A novel approach to challenging OCD related beliefs using a mobile-app: An exploratory study.

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Abstract

Background and Objectives: According to cognitive models, obsessive compulsive symptoms result from catastrophic misinterpretations of commonly occurring intrusive experiences and the use of counterproductive strategies to manage them. Obsessive Compulsive Disorder (OCD) related beliefs such as inflated responsibility, importance of thoughts and perfectionism increases the likelihood of such misinterpretations. Consistent with a growing body of literature supporting the usefulness of mobile delivered technologies in fostering cognitive behavior change, the present study assessed the effectiveness of a novel cognitive training exercise designed to challenge OCD-related beliefs. This mobile app training exercise consists of users having to pull statements challenging OCD beliefs towards themselves (downwards) and to throw away (push upwards) contra-productive self-statements. **Methods:** 36 third-year BA students started the trial. Twenty completed pre and post measures of OCD-beliefs, mood and OCD symptoms including relationship-obsessions. Participants were instructed to complete two minutes of daily training for a period of 15 days. **Results:** No significant differences were found between completers and non-completers on demographic and symptom related measures at Time 1. Repeated-measures MANOVA of the 20 completers showed a significant reduction on all OCD symptoms measures and on OCD-beliefs. No significant reduction was found in depression symptoms. Regression analysis showed change in levels of OCD-beliefs was associated with reduction in OCD symptoms at Time 2 over and above OCD symptoms at Time 1. **Limitations:** The study is an open trial with non-clinical participants **Conclusions:** This mobile delivered training exercise may be useful for the reduction and relapse prevention of OCD-related beliefs and symptoms.

1. INTRODUCTION

Obsessive-Compulsive Disorder (OCD) is an incapacitating disorder defined by persistent unwanted and disturbing intrusive thoughts, images or urges (obsessions), and/or ritualistic and repetitive acts (compulsions; American Psychiatric Association, 2013). OCD may include a variety of themes such as scrupulosity, repugnant obsessions, moral and physical contamination fears and cleaning compulsions and relationship-related obsessions (e.g., Abramowitz & Jacoby, 2014; Doron, Derby, & Szepsenwol, 2014).

Cognitive behavior therapy (CBT) has been shown to be an effective OCD treatment (NICE, 2005). According to cognitive models of OCD, obsessions and compulsion are the result of the mismanagements of commonly occurring intrusive thoughts, images and urges (Clark & Radomsky, 2014; Rachman & de Silva, 1978; Salkovskis, 1985). Catastrophic misinterpretation of such intrusive experiences and the use of counterproductive cognitive and behavioural strategies to manage them lead to their escalation into chronic obsessions.

Several maladaptive beliefs have been associated with increased catastrophical interpretations of intrusions, such as responsibility, over-importance of thoughts, desire to control one's thoughts, overestimation of threat, need for certainty, and perfectionism (OCCWG, 1997, 2005). Indeed, CBT includes a variety of strategies for challenging OCD-related beliefs including psychoeducation regarding their role in the maintenance of OCD, cognitive reconstruction, Exposure and Response Prevention (ERP), behavioral experiments and more recently cognitive bias modification (CBM). These strategies facilitate the processing of alternative explanations of events, thoughts and

emotions, allowing clients to re-evaluate their rigid maladaptive beliefs and reduce compulsive behaviors (e.g., Abramowitz, 2006; Teachman, Beadel & Steinman, 2014).

Many individuals presenting with OCD, however, avoid seeking professional help for a variety of reasons (e.g., del Valle, Belloch, & Carrió, 2017; Schwartz, Schlegl, Kuelz, & Voderholzer, 2013). Internet-delivered CBT (iCBT; Lenhard et al., 2014) and mobile delivered CBT applications have been suggested to be effective ways of increasing accessibility to CBT (Price et al., 2013). Such alternative delivery systems for OCD-based CBT are consistent with the stepped-care approach for OCD (NICE, 2005) whereby clients with OCD may begin with low intensity interventions (e.g., self-help materials) and, if needed, gradually receive more intense and expert interventions (Tolin, Diefenbach, & Gilliam, 2011).

Indeed, mobile health care (mHealth) applications often includes the same treatment content and form as iCBT platforms delivered on a mobile platform. Such formats, however, presume high internal motivation, long attentions span and high persistence from users. Today's mobile users may benefit from treatment applications that would be easy to use, require a relatively short attention span, help to overcome the barriers in accessing to effective treatments, and that might facilitate the treatment process by enhancing the engagement of patients (Price et al., 2013).

Consistent with this, the aim of the current study was to explore the usefulness of a mobile application named GG relationship obsession (GGRO) in the reduction of OCD-related beliefs. GGRO is simple to use and requires short daily training (3min a day). Users of this app learn to respond to statements that challenge OCD-relate beliefs by pulling them down (i.e., towards themselves) and throw away statements that are consistent with OCD-related beliefs (see Method section). Statements challenging such

beliefs include alternative, more adaptive interpretations of thoughts, emotions and events as well as statements encouraging approach behavioral strategies (e.g., tolerance of negative feelings and acceptance of thoughts). Increasing accessibility to such statements is expected to reduce adherence to OCD-related beliefs and associated symptoms.

GGRO was designed to challenge maladaptive beliefs that underlie common OCD symptoms (e.g., contamination) as well as relationships obsessions (Doron, Derby, Szepsenwol, Nahaloni., & Moulding, 2016; OCCWG, 2005). Relationship obsessions are disabling and include obsessive doubts and preoccupations focusing on perceived flaws of the partner (partner-focused obsession) and/or on the relationship itself (relationship-centered; Doron, Derby, Szepsenwol., & Talmor, 2012a; 2012b).

In this proof of concept study, we have evaluated pre-post changes in levels of OCD-related maladaptive beliefs and OCD symptoms, including relationship-related OCD symptoms, following 15 days of using GGRO. We also assessed whether pre-post changes in maladaptive belief scores were associated with reduction in OCD symptoms.

2. METHOD

2.1 Participants and procedure. Thirty-six 3rd year students at the BA program of the University were recruited by the authors from their lectures. The students were invited to voluntarily participate in a study about beliefs, self-talk, mood and relationships. Those interested in participating, attended a recruitment seminar and completed a pre-treatment evaluation. As show in Figure 1, 20 of the 36 participants completed T2 measures. All participants that completed T2 measures reported using the app more than the 12 days required and therefore were defined as completers. The completers (16 women) ranged in age from 19 to 26 years (*Mdn*= 21). Nine of them were in a romantic

relationship at the time of the study, with a median length of 17.95 months. Most participants reported average socioeconomic status (75%). Participants were informed of their rights and provided online informed consent in accordance with university IRB standards. None of the participants received any extra compensation for taking part in the study. The study received the approval of the University Ethics Committee.

Following the completions of the pre-treatment evaluation, participants were requested to download the application GGRO. First time users of this app go through an automatic tutorial session explaining the impact of self-talk on our mood. They are instructed to reject maladaptive thoughts by throwing them away from themselves (upwards) and embrace supportive thoughts by pulling them towards themselves (downwards). During each training session, users are presented with 'blocks' featuring statements such as "I take things as they come" or "Everything can end in a catastrophe". They then have to respond to these statements by either pulling 'blocks' towards themselves (i.e., downwards) or throwing the blocks away from themselves (i.e., rejecting them upwards).

Users progressively complete 45 levels dedicated to OCD-relevant maladaptive beliefs (3 levels per belief) such as dealing with threat, importance of thoughts, overcoming perfectionism, etc. Each level includes alternative interpretations of a specific maladaptive belief. For instance, statements challenging perfectionism may include "Mistakes teach me to overcome my fears" and "Imperfect is human". Users are also encouraged to adopt approach behavioral strategies (e.g., tolerance of negative emotions) by responding to statements such as "I can tolerate doubts".

Each time a new set of levels dealing with a specific belief are introduced, a screen is presented with the rational for challenging this maladaptive belief. For

example, before learning to challenge over-estimation of threat, users are presented the following statement: “The world can be dangerous, but the tendency to look for danger all the time increases fears and anxieties. Let's learn to reduce this tendency! ” A set of 6 levels challenging two beliefs (e.g., importance of thoughts and overestimation of threat) is followed by an encouraging statement such as: “Excellent! Now you’ve learned how to better deal with your thoughts and to recognize the way you over-estimate threat”. Each level completed is also followed by a short memory quiz in which the user has to identify one (out of 3) OCD-challenging statements that appeared in the last completed level. This quiz aims to focus user's attention on the statements that challenge OCD-beliefs.

Push notifications remind users to use the app each day. Following the completion of 3-levels at a given day, a screen prompting users to stop using the app for that day appears. Users are also advised to train once a day at a preset time rather than in response to distressing thoughts or events.

2.2 Measures

All participants answered the Spanish validated versions of the following questionnaires at pre- and post-treatment:

2.2.1. The Obsessive-Compulsive Inventory (OCI-R; Foa et al., 2002) is a self-report questionnaire assessing OCD symptoms. The OCI-R includes 18 items with a 5-point Likert scale from 0 (*not at all*) to 4 (*extremely*). In this study, internal consistency scores were adequate at pre-treatment (α = .82) and post-treatment (α = .81).

2.2.2. The short form of the Obsessive Beliefs Questionnaire (OBQ-20; Moulding et al., 2011) is the abbreviated version of the 44-item Obsessive Beliefs Questionnaire-Revised (OCCWG, 2005) assessing pan-situational cognitions associated with OCD.

The OBQ-20 is composed of 20 items on a 7-point scale ranging from 1 (*disagree very much*) to 7 (*agree very much*). In this study, internal consistency scores were high at pre-treatment (α = .95) and post-treatment (α = .93).

2.2.3. The Relationship Obsessive–Compulsive Inventory (ROCI; Doron et al., 2012a) is a self-report measure that assesses relationship-centered ROCD symptoms. The ROCI consists of 12 items on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). In this study, internal consistency of the ROCI total score was adequate at pre-treatment (α = .84) and post-treatment (α = .75).

2.2.4. Partner-Related Obsessive–Compulsive Symptoms Inventory (PROCSI; Doron et al., 2012b) is a self-report measure which assesses partner-focused ROCD symptoms. The PROCSI consists of 24 items on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). In this study, internal consistency of the PROCSI total scores were adequate at pre-treatment (α = .81) and post-treatment (α = .72).

2.2.5. The short version of the Depression, Anxiety, Stress Scale (DASS; Lovibond & Lovibond, 1995) is a self-report questionnaire listing negative emotional symptoms (depression, anxiety and stress). In the present study, only the depression scale (7 items) was used. Internal consistency scores were adequate at pre-treatment (α = .90) and post-treatment (α = .79).

3. RESULTS

3.1. Differences between completers and non-completers.

Before examining the pre-post training effects, differences on socio-demographic characteristics and pre-treatment measures between completers (n = 20) and non-completers (n = 16) were calculated. As shown in Table 1, no significant differences between the two groups emerged on any of the measures or socio-

demographic variables evaluated. Effect sizes of all differences were small to null (see Table 1), except for the PROCSI (Cohen's *d*=.42) suggesting completers had somewhat higher PROCSI scores than non-completers.

3.2. Differences between pre- and post-training on measures assessed.

A repeated-measures multivariate analysis of variance (MANOVA) was conducted to determine differences between pre-training and post-training levels on OCD-related beliefs (OBQ-20), OCD symptoms (OCI-R), relationship obsessive-compulsive symptoms (ROCI and PROCSI) and depression symptoms (DASS-D). As expected, the test revealed a significant multivariate effect (Pillai's trace = .964, $F(5,15) = 5.27$, $p = .005$, $d = 0.72$). Moreover, univariate analyses revealed significant pre-post treatment differences with large effects size in all symptom measures, except depression (see Table 2).

3.3. Associations between OCD symptoms and changes in OCD-related beliefs

In order to examine whether levels of OCD symptoms were associated with pre-post training changes in levels of maladaptive beliefs, a hierarchical regression was performed. Changes in levels of maladaptive beliefs was calculated by subtracting OBQ T2 scores form OBQ T1 scores (i.e., OBQ-20-T1 – OBQ-20-T2). OBQ-20 change scores was then regressed on OCI-R total scores at T2, controlling for OCI-R total scores at T1 (see Table 3). As expected, change OBQ-20 scores negatively predicted OCI-R scores at T2 over and above OCI-R T1 scores, suggesting that pre-post changes occurring in levels of maladaptive beliefs are associated with reduction in OCD symptoms over a 15-day time span.

4. DISCUSSION

The current study evaluated a brief training exercise for challenging OCD-beliefs delivered via a mobile application platform. Our findings suggest that training 3 minutes a day for a period of 15 days is associated with a significant, large effect-size reductions in levels of OCD-related beliefs. Our participants also showed significant pre-post training decreases in levels of OCD symptoms including relationship-related OCD symptoms. Moreover, pre-post changes in levels of OCD-beliefs were associated with reduction in OCD symptoms levels. No significant changes in levels of depressive symptoms were observed.

Our findings are consistent with the stepped-care approach for OCD (NICE, 2005) and the use of alternative modes of treatment delivery. Mobile applications may offer a cost effective, accessible solution for individuals requiring low intensity interventions for OCD. Indeed, our study suggests that short, daily exposure to interpretations of thoughts, emotions and events related to OCD and having to actively respond to such interpretations may lead to significant reduction in maladaptive beliefs. Such finding may be important considering frequency of intrusive thoughts and OCD symptoms levels were found to be strongly related to OCD-beliefs in non-clinical and clinical samples (e.g., OCCWG, 2005, Moulding, Kyrios, Doron, & Nedeljkovic, 2007). Reducing levels of maladaptive beliefs in at risk populations using cost effective, accessible mobile platforms such as used in this study, may increase resiliency to OCD and related disorders. Moreover, such a platform may be useful for relapse prevention following treatment.

Our exploratory study has limitations. An important limitation is the use of student participants. Recent reviews support the utility of nonclinical participants in OCD related research (e.g., Abramowitz & Jacoby, 2014) and taxometric findings

suggest a dimensional view of OC-related beliefs and symptoms (Haslam, Williams, Kyrios, McKay, & Taylor, 2005). Future research would benefit from examining the usefulness of this training platform in OCD cohorts.

Another limitation of our study is the size of our cohort and the significant dropout rate. Previous studies using mobile and internet technologies have shown comparable dropout rates (e.g., Arean et al., 2016; Roepke et al., 2015). In fact, one of the main challenges in studies of eHealth applications in general, and specially web-based interventions, is the high rates of dropouts (Eysenbach, 2005; Kelders, Van Gemert-Pijnen, Werkman, Nijland, & Seydel, 2011; Ludden, van Rompay, Kelders, & van Gemert-Pijnen, 2015). Future studies may benefit from the use of dropout reduction strategies (e.g., monitory or course credit compensation). Finally, our effect size calculations suggested that individuals with higher partner-focused ROCD symptoms might have been somewhat more likely to complete our study than individuals with lower partner-focused scores. Only small or null effect sizes were found on all other measures, particularly on our main study measure of OCD-related beliefs. Nevertheless, the results of this study should be interpreted with care and must be replicated with larger samples using a control group.

Taking into account these limitations, our results suggest that even brief, daily cognitive training exercises increasing accessibility to alternative interpretations of OCD-related events may lead to significant changes in levels of maladaptive beliefs.

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Figure 1. Participants flowchart

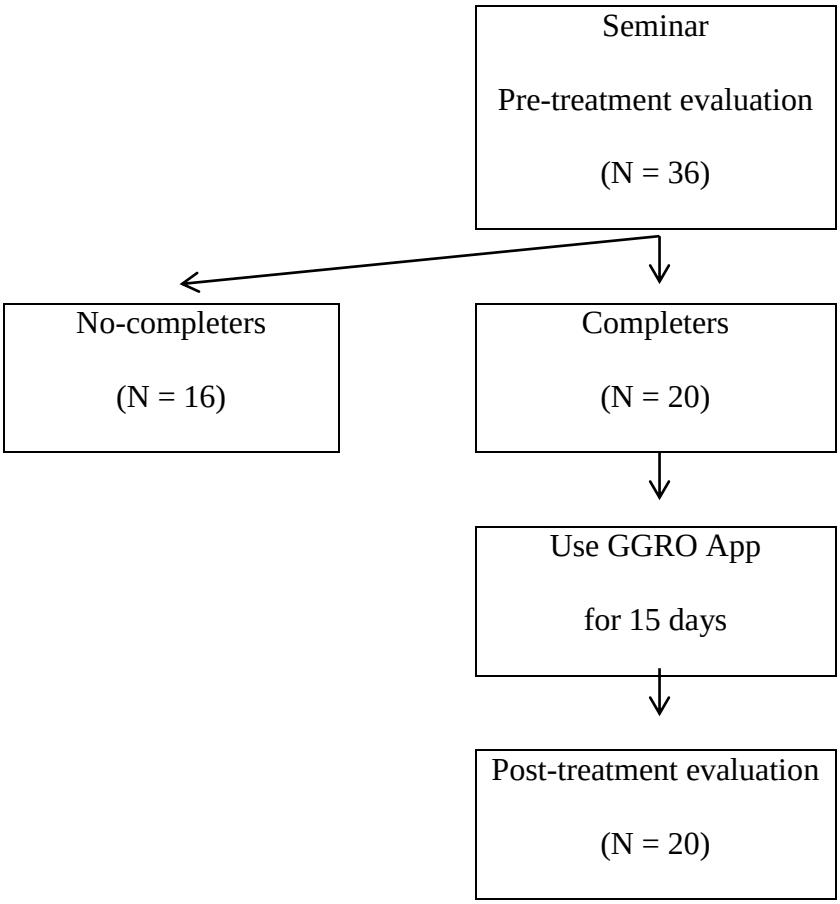

Table 1

Differences between completers and non-completers.

	Completers M (SD)	No-completers M (SD)	$F(1,34)/\chi^2$ (3)	*p*	*d*
Age (years)	21.30 (2.10)	22.63 (8.23)	.48	.49	0.23
Months in relationship	17.95 (18.46)	38.31 (100.17)	.80	.38	0.3
Socio-economic status (% Medium)	75%	62.5%	1.36	.71	0.12
DASS	1.51 (0.51)	1.54 (0.52)	.01	.90	0.06
OCI-R	1.72 (0.39)	1.71 (0.36)	.01	.92	0.03
OBQ-20	2.96 (1.14)	2.99 (1.01)	.008	.93	0.03
ROCI	6.93 (0.81)	6.78 (0.73)	.36	.55	0.19
PROCSI	6.85 (0.68)	6.62 (0.38)	.92	.34	0.42

DASS: Depression, Anxiety, Stress Scale; OCI-R: Obsessive-Compulsive Inventory; OBQ-20: short form of the Obsessive Beliefs Questionnaire; ROCI: Relationship Obsessive–Compulsive Inventory; PROCSI: Partner-Related Obsessive–Compulsive Symptoms Inventory.

Table 2

Descriptive statistics and multivariate test of symptom questionnaires.

	Time 1 M (SD)	Time 2 M (SD)	$F_{(1,19)}$	*p*	*d*
OBQ-20	2.96 (1.14)	2.23 (0.91)	16.69	.001	0.71
OCI-R	1.72 (0.39)	1.42 (0.34)	21.13	<.001	0.85
ROCI	6.93 (0.81)	6.37 (0.36)	12.14	.002	0.89
PROCSI	6.85 (0.68)	6.40 (0.38)	18.78	<.001	0.82
DASS	1.51 (0.51)	1.41 (0.34)	1.69	.21	0.23

DASS: Depression, Anxiety, Stress Scale; OCI-R: Obsessive-Compulsive Inventory; OBQ-20: short form of the Obsessive Beliefs Questionnaire; ROCI: Relationship Obsessive–Compulsive Inventory; PROCSI: Partner-Related Obsessive–Compulsive Symptoms Inventory.

Table 3

Standardized Regression Coefficients for T2 OCI-R Regressed on T1 OCI-R and Change OBQ Scores.

	OCI-R T2		
	β	*t*	*ΔR²*
Step 1			.47***
OCI-R T1	1.0	5.42	
Step 2			.17*
Δ OBQ	-.53	2.84	

Note. OCI-R = Obsessive-Compulsive Inventory Revised total score; OBQ = Obsessive Beliefs Questionnaire.

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