

# GET.HAPPY - Acceptance of an internet-based self-management positive psychology intervention for adult primary care patients with mild and moderate depression or dysthymia: A pilot study

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## ABSTRACT

**Introduction:** A growing number of internet interventions have been shown to help in alleviating symptoms of depression. So far, only little research has focused on other methods than CBT. The present study aimed to investigate the level of satisfaction with a positive psychology online training among patients with mild and moderate depression or dysthymia. Secondary outcome measures included changes in symptom severity, health related quality of life, and negative effects.

**Methods:** A total of 81 participants were allocated to the intervention. They were asked to complete online questionnaires and were called by one of the study psychologists at baseline, at post-treatment, and at follow-up (3 months after completion of the intervention). Shorter questionnaires were administered after each module.

**Results:** Overall satisfaction was promising. While participants seemed to be very satisfied with many aspects of the program itself, they were slightly less satisfied with its impact on the problems they sought to solve. Overall, negative effects attributed to the program were small with one exception. At post-treatment, 22.6% of the participants felt that they or their problems were not taken seriously by the program. Symptom severity decreased over time with mild to moderate effect sizes. There was a moderate increase in satisfaction with mental health at both post-treatment and follow-up.

**Conclusions:** The online program investigated here may be a useful resource-oriented addition to the standard treatment of depression.

## 1. Introduction

With a 12-month prevalence of 6.9%, depression is among the leading causes of disability worldwide (Vos et al. 2012; Wittchen et al. 2011). Despite the existence of adequate treatments, such as antidepressant medication or psychotherapy, not all patients receive professional help (Kohn et al. 2004; Wittchen et al. 2011; Wittchen and Jacobi 2005). Possible reasons include long waiting periods for doctor's appointments, the fear of stigma, or a preference to solve the problem on one's own (Corrigan 2004; Kessler et al. 2001; Kohn et al. 2004).

In past years, internet interventions for different kinds of physical and mental illness have become available (e.g. Beintner et al. 2012; Buhman et al. 2016; Mewton et al. 2014; Ramadas et al. 2011; Riper et al. 2014). Such interventions may aid in bridging the treatment gap by providing a first, low-threshold opportunity to seek professional

help. An ample body of research aimed at the online treatment of depression suggests mild to moderate effects of internet interventions on different outcome measures, such as symptoms of depression, quality of life, or disability (Andersson and Cuijpers 2009; Cuijpers et al. 2011; Richards and Richardson 2012; Spek et al. 2007). Effect sizes were larger and drop-out was lower, when the intervention was supported by professional or administrative staff as opposed to purely self-guided (e.g. Andersson and Cuijpers 2009; Bauermeister, Reichler, Munzinger, & Lin, 2014; Cowpertwait and Clarke 2013; Johansson and Andersson 2012; Richards and Richardson 2012). Effects may also be moderated by initial symptom severity (Bower et al. 2013) and treatment status (Klein, Berger, Schroder, Spath, Meyer, Caspar, et al., 2016a; Meyer et al. 2015). Remarkably, effect sizes found for internet interventions seem to be similar in magnitude to those of face-to-face psychotherapy (Andersson et al. 2014a; Andrews et al. 2010; but see Arnberg et al.

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(2014) for a critical review), and, authors generally report high levels of satisfaction with this kind of intervention (Andrews et al. 2010)<sup>1</sup>.

To this point, most of the internet interventions aiming at the treatment of depression are based on cognitive behavioral therapy (CBT). Although both face-to-face and internet-based CBT are among the most researched and most effective psychotherapeutic approaches, not all patients respond to this form of treatment. Similar findings for other forms of psychotherapeutic and medication treatment suggest that there is no “one-fits-all” solution (see Hollon et al. 2002 for a review of different interventions). Differences in patients' personalities, problems and preferences seem to require different approaches for internet-based interventions just as there are for face-to-face therapies. Yet, only few studies investigated programs that were based on other kinds of treatment, such as psychodynamic therapy (Johansson et al. 2012), interpersonal therapy (IPT; Donker et al. 2013), behavioral activation (BA) combined with acceptance and commitment therapy (ACT; Carlbring et al. 2013), or problem solving therapy (van Straten et al. 2008; Warmerdam et al. 2008). First results are promising with moderate to large effects. However, according to Amberg et al. (2014), more research is needed to determine the efficacy of other methods than CBT.

In the present study, we investigated an internet intervention which was based on positive psychology interventions (PPI). In contrast to other psychological interventions, such as CBT, which focus on the reduction of symptoms by changing negative thoughts and behaviors, the field of positive psychology aims to improve well-being, satisfaction, and happiness by promoting positive thoughts and behaviors (Seligman and Csikszentmihalyi 2000). PPIs include a wide variety of different strategies, such as writing gratitude letters, identifying one's strengths, or writing down a number of good things that happened during the day. Although, technically, the idea of PPIs was not to fix something pathological or deficient (Sin and Lyubomirsky 2009), the effects of such techniques on mental illness (Walsh et al. 2016), and symptoms of depression in particular (e.g. Seligman et al. 2006), have become the focus of interest in a growing number of studies. In two meta-analyses, results of the extant research were summarized. Both analyses showed an increase in well-being and a mild to moderate decrease in symptoms of depression (Bolier, Haverman, Westerhof, Riper, Smit, and Bohlmeijer, 2013b; Sin and Lyubomirsky 2009), suggesting that PPIs may be a beneficial addition to the standard treatment of clinical depression (Johnson and Wood 2015). A growing body of research has focused on the dissemination of PPIs via the internet - an important undertaking as approximately 50% of online happiness seekers present with clinically relevant symptoms of depression (Parks et al. 2012). So far, online positive psychology interventions (OPPIs) have delivered mixed results in alleviating depressive symptoms (see Bolier and Abello 2014; Mitchell et al. 2010 for reviews). While some studies observed positive effects of OPPIs compared to the control condition (Bolier, Haverman, Kramer, Westerhof, Riper, Walburg, and Bohlmeijer, 2013a; Seligman et al. 2005; Shapira and Mongrain 2010; Wellenzohn et al. 2016), others did not (Abbott et al. 2009; Gander et al. 2013; Mitchell et al. 2009; Mongrain and Anselmo-Matthews 2012).

Unlike most of the programs using CBT, which usually incorporate a number of different topics and exercises, most of the OPPIs investigated in the aforementioned studies were short one-week exercises. So far, only a few studies have investigated longer or more complex programs, most of which incorporate exercises from both positive psychology and

other disciplines, such as cognitive therapy (Abbott et al. 2009; Antoine et al. 2018; Bolier, Haverman, Kramer, Westerhof, Riper, Walburg, and Bohlmeijer, 2013a; Roepke et al. 2015) and results were mixed. Both Antoine et al. (2018) and Abbott et al. (2009) assessed changes in symptoms of depression in non-clinical samples. While Antoine et al. (2018) observed a decrease in symptoms of depression, Abbott et al. (2009) did not, possibly due to small sample sizes and high attrition rates.

Bolier, Haverman, Kramer, Westerhof, Riper, Walburg, and Bohlmeijer (2013a) observed mild to moderate levels of depression at baseline and a small reduction in symptoms of depression post-treatment as well as six months after the intervention. However, the majority of participants completed only one out of six modules (the minimum suggested by the program), making it more difficult to draw conclusions about the use of complex programs. Roepke et al. (2015) investigated a program consisting of two modules, one of which incorporated CBT exercises and the second one consisting of PPI exercises, among clinically depressed participants. Symptoms of depression decreased significantly when participants downloaded the entire program. However, exploratory analyses showed no advantage of just the PPI module over a waitlist control group. To summarize, more complex OPPI programs have been shown to reduce symptoms of depression in non-clinically depressed participants. Studies investigating the reduction of symptoms of depression among clinically depressed participants do not allow to draw firm conclusions about the use of complex OPPI programs. To our knowledge, a complex online program, consisting of PPI exercises only and encouraging participants to complete multiple exercises, has not yet been tested among clinically depressed participants. Exploratory analyses by Carpenter et al. (2016) show that, in a non-clinically depressed sample, a more frequent use of a complex OPPI program can lead to increased well-being in a subgroup of participants who showed low well-being at baseline. Although these results suggest that distressed participants benefit from higher use of a complex OPPI program, they cannot simply be transferred to a group of clinically depressed participants. Due to certain characteristics of depression, such as fatigue, poor concentration, or feelings of guilt, participants might react differently to the requirements of a complex program and might even experience negative effects rather than the alleviation of depressive symptoms. Such negative effects have been largely neglected in any type of psychotherapy research, among others due to difficulties in operationalizing the concept (Linden and Schermuly-Haupt 2014). Only recently has this issue received more attention, especially among authors focusing on internet interventions (Andersson et al. 2014b; Andersson et al. 2015; Klein, Gerlinger, Knaevelsrud, Bohus, Meisenzahl, Kersting, et al., 2016b). First steps towards a common standard have been made (Rozenal et al. 2014), but they have not yet been established, leading to a wide variety of measures used to assess adverse events and negative effects. Such measures include the registration of symptom deterioration or the appearance of new symptoms (e.g. Boss et al. 2016; Bruggeman Everts et al. 2015; Enander, Ivanov, Andersson, Mataix-Cols, Ljótsson, and Rück, 2014), analyzing the answers to open ended questions (e.g. Alfnsson et al. 2015; Kaldø et al. 2015) or employing variations of questionnaires used in psychotherapy research (Boss et al. 2016). Numbers of negative effects and adverse events observed in previous studies range from 0 to 21% (Alfnsson et al. 2015; Andersson, Nordgren, Buhrman, and Carlbring, 2014b; Blom et al. 2015; Boss et al. 2016; Bruggeman Everts et al. 2015; Carlbring et al. 2013; Kivi et al. 2014; Klein, Berger, Schroder, Spath, Meyer, Caspar, et al., 2016a; Rozenal et al. 2015). In a recent review of PPIs, the authors claim that, as opposed to antidepressant medication, such interventions hold no side-effects (Layous et al. 2011). Yet, to our knowledge, negative effects of OPPIs have never been assessed.

To summarize, extant research on internet interventions has mainly focused on the investigation of standard depression treatments, such as CBT. However, standard treatment options do not always alleviate

<sup>1</sup> Note, that findings in psychotherapy research need to be treated with caution. It has been suggested that positive outcomes might not be attributable to the intervention being superior to the control condition, but to a placebo effect due to patients knowing that they have been assigned to a control condition, such as waitlist or no treatment. This knowledge may lead to or worsen feelings of frustration and hopelessness, especially in patients with depression (Gold et al. 2017). Similarly, positive findings for internet interventions need to be interpreted carefully (Hegerl et al. 2017).

depressive symptoms, creating the need to explore other possibilities. Recent studies investigating alternative approaches, such as PPI, suggest that these interventions might aid in reducing symptoms of depression in clinically as well as non-clinically depressed samples and that a more frequent use of such programs might boost effects. However, a more complex online program solely consisting of PPI exercises has never been investigated in a group of clinically depressed participants, who might have a different reaction than a distressed, but otherwise healthy sample. The present study aims to provide first insights by investigating a more complex 7-week online program consisting of several different PPIs among clinically depressed participants. The program was published by the well-known German physician and entertainer Eckert von Hirschhausen. It was previously investigated among employees of an insurance company (Feicht et al. 2013). When compared to a wait list control group, the online program was shown to significantly reduce perceived stress ( $d = 0.64$ ) and to improve happiness ( $d = 0.93$ ), satisfaction ( $d = 1.17$ ), and quality of life ( $d = 1.06$ ). Results indicate that the online program was beneficial for a non-clinical sample, but it has not yet been evaluated in a clinical subgroup. In a first exploratory attempt to learn how a clinically depressed group would react to PPI, the book, on which the program investigated here was based, was given to depressed inpatients at a local psychiatric hospital. Feedback indicated that more severely depressed patients might not feel like they were taken seriously by such an intervention. Thus, as a first step, we chose to conduct a single-arm pilot study, which primarily aimed to assess the acceptance of and the satisfaction with this web-based happiness training program among participants with mild and moderate depression. Secondary outcome measures included the assessment of symptom severity and health related quality of life over time as well as negative effects.

## 2. Methods

### 2.1. Participants

A total of 81 participants were allocated to the trial (see Fig. 1 for CONSORT flow diagram; Moher et al. 2001).

Participants were mainly recruited through the website, online newsletters, and social media advertisement of the German Depression Foundation as well as flyers, which were sent to general practitioners in the area. Our goal was to reach a sufficient number of individuals who had been diagnosed with depression and who would be willing to participate in a PPI program. The study was advertised as a pilot study to investigate the acceptance with and the benefits of a positive psychology program among persons with depression. The screening process comprised two stages: a short online questionnaire assessing basic inclusion and exclusion criteria followed by a more thorough telephone interview, provided that the online test had been passed. All telephone interviews throughout the study were conducted by trained psychologists.

Participants were included if they met the following criteria: a) aged 18 or above, b) diagnosis of unipolar depression or dysthymia past or present according to the M.I.N.I. (Mini International Neuropsychiatric Interview German version 5.0.0; Ackenheil et al. 1999) and a PHQ-9 (Patient Health Questionnaire) score of  $> 4$ , but  $< 15$  at the time of the screening (indicating mild or moderate symptoms of depression), c) outpatient status and current outpatient treatment by a physician or certified psychotherapist, d) internet access, e) adequate knowledge of the German language, f) none of the following diagnoses according to the clinical interview: dementia, alcohol or drug addiction or abuse within the past 6 months, schizophrenia, manic episodes or bipolar disorder, obsessive-compulsive disorder, f) no known antisocial or Borderline personality disorder, g) no signs of acute suicidality, h) no physical illnesses in need of acute in-patient treatment, i) no participation in another clinical trial during the four weeks prior to the current study. All participants were citizens of Germany (see Table 1 for

demographic information). Written informed consent from each patient and institutional review board approval were obtained. This trial was registered with the German Clinical Trials Register: DRKS00009301.

### 2.2. Intervention

The seven-week happiness training “Glück kommt selten allein” is a self-guided German language program available to everyone online (<http://www.glueck-kommt-selten-allein.de>). The service is free. The program comprises seven modules; each module comprises two or three exercises and is meant to be completed within one week starting on Mondays. In order to go on to the next module, the completion of the previous module is required. Exercises are based on positive psychology interventions (see Table 2 for list of exercises). The program was published by Eckart von Hirschhausen, a German physician and entertainer. Its original aim was to provide a tool for the general population to improve happiness. Thus, it was not originally developed to specifically aid individuals with depression.

### 2.3. Assessment

Outcome data were collected at baseline (T0), three weeks into the intervention (T1) for clinical observation, at the end of the intervention (post-treatment, T2), and three months after the end of the intervention (follow-up, T3). Additional data (PHQ-9) were collected after each module for clinical observation only. A short evaluation of each module was conducted at the end of each week as well (see Table 3 for an overview of measurements and measurement points). All questionnaires were administered online using LimeSurvey, version 1.92. Data were stored on a secure server at the Clinical Trial Centre Leipzig, Leipzig University. Participants were called at all four main assessment points to assess adverse events and the participant's overall condition as well as potential difficulties with the program. Weekly PHQ-9 scores were made available to interviewers throughout the intervention to be able to react to any sudden deterioration in mood or the emergence of suicidal ideation. Thus, interviewers were not blinded with respect to changes in mood throughout the study. Participants were asked to complete the online questionnaires (via telephone or, if not available at that moment, via e-mail), if they had not done so within the first two days of receiving the initial e-mail invitation.

Primary outcome measures included a modified German version of the CSQ-8 (Client Satisfaction Questionnaire, German: ZUF-8; Larsen et al. 1979; Schmidt and Lamprecht 1989) as well as self-generated items to assess the participants' satisfaction with the program and with each of the modules.

The CSQ-8 is an eight-item questionnaire designed to measure patient satisfaction with services. For each item, patients are asked to choose one of four answers. Scores range from eight to 32, with the latter representing greater satisfaction. The German translation refers to hospital stays. Thus, a slight change in wording was necessary to better fit our goal of measuring satisfaction with an online tool. Cronbach's alpha was 0.93.

Upon completion of the program, we asked participants how satisfied they were with the content of the program (very satisfied, satisfied, somewhat satisfied, not satisfied), whether they thought the program was interesting, coherent, easy to use, and motivating (agree, somewhat agree, somewhat disagree, do not agree), and, whether they thought it was easy to incorporate into everyday life and feasible alongside child care (yes, very; yes, somewhat; no, not so much; no, not at all; for the last item: no children/no children present in household). After each module, we asked participants to state whether they felt better or worse after completing the module and whether they thought this change was due to the program or due to something else. Furthermore, we asked them whether they found the module to be interesting and informative, whether they had already been familiar with most of the content, and whether they found the content to be too

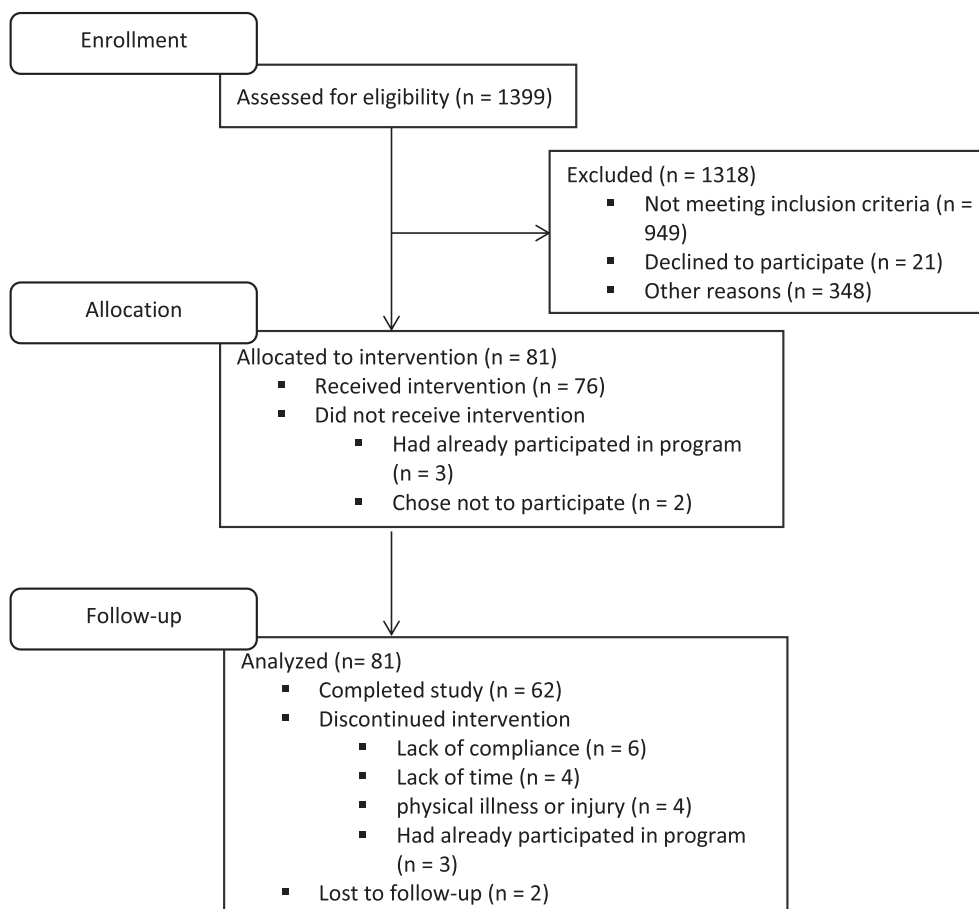


Fig. 1. Participant flow throughout the study.

disturbing (yes/no).

Secondary outcome measures included measures assessing changes in symptom severity (IDS-SR and PHQ-9), satisfaction with mental and physical health (SF-12) as well as measures assessing negative effects (INEP in a modified version) and adverse events.

In order to assess changes in the severity of symptoms of depression, the IDS-SR and the PHQ-9 were used. The IDS-SR (Inventory of Depressive Symptomatology; [Rush et al. 1996](#)) is a self-assessment tool comprising 30 items rating symptom severity over the past week. Scores ranging from 0 to 13 points indicate no depression, from 14 to 25 mild depression, from 26 to 38 moderate depression, from 39 to 48 severe depression, and from 49 to 84 very severe depression. Cronbach's alpha was 0.90 at follow-up. The PHQ-9 (Patient Health Questionnaire; [Kroenke et al. 2001](#)) comprises nine items. Participants are asked to rate symptom frequency over the past two weeks on a four-point scale (0 - not at all, 1 - several days, 2 - more than half of the days, 3 - nearly every day). Scores ranging from 0 to 4 indicate minimal symptoms, from 5 to 9 mild symptoms, from 10 to 14 moderate symptoms, from 15 to 19 moderately severe symptoms, and from 20 to 27 severe symptoms. Cronbach's alpha was 0.85 at follow-up.

The SF-12 (Short-Form-12; [Ware Jr, Kosinski, and Keller, 1996](#)) is a self-assessment tool used to measure health status. Twelve items measure the following eight concepts: physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health. Six items are combined to calculate each of the two summary subscales, The Physical Component Summary (PCS) and the Mental Component Summary (MCS). Calculation of the subscales is complex. A detailed description can be found elsewhere ([Ware et al. 1995](#)).

Due to a lack of adequate tools to measure negative effects of online tools, we opted to use a modified version of the German language Inventory for the Assessment of Negative Effects of Psychotherapy (INEP; [Ladwig et al. 2014](#)). The original version comprises 21 statements addressing different potentially negative effects, such as increased fear of “being found out” by others, increased difficulty to make decisions without help, or feeling hurt by statements of the therapist. Seven of the original items referred to problems with the therapist and were discarded. The wording of the remaining 14 items was modified to fit the intervention investigated here. Four items were added. The first six items are rated on scale from  $-3$  to  $3$  with each endpoint signifying two opposite answers, e.g. “After having completed the intervention, I feel better/worse”. The other items were rated on a four-point scale (see [Appendix A](#) for a list of items). Due to our modifications, no scores were calculated. Instead, we opted to report frequencies. For all, but the last item, participants were asked whether they thought that changes were due to the program or due to something else. Adverse events were assessed separately and rated regarding their relatedness to the intervention (certain, likely, possible, or no relation).

#### 2.4. Statistical analysis

Statistical analyses were performed using SPSS, version 23. Primary outcome measures were analyzed descriptively. For the IDS-SR, the PHQ-9, and the SF-12 subscales PCS and MCS, linear mixed models with time as fixed factor were used to calculate differences between baseline, post-treatment, and follow-up. Assuming that missing data are missing at random, linear mixed models are a valid tool to analyze all the data available after collection ([Bell et al. 2014](#)). Maximum likelihood estimation was used and, based on the goodness of fit (Akaike's



**Table 1**  
Sociodemographic information of participants allocated to the Intervention, n = 81.

Characteristic	M	SD
Age (years)	45.6	11.2
Age of first episode (years, self-report)*	26.9	13.4
Number of episodes (self-report)	7.7	8.9
	n	%
Gender		
Female	71	87.7
Male	10	12.3
Diagnosis		
MDD, current	11	13.6
Dysthymia	13	16.0
MDD, past	57	70.4
PHQ category		
Mild	51	63.0
Moderate	30	37.0
Current Antidepressant medication		
Yes	58	71.6
No	23	28.4
Current or past psychotherapy		
Yes	75	92.6
No	6	7.4
Past hospitalization due to mental illness*		
Yes	60	74.1
No	20	24.7
Internet use at home		
(almost) daily	78	96.3
2–3 times a week	3	3.7
Once a week or less**	0	0
Living area		
Urban	50	61.7
Rural	31	38.3
Education		
High school	2	2.4
Vocational training	43	53.1
University degree	35	43.2
PhD	1	1.2
Employment status		
(Self-)employed	59	72.8
In training/student	2	2.5
Retired/chose to stay at home	3	3.7
Unemployed/unable to work	17	21.0
Relationship status		
Married	33	40.7
Married, separated	2	2.5
In a relationship	9	11.1
Single	23	28.4
Divorced	13	16.0
Widowed	1	1.2

Note: \*Information was available from 80 participants; \*\*empty categories were combined; MDD: Major Depression Disorder.

information criterion: AIC), either a first-order autoregressive or a first-order heterogeneous autoregressive covariance structure was chosen. In addition to the intention to treat analysis (ITT), a per protocol analysis (PP) was conducted. Participants were included in the per protocol analysis if they had completed at least 5 out of 7 modules. Intention to treat analyses are reported, unless indicated otherwise. Statistical testing was conducted on a 0.05 significance level and, if applicable, corrected for multiple testing.

Effect sizes were calculated for imputed data (multiple imputation with 50 imputations) taking into account the dependence of data collected within participants (Morris and DeShon 2002). Effect sizes were defined as small ( $d > 0.2$ ), moderate ( $d > 0.5$ ) or large ( $d > 0.8$ ). Reliable change rates were calculated for both the IDS-SR and the PHQ-9 using the Reliable change index (RCI). Reliable change refers to an individual's change between two points of measurement which goes beyond the change that would be expected due to the variability of the instrument itself (Evans et al. 1998; Jacobson and Truax 1991). It can be used to detect both a reliable improvement or deterioration.

### 3. Results

#### 3.1. Participation

Out of 81 participants included in the study, 58% completed at least five out of seven modules, i.e. they completed at least one exercise per module. Overall, 23.5% of the participants did not complete the study, with 21.0% dropping out during the intervention and 2.5% being lost to follow-up.

#### 3.2. Primary outcome

The average sum score of the CSQ-8 reached 22.4 ( $SD = 5.4$ ; 95% CI [21.0, 23.7]) for the ITT sample and was slightly larger for the PP sample with 23.3 ( $SD = 4.8$ ; 95% CI [21.9, 24.7]). The highest score with a mean of 3.1 ( $SD = 0.9$ ) was observed for item 4 (“Would you recommend our program to a friend?”). The lowest scores were observed for items 2 (“Did you get the kind of service you wanted?”) and 6 (“Have the services you received helped you to deal more effectively with your problems?”) with a mean of 2.6 each ( $SD = 0.8$  and 0.7, respectively).

According to the additional items generated to further assess satisfaction with the happiness training, participants found the program to be interesting ( $M = 3.5$ ,  $SD = 0.8$ ), coherent ( $M = 3.6$ ,  $SD = 0.6$ ), easy to use ( $M = 3.1$ ,  $SD = 0.8$ ), motivating ( $M = 3.1$ ,  $SD = 1.0$ ), easy to incorporate into everyday life ( $M = 3.1$ ,  $SD = 0.7$ ), and feasible alongside child care ( $M = 3.1$ ,  $SD = 0.9$ ). Overall satisfaction was acceptable with a mean of 2.8 ( $SD = 0.8$ ).

According to the weekly rating of module quality, 81.0% of the participants found the content of the modules to be interesting and informative, with a range of 76.4% for module 2 and 87.1% for module 6. A little over a half of the participants stated to have already been familiar with the content of the modules (55.4%). The content of module 4 was most familiar (64.3%), while the content of module 3 was least familiar (44.4%). Very few participants found the content to be too disturbing (6.0%), with module 7 being the least disturbing (1.6%) and module 2 being the most disturbing one (13.2%).

#### 3.3. Secondary outcome

Means, standard deviations, and confidence intervals for secondary outcome measures are presented in Table 4.

For the IDS-SR score, there was a significant main effect of time,  $F(2,74.61) = 9.17$ ,  $p < 0.001$ , due to a significant decrease in symptom severity between baseline and post-treatment,  $F(1,62.03) = 25.45$ ,  $p < 0.001$ ;  $d = 0.60$ , as well as between baseline and follow-up,  $F(1,61.00) = 6.44$ ,  $p = 0.014$ ;  $d = 0.29$ . The difference between post-treatment and follow-up did not reach significance,  $p = 0.330$ ;  $d = 0.17$ . Per protocol analyses yielded similar results, except for the difference between baseline and follow-up, that did not reach significance after Bonferroni correction,  $p = 0.018$ . Reliable positive change was observed in 32.3% and in 31.1% of the intention to treat sample at post-treatment and at follow-up, respectively.

There was a significant main effect of time for the PHQ-9 score,  $F(2,125.00) = 19.80$ ,  $p < 0.001$ , indicating a significant decrease in symptom severity between baseline and post-treatment,  $F(1,64.01) = 79.05$ ,  $p < 0.001$ ;  $d = 0.90$ . The differences between baseline and follow-up,  $p = 0.017$ ;  $d = 0.30$ , and post-treatment and follow-up,  $p = 0.022$ ;  $d = 0.32$ , just failed to reach significance. Per protocol analyses confirmed this pattern. At post-treatment, 22.6% of the intention to treat sample showed positive reliable change. At follow-up, this number increased to 34.4%.

For SF-12 MCS scores, analyses yielded a main effect of time,  $F(2,132.77) = 6.79$ ,  $p < 0.01$ . There was a significant increase in satisfaction with mental health between baseline and post-treatment,  $F(2,132.77) = 6.79$ ,  $p < 0.01$ ;  $d = 0.72$ , and between baseline and

**Table 2**  
List of exercises and short description of instructions.

Exercise	Instruction
<b>Module 1</b>	
Mood check	How do you feel? Observe your mood.
Identifying obstacles	What hindered you from being happy in the past?
Happiness journal	Write down three things that made you happy today.
<b>Module 2</b>	
Physical contact	Find physical contact that is comfortable for you.
Red light	Identify your best friends and meet one of them this week.
Gratitude letter	Write a letter of gratitude to a person who was important to you or inspired you.
<b>Module 3</b>	
Talk about wishes	Tell at least three people about your wishes.
Random acts of kindness	Do something nice for a person without them knowing.
Chance decision	Let chance decide and try something new (e.g. choose a random dish at a restaurant).
<b>Module 4</b>	
Mindful eating	Focus your attention on your food and enjoy it.
Savoring the moment	Pay attention to positive moments and capture them by taking a picture.
Burn off energy through exercise	Do a challenging physical exercise.
<b>Module 5</b>	
Recognizing signature strengths	Identify your strengths.
Using signature strengths	Use your talents in a new area.
<b>Module 6</b>	
Making presents	Share your fortune with others by giving them something.
Gratitude journal	Write down three things you are thankful for.
Ten minutes of silence	Enjoy ten minutes of quiet time every day to help get a sense of fulfillment.
<b>Module 7</b>	
Favorite exercises	Identify your favorite happiness exercises.
Become an ambassador of happiness	Share your experience and tell someone about your favorite exercise.
Treating oneself	Rewards are important. Treat yourself to something nice.

**Table 3**  
Measurements and measurement points.

	T0	T1	T2	T3	Weekly
<b>Primary Outcome</b>					
CSQ-8			x		
Evaluation of modules		x	x		x
Evaluation of program			x		
<b>Secondary Outcome</b>					
IDS-SR	x	x	x	x	
PHQ-9	x	x	x	x	x
SF-12	x	x	x	x	
INEP		x	x	x	
Adverse Events	x	x	x	x	

Note: The term “weekly” refers to assessments during the intervention period.

follow-up,  $F(1,72.99) = 9.14, p < 0.01, d = 0.67$ . Again, no difference between post-treatment and follow-up was observed,  $p = 0.999; d = 0.04$ . The increase in satisfaction between baseline and follow-up

**Table 4**  
Means, standard deviations, and confidence intervals of secondary outcome measures.

Measure	ITT			PP		
	T0	T2	T3	T0	T2	T3
n	78	62	61	47	47	46
IDS-SR						
M (SD)	28.1 (8.3)	23.1 (11.4)	24.8 (13.0)	28.0 (8.4)	23.3 (11.3)	24.7 (12.0)
95% CI	[26.2,30.0]	[20.2,26.0]	[21.5,28.2]	[25.5,30.4]	[20.0,26.6]	[20.9,28.4]
PHQ-9						
M (SD)	9.6 (3.4)	6.7 (3.6)	8.1 (5.0)	9.4 (3.2)	7.0 (3.0)	8.2 (4.8)
95% CI	[8.8,10.3]	[5.8,7.6]	[6.8,9.3]	[8.5,10.4]	[5.9,8.1]	[6.8,9.6]
SF-12 MCS						
M (SD)	33.6 (8.0)	38.0 (10.4)	37.8 (12.0)	33.3 (8.1)	37.2 (10.7)	36.9 (11.9)
95% CI	[31.8,35.4]	[35.3,40.6]	[34.7,40.9]	[30.9,35.7]	[34.0,40.3]	[33.4,40.5]
SF-12 PCS						
M (SD)	44.1 (8.6)	46.4 (8.5)	45.4 (9.5)	44.6 (8.8)	47.1 (8.4)	46.2 (8.8)
95% CI	[42.1,46.0]	[44.3,48.6]	[43.0,47.8]	[42.1,47.2]	[44.6,49.5]	[43.6,48.8]

Note: Improvement is indicated by lower scores for the IDS-SR and the PHQ-9 and by higher scores for the SF-12 subscales MCS and PCS. ITT: Intention to treat, PP: Per protocol.

was not confirmed in the per protocol analysis,  $p = 0.026$ . The main effect of time for the PCS subscale reached significance at a trend level only,  $F(2,129.23) = 2.84, p = 0.062$ .

According to our weekly assessment, on average, 37.0% of the participants declared to have felt better and attributed this improvement to the modules, while 9.1% stated that they felt better due to other reasons. Almost half of our participants noticed no change at all (46.5%).

### 3.4. Negative effects

Reliable deterioration was observed for the IDS-SR (1.6%), but not for the PHQ-9 at post-treatment. At follow-up, 14.8% of the participants showed deterioration for both the IDS-SR and the PHQ-9. Overall subjective deterioration averaged across the seven intervention weeks was at 7.4%. Subjective deterioration attributed to the program was at 4.8%.

Overall, four adverse events were rated as “possibly related” to the

intervention. All of them were deteriorations in mood. One of these adverse events was observed at post-treatment, three were observed at follow-up.

According to the INEP, 8.4% of the participants experienced any kind of negative effect at post-treatment, 2.2% of the participants reported negative effects due to the program and 6.2% due to other reasons. At follow-up, overall negative effects rose to 12.2%. However, negative effects attributed to the program slightly decreased to 1.7%. Evidently, negative effects due to other reasons were at 10.5%. Two items stood out in particular. First, at post-treatment, 22.6% of the participants felt that they or their problems were not taken seriously by the program. This number was similarly high at follow-up (21.3%). Second, 8.1% of the participants stated that they felt dependent on the content of the program at post-treatment. However, at follow-up, none of the participants felt this way anymore.

#### 4. Discussion

We investigated the acceptance of and satisfaction with a complex internet intervention based on positive psychology among patients with mild or moderate depression or dysthymia. In addition, we assessed changes in symptom severity, changes in health related quality of life, and negative effects.

Overall satisfaction was promising. CSQ-8 scores were in the upper range, albeit lower than scores found for programs specifically developed for the treatment of depression (Boss et al. 2016; Meyer et al. 2015). Participants of the present study seemed to be satisfied with several aspects of the program itself. They found it interesting, although more than half of them were familiar with the content, and would even recommend it to a friend. However, they were somewhat less satisfied concerning the intended purpose of this study - the treatment of depression. Participants were less likely to state that they found the help they sought or to have learnt how to deal more effectively with their problems. Moreover, almost a quarter of our participants stated that they felt as though they or their problems were not taken seriously by the program. These findings might have been caused by a mismatch of expectations raised by the study itself and the intended purpose of the program, which, as a positive psychology intervention, was not originally created to treat persons with depression, but for individuals who wished to be happier. The latter finding is also in line with observations we had previously made when giving the book, on which the program investigated here was based, to more severely depressed inpatients.

Symptom severity decreased during the intervention with moderate to large effect sizes, and only slightly increased again afterwards, not reaching the initial level. There was no improvement in quality of life concerning physical health, but a moderate increase concerning mental health, which was also observed at follow-up. Results should be interpreted with caution, since, due to the lack of a control group, changes could be attributable to the program or to something else. However, subjective reports of our participants suggest that more than a third of them felt better due to the program. Overall, negative effects were small. Reliable deterioration was very small at post-treatment, but increased to an average level at follow-up. Subjective deterioration and negative effects ranged from 7.4% to 8.4% at post-treatment and 12.2% at follow-up, but only between 1.7% and 4.4% were attributed to the program.

Previous research suggests that programs with fewer exercises may yield larger effects. Schueller and Parks (2012) observed a reduction in symptoms of depression when investigating a positive psychology program. This effect was more pronounced when participants completed two or four exercises as opposed to six exercises. Parks (2014) suggests that more might not always be better. A more complex program such as the one investigated here, that requires participants to choose and complete several exercises in a short amount of time might be too overwhelming, even more so for persons who suffer from depression. Exercises of the second module (Physical contact, Red light,

and Gratitude letter) seemed to be particularly difficult for our sample. It was rated as most disturbing and as least informative or interesting and, according to our participants, was the one module most likely leading to deterioration. Persons suffering from depression often tend to socially isolate themselves and thus, might have found these exercises too demanding. Our result is corroborated by findings of Sin et al. (2011), who observed deterioration in a dysphoric (not clinically depressed) sample when asking them to write a letter of gratitude each week over a period of eight weeks, even though delivery of these letters was not required. Thus, for clinically depressed users, exercises focusing on engaging with other people should either not be part of positive psychology interventions or, in case of more complex programs, placing these exercises towards the end might be an option to raise the level of difficulty more slowly, making participants feel more comfortable and possibly lowering attrition rates. Overall, exercises from module six, which focused on being thankful (Making presents, Gratitude journal, and Ten minutes of silence), were perceived as most beneficial by our participants. They were rated as most informative and interesting and seemed to yield the largest improvement. Interestingly, sharing the feeling of being thankful by making presents (and thereby engaging with others) seems to be much easier for persons with depression than exercises from the second module. It is possible, that making presents might be less demanding and bear fewer possibilities for rejection than engaging in physical contact, identifying and meeting best friends, or writing a letter of gratitude.

Although positive effects reported here were moderate to large, they might be underestimated due to properties of the sample. Previous research suggests that higher symptom severity at baseline may yield larger effects (Bower et al. 2013). We included participants with mild and moderate symptoms of depression, possibly causing a floor effect. However, an analysis of our data did not corroborate this notion. Participants who presented with more severe symptoms of depression at baseline did not show a larger decrease in symptom severity at post-treatment when compared to participants with mild or moderate symptoms of depression ( $F(1,69.01) = 2.31, p = 0.133$ ). Variability in our sample may have been too small to observe significant differences between the groups.

Psychotherapy, and CBT in particular, incorporates a variety of methods and techniques, some of which overlap with interventions used in positive psychology approaches (Karwoski et al. 2006). The vast majority of our participants reported a long history of depression and almost all of them had received psychotherapy, suggesting that psychotherapy did not have long-term effects for these patients. Chronification, familiarity with the content of the program or psychotherapy in general, might have led to smaller effects in the present study.

Guidance, on the other hand, might have boosted effects. It has been shown to be positively related to the effectiveness of internet interventions (e.g. Andersson and Cuijpers 2009; Baumeister et al., 2014; Cowpertwait and Clarke 2013; Johansson and Andersson 2012; Richards and Richardson 2012) and, thus, might have an impact on satisfaction. The incorporation of limited guidance due to our study design (e-mails and phone calls) does not reflect real life use of the program, where personal contact is voluntary and limited to the network of participants.

#### 4.1. Conclusion

We conclude that the online program investigated here may be a useful resource-oriented addition to the standard treatment of depression. Participants were satisfied with many aspects of the program, symptom severity and health related quality of life concerning mental health improved, and, overall, negative effects were small. Future research should address the effectiveness of the program in a randomized controlled trial and assess long-term effects beyond three months after the intervention.

Our results also indicate that the program did not seem to meet all

the expectations of persons with depression. A substantial number of participants did not feel taken seriously by the program and satisfaction was lowest, when we asked participants whether they had received the services they wanted and whether the program had helped them to deal more effectively with their problems. Thus, we do not believe the program to be an adequate standalone treatment tool for depression; however, we found promising first results for the investigated online positive psychology program.

### Authors' contributions

FG contributed to the study design, prepared and conducted the study, performed statistical analyses and wrote this publication. CO contributed to data acquisition and assisted in various steps throughout the study. CRK conceptualised and coordinated the study and revised the paper. UH contributed to the study design and revised the paper for important intellectual content. EvH is the creator of the online program investigated here. All authors read and approved the final manuscript.

### Conflict of interests

Within the last three years, UH was an advisory board member for Lundbeck, Servier and Otsuka Pharma; a consultant for Bayer Pharma; and a speaker for Medice Arzneimittel, Novartis, Roche Pharma. EvH is the creator of the online program and the corresponding book "Glück kommt selten allein". CRK received lecture honoraria by Servier. All other authors declare that they have no competing interests.

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### Appendix A

List of modified INEP items used in the present study (loose translation).

After having completed the program....  
 ...I feel better/worse.  
 ...I find it easier/more difficult to trust others.  
 ...I am less/more burdened by events from my past.  
 ...I experience more/fewer conflicts in my partnership.  
 ...my relationship with my family has become better/worse.  
 ...my relationship with my friends has become better/worse.  
 ...I am afraid, my classmates or co-workers could find out about it.  
 ...I have experienced problems with insurance companies (e.g. life insurance) or am afraid of experiencing problems.  
 ...I am more worried about financial issues.  
 ...I feel dependent on the content of the program.  
 ...I find it difficult to make important decisions by myself.  
 ...I have had longer periods of feeling bad.  
 ...I have changed for the worse.  
 ...I have had suicidal thoughts for the first time.  
 ...I have changed my medication without consulting my physician.  
 ...I have cancelled doctor's or psychotherapist's appointments.  
 ...new symptoms have developed.  
 I did not feel taken seriously by the program.

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