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Feasibility of a worker-directed web-based intervention for employees with depressive symptoms

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ABSTRACT

Depressive disorders are highly prevalent in the working population and lead to excessive costs. Online interventions have shown to be effective treatments for depression but are not often applied in the work setting, despite the importance of work related aspects in the development and perpetuation of depression. We developed a worker-directed web-based intervention for employees with depressive symptoms named Happy@Work. A process evaluation was conducted alongside a randomized controlled trial to assess the feasibility of the intervention and to explore barriers and facilitators for further implementation of the intervention. Employees from different companies in the Netherlands who experienced elevated depressive symptoms and were not on sick leave were eligible to take part in this study. Happy@Work contains six lessons and every lesson has several assignments. When completed, a coach provides feedback to assignments via the website. Process measures investigated were: reach, dose delivered, dose received, and fidelity. Recruitment methods and participant satisfaction with the intervention were described and analyzed as well. Data was collected at baseline and 8 weeks later via online questionnaires and data registrations on the website. The implementation score of the intervention was sufficient, but reach of the target population was low. The dose delivered was high, with 93.1% of participants who used the intervention components that were offered to them. However, adherence to the intervention was low; the dose received was 57.8%. The fidelity of the implementation of the intervention was satisfactory. Recruitment of companies and participants was difficult. Participants were satisfied with the different aspects of the intervention, especially with the feedback from the coach. The results of this process evaluation showed that the intervention was conducted according to protocol and seems feasible for further implementation. Potential barriers to further implementation of the intervention include the reach of the target population, intervention adherence and the quality of the feedback. Based on the results of the effectiveness of the intervention, we do not recommend further implementation of the intervention in its current form.

1. Introduction

Depressive disorders are highly prevalent in the working population (OECD, 2012; Wang et al., 2006) and lead to excessive costs for both society and employers (Berto et al., 2000; Greenberg and Birnbaum, 2005; Smit et al., 2006; Thomas and Morris, 2003). About 70–85% of the total costs are due to work absenteeism, work impairment and loss of work productivity, which implies that companies pay the largest part of the costs of depression (Lerner and Henke, 2008; Henderson et al., 2005; de Graaf et al., 2011; Smit et al., 2006; Thomas and Morris, 2003).

Many studies on the treatment of depression in mental health care have shown that depression can be treated effectively with different types of psychotherapy such as cognitive behavior therapy, interpersonal therapy, and problem solving therapy (Barth et al., 2013; Cuijpers et al., 2011, 2013). In the past decade, ample research has shown that these treatments can also be delivered successfully through the Internet (Andersson and Cuijpers, 2009; van't Hof et al., 2009; Richards and Richardson, 2012; Spek et al., 2007), which has several advantages such

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as reduction of therapist time, high accessibility, increased user control of the intervention, and cost savings (Cuijpers et al., 2008; Griffiths et al., 2006).

Despite the importance of work related aspects in the development and perpetuation of depression (Nieuwenhuijsen et al., 2008; Szeto and Dobson, 2013) and the large impact on absenteeism and work productivity (Lerner and Henke, 2008; Henderson et al., 2005) not much is known about worker-directed interventions for employees with depression and the results of the few studies that have been conducted thus far are inconsistent (Blonk et al., 2006; van der Klink et al., 2003; Nieuwenhuijsen et al., 2008; Rebergen et al., 2009; Schene et al., 2007). Web-based interventions may be of particular interest to employees due to high user control as they can work through the intervention at their own pace and outside working hours. However, to the best of our knowledge, web-based interventions for the treatment of depression in the workplace have not been studied yet.

Therefore we developed a guided web-based worker-directed intervention for employees with depressive symptoms who are not absent from work due to illness (sick-leave), named Happy@Work. The intervention is aimed at reducing the employee's depressive symptoms, and we postulate that in turn this may reduce work absenteeism and loss of work productivity, which will result in cost savings for the employer. The effectiveness of the intervention is described elsewhere and some of the information in this manuscript has also been reported in those papers (Geraedts et al., 2013, 2014b).

In order to get detailed information on the feasibility of the intervention a process evaluation was conducted alongside the RCT. Performing a process evaluation alongside a randomized controlled trial has been recommended by several authors (Kristensen, 2005; Linnan and Steckler, 2002; Oakley et al., 2006; Saunders et al., 2005) 1) to facilitate the interpretation of study findings by providing detailed information on the implementation of the intervention (Oakley et al., 2006) 2) to gain insight into barriers and facilitators of the implementation of the intervention that was used in the RCT, which can be used to further improve the intervention, and 3) to guide further implementation of the intervention into routine practice (Grol and Grimshaw, 2003; Oakley et al., 2006; Rychetnik et al., 2002).

This paper describes the process evaluation of the web-based intervention Happy@Work. The primary goal is to investigate the feasibility of the intervention by describing the process systematically. The second objective is to explore possible barriers and facilitators for future implementation of the intervention into routine practice.

2. Method

This process evaluation was conducted alongside a randomized controlled trial, which was conducted from 2011 to 2014, in which we studied the effectiveness and cost-effectiveness of a web-based guided self-help course for employees with depressive symptoms who were not on sick-leave compared to a care-as-usual (CAU) control group. This study was approved by the Medical Ethics Committee of the VU University Medical Center (registration number 2011/2) and the details of the design of the study are described elsewhere (Geraedts et al., 2013).

2.1. Recruitment of participants

A total of six (international) companies participated in the study. Participants were recruited via different methods, such as banners on the company's intranet, pamphlets and posters. No other recruitment methods than self-referral were used. Employees from participating companies were eligible to take part in this study if they were 18 years of age or older, had mild to severe depressive symptoms as measured by a score of 16 or higher on the Center for Epidemiological Studies — Depression (CES-D) scale (Bouma et al., 1995), were not on full or partial sick-leave, and had access to the Internet and an e-mail address. Employees were excluded from the study if they were using medication for depressive symptoms for less than one month, or if they had a legal labor dispute with their employer. All interested employees who met the inclusion criteria were randomized to one of the groups. In this process evaluation we will only report data from the intervention group (n = 116), since they were the only group exposed to the intervention.

2.2. Intervention protocol

The intervention Happy@Work is a brief web-based intervention delivered with guidance from a coach. It is based on Problem Solving Treatment (PST) (Bowman et al., 1995), Cognitive Therapy (CT) (Beck et al., 1979), and a guideline for employees to help them prevent work related stress (Franck and Wiezer, 2004a,b). In PST, it is assumed that depressive symptoms can be caused by practical problems that people face in their daily lives. It is believed that, when people can resolve their problems, their symptoms of depression will decrease (Warmerdam et al., 2008). Different PST methods can help them solve their problems. Sometimes problem solving can be disrupted by automatic thoughts such as “I am too weak to solve this problem” or “I will fail solving this problem”. PST may not be sufficient to change these automatic thoughts. Therefore, we incorporated CT information and assignments to support a change in automatic thoughts (Beck et al., 1979). Some of the problems that people face are likely to be work-related. These problems are sometimes more difficult for people to comprehend (Franck and Wiezer, 2004a,b). Therefore, one lesson is focused on work-related problems specifically.

Happy@Work consists of six lessons and each lesson follows the same structure; information about the theme of the lesson, examples from fictitious participants, and assignments. In addition, participants were given the opportunity to keep a daily mood diary throughout the intervention, by grading their mood between 1 and 10. The diary also allows for a brief text description of positive and negative events that occurred that day. The assignment of the mood diary was optional, which was informed to the participant during the first lesson, and was not seen as necessary to successfully follow the course. A detailed description of the lessons can be found in Table 1 and screenshots of the intervention can be found in Supplementary file 1.

The following procedure was applied. When participants were eligible to take part in the study and randomized to the intervention group, an account was generated on the Happy@Work website by the researchers and a coach was assigned. Next, an automatic e-mail was sent to the e-mail address of participants containing a link to activate the account and the option to create their own password. This allowed participants to log on to the website, to start with lesson one of the intervention, and to access the mood diary. The coach received an e-mail whenever a participant had finished a lesson and provided feedback within 3 working days via the website. Participants received an automatic e-mail as soon as the feedback was posted on the website containing information on the theme of the next lesson and the deadline for completion. The participants were permitted to start with a new lesson when they had received the feedback (i.e. tunneled intervention).

The total duration of the intervention was seven weeks. Participants were advised to follow one lesson each week and were given one week extra time in case of delay. The daily mood diary could be used for eight weeks. When deadlines for completion were not met, e-mail reminders were sent by the researchers. If participants had not shown activity on the website for a period of three weeks, they were considered intervention drop-outs and received an e-mail with a link to a short online questionnaire to identify drop-out reasons. Participants were allowed to continue with the intervention after they received the e-mail with the drop-out questionnaire. The same questionnaire was sent to participants who decided to discontinue the intervention, which could be announced via e-mail to the researchers or via the website to the coach.

All coaches were Master's level students in clinical psychology that had followed a six hour training. All coaches used a detailed manualized

Table 1
Description of the intervention.

Lesson	Title	Content	Assignments
1	Introduction of problem solving	Introduction to the course	PST
		Psycho-education about depression and stress	Mood diary
		Information about PST	
2	Problem solving methods	Discussion of different problem solving methods	PST
			Mood diary
3	Changing cognitions	Identification of (automatic) negative thoughts	PST
		A method to change negative thoughts	CT
			Mood diary
4	Dealing with work related problems	Special focus on solving work related problems with	PST
		PST	CT
			Mood diary
5	Receiving and giving social support	Receiving social support	PST
		from others	CT
		(such as colleagues or a partner)	
		Provide social support to others	Mood diary
6	Intervention evaluation and relapse prevention	Reflect on progress in the intervention	PST
		Make a plan how to deal with future problems	Mood diary

CT = Cognitive Therapy; PST = Problem Solving Treatment.

protocol throughout the intervention. To ensure treatment fidelity, all feedback was reviewed, and corrected if necessary, by a supervisor (AG) before it was placed on the website.

2.3. Process elements

We defined seven process components that are in line with the recommendations of Linnan and Steckler (2002); recruitment, reach, dose delivered, dose received, fidelity, implementation score, and satisfaction. These components were addressed by combining both qualitative and quantitative data at the participant level or the company level. The process component Context was not systematically assessed in this study and was therefore not reported.

2.3.1. Recruitment

Recruitment refers to the procedures used to approach and attract companies to partake in the study and employees with depressive symptoms to participate in the study. The researchers registered all companies that were approached, the methods that were used to recruit companies and the reasons for not taking part. We also monitored all methods for recruiting participants.

2.3.2. Reach

Reach is defined as the degree to which the intended audience participated in the intervention. The intervention targets all employees from participating companies who were not on sick-leave and who experienced depressive symptoms and wanted help for that via the intervention Happy@Work. Therefore, we defined reach as the proportion of the number of study participants who were eligible and willing to participate divided by the number of employees who applied to participate in the study. We also collected data on the proportion of recruited employees who did not engage in the study and exclusion reasons before randomization.

2.3.3. Dose delivered

Dose delivered concerns the proportion of the intended intervention that is actually delivered to the participant and is determined by the actions of the intervention provider (the researchers). As described above, at the start of the intervention, researchers created an account for every participant who was randomized to the intervention group and which had to be activated by the participant. After activation of the account, the participant had full access to all intervention components which the intervention provider made available on the website. Once activated, the participant had direct access to the mood diary and could start with the first lesson of the intervention. Since this is a tunneled intervention, the participant had to complete a full lesson and receive feedback in order to proceed with the next lesson. Dose delivered was therefore defined as the proportion of participants that started using the intervention, either by starting lesson one or by using the mood diary, divided by the total number of generated accounts.

2.3.4. Dose received

Dose received is a process measure which assesses the participant's "exposure" to the intervention; what proportion of the intervention components did the participants receive? In accordance with the working mechanism of the intervention, we decided that the basic information and assignments of both PST and CT were core components of the intervention (lesson one to three). Therefore, dose received was defined as the proportion of participants who had completed three or more lessons of the intervention. We also collected data on frequency of use of the mood diary.

2.3.5. Fidelity

Fidelity refers to the quality of the implementation of the intervention and the extent to which the intervention was delivered as planned by the intervention providers. In this study trained coaches gave written feedback on the assignments after completion of each lesson. All coaches used a manualized protocol for providing feedback and all feedback was checked and corrected by a supervisor (AG) before it was placed on the website. Fidelity was defined as the proportion of text of feedback that was written by the coach according to the manualized protocol. A random sample of 10% of all feedback texts was checked by the main researcher (AG). Of every feedback text the proportion of text which was written according to the manualized protocol was scored. A score of 100% means that no changes to the feedback were necessary, while a score <100% means that changes were needed (a lower score means more corrections needed). The proportions were summed and divided by the number of the sample of feedback texts. The average proportion was then reported as the fidelity score.

2.3.6. Implementation score

An implementation score was calculated by using the average of four process components: Reach, Dose delivered, Dose received and Fidelity.

2.3.7. Satisfaction

Satisfaction with the intervention was assessed after the intervention, at 8 weeks. The Internet Intervention Evaluation Questionnaire (van Straten, unpublished results) was used to evaluate satisfaction with the intervention. This questionnaire contains both quantitative and qualitative questions. Participants were asked to grade the website, feedback, and the intervention on a scale from 1 to 10. Concerning the website, participants were asked to score the usability, lay-out and distinctness of the website. Regarding the feedback, they were asked to score the quality, length and frequency of the feedback. In relation to the intervention, they were asked to score the information on the website, the usefulness of the fictitious participants, the quality of the assignments, the quality of the support on the website to reduce symptoms, and the duration of the intervention. All answers were scored on a 5-point Likert scale ranging from "very bad" to "very good". Furthermore, participants were asked to give comments and/or suggestions for improvement of the website, the feedback, and the intervention, and were allowed to give other remarks. These were

all optional open-ended questions which were scored in clusters by two researchers (AG & AK) independently.

To identify reasons for drop-out we used an adapted version of the Internet Intervention Adherence Measure (Ritterband et al., 2008). Reasons were categorized as Internet/computer/technical issues, Personal/family issues, Intervention — general issues, and Intervention — specific issues. Participants responded whether the reason had 'no part' (scored 1), 'a small part' (scored 2), or 'a major part' (scored 3) in their decision to drop out. An open-ended question also asked for other reasons of drop-out. These answers were clustered by the researchers as mentioned before.

2.3.8. Future use of web-based interventions

The participants were asked for their preference regarding the delivery of a future web-based intervention. Options were: the intervention is delivered via the employer (including the coaching), the intervention is delivered via the employer and the coaching through mental health care, the intervention is delivered via mental health care (including the coaching), or "I would not opt for a web-based intervention". Participants were then asked to explain their answer in an open-ended question. This answer was again clustered by the two researchers (AG & AK).

2.4. Data collection and data analysis

Data for this process evaluation was collected at baseline (T0) and at 8 weeks (post-treatment; T1) via online questionnaires to assess baseline demographic characteristics, such as age and gender, and satisfaction with the intervention. We also used the following data that was obtained from the website: account activation, number of lessons completed, dates of lesson completion, dates of feedback placement on the website, e-mail reminders, e-mails with notifications of feedback, inactive participants, and frequency of use of the mood diary. The data was analyzed in SPSS and Excel. Quantitative data were analyzed by means of descriptive statistics; frequencies, percentages, means and standard deviations.

3. Results

3.1. Recruitment

3.1.1. Recruitment of companies

A total of 49 companies were approached to participate in the study, the majority by sending a flyer with information about the study via e-mail. Some companies were approached via researchers from the network of the researchers in this study. Four companies were contacted directly by telephone or in face-to-face meetings. Of the 49 approached companies, 20 did not respond to the e-mail invitation and 23 did not want to participate in the study; 19 of those companies showed initial interest but decided not to take part after further discussion with the research team. The main reasons for not taking part were the study design; a randomized controlled trial with a control group was not seen as preferable in the company (n = 9), or the company could not participate due to reorganizations (n = 5). Nine companies did not give a reason for not taking part. One company committed to the study initially but decided not to in the end because the study could not be implemented in the company. Finally, five of the 49 approached companies agreed to participate in the study. There was one company who already committed to participate in the study before recruitment of companies started. This company was approached by the researchers during the design phase of the trial and was involved in several final details concerning the use of questionnaires in the RCT. This makes a total of six companies. The six participating companies were: two banking companies (companies 1 and 2), two research institutes (companies 3 and 4), one security company (company 5), and one university (company 6).

3.1.2. Recruitment of participants

Recruitment of participants was between September 2011 and December 2012. A total of four different recruitment methods were used in the recruitment of participants; banners on intranet websites or digital newsletters of the companies, digital pamphlets on intranet websites, paper pamphlets, and paper posters. Table 2 shows an overview of the different recruitment methods per company and the number of recruited employees. The banners always contained a link to the digital pamphlet which was available on a different webpage on the intranet of the company. Banners and digital pamphlets were used in all companies, paper pamphlets were used in companies 1 and 5, and paper posters were only used in company 5. In companies 4–6 a banner was placed on the intranet once. In companies 1–3 a banner was placed online twice, because the recruitment period in these companies was longer (see also Table 2). The length of the banners differed per company but was generally 4 to 10 sentences long. The exact content of the banner was determined in agreement with the company and was targeted at people who were experiencing "feelings of stress or feeling down" (companies 2–6) or "a feeling of not being in balance" (company 1). All banners mentioned the research setting, but the amount of detail on this differed per company.

3.2. Reach

A total of 778 employees from the different companies applied for the study and 250 employees were eligible to participate. Fig. 1 shows the flow-diagram of study participants, including exclusion rates and reasons. Exclusion rates and reasons are also reported in Table 2.

To determine whether the study participants of the different companies were representative of the entire group of employees of the companies we compared characteristics of study participants with characteristics of employees in the entire company via different internal reports and databases of employee characteristics. The characteristics that were compared were age, gender, and educational level. In all companies, study participants were higher educated and more likely to be female compared to all employees from that company. This probably reflects the higher depression rate in women in general (Alonso et al., 2004). In company 3, participating employees were slightly younger compared to the average age in that company. Table 3 shows the baseline characteristics of the participants in the intervention group.

From the 778 employees who applied for the study, 250 participants were eligible to participate in the study. Of those, two participants withdrew from the study. This leads to a reach of 31.9% ([250–2]/778).

3.3. Dose delivered

A total of four participants in the intervention group did not use any of the intervention components that were offered to them by the intervention providers after they had activated their account. This results in a dose delivered of 93.1% (108/116).

3.4. Dose received

Completion of lessons is shown in Fig. 1. Lesson 1 was completed by 105 participants (90.5%), lesson 2 by 87 participants (75%), lesson 3 by 67 participants (57.8%), lesson 4 by 57 participants (49.1%), lesson 5 by 45 participants (38.8%), and lesson 6 by 32 participants (26.7%). This results in a dose received score of 57.8% (67/116). The mood diary was used by 86% of the participants, but the frequency of usage varied; M = 18.6 (SD = 15.0, range = 1–58).

3.5. Fidelity

A random sample of 39 feedback texts was checked. The proportion of feedback which was written according to the feedback protocol varied

Table 2
Recruitment methods in the different companies.

Company	Total employees	Recruitment	Recruitment method	Included			Exclusion			
		Recruitment period		Total recruited	Total included	Included intervention	Depression	Absenteeism	Medication	Labor dispute
Bank 1 (1)	18,207	Sep '11–Dec 2012	2 times banner Digital pamphlet	316	59	30	59	21	2	2
Bank 2 (2)	40,923	March–Dec 2012	2 times banner Digital pamphlet	300	107	54	54	17	7	1
Research 1 (3)	3357	Apr–Dec 2012	2 times banner Digital pamphlet	88	30	14	20	6	2	–
Research 2 (4)	2408	Apr 2012	1 banner Digital pamphlet	15	9	5	3	–	–	–
Security (5)	6328	Dec 2012	1 banner Paper pamphlets Paper posters	22	11	5	2	–	1	–
University (6)	8192	Dec 2012	1 banner Digital pamphlet	37	15	8	6	4	–	1
Total	79,415	–	–	778	231	116	144	48	12	4

between 62.3% and 100%. The mean proportion was 72.2% which results in a fidelity score of 72.2%.

3.6. Implementation score

Using the average of the process components Reach, Dose delivered, Dose received, and Fidelity, the implementation score was 63.8%.

3.7. Satisfaction

The post-treatment assessment was completed by 74 participants. Table 4 presents satisfaction scores with the different components of the intervention including comments and suggestions for improvement of the intervention. In general, the satisfaction with the intervention, feedback and website was sufficient, with all grades above 7 on a scale

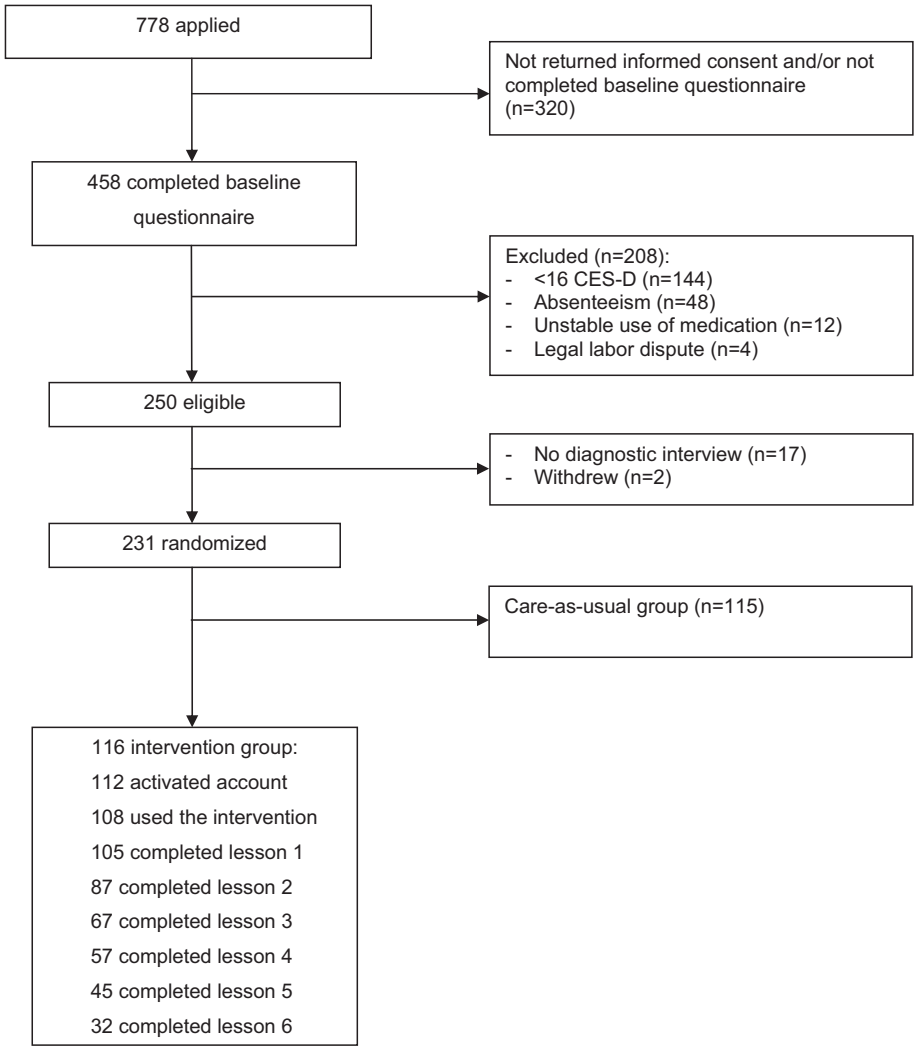

Fig. 1. Flowchart of participants.

Table 3
Baseline characteristics of the intervention participants.

Characteristic[a]	
Age (years ± SD)	43 ± 8.9
Gender	
Female	77 (66.4)
Male	39 (33.6)
Country of birth	
Netherlands	107 (92.2)
Other	9 (7.8)
Marital status	
Relationship	86 (74.1)
No relationship	30 (25.9)
Education[b]	
Low	11 (9.5)
Middle	31 (26.7)
High	74 (63.8)
Working hours[c] (mean ± SD)	33.71 ± 4.8
Working days (mean ± SD)	4.32 ± 0.6

[a] All data are presented in N (%) of participants, unless otherwise specified.
[b] Low = primary education or lower general secondary education, middle = intermediate vocational education or high school, high = higher vocational education or university.
[c] Mean working hours per week according to the contract of the employee.

from 1 to 10. The website was graded 7.4 (SD = 0.9) and the different components related to the website were all scored "good." Suggestions for improvement of the website were reported by 23 participants. The feedback was graded 7.7 (SD = 1.3) and the different components related to the feedback were all scored "good." Commentary and suggestions for improvement were reported by 26 participants. The intervention was graded 7.4 (SD = 1.2) and the different components related to the intervention were all scored "good." Commentary and suggestions for improvement were reported by 35 participants. Additional remarks were reported by 14 participants and most of the remarks were an addition to the previous remarks. Needing a longer period of time to complete the intervention was reported most frequently (3 times).

A total of 29 participants dropped out of the intervention, 16 on their own request and 13 due to inactivity on the website. Two participants reported that they wanted to continue with the intervention after they had received the drop-out questionnaire. The drop-out questionnaire was completed by 14 participants and an additional six participants reported a drop-out reason via e-mail. The main reason for drop-out was the category "Personal/family issues", with lack of time as the most important reason (reported 8 times). Other frequently reported reasons for drop-out were that the intervention took too much time to follow (reported 8 times) and that the time to complete the assignments was too short (reported 7 times). However, these reasons were scored as less important.

3.8. Future use of web-based interventions

Participants were also asked what their preference would be regarding interventions in the future. Participants most frequently reported that they would prefer intervention delivery via the employer and to receive coaching via mental health care. Participants reported that they believed it was important that their employer facilitates the possibility of following a web-based intervention for depressive symptoms, but that participation should be anonymous from the employer (reported 17 times). The four different preference options and the argumentation can be found in Table 4.

4. Discussion

The aims of this study were to assess the feasibility of the intervention by describing the process systematically according to the process evaluation criteria of Linnan and Steckler (2002) and to explore possible barriers and facilitators of further implementation of the web-based intervention Happy@Work.

The results of this process evaluation show that the intervention was implemented according to protocol, with an overall implementation score of 63.8%. The intervention providers delivered the intervention to participants according to the intervention protocol (dose delivered) and the manualized protocol to provide feedback was overall used properly (fidelity score). Furthermore, the satisfaction scores of the different intervention components were all good. Satisfaction with feedback received the highest grades, and 76% of the participants reported that they would like to follow a web-based intervention again in the future. However, only 31.9% of the target population was reached within this study. This result is highly influenced by the fact that this intervention was implemented alongside a randomized trial.

Table 4
Satisfaction and preferences scores.

Participants (n = 74)	Grades (Mean, SD)	Satisfaction (Mean, SD)	Reported comments, suggestions, and argumentation
Satisfaction with the intervention			
Website	7.4 (0.9)		
Usability		3.8 (0.6)	Facilitating the process of saving and sending assignments (n = 6)
Lay-out		3.9 (0.6)	
Distinctness		3.9 (0.5)	
Feedback	7.7 (1.3)		
Quality		4.0 (0.8)	More tailored feedback (n = 10)
Length		4.1 (0.6)	Expression of satisfaction with the motivational approach of the feedback (n = 10)
Frequency		4.2 (0.5)	
Course	7.4 (1.2)		
Explanation on website		3.9 (0.5)	Having a longer period of time to complete the course and/or lessons (n = 10)
Usefulness of fictitious participants		4.0 (0.6)	
Quality of the assignments		3.9 (0.6)	Expression of satisfaction with the course (n = 9)
Quality of support on the website to reduce symptoms		3.8 (0.7)	
Duration of the course		3.7 (0.8)	
Preferred use of intervention:	**Percentage**		
Intervention & coaching via employer/company	16%		The employer would be informed about the mental health status of the employee and/or coach's expertise of the company (n = 7)
Intervention via employer & coaching via MHC	39%		Important that the employer facilitates the possibility of following an intervention, but that participation should be anonymous from the employer (n = 17)
Intervention & coaching via MHC	20%		Total anonymity from the employer (n = 20)
I would not follow an Internet intervention	24%		Preference for face-to-face contact with a professional therapist (n = 14)

MHC = mental health care.

The outcome in terms of reach is biased since it represents a subsample of the target population who is willing to participate not only in the intervention, but also in a study. It is, however, not known how many employees of the target population were willing to participate in the intervention, but did not apply because they did not want to participate in a study. The estimation of the reach is therefore a conservative estimation. Furthermore, the dose received score was relatively low which indicates low treatment adherence which was influenced by the fact that participants only received seven weeks to complete the intervention. The majority of the participants were simply not able to complete more lessons within those weeks. Many participants reported that they did not have enough time to complete the lessons and only few participants stopped with the intervention at their own request due to lack of time or other reasons. This time restriction was a consequence of our research design. However, it is very difficult to draw conclusions on whether the treatment adherence would be higher when the intervention would be used in routine practice. The recruitment of both companies and participants in order to include 116 participants in the intervention appeared to be difficult. Only 10% of the approached companies participated in the study and only a selective group of the total number of employees who applied for the study participated in the study. Since this process evaluation was performed alongside a RCT and recruitment of both companies and participants was meant for participation in the study, it is difficult to draw conclusions whether companies would be willing to provide the intervention to their employees and whether employees would be interested in the intervention. Several companies did not want to participate in the study because of the design, but it is not known whether these companies would have been interested in the intervention if this was not part of a research study. Based on the implementation score, the high satisfaction scores and the adequate fidelity score we conclude that the intervention seems feasible, but this conclusion needs to be interpreted with care due to the lower reach and dose delivered score and difficulties with recruitment. Other studies have also showed good feasibility of web-based interventions for various mental health problems (Bendtsen et al., 2006; Bewick et al., 2008; van Voorhees et al., 2007; Westrup et al., 2003) and treatment adherence is a general problem in web-based interventions.

The results of this study revealed three important barriers to future implementation of the intervention into routine practice. The first concerns the reach of the target population. As described before, the reach was 31.9% and represents a conservative estimation of the reached target population. Since the successes of recruitment of the target population differed between companies, we can conclude that it is important to pay attention to recruitment strategies to reach the target population, such as use of different channels to promote the intervention like the intranet and also paper posters, choices of specific words that relate to the company culture like “stress” or “feeling down” instead of “depressed”, and so on.

The second barrier concerns adherence to the intervention. The majority of the participants used some of the different intervention components which were offered by the intervention providers (dose delivered). However, the dose received score was relatively low; only 57.8% of the participants followed the core components of the intervention and only 26.7% completed the entire intervention within seven weeks. Adherence to web-based interventions is a current issue in Internet intervention research (Eysenbach, 2005; Donkin et al., 2011; Riper et al., 2010) and drop-out percentages vary between studies (Melville et al., 2010). Several methods to increase adherence rates have been suggested, such as further increase of user control (Sorbi and Riper, 2009), individually-tailored interventions (Carlbring et al., 2011), text-messages by phone (Heber et al., 2013), and telephone calls to participants (Carlbring et al., 2007), but it is not yet known what the effects of these methods are (Melville et al., 2010). This study suggests that increasing the time for completion of lessons could be a possible solution to decrease drop-out, since both intervention drop-outs and intervention completers reported that they would have liked to have more time to complete lessons. The final barrier concerns the fidelity. The overall fidelity score was 72.2% which is a fair score. This means that, overall, the supervisor had to correct 27.8% of the text before it could be placed on the website. However, the percentage of text that had to be corrected by the supervisor varied; in several cases a correction of almost 40% of the text was necessary. Participants were pleased with the quality and frequency of the feedback that was provided. In this study, the supervision of the coaches was meant to make sure that the quality of the feedback was sufficient and the high satisfaction scores showed that this was successful. However, if the intervention would be implemented in routine practice there will not be a supervisor and feedback will be placed online directly by the coach. This implicates that both the training of coaches and the feedback protocol should be reevaluated to improve the quality of the written feedback of the coaches.

4.1. Strengths and limitations

An important strength of this study is the data collection, which was assessed in a systematic way via the use of a well established theoretical framework to assess process measures of Linnan and Steckler (2002). Furthermore, we collected both quantitative and qualitative data from participants via online questionnaires and we collected objective data from the website. The combination of these different data collection methods gives a more extensive and detailed view of the participant' compliance to the intervention.

This study has several limitations. First, this process evaluation was conducted alongside a RCT. Although the RCT design of this study is a very strong design to test the effectiveness of an intervention, it has some important disadvantages facing the process evaluation. First, the implementation of the intervention was provided and controlled by the researchers, which is not comparable to use of the intervention in routine practice. This may give a blurred view of the reach, dose delivered, dose received, fidelity and implementation score. As a result of the high control of the researchers over the implementation of the intervention, several of these scores seem unnaturally high. This needs to be kept in mind for implementation of the intervention in routine practice. The process evaluation shows that it is possible to successfully implement the intervention under controlled circumstances. Second, this intervention was developed to be used by occupational safety and health services (OSHS) within companies. This is a very different setting than the current research setting in which the intervention was tested. This has important consequences for the interpretation of the results. For example, as described before, the feedback will not be supervised in routine practice, which implicates that the training and the feedback protocol should be reevaluated before further implementation. With some adaptations to the protocol and training OSHS employees should be able to provide high quality feedback to employees who receive the intervention. Furthermore, the creation of accounts, which was done by the researchers, will probably be performed by employees of the OSHS. The creation of accounts could easily be done by employees of the OSHS but is not clear whether they often meet the target group; employees with depressive symptoms who are not on sick-leave. Privacy issues also need to be kept in mind. During the trial, participants were allowed to follow the intervention completely anonymously from their employer. Participants frequently reported that they thought it was very important that the employer facilitates the delivery of a web-based intervention but that participation would be unknown to the employer. If the intervention would be used by the OSHS, clear statements about the confidentiality obligation of the OSHS need to be made.

A second related limitation of this study is that the participants in the intervention were recruited in a randomized controlled trial, which means that they also had a 50% chance to be assigned to the control group who did not receive the intervention. It is very likely that only highly motivated employees participated in this study (selection bias)

and that these participants are not representative of the target group in routine practice. This can influence effectiveness results. However, it could also indicate that more employees would like to follow the intervention if it was implemented in routine practice because they will not have a chance to be randomized to a control group. Furthermore, the 49 approached companies were recruited to participate in a study and not for the implementation of a web-based intervention. It is therefore not known if companies will be more or less willing to use the intervention.

Finally, although we were able to use some objective data from the website, we did not use an extensive weblog registration system to collect data for participant's compliance. As a result, we were unable to collect data on, for example, time registration and log-ins which resulted in a less extensive and reliable measure of participant compliance with the intervention.

4.2. Implications for research and practice

This process evaluation showed that the web-based intervention Happy@Work seems feasible. This implicates that the intervention could potentially be implemented into routine practice. Three important barriers to further implementation should be kept in mind concerning the reach of the target population, adherence to the intervention, and the quality of the feedback. More research on possible effective methods to decrease drop-out from web-based interventions is necessary.

Since this study was performed alongside a randomized trial, it is important to combine the findings of this process evaluation with the findings in terms of effectiveness of the intervention (Geraedts et al., 2014a,b). Based on these findings we do not recommend further implementation of Happy@Work into routine care in its current form. The effective dose of the intervention (dose delivered) was not sufficient. This affected the effectiveness results; no significant results in terms of decrease in depressive symptoms were found. Therefore, specific attention to increasing the treatment adherence is necessary before the intervention should be implemented.

Besides the limitations of performing a process evaluation alongside a randomized controlled trial, future research on the effectiveness of web-based interventions should more often focus on performing process evaluations as well. Only few researchers have published papers on process evaluations (Bouwsma et al., 2013; Escoffery et al., 2003; van Voorhees et al., 2007), or feasibility studies (Bendtsen et al., 2006; Bewick et al., 2008; van Voorhees et al., 2007; Westrup et al., 2003), but a corresponding theoretical framework approach, such as Linnan and Steckler's (2002) approach, is often missing. Increased use of process evaluations, preferably with a theoretical framework approach, will narrow the gap between research and routine practice and could facilitate the implementation of research on web-based interventions into routine practice which is one of the challenges in e-mental health in the Netherlands (Blankers et al., 2013; Riper et al., 2007; Sorbi and Riper, 2009). These process evaluations should incorporate both quantitative and qualitative data. Linnan and Steckler (2002), for example, also recommend the use of focus interviews with different stakeholders when performing a process evaluation. Furthermore, Internet intervention researchers should also perform more studies on implementation of Internet interventions.

When developing a study on a web-based intervention in the workplace context we recommend to pay specific attention to the question how one can reach the target population. Researchers should consider using different recruitment strategies, like intranet and paper posters, and one should also consider other options such as recruitment via company counselors or managers. Furthermore, for the choice in the content in the recruitment messages the company culture should be kept in mind. Words like “stress” might better fit in the company culture compared to, for example, “depressed”. These strategies might increase the reach of the target population. Researchers should also consider different and multiple options to keep participants motivated to complete the intervention. One might, for example, use both e-mail reminders and text messages by phone when deadlines are not met. A longer period to complete the intervention seems essential. Another option would be to use more tailored interventions. This will likely increase motivation of participants because they will only receive sections of the intervention that relate to their specific symptoms and problems.

4.3. Conclusion

This study described the process evaluation of the web-based intervention Happy@Work. The results showed that the intervention seems feasible for further implementation in occupational health care. Three barriers to further implementation of the intervention concerning reach, adherence to the intervention, and quality of the feedback need to be kept in mind. However, due to the high control of the researchers over the implementation of the intervention, the results should be judged with care. Based on the results of the effectiveness of the intervention, we do not recommend further implementation of the intervention in its current form.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

PC and WvM obtained funding for the study. AG drafted the manuscript. All authors contributed to the further writing of the manuscript. All authors read and approved the final manuscript.

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Appendix A. Supplementary data

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