, and 3) high weight and shape concerns (Weight Concerns Scale score > = 47). Individuals were included if they had subclinical ED symptoms. Those who screened positive for DSM-5 full-threshold AN, BN, or BED were offered a referral. Participants with current depression or who were currently in therapy to address their eating and body image concerns were also excluded from the study and provided a referral.

Although EDs affect a significant number of males and research is desperately needed on effective interventions for males at-risk for and with ED symptoms, this study was limited to female participants due to practical reasons. Specifically, the evidence-base for the *StudentBodies* programs has only been established for females, and this study sought to first adapt an already evidence-based intervention for a more symptomatic population before further adapting the intervention for males.

Participants were randomized to an intervention or waitlist control condition. Participants were recruited from a large private university in the United States and the surrounding communities. To detect a medium effect size on the Weight Concerns Scale and the Eating Disorders Examination–Questionnaire (EDE-Q), it was determined that 64 participants were needed. This estimated effect size is comparable to Jacobi et al., who found effect sizes of 0.40–0.84 with a sample size of 126.

2.2. Procedure

Participants were recruited through print and online advertisements, university list-serve emails, and classroom and dorm presentations. Residential education staff and student health services staff also directed students to the study. Additionally, students learned about the study through the Healthy Body Image Program, a comprehensive online eating disorders screening and prevention program for college students (Jones et al., 2014). Interested participants contacted the research coordinator via email and subsequently completed a brief online eligibility screen, including self-report height and weight measurements to determine body mass index (BMI) and the Weight Concerns Scale (Killen et al., 1994) to identify high-risk individuals. Eligible participants met in person with a research assistant to provide informed consent, completed self-report assessments, baseline interview (Eating Disorders Examination), and measure height and weight. Online assessments were administered through Qualtrics, an online survey software program licensed by the university. Participants were then randomized into the intervention or waitlist control group by random number

sequences generated by the study coordinator using Excel. Prior to starting the program, participants were asked to create a non-identifiable username and were given access to the password-protected online program.

The intervention group was offered the 10-week program immediately and the waitlist control group was offered the program after 10 weeks following completion of a second set of baseline measures to re-determine appropriateness of the intervention. Two months after the completion of the 10-week program, the participants were administered a "booster" session to support relapse prevention and maintenance of intervention effects. Study personnel and all related materials outlined guidelines regarding participation requirements and clearly stated that the online program was not designed to replace psychotherapy and information about available and appropriate services was provided to all participants.

All measures, except for demographics and the Eating Disorder Examination (EDE) were administered at baseline and 2.5 month post-intervention. The EDE, a structured interview, could not be administered at post-intervention because post intervention assessments were conducted online. Instead, a shortened self-report version, EDE-Questionnaire (EDE-Q) was administered at post-intervention.

2.3. Measures

At baseline, participants reported demographic information, including their age, year in school, ethnicity, mother and father's highest level of education, and current living situation. The EDE-Q, a self-report measure that provides frequency data on the past 28 days on key behavioral features of EDs was administered. This measure contains four subscale scores reflect the severity of symptoms: restraint, eating concerns, shape concerns, and weight concerns. It consists of 36 items and has been found to have good concurrent validity and acceptable criterion validity in community samples (Mond et al., 2004). The semi-structured interview version of this measure, the EDE, was also administered in order to assess the presence and frequency of objective binge eating (OBE), subjective binge eating (SBE), objective overeating (OOE), and compensatory behaviors. This measure was only utilized at the baseline time point in order to ensure participant eligibility (i.e., does not meet criteria for AN, BN, or BED). The EDE has been shown to have a satisfactory degree of internal consistency across all subscales (Cooper et al., 1989). The five-item Weight Concerns Scale (WCS), a self-report measure, was also used to measure participants' weight and shape concerns, a modifiable risk factor for ED onset. The WCS examines worry about weight and shape, fear of weight gain, dieting behavior, importance of weight, and feelings of fatness. The WCS has acceptable test-retest reliability ($a = .85$), adequate predictive validity, and a one-year stability of $r = .75$ (Killen et al., 1994). At all assessment points, participants provided self-report of their weight and height. Height and weight were converted to body mass index (BMI = weight kg/height m^2).

Depressive mood was assessed using the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D is a 20-item self-report scale designed to measure depressive symptomatology and has been shown to have good sensitivity, good specificity, and high internal consistency (Lewinsohn et al., 1997). The Clinical Impairment Assessment questionnaire (CIA), a 16-item self-report measure of the severity of psychosocial impairment due to ED symptoms, was also used to assess the following domains: mood and self-perception, cognitive functioning, interpersonal functioning, and work performance. The CIA has been found to demonstrate high levels of internal consistency, validity, reliability, and sensitivity to change (Bohn et al., 2008).

2.4. Program adherence, acceptability and feasibility

Adherence was measured as the number of pages viewed, eating behavior checklists completed, journal entries completed, and self-monitoring logs completed. Acceptability was assessed through qualitative survey feedback from participants, messages from participants, and feedback from intervention coaches. Feasibility was determined by examining the resources required to reach the participant recruitment target within the academic year, study drop-out, and support from the university administration to conduct the study collaboratively with student health services. The recruitment period of the current study lasted 16 months.

2.5. Risk management, internet privacy, and confidentiality procedures

During the screening process and throughout the program, participants who evidenced severe psychological distress or suicidality, as measured by a depression screen and participant comments submitted via the online program, were referred to emergency services, and the student health center for follow-up. Students who met criteria for a full-threshold ED at screening or endorsed severe ED symptoms during the course of the study were also referred to seek in-person treatment. Additionally, participants whose ED symptoms did not reduce by 50% (as compared to their baseline assessment) by the midpoint of the program (Session 5) were also given clinical referrals. Study personnel monitored participants several times per week, including progress in the program and postings to journals, eating behavior checklists, weight logs and the discussion board.

The technology partner, in conjunction with the participating university's school of medicine, hosted the program on a Health Insurance Portability and Accountability Act (HIPAA) compliant server, in order to ensure data security and privacy for all participants. Participants were required to create non-identifiable usernames and passwords in order to log into the password protected program and server. In order to protect confidentiality, participants were also assigned unique identification numbers for all assessment purposes.

All participant records were kept in locked filing cabinets or in encrypted, password-protected electronic spreadsheets on the research coordinator's computer, which met full electronic data management standards of the research institution. Participants were permitted to communicate with the research coordinator through email and were notified that email is not a secure medium. However, communication within the online program was secure due to the HIPAA compliant and password protected online platform. Email correspondence is not included in any statistical analyses.

2.6. Intervention

StudentBodies-Eating Disorders (*SB-ED*) is a structured cognitive-behavioral online program supported by an online, asynchronous, moderated discussion group and text-based coaching. *SB-ED* consists of 10 weekly sessions and includes activities such as self-monitoring logs and journal entries. All activities were reviewed by coaches and addressed in weekly, individualized feedback to the participant. The program also includes a moderated, anonymous discussion board, which gives participants the opportunity to provide support to one another and share their experiences. A booster session was offered two months after the last session was completed to support maintenance of intervention changes and prevent symptom recurrence.

The program was adapted from previous versions of *SB* shown to reduce ED risk factors and prevent the onset of EDs in high-risk groups in the US and Germany (Taylor et al., 2006). For this study, the program content was translated from the German versions of *SB-AN* and *SB+* and adapted to include culturally appropriate examples and generalized to address not only restrictive eating behaviors, but also bulimic and compensatory behaviors. These clinical content changes were made according to Fairburn's *Cognitive Behavior Therapy and Eating Disorders* treatment manual (Fairburn, 2008), thus integrating existing *SB* content with clinically-relevant material and updated CBT theory and techniques. Table 1 provides an overview of the weekly topics covered in

Table 1
Sessions themes.

Session	Topic
0	*Introduction*: Introduction to program, discussion board, coach messaging and feedback, program format and timeline.
1	*Introduction to Self-Monitoring, Regular Eating and Motivation*: Regular eating, self-monitoring of daily eating, compensatory and exercise behaviors, and weekly weight journal. Goal setting and motivational enhancement.
2	*Eating Disorders and Compensatory Behaviors*: EDs and compensatory behaviors psychoeducation and CBT model.
3–4	*Binge and Restrictive Eating, and Mood and Food*: Triggers and consequences of binge and restrictive eating, identifying automatic thoughts.
5–6	*Nutrition, Self-Esteem, and Personality*: Healthy eating habits, components of self-esteem, and the influence of perfectionistic thinking on disordered eating.
7	*Unhealthy Weight Loss Methods and Body Image*: Unhealthy dieting, forbidden foods identification and exposure planning, negative body image, and food myths. Exercises to improve body image.
8	*Exercise and Interpersonal Skills*: Healthy exercise habits, effective interpersonal skills, and managing negative emotions.
9	*Mindfulness and Unconditional Acceptance*: Mindful eating, relationship between painful emotions and disordered eating behaviors, coping with painful emotions.
10	*Review*: Summary of intervention topics and preparing for maintenance.
11	*Relapse Prevention and Maintenance of Change*: Strategies to maintaining changes, cope effectively with future challenges, and prevent relapse.

each session. Table 2 provides an outline of the intervention components of the program and their purposes.

2.7. Coach training and dashboard

Coaches for this program, clinical psychology doctoral students, participated in a 2-session training on CBT for EDs, motivational interviewing, and coaching techniques, followed by ongoing weekly group supervision by a licensed psychologist. The coach dashboard, a clinical management tool created to streamline the coaching process, provided an outline of participant progress, including the last time a participant logged into the program, the participant's current session, and each participant's submitted eating behavior checklists, self-monitoring logs, and journal entries. Coaches and participants could flag inappropriate or concerning content in the discussion board, and these posts were then displayed in the coach dashboard. From this page, coaches could also choose to delete the discussion board post or message the participant who posted it.

Table 2
Intervention components.

Intervention components	Purpose	Example
Psychoeducational Readings	Increase knowledge	See Table 1 for topics.
Eating behavior checklist	Behavior modification	Daily monitoring of meals, restricted meals, snacks, avoided foods, binges, and compensatory behaviors
Weight log	Behavior modification	Enter weight in pounds
Exercise log	Behavior modification	Daily monitoring of type and duration of physical activity
Self-monitoring log	Behavior modification, cognitive restructuring	Identification of automatic thoughts and support for cognitive restructuring
Journal entries	Increase awareness of thoughts/emotions	e.g., "*What are the pros and cons of changing your eating behaviors*?"
Goal Setting	Motivation, behavior modification	e.g., "*What is your specific body image goal*?"
Asynchronous discussion board	Social support, problem solving	Discussion threads and weekly themes posted by coaches
Coaching	Support and guidance	In-person 30 minute motivational interview at baseline, weekly feedback, and as-needed messaging

Coaches provided individualized weekly feedback to participants using a pre-programmed library of templates. Words in the template highlighted in yellow indicated content that coaches needed to individualize for each participant by paraphrasing the participants' submitted entries. Yellow highlighted text also indicated conditional text that the coaches included depending on the actions of the participant in the session (i.e., "If the goal is not specific/manageable…" or "If the participant did not complete the exercise…"). Words underlined and in red font indicated the topic of the activity or content, which helped the coach locate the submitted data on the coach dashboard. Coaches were instructed to provide feedback within one week of the participant completing a given session.

Coaches were incorporated in an attempt to make the intervention more personal and to address issues, such as misunderstandings related to program content, treatment rationale rational and adherence problems, and identify the deterioration of symptoms. Given the literature recommends using uniform terminology to define negative effects, the current study used the definitions outlined by Rozental et al. (2014) for the following items: deterioration, adverse events, severe adverse events, novel symptoms, dropout, nonresponse, and unwanted events. In the present study, these negative effects were monitored by reviewing pre-post scores of the two primary measures (EDE-Q and WCS), data derived from the consort diagram, and review of participants' self-report of experience via submitted journal entries and text messages with coaches.

2.8. Statistical analyses

Electronic data was downloaded from Qualtrics (online survey software) and analysed using the Statistical Package for the Social Sciences (SPSS for Mac, version 21.0). All statistical tests were two-tailed to allow for the detection of positive and negative changes, and given the pilot, hypothesis-generating nature of this study, the significance level was set to alpha = .05 and not adjusted for multiple comparisons. Furthermore, it has been suggested that effect sizes rather than *p*-values should be the primary focus of interest in such hypothesis-generating studies (Kraemer et al., 2002), and thus effect sizes are presented for both significant (alpha < .05) and non-significant findings. An independent-samples t-test was conducted to compare change in mean scores in normally distributed, continuous measures (and effect sizes are presented for the magnitude of the difference in change between conditions). The data was also analysed using an intention-to-treat (ITT) analysis. Under the ITT model, all randomized participants in the treatment and waitlist-control group were included in the analysis. Missing data (e.g., for participants who did not complete follow-up assessments) was imputed using multiple imputations, specifying five iterations, based upon fully conditional Markov chain Monte Carlo modeling (Schafer, 1997; including baseline data and study condition as predictor variables used for imputing missing values).

3. Results

3.1. Screening and randomization

Participant flow is described in Fig. 1. A total of 65 participants were randomized and 41 participants (63% of randomized) completed pre-post assessments (intervention = 14, waitlist control = 27) and were included in the main study analyses.

With regard to baseline demographics (participants were allowed to choose all applicable races and ethnicities), 23 participants (56.1%)

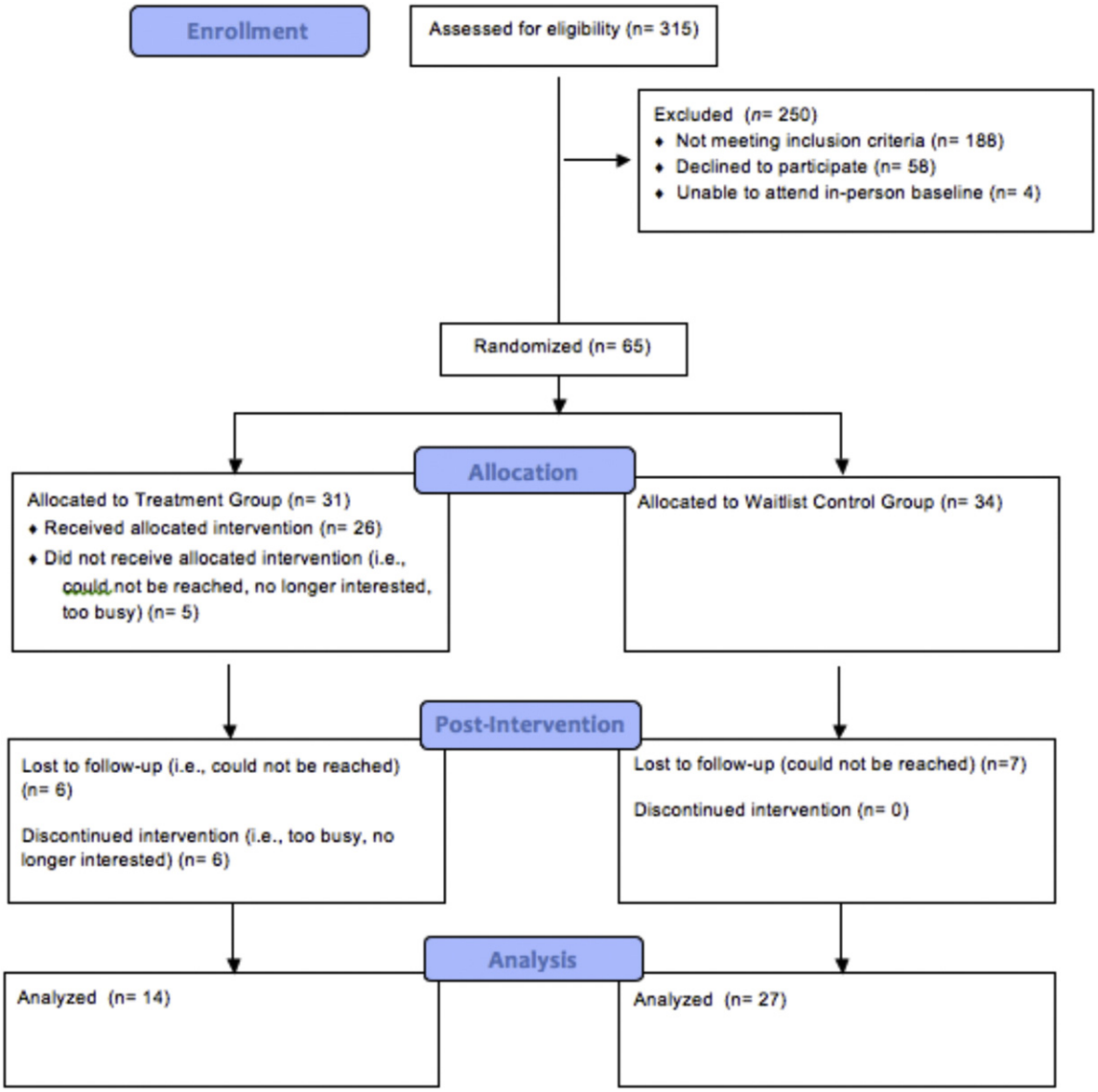

Fig. 1. Participant flow.

Table 3
Primary and secondary outcomes.

	Treatment ($n = 14$)				Waitlist control ($n = 27$)				t	Cohen's d
	Baseline		Post-intervention		Baseline		Post-intervention			
	M	SD	M	SD	M	SD	M	SD		
EDE-Q										
Global score	2.3	.9	1.4	.7	2.6	1.0	2.6	1.0	4.6***	1.52
Eating concern	1.5	.9	.8	.7	1.4	1.2	1.4	1.1	2.9**	.99
Weight concern	2.9	1.1	1.8	.8	3.3	1.3	3.3	1.3	4.4***	1.38
Shape concern	2.5	1.2	1.7	1.0	3.0	1.1	2.9	1.3	2.9**	.95
Restraint	2.2	1.3	1.2	.8	2.5	1.2	2.7	1.1	3.1**	1.01
Loss of control	6.4	6.8	2.1	3.7	4.4	6.7	4.4	6.7	2.4*	.77
Binge-eating episodes in past month	3.1	4.6	1.6	2.4	2.6	6.7	2.5	5.9	1.2	.37
WCS	61.5	14.2	46.3	12.8	67.4	14.6	64.0	15.2	2.2*	.71
CIA	14.9	9.1	7.7	5.2	15.2	8.9	12.6	8.0	2.2*	.70
CES-D	18.3	5.0	14.1	3.9	16.3	5.9	14.8	5.2	1.5	.54

* $p < .05$.
** $p < .01$.
*** $p < .001$.

identified as White/Caucasian, 8 (19.5%) as Chinese, 4 (9.8%) as African American/Black, 4 (9.8%), as Japanese, 3 (7.3%) as Latino/Hispanic, 2 (4.9%) as Asian Indian, 2 (4.9%) as Mexican-American, 1 (2.4%) as Korean, 1 (2.4%) as Pacific Islander, 1 (2.4%) Vietnamese, and 5 (12.2%) as Other (Arab, Middle Eastern, Mien, and Tibetan). While this sample includes a wide spread of ethnic backgrounds, this is not a nationally representative sample. Additionally, 30 participants (73.2%) identified as undergraduates, while 8 (19.5%) identified as graduate students and professionals. All participants were female, as dictated by the eligibility criteria, and the age ranged from 18–25 years. The majority of the participants also lived in a dorm on campus (30; 73.2%). On average, participants in the intervention group had a BMI of 24.1 kg/m^2, a WCS Score of 59.5 (i.e., high body image concern), and an EDE-Q Global score of 2.1. Meanwhile, participants in the waitlist control group had an average BMI of 25.2 kg/m^2, a WCS Score of 67.5, and an EDE-Q Global score of 2.5. There were statistically significant differences at baseline between intervention and control participants on the EDE-Q Global, EDE-Q Restraint, and WCS (*ps* < .05) (with the control participants reporting higher levels) but not on any other baseline measures or demographic characteristics.

3.2. Primary analyses

A summary of the results can be found in Table 3.

In assessing changes in eating disorder psychopathology, the EDE-Q Global Score demonstrated a significant difference in pre-post change in mean scores between the intervention group (M = −0.9, SD = 0.6) and the waitlist control group (M = 0.06, SD = 0.6); t(38) = 4.6, p < 0.01), with a large effect size (Cohen's d = 1.52). This difference was found across all EDE-Q subscales (Table 3). In evaluating weight and shape concerns, an independent-samples t-test compared change in pre-post WCS scores between the intervention group and waitlist control group and indicated a significant difference in pre-post change in mean scores between the intervention group (M = −15.2, SD = 18.2) and waitlist control group (M = −4.0, SD = 13.1); t(38) = 2.2, p < 0.05, with a medium to large effect size (Cohen's d = 0.71).

With regard to binge eating, results indicated a significant difference in pre-post change in mean scores for the number of days experiencing a loss of control between the intervention group (M = −4.3, SD = 5.6) and waitlist control group (M = −0.2, SD = 5.0); t(38) = 2.4, p < 0.05, with a large effect size (Cohen's d = 0.77). However, an independent-samples t-test did not yield a significant difference in pre-post change in mean scores for the number of days experienced binge-eating episodes between the intervention group (M = −1.4, SD = 3.7) and waitlist control group (M = −.2, SD = 2.7); t(38) = 1.2, ns (Cohen's d = 0.37).

3.3. Secondary analyses

On the CIA, a measure of psychosocial impairment, there was a significant difference in pre-post change in means scores between the intervention group (M = −7.2, SD = 7.8) and waitlist control group (M = −2.5, SD = 5.4); t(37) = 2.2, p < 0.05, with a medium to large effect size (Cohen's d = .70). Meanwhile, on the CES-D, a measure of depression, there was no significant difference in pre-post change in means scores between the intervention group (M = −4.3, SD = 6.5) and waitlist control group (M = −1.4, SD = 3.7); t(17.9) = 1.5, ns (Cohen's d = 0.54). Of note, the mean CES-D for the sample as a whole was 17.0 (SD = 5.7). A CES-D of 16 or greater is indicative of being at risk for clinical depression (Lewinsohn et al., 1997), suggesting that at least half the sample had depression symptoms in the clinical range.

3.4. Complete-case v. intention-to-treat analysis

Contrary to the complete-case analyses, results of the ITT analyses of independent samples t-tests on the pooled imputed data did not yield significant results for any of the outcome variables. See Table 4 for a summary of these results using the ITT analysis model.

3.5. Program adherence and acceptability

On average, the participants in the intervention group who used the online program opened 68.6% of the pages (total: 283, M = 194.1, SD = 104.2, range: 32–283), completed 58.1% of the journal entries (total: 218, M = 126.6 SD = 69.7, range: 0–199), filled out 67.9% of the self-monitoring logs (total: 6, M = 4.1, SD = 3.0, range: 0–7), and completed 53.1% of the recommended 70 eating behavior checklists (M = 37.2, SD = 28.1, range: 0–80). Participants reported several reasons for not using the online program, including: loss of interest, too busy, and technical problems. Linear regression models were conducted to explore the relationship between the four program adherence measures (total pages viewed, total eating behavior checklists completed, total journal entries completed, and total self-monitoring logs completed) and the primary outcome variables (WCS, EDE-Q). The models did not yield any significant relationships.

Acceptability was assessed through qualitative survey feedback and in-program messages from participants. Table 5 highlights participant quotations describing feedback about the program.

4. Discussion

The current study examined an Internet-based program designed to help female college students reduce AN and BN symptom progression,

Table 4
Intention-to-treat analysis: primary and secondary outcomes.

	Treatment (n = 31)				Waitlist control (n = 34)				t	Cohen's d
	Baseline		Post-treatment		Baseline		Post-treatment			
	M	SD	M	SD	M	SD	M	SD		
EDE-Q										
Global score	2.1	.9	1.9	.7	2.5	.9	2.6	.9	.9	.22
Eating concern	1.3	.8	1.2	.7	1.5	1.1	1.4	1.0	-.3	-.08
Weight concern	2.8	1.1	2.4	.8	3.2	1.2	3.3	1.2	1.7	.45
Shape concern	2.3	1.2	2.2	.9	2.9	1.1	2.9	1.1	.6	.15
Restraint	1.9	1.2	1.8	.9	2.6	1.1	2.7	1.0	.6	.17
Loss of control	4.9	6.8	3.2	3.2	4.4	6.2	4.4	6.0	1.1	.29
Binge-eating episodes	3.0	5.4	1.9	2.1	2.6	6.3	2.4	5.2	.8	.20
WCS	59.5	15.3	54.1	16.5	67.5	14.1	64.8	14.7	.7	.17
CIA	12.6	7.6	10.7	4.9	15.1	8.1	12.7	7.0	-.3	-.08
CES-D	16.4	5.6	16.4	3.6	16.5	5.5	16.2	4.7	-.2	-.06

Table 5
Participant feedback about program.

Positive feedback	Areas for improvement
"I just want to say how grateful I am that this program exists. Five months ago, if you had told me that I would stop bingeing, lose my restrictive eating habits, and start exercising for pleasure (rather than weight loss), I wouldn't have believed you. Now, I have a tool kit that allows me to deal with a range of eating behaviors and scenarios."	"I noticed a lot of small bugs in the functionality of the program–forms not working properly, things not saving correctly, stuff like that."
"I liked that it was self-paced, and very positive. I learned to do more self-reflection, to be kinder to myself, and about mindfulness."	"One thing that I would see as an improvement is allowing participants to save their work in a session in case they don't finish in one sitting. I know that at least in my case, it was difficult to find a solid block of time to complete the entire session so I wanted to save my work and come back to it later but I couldn't."
"Student Bodies was really great. It helped me to not only think better about my image, but think about the far-reaching and long-term consequences of maintaining an unhealthy relationship with my body and food."	"Because the program was tailored to everyone, there was a lot of wasted time spent on issues I didn't have, like anorexia or bulimia, etc. I wonder if it would be possible to tailor programs in the future."

reduce weight and shape concerns, enhance body image, promote healthy weight regulation, and increase knowledge about the risks associated with EDs. In our sample, ED symptoms decreased significantly in the participants who completed the program compared to a waitlist control. However, almost half the treatment subjects failed to complete the program and there were no differences between the groups on the primary measures for the ITT analyses.

4.1. ED Psychopathology

Using the complete-case analysis method, treatment participants' scores on the EDE-Q Global scores, all EDE-Q subscales, and WCS decreased significantly from baseline to post-intervention, as compared to those in the waitlist-control group. These results suggest that intervention participants experienced greater reductions in ED-related attitudes and concerns regarding their weight and shape as compared to their waitlist control counterparts. However, the ITT analyses, with missing data imputed using multiple imputation, did not yield significant results for any of the outcome variables. It is possible that the high dropout rate across study condition (37%) and small sample size made these results unstable. Indeed, it has been suggested that multiple imputation may not perform well as the percent of missing data approaches 50% (Graham et al., 2007). As such, the ITT results are difficult to interpret.

The complete-case results of this study are comparable to results from earlier versions of *SB* for different target groups ranging from low-symptomatic to high-symptomatic. The mean baseline WCS scores of our intervention and control groups, 59.5 and 67.5 respectively, were comparable to those in other ED preventive interventions. In the original *SB* study, participants, who were women without ED symptoms but who had high weight and shape concern, in the intervention group reported greater reduction in weight and shape concerns as compared to their control group counterparts (Killen et al., 1994). Taylor et al. (2006) also produced significant reductions in weight and shape concerns for participants with high weight and shape concerns utilizing an 8-week version of *SB*. In *StudentBodies+* (*SB+*), a program specifically designed for women with subclinical BN and eating disorder not otherwise specified symptoms, treatment participants also reported similar reductions in ED-related attitudes and associated psychopathology. Furthermore, *SB-AN* yielded results indicating significant reductions on many of the ED-related attitude measures and associated psychopathology (Ohlmer et al., 2013). These studies, including participants with ED symptoms, also demonstrated significant impacts on ED behaviors. For *SB-AN*, 50% of participants who endorsed engaging in binge-eating episodes did not report this behavior at follow-up and for *SB+*, researchers found a 67% greater reduction in objective and subjective binge eating episodes, a 86% greater reduction in purge episodes and a 58% greater reduction in onset of full or subclinical EDs in the intervention group compared to waitlist control participants. While the current pilot study did demonstrate a significant reduction in loss of control over eating, it did not have an impact on total binge eating episodes. However, it should be noted that participants in this study who met DSM-5 criteria for BN or BED were not included and referred for treatment.

As compared to a 2012 meta-analysis of 990 female high school and college students participating in *SB* trials, the current study also yielded larger effect sizes on several ED-related attitudes, including restraint and avoidance over eating, preoccupation with food, fear of losing control over eating and preoccupation with shape or weight (Beintner et al., 2012). The larger effect sizes of the current study may be due to the highly interactive features of the program and the more symptomatic group of participants. However, the drop-out rates were higher in this study than in those reported by Beintner which might have resulted in higher effect sizes (Beintner et al., 2014). These researchers found that Internet-based interventions (versus CD-ROM and bibliotherapy), guided self-help programs, multisession programs and guidance provided by mental health specialists (versus nurse or general practitioner) predicted greater reductions in ED related attitudes and concerns about weight and shape, and all of these features are present in the current program (Beintner et al., 2014).

4.2. Associated psychopathology

Our complete-case results indicated a significant decrease in pre-post change in mean scores in overall psychosocial impairment with a medium to large effect size for the intervention group as compared to the waitlist-control group, who did not use the online program. As individuals with EDs often experience psychosocial consequences such as low self-esteem, depression, worthlessness, hopelessness, and mood swings, improving ED symptoms may also affect associated psychopathology (Massey-Stokes, 2009).

With regard to associated depressive symptoms, the current study did not yield significant pre-post change in mean scores between participants who used the online program and participants who did not use it, with both groups beginning the study with baseline depressive symptoms in the clinically significant range. This finding is similar to that of Taylor et al., which also did not detect significant pre-post changes on the CES-D among participants with high weight and shape concerns (Taylor et al., 2006). However, some studies have shown significant changes, but only small to medium effect sizes for self-reported depressive symptoms (Jones et al., 2014; Ohlmer et al., 2013). A 2014 review of e-therapies for anxiety and depression concluded that in computerized CBT programs, the amount of therapist input given is an important feature that likely affects outcome (Loucas et al., 2014). While the current study did include feedback/input from coaches, the majority of the feedback focused on ED-related pathology, rather than depressive symptoms. If coaches included more feedback/input on a participant's depressive symptoms, perhaps these symptoms may have been impacted. Depressive symptoms also were not a focus of the psychoeducational or self-monitoring aspects of the program. Whether or not to make these changes in future iterations of the program is debatable, because depressive symptoms, including hopelessness and impaired concentration, may make it difficult to engage in treatment at all (Fairburn, 2008). For participants with semi-independent clinical depression, the depression should be treated before the ED. In future studies, it may be beneficial to have markedly depressed participants first

address their depression prior to starting the program — either though outside services or by creating an additional online CBT module that specifically aims to improve mood.

4.3. Negative effects

Recently, Internet interventions experts have called for more accurate detection and reporting of negative effects (Rozental et al., 2014). Of note, negative effects, which include negative outcomes, reflect a "significant" decline in some aspects of therapy and an effect not necessarily related to therapy. In the current study, deterioration was monitored by comparing the pre-post scores of the two main outcome measures. Of the 14 participants in the treatment condition included in the complete-case analysis, three showed some deterioration in WCS scores, while one participant (not mutually exclusive) demonstrated deterioration in her EDE-Q Global score. Reviews of participants' journal entries and text conversations between participants and coaches also revealed that participants described some of the following that could be considered negative effects: 1) feeling more preoccupied by and self-conscious of food intake, exercise habits and body image after being asked to keep a meal log and weigh themselves on a weekly basis 2) novel symptoms such as increased stress and anxiety to sharing their thoughts, emotions and experiences with their coaches and other participants on the discussion board and 3) unwanted events such as feeling frustrated and discouraged when encountering technical issues that caused participants to lose data or prevent access to the program. However, some of these could also be considered positive aspects of the program.

In future studies, some of these issues might be addressed in a preventative manner. For instance, psycho-education on the likelihood of these effects occurring and CBT techniques to combat these effects could help prevent or ameliorate them. Additionally, coaches could be trained to identify and proactively discuss these negative effects with participants. In order to combat these concerns, program content and coach messages could be improved to help participants outline realistic expectations of treatment progress. Continued review of the literature should occur to ensure program content is derived from evidence based treatments to avoid deficient treatment.

Regarding dropout, our program dropout rate, 55%, while high, is comparable to face-to-face outpatient ED trials, which have a mean dropout rate of 29–73% (Fassino et al., 2009). It is possible that the selected population in this study is more similar to individuals seeking face-to-face treatment than the previous versions of *SB*. Dropout rates from internet interventions for psychological disorders have been shown to range from 2% to 83% (Melville et al., 2010). Nevertheless, programs need to be developed to identify early drop-outs and provide strategies to reduce this.

Coach factors may also have played contributed to negative effects, given therapist factors in face-to-face treatment has been shown to be a significant predictor of outcome (Del Re et al., 2012). However, research on this subject is inconclusive at this time, as both positive and negative effects of guided self-help programs have been documented (Rozental et al., 2014). Further feedback could have been elicited from both participants and coaches on the quality of their relationship to help shed light on this matter.

4.4. Program adherence and acceptability

On average, the participants in the intervention group who used the online program opened 68.6% of the pages, completed 58.1% of the journal entries, 67.9% of the self-monitoring logs, and 53.1% of the recommended 70 eating behavior checklists. In *SB-AN*, adherence rates were roughly comparable, as participants completed 88.0% of the sessions, 46.7% of journal entries, 13.3% of the self-monitoring logs, and 55.0% of the checklists. Technological limitations prohibited researchers from gathering data on the specific pages and program content that participants accessed. Future studies should collect and analyse this data to further improve adherence rates.

In the current study, none of the adherence measures (total pages viewed, total eating behavior checklists completed, total journal entries completed, and total self-monitoring logs completed) were correlated with the primary outcome variables (WCS, EDE-Q). This suggests that program adherence is not associated with treatment effectiveness. Essentially, "program exposure" or merely adhering to the program may not lead to change, but interacting with and understanding the content may produce results. Consequently, there may not be a relationship between program adherence and treatment outcomes. The authors also noted that adherence correlated with outcomes differed based on the type of outcome measures. While the number of logins was best correlated with physical outcomes, module completion was best correlated for psychological outcomes. Perhaps this sheds light on the current study's lack of significant correlation between adherence rates and outcome, as EDs are complex and involve both physical (i.e., exercise, eating habits, compensatory behaviors) and psychological outcomes (i.e., eating-related psychopathology, weight and shape concerns).

Regarding acceptability, participant quotations highlighted that they learned helpful tools to improve their body image and develop healthier eating habits, and they appreciated the self-paced nature of the program. With respect to improvements, participants primarily commented on technical issues, such as difficulty accessing certain portions of the program or inability to save their work. Even though technical problems were outside the control of the research team, further testing prior to program launch could be done to target these bugs. It should also be noted that coaches provided informal feedback throughout the course of the study, especially regarding usability of the coach dashboard and other technical features. In future studies, more quantitative feedback should be collected from both participants and coaches in order to better understand which specific portions of the content were most helpful and technical features that could improve ease of usage.

4.5. Limitations

Despite demonstrating the potential efficacy of *SB-ED*, limitations include the pilot nature of the study and small sample size (thus limiting our ability to correct for multiple comparisons), low adherence, and high dropout rates, thus limiting generalizability. Implementing motivational techniques throughout and prior to starting the program may improve engagement. Providing verbal feedback sessions by phone could also be an opportunity to reinforce participants' goals, progress and motivation for continuing the program. Dropout rates may be explained by a long screening process, differences in moderation between *SB-ED* and *SB-AN*, and technical problems (e.g., inability to access sessions or save journal entries). The length of time between the participant first expressing interest in the study and starting the program ranged from several days to several weeks. Shortening and automating the screening process, such as having a computer calculate screen results and automatically notify participants of their eligibility, may be beneficial. Furthermore, no additional probing of negative effects was conducted. Per recent expert recommendation, query about negative effects is advisable in future research.

The debate regarding the effectiveness of Internet interventions versus in-person treatment in treating eating disorders is ongoing. A recent meta-analysis on this subject yielded inconclusive results because despite support for a handful of Internet interventions that demonstrated reductions in eating disorder related symptoms, the evidence base is too small (Loucas et al., 2014). Furthermore, the format and delivery mode of Internet interventions greatly differ (i.e., guided versus unguided programs, computer based versus smart phone app based applications), and there is not enough research to firmly conclude which characteristics may positively impact the effectiveness of a program. Continued research is recommended in order to shed more light on the strengths and shortcomings of Internet interventions.

Generalizability of findings to the greater population was also compromised as the sample only consisted of female students of traditional college-age. The online program was designed to target college students due to the prior findings that ED prevalence among female college students are high, ranging from 8% to 17% (Hoerr et al., 2002; Striegel-Moore et al., 2003) and CBT for ED programs require more complex cognitive skills, which develop during adolescence and early adulthood. Future research should focus on programs tailored towards males (ED prevalence rates range from 0.33–2%;) (Hudson et al., 2007), athletes, LGBTQ students, and transgender students, as these populations all present unique problems associated with EDs.

4.6. Implications and future directions

The results of this pilot study suggest that *SB-ED* may be effective in reducing ED psychopathology and weight and shape concerns among female college-age students with subclinical EDs. While the study could be improved with a larger sample size and follow-up measures to assess the long-term effects of the online program, this study has significantly contributed to the growing research on the prevention and early intervention of EDs.

With the support of a NIMH-funded R01 grant, an updated version of *SB-ED* is currently being evaluated at 28 universities. In addition to the computer version of the program, researchers will work with a technology company to develop a smartphone app version of the program, an update which may improve participant engagement and reduce dropout due to ease of use and user preference. As adherence and dropout rates can impact intervention outcomes and prior research has indicated that multisession programs have better outcomes than single session programs, transforming weekly sessions into daily sessions may also improve outcome and adherence rates (Beintner et al., 2014). Other possible improvements that have been shown to predict treatment outcome, include incorporating video feedback to mimic the effectiveness of face-to-face guidance (Beintner et al., 2014), increasing motivation levels pre-intervention (Clausen et al., 2013), and developing "flags" to help supervisors and coaches monitor participant behavior more efficiently. The coach dashboard was pivotal in streamlining moderation and care, and supporting the scalability and effectiveness of the program. Future studies of online interventions like *SB* should provide a close examination of the financial costs of the program (e.g., technology programmers, licensed clinical psychologists and graduate student coaches) compared to face-to-face therapy in terms of operation and moderation costs in order to shed light on the possible advantages and benefits of innovative technological interventions as compared to existing mental health resources. Innovative, cost-effective prevention and early intervention programs are critical to treating EDs and eliminating associated medical, psychological, and economic consequences. Preliminary data suggests the potential efficacy of *SB-ED* as a prevention and early intervention program that can be easily implemented on college campuses and can increase accessibility of effective resources to students in need. It has the potential to help college campuses across the nation combat the high rates of EDs and other associated psychopathology to achieve a healthier student body.

Acknowledgments

This work was partially funded by the 2013 Academy for Eating Disorders Student Research Grant. The authors wish to thank the following colleagues and research assistants for their support and work: Ricarda Ohlmer, Mickey Trockel, Salena Schapp, Melody Liu, Katharine Ann Foley-Saldeña, Alexandra DeGrange, Katherine Taylor Lynch, and Hannah Neumann.

References

Agras, W.S., 2001. The consequences and costs of the eating disorders. Psychiatr. Clin. N. Am. http://dx.doi.org/10.1016/S0193-953X(05)70232-X.

Bauer, S., Moessner, M., Wolf, M., Haug, S., Kordy, H., 2009. ES[S]PRIT — an Internet-based programme for the prevention and early intervention of eating disorders in college students. Br. J. Guid. Couns. http://dx.doi.org/10.1080/03069880902957049.

Beintner, I., Jacobi, C., Schmidt, U.H., 2014. Participation and outcome in manualized self-help for bulimia nervosa and binge eating disorder — a systematic review and metaregression analysis. Clin. Psychol. Rev. http://dx.doi.org/10.1016/j.cpr.2014.01.003.

Beintner, I., Jacobi, C., Taylor, C.B., 2012. Effects of an Internet-based prevention programme for eating disorders in the USA and Germany—a meta-analytic review. Eur. Eat. Disord. Rev. 20 (1), 1–8. http://dx.doi.org/10.1002/erv.1130.

Bohn, K., Doll, H.A., Cooper, Z., O'Connor, M., Palmer, R.L., Fairburn, C.G., 2008. The measurement of impairment due to eating disorder psychopathology. Behav. Res. Ther. 46 (10), 1105–1110. http://dx.doi.org/10.1016/j.brat.2008.06.012.

Ciao, A.C., Loth, K., Neumark-Sztainer, D., 2014. Preventing eating disorder pathology: Common and unique features of successful eating disorders preven. Curr. Psychiatry Rep. http://dx.doi.org/10.1007/s11920-014-0453-0.

Clausen, L., Lubeck, M., Jones, A., 2013. Motivation to change in the eating disorders: a systematic review. Int. J. Eat. Disord. 46 (8), 755–763.

Cooper, Z., Cooper, P.J., Fairburn, C.G., 1989. The validity of the eating disorder examination and its subscales. Br. J. Psychiatry 154 (JUN.), 807–812. http://dx.doi.org/10.1192/bjp.154.6.807.

Del Re, A.C., Fluckiger, C., Horvath, A.O., Symonds, D., Wampold, B.E., 2012. Therapist effects in the therapeutic alliance–outcome relationship: a restricted-maximum likelihood meta-analysis. Clin. Psychol. Rev. 32, 642–649.

Eisenberg, D., Hunt, J., Speer, N., 2012. Help seeking for mental health on college campuses: review of evidence and next steps for research and practice. Harv. Rev. Psychiatry 20 (4), 222–232. http://dx.doi.org/10.3109/10673229.2012.712839.

Eisenberg, D., Nicklett, E.J., Roeder, K., Kirz, N.E., 2011. Eating disorder Symptoms among college students: prevalence, persistence, correlates, and treatment-seeking. J. Am. Coll. Heal. http://dx.doi.org/10.1080/07448481.2010.546461.

Fairburn, C.G., 2008. Cognitive behavior therapy and eating disorders. Cognitive Behavior Therapy and Eating Disorders (Retrieved from http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc5&NEWS=N&AN=2008-07785-000).

Fassino, S., Pierò, A., Tomba, E., Abbate-Daga, G., 2009. Factors associated with dropout from treatment for eating disorders: a comprehensive literature review. BMC Psychiatry 9, 67. http://dx.doi.org/10.1186/1471-244X-9-67.

Field, A.E., Camargo, C.A., Taylor, C.B., Berkey, C.S., Colditz, G.A., 1999. Relation of peer and media influences to the development of purging behaviors among preadolescent and adolescent girls. Arch. Pediatr. Adolesc. Med. 153 (11), 1184–1189.

Graham, J.W., Olchowski, A.E., Gilreath, T.D., 2007. How many imputations are really needed? Some practical clarifications of multiple imputation theory. Prev. Sci. 8, 206–213. http://dx.doi.org/10.1007/s11121-007-0070-9.

Hoerr, S.L., Bokram, R., Lugo, B., Bivins, T., Keast, D.R., 2002. Risk for disordered eating relates to both gender and ethnicity for college students. J. Am. Coll. Nutr. 21 (4), 307–314. http://dx.doi.org/10.1080/07315724.2002.10719228.

Hudson, J., Hiripi, E., Jr, H.P., Kessler, R., 2007. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. Biol. Psychiatry 61 (3), 348–358. http://dx.doi.org/10.1016/j.biopsych.2006.03.040.

Jacobi, C., Fittig, E., Bryson, S.W., Wilfley, D., Kraemer, H.C., Taylor, C.B., 2011. Who is really at risk? Identifying risk factors for subthreshold and full syndrome eating disorders in a high-risk sample. Psychol. Med. 41 (9), 1939–1949. http://dx.doi.org/10.1017/S0033291710002631.

Jacobi, C., Völker, U., Trockel, M.T., Taylor, C.B., 2012. Effects of an Internet-based intervention for subthreshold eating disorders: a randomized controlled trial. Behav. Res. Ther. 50 (2), 93–99. http://dx.doi.org/10.1016/j.brat.2011.09.013.

Jones, M., Kass, A.E., Trockel, M., Glass, A.I., Wilfley, D.E., Taylor, C.B., 2014. A population-wide screening and tailored intervention platform for eating disorders on college campuses: the healthy body image program. J. Am. Coll. Heal. 62 (5), 351–356. http://dx.doi.org/10.1080/07448481.2014.901330.

Killen, J.D., Taylor, C.B., Hayward, C., Haydel, K.F., Wilson, D.M., Hammer, L., Kraemer, H., Blair-Greiner, A., Strachowski, D., 1996. Weight concerns influence the development of eating disorders: a 4-year prospective study. J. Consult. Clin. Psychol. 64 (5), 936–940. http://dx.doi.org/10.1037/0022-006X.64.5.936.

Killen, J.D., Taylor, C.B., Hayward, C., Wilson, D.M., Haydel, K.F., Hammer, L.D., Simmonds, B., Robinson, T., Litt, I., Varady, A., 1994. Pursuit of thinness and onset of eating disorder symptoms in a community sample of adolescent girls: a three-year prospective analysis. Int. J. Eat. Disord. 16 (3), 227–238. http://dx.doi.org/10.1002/1098-108X(199411)16:3<227::AID-EAT2260160303>3.0.CO;2-L.

Kraemer, H.C., Wilson, G.T., Fairburn, C.G., Agras, W.S., 2002. Mediators and moderators of treatment effects in randomized clinical trials. Arch. Gen. Psychiatry 59, 877–883. http://dx.doi.org/10.1001/archpsyc.59.10.877.

Lewinsohn, P.M., Seeley, J.R., Roberts, R.E., Allen, N.B., 1997. Center for Epidemiologic Studies Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. Psychol. Aging 12 (2), 277–287. http://dx.doi.org/10.1037/0882-7974.12.2.277.

Lindenberg, K., Moessner, M., Harney, J., McLaughlin, O., Bauer, S., 2011. E-health for individualized prevention of eating disorders. Clin. Pract. Epidemiol Ment. Health 7, 74–83. http://dx.doi.org/10.2174/1745017901107010074.

Loucas, C.E., Fairburn, C.G., Whittington, C., Pennant, M.E., Stockton, S., Kendall, T., 2014. E-therapy in the treatment and prevention of eating disorders: a systematic review and meta-analysis. Behav. Res. Ther. 63C, 122–131. http://dx.doi.org/10.1016/j.brat.2014.09.011.

Massey-Stokes, M.S., 2009. Prevention of Disordered Eating among Adolescents. Clear. House http://dx.doi.org/10.1080/00098650009599439.
Melville, K.M., Casey, L.M., Kavanagh, D.J., 2010. Dropout from Internet-based treatment for psychological disorders. Br. J. Clin. Psychol. Br. Psychol. Soc. 49 (Pt 4), 455–471. http://dx.doi.org/10.1348/014466509X472138.
Mond, J.M., Hay, P.J., Rodgers, B., Owen, C., Beumont, P.J.V., 2004. Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. Behav. Res. Ther. http://dx.doi.org/10.1016/S0005-7967(03)00161-X.
Ohlmer, R., Jacobi, C., Taylor, C.B., 2013. Preventing symptom progression in women at risk for AN: results of a pilot study. Eur. Eat. Disord. Rev. 21 (4), 323–329. http://dx.doi.org/10.1002/erv.2225.
Paxton, S.J., McLean, S.A., Gollings, E.K., Faulkner, C., Wertheim, E.H., 2007. Comparison of face-to-face and internet interventions for body image and eating problems in adult women: an RCT. Int. J. Eat. Disord. 40 (8), 692–704. http://dx.doi.org/10.1002/eat.20446.
Radloff, L.S., 1977. The CES-D scale: a self report depression scale for research in the general. Appl. Psychol. Meas. 1, 385–401. http://dx.doi.org/10.1177/014662167700100306.
Robergeau, K., Joseph, J., Silber, T.J., 2006. Hospitalization of children and adolescents for eating disorders in the state of New York. J. Adolesc. Health 39 (6), 806–810. http://dx.doi.org/10.1016/j.jadohealth.2006.08.003.
Roerig, J.L., Mitchell, J.E., Myers, T.C., Glass, J.B., 2002. Pharmacotherapy and medical complications of eating disorders in children and adolescents. Child Adolesc. Psychiatr. Clin. N. Am. 11, 365–385 (Retrieved from http://www.scopus.com/inward/record.url?eid=2-s2.0-0036082260&partnerID=40&md5=182d36a56d41702c7826cd0562870323).
Rozental, A., Andersson, G., Boettcher, J., Ebert, D., Cuijpers, P., Knaevelsrud, C., Ljotsson, B., Kaldo, V., Titov, N., Carlbring, P., 2014. Consensus statement on defining and measuring negative effects of Internet interventions. Internet Interv. 1, 12–19. http://dx.doi.org/10.1016/j.invent.2014.02.001.
Schafer, J.L., 1997. Analysis of incomplete multivariate data. Chapman & Hall, London, UK.
Stice, E., 2001. A prospective test of the dual-pathway model of bulimic pathology: mediating effects of dieting and negative affect. J. Abnorm. Psychol. 110 (1), 124–135. http://dx.doi.org/10.1037/0021-843X.110.1.124.
Stice, E., Rohde, P., Durant, S., Shaw, H., 2012. A preliminary trial of a prototype internet dissonance-based eating disorder prevention program for young women with body image concerns. J. Consult. Clin. Psychol. http://dx.doi.org/10.1037/a0028016.
Striegel-Moore, R.H., Dohm, F.A., Kraemer, H.C., Taylor, C.B., Daniels, S., Crawford, P.B., Schreiber, G.B., 2003. Eating disorders in white and black women. Am. J. Psychiatry 160 (7), 1326–1331. http://dx.doi.org/10.1176/appi.ajp.160.7.1326.
Swanson, S.A., Crow, S.J., Le Grange, D., Swendsen, J., Merikangas, K.R., 2011. Prevalence and correlates of eating disorders in adolescents. Results from the national comorbidity survey replication adolescent supplement. Arch. Gen. Psychiatry 68 (7), 714–723. http://dx.doi.org/10.1001/archgenpsychiatry.2011.22.
Taylor, C.B., Bryson, S., Luce, K.H., Cunning, D., Doyle, A.C., Abascal, L.B., Rockwell, R., Dev, P., Winzelberg, A.J., Wilfley, D.E., 2006. Prevention of eating disorders in at-risk college-age women. Arch. Gen. Psychiatry 63 (8), 881–888. http://dx.doi.org/10.1001/archpsyc.63.8.881.
Wertheim, E.H., Koerner, J., Paxton, S.J., 2001. Longitudinal predictors of restrictive eating and bulimic tendencies in three different age groups of adolescent girls. J. Youth Adolesc. 30 (1), 69–81. http://dx.doi.org/10.1023/A:1005224921891.
Wichstrøm, L., 2000. Psychological and behavioral factors unpredictive of disordered eating: a prospective study of the general adolescent population in Norway. Int. J. Eat. Disord. 28 (1), 33–42. http://dx.doi.org/10.1002/(SICI)1098-108X(200007)28:1<33::AID-EAT5>3.0.CO;2-H.
Yager, J., Devlin, M.J., Halmi, K.A., Powers, P., Zerbe, K.J., 2006. Treatment of patients with eating disorders,third edition. American Psychiatric Association. Am. J. Psychiatry 163 (7 Suppl), 4–54. http://dx.doi.org/10.1002/ejic.200200680.
Ybarra, M.L., Eaton, W.W., 2005. Internet-based mental health interventions. Ment. Health Serv. Res. http://dx.doi.org/10.1007/s11020-005-3779-8.