



Impact of telephone prompts on the adherence to an Internet-based aftercare program for women with bulimia nervosa: A secondary analysis of data from a randomized controlled trial

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ABSTRACT

Introduction: Poor adherence is a common challenge in self-directed mental health interventions. Research findings indicate that telephone prompts may be useful to increase adherence.

Method: Due to poor adherence in a randomized controlled trial evaluating an Internet-based aftercare program for women with bulimia nervosa we implemented regular short telephone prompts into the study protocol halfway through the trial period. Of the 126 women in the intervention group, the first 63 women were not prompted by telephone (unprompted group) and compared with 63 women who subsequently enrolled into the study and were attempted to prompt bimonthly by a research assistant (telephone prompt group). Completed telephone calls took less than 5 min and did not include any symptom-related counseling.

Results: Most of the women in the telephone prompt group (67%) were reached only once or twice during the intervention period. However, overall adherence in the telephone prompt group was significantly higher than in the unprompted group ($T = -3.015$, $df = 124$, $p = 0.003$).

Conclusion: Our findings from this secondary analysis suggest that telephone prompts can positively affect adherence to an Internet-based aftercare intervention directed at patients with bulimia nervosa.

1. Introduction

Internet-based interventions have been developed for a wide range of health problems, including mental disorders, and also cover the entire mental health intervention spectrum from preventive interventions to aftercare (e.g. Portnoy et al., 2008; Beintner et al., 2012; Ebert et al., 2015; Kuester et al., 2016; Sander et al., 2016; Vigerland et al., 2016; Boumparis et al., 2017; Pasarelu et al., 2017). Attrition and poor adherence are a challenge many of these interventions (e.g. Eysenbach, 2005; Linke et al., 2007; Wangberg et al., 2008; Christensen et al., 2009; Donker et al., 2013; Wojtowicz et al., 2013; van Ballegooijen et al., 2014), with the greatest loss of patients happening at the beginning, i.e., before or during the first sessions of the intervention (e.g. Linke et al., 2007; Wangberg et al., 2008).

According to the e-Health Acceptance Model (Jung and Berthon, 2009), an individual's acceptance of a self-directed online intervention is determined by its compatibility with user needs and expectancies, and its credibility. Both compatibility and credibility impact users' expected usefulness of the intervention (Davis, 1989) and are likely to affect adherence.

Previous research findings suggest that periodic prompts (i.e., “messages, reminders, or brief feedback communicated to participants multiple times over the duration of an intervention” (Fry and Neff, 2009, p. 1)) can improve the effectiveness of health behavior intervention (Fry and Neff, 2009) and may also facilitate engagement with digital interventions (Alkhalidi et al., 2016). However, the body of research in field is still limited and findings are inconsistent. Results from some studies suggest that telephone prompts may be more effective in promoting better adherence (Stevens et al., 2008; Titov et al., 2009; Greaney et al., 2012) and more positive treatment outcomes than email prompts (Svetkey et al., 2008; Titov et al., 2009; Greaney et al., 2012) but in other studies, telephone prompts were not associated with higher adherence (Andersson et al., 2003; Farrer et al., 2011) or better outcomes (Farrer et al., 2011).

During the course of a randomized controlled trial evaluating an Internet-based aftercare program (“IN@”) for women with bulimia nervosa following inpatient treatment (Jacobi et al., 2017) (ISRCTN08870215) problems with patient adherence became apparent. When we originally designed the IN@ intervention, we included a number of features previously shown to promote compatibility and

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credibility: Individualized feedback, individual goal setting, social support by peers and professionals, regular provision of new content, and periodic prompts and reminders (Brouwer et al., 2011). We also aimed to further promote the credibility or trustworthiness of the intervention (Jung and Berthon, 2009; Crutzen et al., 2011) by informing patients about the scientific background of the intervention, naming all participating hospitals and the funding agency on the home page, and by including CVs of the program moderators in the first session of the program. Nonetheless, during the course of the study many women did not log on to the intervention as suggested and attrition was substantially higher than expected based on our previous experiences with online interventions directed at women with eating disorder symptoms (Beintner et al., 2014).

Originally, the study protocol of our intervention included the following prompts: 1. Patients received a monthly e-mail message if new content had been provided. 2. They were also prompted by email if they had been inactive for more than one month or if they had failed to fill in questionnaires to monitor the course of their core eating disorder symptoms. 3. They received regular written feedback on their entries to personal diaries and logs.

When the relatively low adherence became obvious during the course of the trial, a change of core features of the intervention (e.g., shortening the intervals at which new content was provided, providing guidance by telephone) would have represented a violation of the study protocol. We therefore pragmatically decided to add very brief but regular telephone prompts, providing motivational and technical support to patients if needed to increase adherence to the intervention. This minor design change was implemented about 18 months after the beginning of recruitment for the study. The aim of the present investigation is to determine whether these additional telephone prompts had an impact on adherence to the Internet-based aftercare intervention. We compared the women who enrolled in the first 18 months and were not attempted to prompt by telephone with the women who enrolled after the decision to introduce the telephone prompts was made.

2. Method

A total of 253 women recruited from 13 psychosomatic hospitals in Germany were included in the randomized controlled trial (ISRCTN08870215). Details of the study design and procedure of the original study as well as findings on the primary outcomes have been published elsewhere (Jacobi et al., 2017). For the current secondary analyses, data from 126 women who were randomly allocated to the intervention group of the trial were included.

2.1. Internet-based intervention

All women in the intervention group of the original study received the Internet-based, cognitive-behavioral intervention IN@ which comprises 11 sessions over 9 months and includes reading assignments as well as email feedback and real-time online chats with a clinical psychologist specialized in eating disorder treatment. The psychoeducational components are complemented by personal goal setting, a personal diary and self-monitoring diaries for core eating disorder symptoms and to monitor and challenge eating disorder related automatic thoughts and attitudes. More details on the intervention have been described elsewhere (Jacobi et al., 2017).

2.2. Additional telephone prompts

To improve participation during the course of the trial, a research assistant not involved in guiding the intervention attempted to contact women of the intervention group who had enrolled in the trial after the first 18 months of recruitment at regular intervals (six times; at 2 weeks, 2 months, 3 months, 4 months, 6 months, 8 months after allocation to the intervention). Each scheduled contact was attempted

repeatedly at different times of the day and week, at times convenient to the patient (i.e., within and outside office hours). Patients that were reached were prompted as follows: When a patient had not used the program following the last call, the research assistant asked if there were technical problems, if the patient currently had BN symptoms, and encouraged her to continue using the program. When a patient was actively using the program, the research assistant asked if the patient was satisfied with it. Telephone calls took less than 5 min.

As the decision to include minimal telephone guidance was made 18 months after the beginning of the trial, attempts were made to contact all women enrolled in the study after this decision was made. These women we attempted to prompt will be referred to as the telephone prompt group in this paper. The remaining women (i.e., women enrolled in the study before the decision to introduce telephone prompts was made) will be referred to as the control unprompted group.

2.3. Measures

We chose overall participation as the primary measure of adherence. Overall participation was defined as the proportion of all assignments opened by each patient. Assignments included reading psychoeducational material and completing questionnaires and diaries. Participation was recorded automatically in log files. Reading assignments were considered completed when the respective page had been opened by the patient. Surveys and diaries were considered completed when an entry had been made.

Additional measures of adherence were the use of the personal goal-setting task, the use of symptom diaries, and the use of one-to-one online chats. The personal goal-setting task in each session was considered completed if a patient had set herself at least one goal. The use of the symptom diary was operationalized as the number of weeks the symptom diary had been completed. The use of the online chats was operationalized as the number of online chats a patient had joined.

Finally, treatment completion and study dropout were used as outcome measures. A participant was regarded a treatment completer if she had provided the main outcome at post-intervention and her overall participation exceeded 25% of the assignments or she had joined at least two one-to-one chats. A participant was considered a study dropout if she had not provided post-intervention data on core BN symptoms and the main outcome was therefore not available.

2.4. Statistical analysis

Differences in overall participation, the use of the personal goal setting task, symptom diaries and one-to-one-chats between the telephone prompt group and the control group were analyzed by two-tailed *t*-tests for independent samples. Differences in treatment completion and study dropout rates between the telephone prompt group and the control group were compared by Fisher's Exact Tests for independent samples.

3. Results

Of the 126 women in the intervention group, 63 women were allocated to the telephone prompt group and 63 to the unprompted group based on the time of their enrolment in the study.² These women were on average 25.6 years old (SD = 7.2) and had suffered from bulimia nervosa for 6.6 years (SD = 5.6). At hospital admission, they reported an average of 13.7 binge eating episodes (SD = 11.9) and 22.6 episodes of compensatory behaviors (SD = 20.3) per week. One in three of the women had a history of anorexia nervosa, and 87% had received

² While we did not aim to split the intervention group exactly in half, this happened by coincidence.

Table 1
Comparison of baseline characteristics in the telephone prompt group and the unprompted group (*t*-tests).

	Telephone prompt group (N = 63) M (SD)	Unprompted group (N = 63) M (SD)	T	df	p
Age (years)	25.75 (7.085)	25.92 (7.312)	0.136	124	0.892
BMI (kg/m ²)	21.31 (3.226)	21.67 (2.675)	0.691	124	0.491
Frequency of binge eating episodes per week	0.48 (1.330)	0.49 (1.424)	0.065	124	0.949
Frequency of episodes of self-induced vomiting per week	0.70 (1.520)	0.57 (1.434)	-0.482	124	0.630
Illness duration (years)	6.32 (5.951)	6.95 (5.205)	0.581	124	0.562

psychotherapeutic or psychiatric treatment before being admitted to hospital. Most women (83%) also received psychotherapeutic face-to-face outpatient treatment (M = 23 sessions; SD = 49.71) while having access to the Internet-based aftercare intervention.

Women in the two groups did not differ in terms of symptom severity at baseline, illness duration, age, BMI, or comorbidities (see Table 1). However, significantly more women in the telephone prompt group compared with the unprompted group reported a history of anorexia nervosa (43% vs. 22%; $\chi^2 = 6.11, p = 0.022$).

In the telephone prompt group, 11 (17.5%) women could not be reached at all, 24 (38.1%) women were reached once, 18 (28.6%) women were reached twice, eight (12.7%) women were reached three times, and two (3.2%) women were reached four times.

Women in the telephone prompt group showed significantly higher adherence than women in the unprompted group (see Table 2): They completed significantly more assignments (overall participation), used the personal goal setting feature in significantly more sessions and filled out the symptom diary significantly more frequently than women in the unprompted group. The groups did not differ in their use of scheduled one-to-one chats (see Table 2). Women in the telephone prompt group were also more likely to be classified as treatment completers according to the study protocol, while the groups did not differ in study dropout rates (i.e., the failure to provide post-intervention data on core BN symptoms; see Table 3). The number of successful telephone contacts was significantly correlated with overall participation (see Table 4; $r = 0.436; p < 0.001$).

4. Discussion

The aim of this secondary analysis of data from a randomized controlled trial was to determine whether six regular brief telephone prompts administered in addition to email prompts would enhance adherence to an Internet-based aftercare intervention for women with bulimia nervosa following inpatient treatment. Although six prompts were scheduled during the course of the nine-month intervention, the majority (66.7%) of women were only reached once or twice. Nevertheless, women who had been attempted to be prompted (regardless of how many times they had actually been reached) showed significantly better adherence to the intervention than women not attempted to be prompted. Although adherence increased with the number of telephone contacts, it appears that two prompts already have a substantial impact on adherence because they were associated with 25% higher overall intervention participation. An explanation for this finding could be that even few prompts increased participants' sense of accountability for their active participation in the intervention and also

Table 2
Comparison of adherence measures in the telephone prompt group and the unprompted group (*t*-tests).

	Telephone prompt group (N = 63) M (SD)	Unprompted group (N = 63) M (SD)	T	df	p
Overall participation	45.0% (34.3%)	27.7% (29.8%)	-3.015	124	0.003
Use of personal goals feature (out of 10)	3.87 (3.48)	1.95 (2.85)	-3.387	124	0.001
Use of symptom diaries (weeks)	10.81 (13.35)	4.35 (8.89)	-3.196	124	0.002
Use of one-to-one-chats (out of 9)	1.29 (2.04)	0.76 (1.73)	-1.557	124	0.122

Table 3
Comparison of treatment completion and study dropout rates in the telephone prompt group and the unprompted group (Fisher's exact tests).

	Telephone prompt group (N = 63) N (%)	Unprompted group (N = 63) N (%)	p
Treatment completer according to study protocol	41 (65.1%)	27 (42.9%)	0.020
Study dropouts	20 (31.7%)	21 (33.3%)	1.000

Note: A patient could drop out of treatment, but still complete the study by providing post-intervention data.

Table 4
Number of successful telephone prompts and overall participation.

Number of successful telephone prompts	N	Overall participation M (SD)
0	11	29.9% (31.66)
1	24	31.8% (30.53)
2	18	55.4% (31.39)
3	8	60.5% (32.82)
4	2	96.5% (2.50)

led to a more intensely perceived sense of support by the study team.

Unfortunately, the impact of telephone prompting (i.e., reminding participants to use the intervention without supplying actual telephone guidance) in online-interventions has not been studied to a great extent and with mixed findings (Alkhalidi et al., 2016). In a randomized controlled trial on an unguided, web-based treatment for social phobia, the addition of weekly non-clinician telephone contact was also associated with better adherence (Titov et al., 2009). Also in line with our findings, in a study on the use of a weight loss maintenance website, automated telephone prompts appeared to be very effective at helping participants uphold ongoing participation over the course of one year. An escalating series of prompts effectively cued participants to return to the website in 97.3% of cases (Stevens et al., 2008).

Our findings are also consistent with findings from a study on an Internet-based cancer risk reduction program (Greaney et al., 2012). Participants (N = 100) in this program were only prompted if they failed to complete self-monitoring assignments; one group received email prompts only, another group additional short telephone prompts that were limited to technical assistance. The group that received telephone calls was about twice as likely to complete self-monitoring than

the group that received only email prompts.

Other studies did not support a positive effect of telephone prompts. Weekly phone calls did not impact adherence to an, online intervention for depression in a randomized controlled trial (Farrer et al., 2011). Similarly, in a study investigating the role of therapist initiated telephone prompts in an online intervention for headache patients, weekly individual telephone calls over a course of six weeks did not impact treatment dropout (Andersson et al., 2003). However, the sample size ($N = 44$) in that study was relatively small and may have been underpowered to detect significant differences.

Our study is limited by the fact that the women were not randomized to the two different prompting conditions, but were consecutively allocated to the groups depending on their time of enrolment in the trial. However, we could not detect any substantial baseline differences between the two groups that could have explained differences in adherence.

Another limitation of the study is the overall adherence measure that was used. A more proximal marker for the effects would have been favorable and should be used in future investigations of the impact of prompts. For example, the timespan between a prompt and a return to the intervention could be recorded. Unfortunately, given the ad-hoc nature of the prompts being added to our intervention halfway through a clinical trial, the investigation of the impact of these prompts was not as thoroughly planned as it could have been and the exact timing of prompts as well as the use of the intervention have not been stored in our database.

The failure to store log data also made it impossible to determine how much time a participant spent on each page. Theoretically, a participant could have completed a session by clicking through it without reading. However, since participants were incentivized for completing the assessments, but not the sessions, and also considering the overall low adherence it seems unlikely that this has occurred on a large scale in the trial. Also, it is unlikely that the chosen definition has had an impact on group differences in adherence.

5. Conclusion

Our results suggest that few brief telephone prompts, even if they are given by research assistants and do not include specific symptom-related counseling, can positively affect adherence to an Internet-based aftercare intervention directed at patients with bulimia nervosa. Our findings may be especially relevant for self-directed interventions which are several months long, have large intervals between sessions, or are addressed at individuals who are typically ambivalent towards behavior change as is the case for women with eating disorders, (e.g. Perkins et al., 2007, Castro-Fornieles et al., 2011). In future studies on technology-based interventions, an automated algorithm of successive prompts to participants who adhere poorly should be implemented as a fixed part of the intervention design. However, more systematic research is needed regarding the optimal mode of delivery, frequency, and spacing of these prompts in different contexts of use of technology-based interventions. The proximal effect of various kinds of prompts on adherence markers could be efficiently investigated in micro-randomized trials (Klasnja et al., 2015).

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