



A randomized controlled trial on the role of support in Internet-based problem solving therapy for depression and anxiety



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ABSTRACT

Internet-based interventions can be effective treatments for anxiety and depression. Meta-analytic evidence suggests that they should be delivered with human support to reach optimal effects. These findings have not consistently been replicated in direct comparisons of supported and unsupported interventions, however. This study examined the role of support in Internet-based problem solving treatment (PST) for symptoms of anxiety and/or depression. Adults with mild to moderate symptoms of anxiety and/or depression were recruited from the general population and randomized to: (1) PST without support ($n = 107$), (2) PST with support on request ($n = 108$), (3) PST with weekly support ($n = 106$), (4) no Internet-based intervention but non-specific chat or email ($n = 110$), or (5) waitlist control (WLC; $n = 106$). Primary outcomes were symptoms of anxiety (HADS) and depression (CES-D) measured at baseline and 6 weeks later. Analyses were first based on the intention-to-treat principle (ITT) and repeated with intervention completers. Only participants who received PST with weekly support improved significantly more than WLC for depressive symptoms. Results for anxiety were less robust but in favor of the weekly support condition. The results underscore the importance of structural support in Internet-based interventions for depression and anxiety.

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1. Introduction

Anxiety and depression are common mental disorders (Wang et al., 2007) which impair the quality of life of individuals and are associated with a substantial societal burden (Mathers & Loncar, 2006; Smit et al., 2006). There is no doubt that Internet-based self-help interventions can be effective in reducing symptoms of anxiety and depression (Andersson & Cuijpers, 2009; Richards & Richardson, 2012; Spek et al., 2007). An increasing number of randomized controlled trials have demonstrated its effectiveness for a range of psychotherapies such as Cognitive Behavioral Therapy (CBT: Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010), Problem Solving Therapy (PST: Van Straten, Cuijpers, & Smits, 2008;

Warmerdam, van Straten, Twisk, Riper, & Cuijpers, 2008), Interpersonal Therapy (IPT: Donker et al., 2013), and Psychodynamic Psychotherapy (PDT: Johansson et al., 2012). Internet-based interventions gradually find their way to routine practice (Andersson & Titov, 2014) and may be a cost-efficient, accessible, and less stigmatizing alternative to traditional face-to-face treatments delivered in mental health settings (Andrews et al., 2010; Warmerdam, Smit, van Straten, Riper, & Cuijpers, 2010).

One important issue for the implementation of Internet-based interventions is whether they should be provided with or without support by a coach or therapist. Several meta-analyses have demonstrated that Internet-based interventions delivered with support (i.e. guided interventions) result in moderate to high effects sizes comparable to face-to-face interventions (Andersson, Cuijpers, Carlbring, Riper, & Hedman, 2014) whereas unguided interventions (i.e. interventions that people work through on their own) generally show small effects (Andersson & Cuijpers, 2009; Richards & Richardson, 2012; Spek et al., 2007). These results have not consistently been replicated in studies that directly compared guided and unguided interventions, however. Three studies on depression

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showed no significant differences (Berger, Hammerli, Gubser, Andersson, & Caspar, 2011a; Farrer, Christensen, Griffiths, & Mackinnon, 2011; Mohr et al., 2013) although moderate effect sizes in favor of the guided intervention were found in the study by Berger and colleagues. One study on social phobia showed no significant difference (Berger et al., 2011b) while the other study demonstrated superior effects of the guided Internet-based intervention compared to the unguided Internet-based intervention (Titov, Andrews, Choi, Schwencke, & Mahoney, 2008). More research is needed as sample sizes in these studies were relatively small and results may have been confounded by, for example, intensive screening at study entrance (Berger et al., 2011a).

One explanation for the different outcomes in guided versus unguided Internet-based interventions is that human support may increase treatment adherence through accountability to a coach or therapist (Mohr, Cuijpers, & Lehman, 2011). It is well-known that treatment adherence is lower in unguided interventions than guided ones (Christensen, Griffiths, & Farrer, 2009; Waller & Gilbody, 2009) with rates being reported of 26% in unguided and 72% in guided interventions (Richards & Richardson, 2012), and higher adherence to treatment has shown to result in better patient outcomes (Donkin et al., 2011). Additionally, if support would be necessary to achieve higher adherence rates and optimal effects, it is not clear what level of support should be provided. For example, if the presence of a coach is an important factor, it would not matter so much how frequently support would be provided, and minimal and more intensive support may be equally effective. However, support may also include more structural aspects such as motivating the patient to continue with the treatment and helping the patient work with the program and understand the treatment, which require higher levels of support.

To be able to achieve optimal effects of Internet-based interventions, it is important to gain more insight into the role of support. Unguided interventions are much easier to implement than guided interventions as they do not need an infrastructure of professionals and there is virtually no limit on the number of clients that can enter the program as no therapist time is involved (Andersson & Titov, 2014). Additionally, if support is needed, it is important to know what level of support is minimally required to reduce therapist time and thereby costs of delivery. The aim of this study was to examine the effectiveness of Internet-based problem solving treatment (PST) delivered with different levels of support in individuals with mild to moderate symptoms of anxiety and/or depression. We compared respondents taking part in four types of treatment: (1) Internet-based PST without support, (2) Internet-based PST with support on request, (3) Internet-based PST with weekly support, (4) no Internet-based intervention but non-specific support delivered via chat or email, with a waitlist control group (WLC) that received online psycho-education only (condition 5). The fourth condition was included to examine if support alone, without receiving actual treatment, was sufficient to reach a clinical effect. Compared to WLC, we expected that participants would benefit most from the Internet-based intervention provided with weekly support, followed by the support on request condition, and the non-specific support and the without support conditions. Additional aims were to determine differences in treatment adherence and satisfaction with the treatment.

2. Methods

2.1. Design

This study is a randomized controlled trial with five conditions: (1) Internet-based PST without support, (2) Internet-based PST with support on request, (3) Internet-based PST with weekly

support, (4) no Internet-based treatment but non-specific support by chat or email, and (5) waitlist control group (WLC) receiving online information only. Follow-up assessments were at post-treatment (6 weeks after baseline) in all conditions. Respondents in the WLC condition were offered the Internet-based intervention with support after the post-treatment assessment. More detailed information about the study design is provided in the treatment protocol (Donker, van Straten, et al., 2009).

2.2. Participants

The study was carried out at the department of Clinical Psychology of the VU University in Amsterdam, the Netherlands. Participants were recruited from the general Dutch population between June 2009 and November 2011 through banners on internet web-sites and advertisements in local newspapers which referred to the study website for more information.

Inclusion criteria were: 1) being aged 18 years or older, 2) mild to moderate symptoms of depression and/or anxiety as defined by a score of 16 or higher and 39 or less on the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) and 8 or higher and less than 15 on the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS; Snaith & Zigmond, 1986). Individuals were excluded when they: 1) had insufficient knowledge of the Dutch language, 2) reported active suicidal plans (based on a 4-item self-report screening question (SQ) (Gega, Kenwright, Mataix-Cols, Cameron, & Marks, 2005), 3) received treatment by a mental health specialist at the time of recruitment. We allowed the use of prescribed medication for anxiety and depressive disorders when the dosage was stable (for at least a month).

2.3. Procedure

The study protocol was approved by the Medical Ethical Committee of the VU University Medical Centre (VUMC; nr 2008-011) and is registered at the Netherlands Trial Register (NTR: nr TC1355). Individuals who were interested in taking part could request more information by entering their name and email address on the study website. Next, they received an information leaflet, an informed consent form, and a link to a screening questionnaire via email. This questionnaire was used as baseline assessment in those who were eligible to take part. Respondents who met the inclusion criteria were randomized into one of the five conditions and informed of the outcome by email in the week prior to the start of the intervention. Individuals who were not eligible for taking part received an email with the reason for exclusion. If the reason for exclusion was symptom severity (a high HADS or CESD score) or suicidal plans, they were advised to contact their GP. All assessments were completed online. In all five conditions, two automated emails were sent to participants reminding them of when to expect the post-treatment assessment to increase adherence to the program (Nordin, Carlbring, Cuijpers, & Andersson, 2010).

2.4. Randomization

Random allocation took place at the individual level by an independent researcher who was not involved in the study. The allocation schedule was derived by computer using a random number generator. Block randomization was applied with variable block sizes containing 6, 8, 10, or 12 allocations with each participant having an equal probability of being assigned to one of the five groups.

2.5. Sample size calculation

The sample size calculation was based on the primary outcomes,

symptoms of depression and anxiety. Based on previous studies (Van Straten et al., 2008; Warmerdam et al., 2008), the study was powered to detect a moderate difference between the intervention conditions and the waitlist control condition with a standard mean difference (Cohen's *d*) of 0.35. Smaller effect sizes were considered to be not relevant from a clinical point of view. Assuming an alpha of 0.05 and a statistical power (1-Beta) of 0.80 in a one-tailed test, we would need to recruit 100 respondents in each of the conditions.

2.6. Intervention: internet-based problem solving treatment

The Internet-based intervention applied in conditions 1, 2, and 3 is a brief problem-solving therapy (PST) called “*Allesondercontrole*” (Van Straten et al., 2008; Warmerdam et al., 2008). In PST, participants learn to regain control over their problems and their lives by learning how to deal with problems in a structured way. The general idea is that symptoms of anxiety and depression will decrease when individuals experience more control. We used a Dutch adaptation of self-examination therapy (SET) (Bowman, Scogin, Floyd, Patton, & Gist, 1997; Bowman, Scogin, & Lyrene, 1995) which is a type of Problem-Solving therapy (Mynors-Wallis, 2005). The intervention consists of five weekly lessons that include information, exercises, and examples (see Warmerdam et al., 2008)).

Condition 1, 2, and 3 differed in the level of support that was provided. In condition 1 (without support), no coach was assigned to respondents and they worked through the program on their own. In condition 2 (support on request), respondents had the option of contacting a coach to ask for support after completion of a lesson. In condition 3 (weekly support), the coach would actively approach the respondents once per week by email after completion of a lesson. The support was focused on helping the respondent work through the self-help method. The time spent on providing support was 25 min per week per respondent on average. When respondents in condition 2 asked for support, the same type of support as provided in condition 3 would be provided in about 25 min. Respondents in condition 2 and 3 were always free to contact the coach in between lessons. Coaches for condition 2 and 3 were Master level psychology students who received a training of approximately six hours given by the first and second author of this paper. All participants in condition 1, 2, and 3 received weekly automated standardized emails with additional information regarding how to carry out the exercises.

2.7. Non-specific support

Participants in condition 4 received non-specific support via chat or email and had no access to an Internet-based intervention. The support involved non-directive conversation techniques based on client-centred therapy (Rogers, 1951), communication skills (Van der Molen, Kluytmans, & Kramer, 1995) and clinical management used in the National Institute of Mental Health treatment for adolescents with depression study (TADS) (March, 2005). The coaches were instructed to give general support and were not trained in specific techniques from other formal psychotherapeutic interventions. Respondents who opted for email were asked to write a weekly email on their problems (length maximum 2 A4), to which the coach responded within two days. Participants that opted for chat sessions, had a scheduled chat session with their coach once a week for five weeks. Coaching was provided by Master level students in Clinical Psychology. The third author trained the coaches in approximately six hours. The time for support per week was kept similar across all intervention conditions and was 25 minutes on average per respondent per week.

2.8. WLC: online information only

The participants in condition 5 received access to a website with psycho-education about depression and anxiety.

2.9. Measures

Depressive symptoms were assessed online with the Dutch version of the Center for Epidemiological Studies Depression scale (CES-D; Radloff, 1977) and the Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, Williams, & Lowe, 2010). The CES-D is a 20-item self-report questionnaire with each item scored on a 0–3 scale. The total score range is 0–60 and higher scores indicate more severe symptoms. The CES-D has shown to have acceptable psychometric properties with a cut-off score of 16 most commonly used (Beekman et al., 1997; Donker, Van Straten, Marks, & Cuijpers, 2010). The PHQ-9 is a nine-item mood module often used to screen and to diagnose patients with depressive disorders. The 9 items are each scored on a 0–3 scale with the total score ranging from 0 to 27 and higher scores indicating more severe depression. The PHQ-9 has shown to have good psychometric properties (Wittkampf, Naeije, Schene, Huyser, & van Weert, 2007).

Symptoms of anxiety were assessed with the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS; (Snaith & Zigmond, 1986) and with the Beck Anxiety Inventory (BAI; Kabacoff, Segal, Hersen, & VanHasselt, 1997). The anxiety subscale of the HADS consists of seven questions that are assessed on a 3-point scale. The total scores ranges from 0 to 21 and higher scores indicate more severe symptoms of anxiety. A frequently used cut-off score for the HADS is 8 or higher which indicates relevant symptoms of anxiety. The HADS has shown to be a reliable and valid instrument in several populations (Spinhoven et al., 1997). The 21-item BAI assesses anxiety with a focus on somatic symptoms. Item responses are on a 0 to 3 scale and the total score ranges from 0 to 63 with higher scores indicating more anxiety. The BAI has high internal consistency and demonstrated good convergent and divergent validity (Kabacoff et al., 1997).

Global satisfaction with the treatment was assessed with the Client Satisfaction Questionnaire-8 (CSQ-8; Nguyen, Atkinson, & Stegner, 1983). This questionnaire consists of 8 items that are measured on a 4 point scale. The total score ranges from 8 to 32, and higher scores indicate higher satisfaction. The questionnaire has shown to have good psychometric properties in a Dutch sample (De Brey, 1983).

2.10. Analyses

All analyses were performed with SPSS version 22.0 (IBM, 2013). Baseline differences in demographic and clinical characteristics were examined using chi-square tests or analysis of variance (ANOVA) followed by Bonferroni post-hoc analyses if applicable. Missing data was handled by multiple imputation (Schafer & Graham, 2002) using the Fully Conditional Specification method (FCS). In this approach, missing data are imputed by a chain of conditional distributions (regression models) using available baseline data (demographic and baseline severity data) from the responders and the non-responders. The model type for scale variables was Predictive Mean Matching (PMM) and we allowed a maximum of 10 iterations for the algorithm to converge and created 100 multiply imputed datasets.

The primary analyses were based on the intention-to-treat principle (ITT). Next, we repeated all analyses with the sample that completed the intervention (treatment completers analyses). Improvement in anxiety and depression within conditions was tested using paired sample t-tests. Differences between Conditions

1–4 and the WLC group (condition 5) were tested by multiple regression analyses with the post-treatment scores as the dependent variable and condition as the independent variable while controlling for baseline scores. For these analyses, four dummy variables were created for conditions 1–4, condition 5 was chosen as the reference group. In secondary analyses, we also explored differences between the other conditions. Cohen's *d* was calculated to indicate effect sizes within and between groups (Cohen & Cohen, 1983), $d < 0.2$ indicates a negligible effect, $0.2 \leq d < 0.5$ a small, $0.5 \leq d < 0.8$ a moderate and ≥ 0.8 a large effect. The effectiveness analyses and the effect sizes were based on the 100 imputed datasets and the results were combined into one single estimate using Rubin's rules (Rubin, 1987). The reported mean and standard deviations are based on the observed data. To test the robustness of the findings, sensitivity analyses were conducted on the observed data.

3. Results

3.1. Baseline characteristics and patient flow

The flow of participants through the study is presented in Fig. 1. A total of 1319 subjects showed interest in the study, 140 (11%) did not complete the screening questionnaire, 104 (8%) declined participation, and 537 (41%) did not meet the inclusion criteria because of high symptom severity ($n = 254$; 19%), low symptom severity ($n = 41$; 3%), or they already received psychological treatment ($n = 242$; 18%). The remaining 537 (41%) participants were randomized to one of the five study conditions: PST without support ($n = 107$), PST with support on request ($n = 108$), PST with weekly support ($n = 106$), non-specific support ($n = 110$), and WLC ($n = 106$). Seventy-three percent of the participants in the non-specific support condition opted for email support ($n = 80$), 21% opted for chat sessions ($n = 23$), 2% switched from chat to email ($n = 2$), and 5% dropped out of the intervention before a decision was made ($n = 5$). Post-treatment assessments were completed by 80% of all participants ($n = 432$) (see Fig. 1) and was significantly higher in the 'non-specific support condition' and the 'WLC' condition (both 88%) compared to the conditions that received PST 'with' or 'without' support (both 70%). There was no difference between the condition that received 'support on request' (76%) and all other conditions.

Demographic characteristics at baseline are presented in Table 1. The average age of the respondents was 45 ($SD = 14$) with a range of 18–81 years. Most participants were female (65%, $n = 348$), had accomplished a degree at a Bachelor's or Master's level (58%, $n = 314$), were born in the Netherlands (93%, $n = 499$) and about half of them was involved in an intimate relationship (57%, $n = 305$). The groups did not differ on any of the demographic characteristics or outcome assessments at baseline.

3.2. Treatment adherence and request for feedback

The majority of participants did not provide a reason for dropping out of treatment. Reasons given were: treatment was not engaging them ($n = 10$), cannot be bothered ($n = 7$), being too busy ($n = 6$), problems with the website ($n = 5$), having started another treatment ($n = 2$), or symptoms had improved ($n = 1$). Adherence rates were highest in the non-specific support condition, respondents completed 3.7 out of 5 contacts on average and 60% completed all 5 contacts (see Fig. 2). In the condition that received 'weekly support', 2.9 lessons were completed on average and 33% completed all lessons. In the 'support on request' condition respondents completed 2.9 lessons on average as well and 31% completed all lessons. Finally, in the condition 'without support',

respondents completed 2.1 lessons on average and 22% completed all lessons. Differences in adherence rates were significant ($F(3,427) = 15.62$, $p < .001$). Post-hoc analyses showed significantly higher adherence rates in the 'non-specific support' condition compared to all other conditions (all p 's $< .01$). Further, significantly higher adherence rates were found in the 'weekly support' condition and the 'support on request' condition compared to the condition 'without support' ($p < .05$ for both). There were no differences in adherence rates between the 'weekly support' and 'support on request' condition ($p = 1.0$).

Of the 108 participants in the 'support on request' condition, 21 (19%) asked for feedback from the coach. Most of those requested feedback once ($n = 14$), others 2 ($n = 1$), 3 ($n = 3$), or 4 ($n = 3$) times. In the 'weekly support' condition, the number of support contacts with the coach was the same as the number of lessons completed.

3.3. Satisfaction with the treatment

Participants who provided post-treatment data were generally moderately satisfied with the treatment they received, however, scores were significantly different between conditions ($F(3,317) = 3.420$, $p = .02$). Those that received PST with 'weekly support' were the most satisfied with an average score of 20.8 out of 32 ($SD = 5.1$; $n = 74$) on the CSQ. In the 'non-specific support' condition, the average score was 20.0 ($SD = 5.4$; $n = 96$), in the 'support on request' condition it was 19.0 ($SD = 4.7$; $n = 81$). Participants that received the Internet-based intervention 'without support' were the least satisfied (mean score 18.4, $SD = 4.9$; $n = 70$). Post-hoc analyses showed that the difference between the 'weekly support' and 'no support' conditions was significant ($p = .02$).

3.4. Post-treatment effectiveness on depression and anxiety

All participants improved significantly between baseline and post-treatment on all outcome measures in the ITT analyses (see Table 2). In the treatment completers analyses, within group improvement did not reach significance for the 'without support' condition on two measures (PHQ and HADS) (see Table 3).

With respect to depressive symptoms, small significant between-group differences in favor of the condition that received 'weekly support' were identified in the ITT analyses (CESD: $ES = 0.34$, $p < .01$, PHQ: $ES = 0.30$, $p < .01$), with stronger effect sizes in the respondents that completed all lessons (CESD: $ES = 0.62$, $p < .01$, PHQ: $ES = 0.64$, $p < .01$). In the treatment completers analyses, we found small significant between-group differences on the PHQ-9 in favor of the 'non-specific support' condition ($ES = 0.34$, $p < .05$).

For anxiety, results on the HADS showed that the 'no support' condition ($ES = 0.25$, $p < .05$) and the 'weekly support' condition ($ES = 0.31$, $p < .05$) improved more than the 'WLC group'. In the treatment completers analyses, the effects were more pronounced in the 'weekly support' condition ($ES = 0.58$, $p < .01$), however, results were no longer significant in the 'no support' condition ($ES = 0.26$, $p = .42$). Again, for the condition that received 'non-specific support', the treatment completers analyses showed small between-group differences ($ES = 0.31$, $p < .05$). Analyses did not show significant between group differences on the BAI for all conditions.

In additional analyses we explored differences between conditions 1–4 on the primary and secondary outcome measures. In the ITT analyses, the 'weekly support' condition improved significantly more than the 'no support' condition on the PHQ ($p < .05$) but no other differences were identified. In the treatment completers analyses, the 'weekly support' condition showed superior effects to the 'no support' condition on both depression measures (CESD:

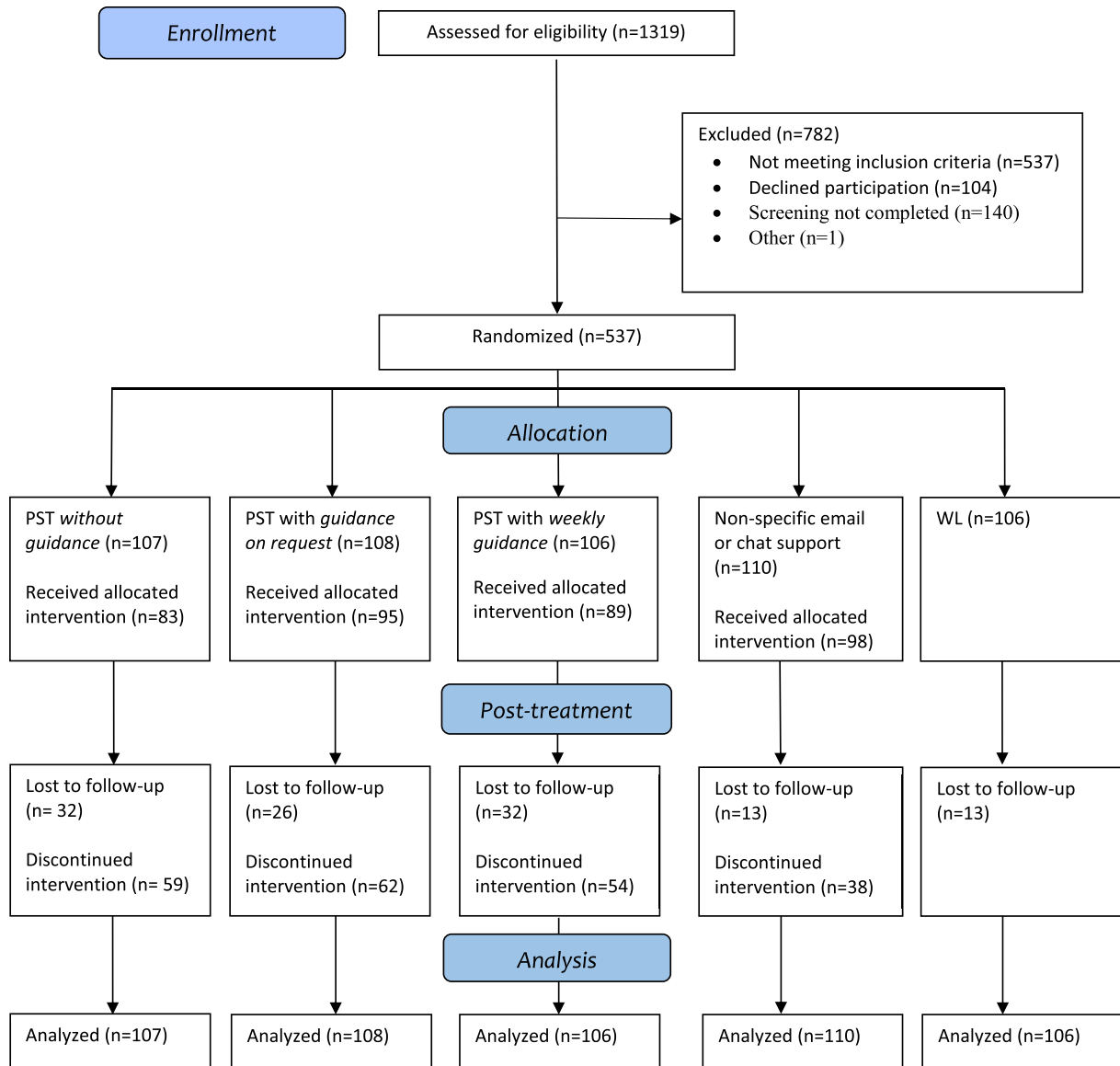


Fig. 1. Participant flow through study.

Table 1

Demographic characteristics of participants who received Internet-based treatment without support (C1), support on request (C2), weekly support (C3), non-specific support (C4) or waitlist control (C5).

	Total N = 537	C1 N = 107	C2 N = 108	C3 N = 106	C4 N = 110	C5 N = 106	Statistic
Age, mean (SD)	44.5 (13.7)	42.8 (15.0)	44.4 (12.9)	42.9 (13.6)	47.0 (13.0)	45.6 (13.6)	(F4,532) = 1.886, p = .11
Gender, n (%) ^a							
Male	187 (35)	37 (35)	39 (36)	34 (32)	38 (35)	39 (37)	$\chi^2(4) = 0.68, p = .95$
Female	348 (65)	69 (65)	69 (64)	72 (68)	72 (66)	66 (63)	
Country of birth, n (%)							
NL ^b	499 (93)	96 (90)	101 (94)	96 (91)	105 (96)	101 (96)	$\chi^2(8) = 0.72, p = .52$
Non western	20 (4)	7 (7)	3 (3)	5 (5)	2 (2)	3 (3)	
Western	17 (3)	4 (4)	4 (4)	5 (5)	3 (3)	1 (1)	
Education, n (%)							
Low	48 (9)	13 (12)	8 (7)	7 (7)	10 (9)	10 (9)	$\chi^2(8) = 5.63, p = .69$
Middle	175 (33)	27 (25)	34 (32)	38 (36)	38 (35)	38 (36)	
High	314 (58)	67 (63)	66 (61)	61 (58)	62 (56)	58 (55)	
Marital status, n (%)							
Married/partner	232 (43)	52 (49)	44 (41)	47 (44)	44 (40)	45 (43)	$\chi^2(4) = 2.08, p = .72$
Single	305 (57)	55 (51)	64 (59)	59 (56)	66 (60)	61 (58)	

^a 1 missing in C1 and 1 missing in C5.

^b 1 missing in C5.

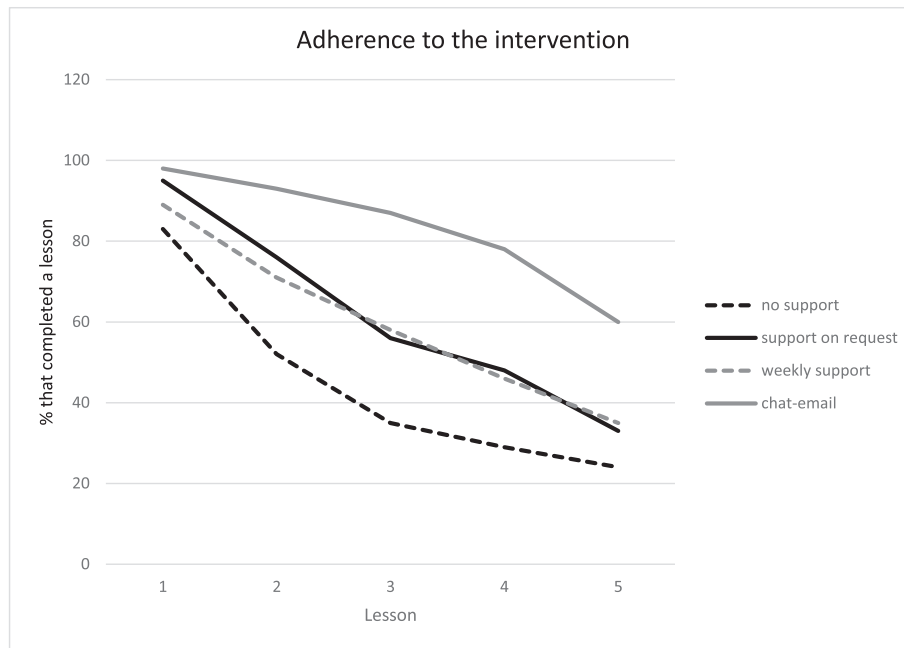


Fig. 2. Proportion of participants in each condition that completed a lesson.

p < .01, PHQ-9: p < .05).

3.5. Sensitivity analyses

A repeat of all analyses on the observed data (study completers only) did not lead to different results. The only noticeable difference was that the between group difference in the 'non-specific support' condition compared to WLC on the PHQ in the treatment completers analyses was no longer significant (p = .05 instead of p = .04).

4. Discussion

This study examined the effectiveness of an Internet-based intervention delivered with different levels of support in

individuals with mild to moderate symptoms of anxiety and/or depression. We compared participants who received Internet-based problem solving treatment (PST) with: (1) no support, (2) support on request, (3) weekly support, and (4) participants who did not receive an Internet-based intervention but were provided with non-specific chat or email support, with a (5) waitlist control group (WLC) that received online information only.

The findings are in line with previous meta-analyses that suggested that Internet-based interventions should be delivered with support to reach optimal clinical effects (Andersson & Cuijpers, 2009; Richards & Richardson, 2012; Spek et al., 2007). Compared to WLC, Internet-based problem solving treatment delivered with weekly support resulted in better improvements for depression and anxiety. Participants in this condition were also the most satisfied with the intervention they had received. While effect sizes

Table 2
Results for ITT sample: Baseline and post-treatment outcomes and effectiveness of the interventions compared to waitlist control.

		Baseline		Post-treatment		ES within group	ES between group
		M	SD	M	SD	d (95% CI)	d (95% CI)
CESD	No support	27.2	6.9	20.0	9.8	0.76 (0.48–1.03)***	0.17 (–0.10–0.44)
	Support on request	26.5	6.9	19.8	9.1	0.77 (0.50–1.05)***	0.22 (–0.04–0.49)
	Weekly support	27.2	6.7	18.7	9.0	1.01 (0.72–1.29)***	0.34 (0.07–0.61)**
	Non-specific support	27.6	6.8	21.3	9.5	0.76 (0.49–1.04)***	0.12 (–0.15–0.39)
	Waitlist control	27.0	6.4	22.5	9.7	0.56 (0.29–0.84)***	–
PHQ	No support	10.5	4.6	8.2	5.5	0.36 (0.09–0.63)***	0.02 (–0.25–0.29)
	Support on request	10.5	4.2	7.9	4.7	0.54 (0.27–0.81)***	0.11 (–0.16–0.38)
	Weekly support	10.3	4.7	6.9	4.4	0.67 (0.39–0.94)***	0.30 (0.03–0.57)**
	Non-specific support	9.8	3.7	7.7	5.0	0.46 (0.19–0.73)***	0.19 (–0.08–0.45)
	Waitlist control	9.7	3.6	8.6	4.7	0.26 (0.01–0.53)*	–
HADS	No support	10.4	2.9	7.7	3.7	0.78 (0.50–1.05)***	0.23 (0.03–0.50)*
	Support on request	9.8	2.7	7.8	3.7	0.63 (0.36–0.90)***	0.27 (0.00–0.54)
	Weekly support	10.0	2.6	7.6	3.5	0.75 (0.47–1.02)***	0.30 (0.02–0.57)*
	Non-specific support	10.3	2.7	8.2	3.5	0.70 (0.43–0.98)***	0.17 (–0.09–0.44)
	Waitlist control	9.9	2.7	8.8	3.7	0.34 (0.07–0.61)**	–
BAI	No support	17.3	8.7	12.1	8.6	0.54 (0.27–0.81)***	0.01 (–0.26–0.28)
	Support on request	16.0	8.0	10.9	6.9	0.64 (0.37–0.92)***	0.23 (–0.04–0.49)
	Weekly support	17.3	9.1	11.8	8.0	0.56 (0.29–0.84)***	0.05 (–0.22–0.32)
	Non-specific support	17.2	9.0	12.3	8.5	0.59 (0.32–0.86)***	0.08 (–0.19–0.35)
	Waitlist control	15.8	8.0	13.0	8.0	0.38 (0.11–0.65)***	–

*p < .05, **p < .01, ***p < .001.

Table 3

Results for treatment completers: Baseline and post-treatment outcomes and effectiveness of the interventions compared to waitlist control.

		Baseline		Post-treatment		ES within group	ES between group
		M	SD	M	SD	<i>d</i> (95% CI)	<i>d</i> (95% CI)
CESD	No support	26.0	6.7	22.1	10.3	0.47 (0.10–1.05)*	0.04 (–0.40–0.48)
	Support on request	25.5	7.1	19.1	9.1	0.74 (0.24–1.24)***	0.31 (–0.09–0.70)
	Weekly support	26.5	5.8	16.8	8.5	1.34 (0.83–1.86)***	0.62 (0.21–0.99)**
	Non-specific support	27.3	7.1	20.1	9.4	0.87 (0.49–1.24)***	0.24 (–0.08–0.56)
PHQ	No support	9.6	3.8	8.5	5.7	0.23 (–0.34–0.80)	0.02 (–0.42–0.46)
	Support on request	10.3	4.2	7.4	5.1	0.59 (0.10–1.08)***	0.21 (–0.18–0.60)
	Weekly support	9.2	4.3	6.0	3.5	0.84 (0.35–1.33)***	0.64 (0.20–0.98)**
	Non-specific support	9.4	3.7	7.0	4.8	0.57 (0.20–0.93)***	0.34 (0.02–0.66)*
HADS	No support	9.5	3.0	8.0	3.3	0.52 (0.05–1.10)*	0.25 (–0.20–0.69)
	Support on request	10.2	2.8	8.1	4.0	0.62 (0.13–1.11)***	0.19 (–0.21–0.58)
	Weekly support	9.9	2.4	6.7	3.5	1.07 (0.57–1.57)***	0.58 (0.19–0.96)**
	Non-specific support	10.2	2.9	7.7	3.5	0.76 (0.39–1.13)***	0.31 (0.01–0.62)*
BAI	No support	15.3	9.1	13.7	8.8	0.20 (–0.37–0.76)	0.10 (–0.34–0.54)
	Support on request	16.3	8.5	11.0	9.0	0.62 (0.13–1.11)***	0.22 (–0.17–0.61)
	Weekly support	16.4	7.7	11.1	7.4	0.71 (0.23–1.19)***	0.22 (–0.16–0.60)
	Non-specific support	17.4	9.7	11.5	8.7	0.65 (0.28–1.01)***	0.16 (–0.16–0.48)

p* < .05, *p* < .01, ****p* < .001.

were small in the intention-to-treat analyses, they were moderate in intervention completers suggesting that a higher dose of the intervention relates to better improvements. For depression, no other significant between group differences were found, except that participants who had completed the ‘non-specific support’ demonstrated a significantly greater reduction of depressive symptoms as measured with the PHQ compared to WLC.

The results for anxiety were less robust. For the HADS, participants in the ‘no support’ condition showed superior effects compared to WLC. However, results were not significant in intervention completers, which makes it unlikely that the effect can be attributed to the intervention. Further, in the ‘support on request’ and the ‘non-specific support’ conditions, small effect sizes in favor of those conditions were found but did not reach significance although intervention completers in the latter condition showed, again, superior effects to WLC. Completing the chat or email support may, thus, be beneficial, although it cannot be ruled out that intervention completers, for example, maintained the treatment because they felt better (Donkin et al., 2011).

It is not clear why superior effects were found on the HADS anxiety subscale, but not on the BAI. One reason may be the different focus of both measures, which is somatic symptoms for the BAI and the cognitive aspects of anxiety, such as worry, for the HADS (Julian, 2011). The latter cognitive aspects are more in line with the content of the interventions that we provided, and may therefore have led to superior effects. Another explanation is that a high score on the HADS was used as an inclusion criteria, whereas we did not use a cut-off for the BAI. Participants may have had relatively low scores on the BAI to start with.

Adherence rates were lowest in the group that received ‘no support’ (22% completed the treatment) and comparable in the conditions that received ‘weekly support’ (33%) and ‘support on request’ (31%). The presence of a coach may thus be sufficient to increase adherence rates. However, unlike the study by Berger and colleagues (Berger et al., 2011b), those in the ‘support on request’ condition did not show superior treatment effects to WLC. Apparently, support is more than a way to increase adherence rates and offering a coach without actually providing support may not be sufficient to reach optimal effects. Participants in the ‘support on request’ condition did not frequently request support, however, and it is possible that minimal support, less than weekly, is still sufficient. Adherence rates were highest in the group that received non-specific support (60% completed all contacts) and participants that completed the intervention also improved significantly more than

WLC on some outcome measures of anxiety and depression. The potential of this type of intervention should be examined in future research to see if treatment adherence and effects can be optimized.

Several reasons may explain the inconsistent findings of studies that directly compared guided and unguided Internet-based interventions (Berger et al., 2011b, 2011a; Farrer et al., 2011; Farrand & Woodford, 2013; Mohr et al., 2013). This includes the type of intervention applied, the target population (Andersson & Cuijpers, 2009), the type of support (Titov et al., 2010), study procedures such as baseline screening or email reminders (Berger et al., 2011a; Nordin et al., 2010), small sample sizes (Mohr et al., 2013), and the choice of the control group (Richards & Richardson, 2012). Dependent on study and intervention characteristics, differences between guided and unguided treatments may be more or less pronounced. Still, the pattern of findings in most studies establish effects that are in favor of guided Internet-based interventions albeit not always significant. Between-group effect sizes in our study were relatively small due to high natural recovery in the WLC control group which may be due to the psycho-education that participants were given access to (Donker, Griffiths, Cuijpers, & Christensen, 2009). This may explain why we did not find significant between group-differences beyond those of the guided Internet-based intervention. Additionally, the target population included individuals with mild to moderate symptoms of depression and/or anxiety. Research has shown that less severe symptoms result in smaller improvements compared to more severe symptoms (Bower et al., 2013).

This study has several limitations. First, adherence rates in our study were relatively low in all conditions. These low adherence rates are likely to be influenced by the fact that study participants only received 6 weeks to complete the intervention. Few participants actually dropped out of the intervention. Most participants were simply not able to complete all the lessons within 6 weeks. To increase adherence rates, we have taken several measures such as email reminders (Nordin et al., 2010), but it may have been beneficial to use other methods as well such as persuasive technology (Kelders, Kok, Ossebaard, & Van Gemert-Pijnen, 2012).

Next, the study was powered to identify differences between the interventions and the WLC condition, and not to detect differences between all intervention conditions which were likely to be small. When we explored differences between conditions, we found superior effects of the weekly support condition over the unguided

condition regarding some depression outcomes and satisfaction with treatment. We did not find other between group differences, however. Additionally, the power analyses was based on a one-sided assumption and on the ITT analyses, not taking into account study attrition. This may have limited the statistical power of the study. Finally, we recruited participants from the general population and we do not know if the results in our study are generalizable to clinical settings. However, Internet-based interventions can be applied in different settings. Whereas clinical settings may be more appropriate for guided Internet-based interventions, an advantage of unguided interventions would be that they could be applied outside clinical settings, as they do not need an infrastructure and coaching.

To conclude, these findings are in line with the evidence showing the importance of support in Internet-based interventions for anxiety and depression to reach optimal treatment effects. Compared to WLC, we did not find evidence for the effectiveness of Internet-based interventions when delivered 'without support' or 'with support on request', nor did the results show that 'non-specific support' without providing actual treatment is effective. However, effect sizes in our study were relatively small compared to other studies, possibly due to study or sample characteristics such as symptom severity being mild to moderate, low adherence rates, and the choice of the control group. It is possible that the other interventions have small significant effects in different circumstances. Future research is needed to further explore what the optimal conditions for the delivery of Internet-based interventions are.

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