

## ARTICLE

# Initial evaluation of a therapist-supported online cognitive therapy self-help for patients with taboo obsessions

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**Abstract**

**Objectives:** The current study evaluated the feasibility of an internet-delivered cognitive therapy (I-CT) in a self-help format with minimal therapist support for patients with obsessive-compulsive disorder (OCD) with primary taboo obsessions. Specifically, the aims were to investigate (1) whether participants were able to grasp and apply the internet-delivered cognitive framework to their own situation; (2) whether they had clinically meaningful reductions of OCD symptom severity; and (3) whether reduced negative appraisals (hypothesized mechanism of change in CT) preceded reductions in OCD symptom severity.

**Method:** Nineteen OCD patients with primary taboo obsessions, recruited from an OCD clinic or self-referrals, received the I-CT intervention for 10 weeks. I-CT did not contain any systematic exposure or response prevention.

**Results:** Adherence and engagement with the intervention was high. Most participants ( $n = 13$ , 68%) understood and successfully applied the cognitive model to their own situation. Within-group analyses showed large reductions in OCD symptom severity at post-treatment (bootstrapped within group  $d = 1.67$  [95% CI; 0.67 to 2.66]) measured with

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the Yale–Brown Obsessive–Compulsive Scale. The gains were maintained at the 6-month follow-up. Post-hoc analyses revealed that the large reductions in OCD symptom severity were driven by the participants who understood the cognitive model. Reductions in negative appraisals predicted subsequent reductions in OCD symptom severity during treatment.

**Conclusion:** It is possible to adapt a purely cognitive intervention to a digital guided self-help format and to achieve both cognitive change and meaningful symptom reduction. The results require confirmation in a randomized clinical trial.

#### KEYWORDS

cognitive therapy, internet-delivered treatment, obsessive–compulsive disorder, taboo obsessions

#### Practitioner points

- Internet-delivered cognitive therapy (I-CT) is a feasible and acceptable psychological intervention for patients with obsessive-compulsive disorder (OCD) with primary taboo obsessions.
- Patients need to fully understand and apply the cognitive framework to their own situation in order to benefit from the I-CT treatment.
- Reductions in negative appraisals seem to have driven reductions in OCD symptom severity in this study.

## INTRODUCTION

Obsessive–compulsive disorder (OCD) is a prevalent, chronic and impairing psychiatric disorder characterized by obsessions and compulsions (American Psychiatric Association, 2013; Pérez-Vigil et al., 2017; Pérez-Vigil et al., 2019; Ruscio et al., 2010; Skoog & Skoog, 1999). Amongst the most common kinds of obsessions are the so-called ‘taboo obsessions’, which involve aggressive, sexual and/or religious thought content (e.g. fear of committing incest, paedophilia or wanting to harm a loved one; Bloch et al., 2008; Brakoulias et al., 2013; Pinto et al., 2008). These obsessions are typically accompanied by checking rituals, mental compulsions and reassurance seeking (Cervin et al., 2021; Leonard & Riemann, 2012; Williams et al., 2011) as well as higher levels of depression, shame and distress compared with the other kinds of obsessions (Brakoulias et al., 2013; Glazier et al., 2015; Grant et al., 2006). Furthermore, a growing body of research has linked taboo obsessions with increased suicidality risk (e.g. Krebs et al., 2021). Some studies have indicated that patients with taboo obsessions require extended treatment periods (Grant et al., 2006) and/or may respond less well to standard psychological treatments based on exposure with response prevention (ERP; Alonso et al., 2001; Mataix-Cols et al., 2002; Rufer et al., 2006; Starcevic & Brakoulias, 2008; Williams et al., 2014).

Though the evidence is more limited, cognitive therapy (CT) is another form of psychological treatment that has been shown to be efficacious for OCD (Öst et al., 2015) and might, at least in theory, be

particularly well suited to treat taboo obsessions (Freeston et al., 2001; Whittal et al., 2010; Wilhelm & Steketee, 2006). CT is based on a cognitive theory which stipulates that the erroneous appraisal of intrusive thoughts plays a key causal role in the development of taboo obsessions. More specifically, appraising obsessions as immoral and personally significant is hypothesized to lead to elevated anxiety. For example, if a mother mistakenly interprets an unwanted thought to drown her infant as a sign that she is an evil person or that she is likely to perform such a behaviour, the thought itself will elicit high levels of distress. This elevated anxiety will in turn lead to thought suppression, which is hypothesized to fuel even more obsessions (Rachman, 1997, 1998; Salkovskis, 1985). The main aim of CT for taboo obsessions is, therefore, to change these negative appraisals (e.g. 'Having these thoughts is a sign that I'm an immoral person') to more functional and realistic beliefs (e.g. 'It's just a random thought and it doesn't say anything about me as a person'). Unlike ERP-based treatments, CT does not involve any specific focus on exposure or habituation to aversive thoughts. Instead, the core focus is on making more nuanced interpretations and reducing the negative appraisals related to intrusive thoughts (Rachman, 1997, 1998). Furthermore, CT may be associated with slightly lower drop-out rates than ERP (11.4% vs. 19.1%; Öst et al., 2015) and there are also data indicating that some therapists are hesitant about treating taboo obsessions with ERP (Gagné et al., 2021). CT could thus potentially serve as complementary intervention for patients who do not respond to or who are unwilling to engage in standard psychological treatment for OCD.

CT for taboo obsessions is usually delivered in-office by a highly trained therapist and is resource intensive, requiring somewhere between 12 and 24 therapy sessions (Freeston et al., 2001; Whittal et al., 2010), posing significant barriers for dissemination. One way to increase the availability of this treatment could be to deliver it remotely in an online self-help format with minimal therapist support (I-CT). The current feasibility study was designed to address three key research questions:

1. Are participants able to grasp and apply an internet-delivered cognitive framework to their own situation?
2. Is I-CT associated with clinically meaningful reductions of OCD symptom severity?
3. Are reductions in OCD symptom severity preceded by reduced negative appraisals (the hypothesized mechanism of change in CT)?

## METHOD

### Participants

This feasibility study included 19 adults with OCD and primary taboo obsessions. Inclusion criteria were defined as: (a) DSM-5 (American Psychiatric Association, 2013) diagnosis of OCD with taboo obsessions as the most impairing symptom, (b) age  $\geq$  18 years, (c) living in Sweden, and (d) having provided informed consent. Exclusion criteria were as follows: (a) no informed consent, (b) not able to read the written material, (c) changes to pharmacological treatment that may affect OCD symptoms during the last month, (d) substance dependence during the last 6 months, (e) psychosis, (f) ongoing mania or hypomania, (g) suicidal risk that may affect study participation, (h) personality disorder that may significantly affect the treatment participation, (i) other ongoing psychological treatments that may affect OCD symptoms and/or (j) other primary psychiatric diagnosis.

### Procedures

The study protocol was approved by the Swedish ethical review board (dnr 2019–06047) and was registered prior to the start of the trial on [www.clinicaltrials.gov](http://www.clinicaltrials.gov) (NCT04313439). Recruitment took place between 26 March 2020 and 1 December 2020. The final data point was collected on the 11 August 2021.

The majority of recruitment took place through the regular patient flow at a specialist clinic for OCD, Sweden. Participants could also self-refer via the study webpage ([www.tvangstankar.se](http://www.tvangstankar.se)). Information about the study was distributed via the clinic and advertisements on social media. A total of 30 individuals showed interest in the study. Patients at the clinic were assessed face-to-face by a mental health professional in line with the clinic's regular routines, that is, this assessment was not a specific part of the study procedure. Individuals who fulfilled the inclusion criteria were invited to participate in the study. Eligible and interested patients were asked to log into a secure web platform, where written information about the study was provided including study objectives, benefits and possible risks associated with the study. Individuals who self-referred via the study's webpage were provided the same written information. All individuals were asked to provide a digital written informed consent through the web platform and to fill out an online pre-selection battery and general sociodemographic information (see 'Measurements' for more detail).

All 30 interested individuals were contacted for a telephone interview to assess inclusion and exclusion criteria. The interview included the clinician-rated Yale–Brown Obsessive–Compulsive Scale (Y-BOCS; Goodman et al., 1989) for assessment of OCD symptom severity and the structured clinical interview Mini International Neuropsychiatric Interview Version 7.0.0 (M.I.N.I.) for assessment of comorbidity. The first author (KOL) conducted all assessments. Five individuals were excluded due to taboo obsessions not being their primary concern, and four were excluded due to primary psychiatric diagnoses other than OCD. One individual declined participation during the telephone interview.

The remaining 20 individuals were included in the study after the telephone interview and completed the baseline assessment. After completion of the baseline assessment, the participants started the 10-week I-CT intervention. One participant was excluded just after enrolment in the study due to severe depressive symptoms and was referred back to the clinic. Eighteen participants (95%) completed the post-treatment measurements (primary endpoint), and 15 participants (79%) completed the 6-month follow-up.

## Therapists

The therapists (KOL, KA and EA) were clinical psychologists with extensive experience in treating OCD and delivering online interventions. KOL and KA were supervised by EA, the principal investigator of the study. The therapists supported the participants throughout the intervention by regular email contact (e.g. minimum of two times/week) via the secure treatment platform and telephone if needed.

## Measures

### Feasibility

The feasibility of the I-CT intervention was assessed in several ways:

- A *General quantitative process data*, including number of treatment dropouts, number of completed online modules, number of messages sent in the online platform and number of participants who requested extra telephone-delivered therapist support during the intervention.
- B *Adverse events* were collected by using a self-rated questionnaire (Andersson et al., 2015). The questionnaire was administered weekly during the intervention period, at post-treatment and at 6-month follow-up. This questionnaire asked if the participants had experienced any unwanted events or effects during participation in the study (*yes/no*). Detailed follow-up questions were given where the participant was asked to describe the event or effect, for example, when, how often and for how long the event/symptom occurred. The participant was additionally asked to rate both immediate and

long-term consequences on a 4-point Likert scale (0 = *did not affect me at all* and 3 = *did affect me very much*).

- C *Qualitative data investigating if participants had understood the cognitive framework* were assessed by the therapists (KOL, KA and EA) who independently rated whether each participant had sufficiently understood and applied the cognitive model to their own situation. This was mainly done by reviewing an online worksheet where the participant was instructed to apply the cognitive model to his/her own situation (example shown in [Figure 3](#)).
- D *Data from therapists* were collected from a clinical round table discussion where the involved therapists discussed each case and common issues they had experienced when providing the I-CT intervention. These discussions were logged, analysed and summarized into themes.

## Acceptability

The acceptability of the intervention was assessed using an adapted version of the *Patient Satisfaction Questionnaire* (Attkisson & Zwick, 1982), which includes questions such as ‘How satisfied are you with the intervention?’ (from 0 = *not at all satisfied* to 3 = *very satisfied*), ‘Would you recommend this intervention to others with obsessions?’ (Yes/No), and also an open-ended question where the participants could provide comments and feedback.

## Primary outcome measure

The *clinician-rated Y-BOCS* was used to assess change in OCD symptom severity from pre-treatment to post-treatment (primary endpoint) and 6-month follow-up (Goodman et al., 1989). The Y-BOCS is regarded as the gold standard measurement for assessing the severity of OCD symptom severity (López-Pina et al., 2015). A higher score indicates a higher level of severity (total range 0–40 points). The Y-BOCS was administered by a clinical psychologist who was not involved in delivering the treatment. Participants who had at least 35% reduction in Y-BOCS from pre-treatment to post-treatment and had a rating of 1 (‘very much improved’) or 2 (‘much improved’) on the Clinical Global Impression-Improvement (CGI-I) at post-treatment were classified as treatment responders. Participants who had a score of  $\leq 12$  and a Clinical Global Impression-Severity (CGI-S) score of 1 (‘normal, not at all ill’) or 2 (‘borderline mentally ill’) were classified as being in remission (Mataix-Cols et al., 2016).

## Secondary outcome measures

The *Y-BOCS—Self-rating* was used to assess weekly OCD symptom severity. The self-rated version of Y-BOCS correlates highly with the original, clinician-rated version when administered in a digital format (Rosenfeld et al., 1992).

The *CGI-S/I* is a frequently used clinician-rated scale of symptom severity and improvement (Guy & Bonato, 1976). In the current study, the CGI-S and CGI-I were used to rate OCD symptom severity and improvement. The CGI-S ranges from 0 (‘no symptoms’) to 7 (‘extremely severe symptoms’). The CGI-I ranges from 0 (‘very much improved’) to 7 (‘very much worse’).

The *Montgomery Åsberg Depression Rating Scale—Self Report* (MADRS-S) is a 9-item self-rated scale assessing depressive symptoms on a 7-point scale ranging from 0 to 6, with a higher score indicating a higher level of depressive symptoms (Svanborg & Åsberg, 1994). The MADRS-S has shown good psychometric properties, with a Cronbach's alpha of .84 (Fantino & Moore, 2009).

The *Work and Social Adjustment Scale* (WSAS) is a 5-item self-rated scale assessing functional impairment in five domains: work/school, home management, social leisure activities, private leisure activities and close relationships. Each domain is rated on a 9-point scale and the individual rates how much the

taboo obsessions impair function in each domain from 0 (*'Not at all'*) to 8 (*'Very severely'*). The instrument has good psychometric properties with a Cronbach's alpha ranging from .70 to .94 and test–retest value of .73 (Mundt et al., 2002).

*Thought Action Fusion Scale* (TAFS) is a 19-item self-rated scale rated on a 5-point scale (from 0 = *strongly disagree* to 4 = *strongly agree*) measuring maladaptive cognitive biases related to intrusive thoughts (Meyer & Brown, 2013).

*Penn State Worry Questionnaire* (PSWQ) is a 16-item scale measuring the frequency of generalized worry. Items are rated on a 5-point scale (from 1 = *'not at all typical of me'* to 5 = *'very typical of me'*). The measure has shown adequate psychometric properties with a strong internal consistency of  $\alpha = .95$  (Meyer et al., 1990).

*The Metacognitions Questionnaire* (MCQ-30) is a 30-item self-rated scale assessing metacognitive beliefs (Wells & Cartwright-Hatton, 2004). The current study used only the *Negative metacognitions subscale* (MCQ-NC) of the MCQ. This subscale includes six statements about how uncontrollable and threatening the individual perceives their worry/thoughts (e.g. 'I could make myself sick with worrying', 'My worrying thoughts persists, no matter how I try to stop them'). Each item is rated from 1 (*'do not agree'*) to 4 (*'agree very much'*).

## Process measures

The *Personal Significance Scale* (PSS) is a 19-item self-rated scale used to clinically assess the degree of personal significance the individual attributes to the obsessions. The scale includes 19 statements (e.g. 'Do these thoughts reveal something important about you' and 'Do these thoughts mean that you are a dangerous person?'), which is rated on a 9-point scale (from 0 = *'not at all'* to 8 = *'definitely'*; Rachman, 2003). The PSS has high internal consistency,  $\alpha = .90$  (Whittal et al., 2010).

## Assessment points

The participants completed all outcome measures prior to the intervention (week 0), at post-treatment (week 10) and at the 6-month follow-up. Additionally, weekly measures were administered throughout the intervention period (week 1–9), which included the self-rated version of the Y-BOCS, the PSS and the Adverse events questionnaire. All participant-rated measures were administered via the study's secure internet platform. Post-treatment and follow-up interviews were conducted by a clinical psychologist not involved in the treatment.

## Statistical analyses

Descriptive statistics were used to evaluate the feasibility of the intervention (i.e. research question #1, *Are participants able to grasp and apply internet-delivered cognitive framework to their own situation?*).

To address research question #2 (*Is I-CT associated with clinically meaningful reductions of OCD symptom severity?*), we estimated the effects of the intervention on the primary and secondary outcome measures using a mixed-effects regression framework. The model included a fixed effect of time and random intercepts with maximum likelihood estimations. Within-group effect sizes were calculated using the `m_effectsize` script in Stata (freely available by typing 'net install m\_effectsize, from [<http://www.imm.ki.se/biostatistics/stata>] replace' in Stata). This command estimates effect sizes by dividing the estimated change score in the mixed-effects regression analysis by the pooled standard deviation at pre-treatment. A 95% confidence interval around the effect size estimates was estimated by using 1000 bootstrap replications. A major advantage of this model is that it incorporates all measurement points and individuals in the effect size estimations. The regression model was repeated from post-treatment to



the 6-month follow-up in order to investigate whether the effects were sustained. All analyses evaluating the effects of the intervention were intention-to-treat.

To address research question #3 (*Are reductions in OCD symptoms preceded by reduced negative appraisals (the hypothesized mechanism of change in CT?)*), we employed a time-lagged mixed-effects regression analysis using weekly ratings on PSS as the independent variable (the indicator for negative appraisals) and the self-rated Y-BOCS as the dependent variable (week 0-10 change score). In the main analysis, we investigated if PSS at week T predicted symptom levels measured with the self-rated Y-BOCS at week T+1. The model also included scores on self-rated Y-BOCS at week T as a covariate to control for symptom change. A sensitivity analysis with the reversed order of measures (i.e. whether score on the self-rated Y-BOCS at week T predicted the score on PSS week T+1, controlling for the score on PSS at week T) was also conducted.

All statistical analyses were conducted in Stata 16.1.

## Intervention

I-CT is a 10-week therapist-guided online self-help intervention. The intervention was mainly inspired by the book ‘The treatment of obsessions’ (Rachman, 2003). The intervention has no ERP-specific components. In line with a cognitive framework, the intervention includes components such as cognitive restructuring and behavioural experiments. It is divided into eight modules where each module contains brief text-based chapters with interactive features such as worksheets. Some modules also include audio recordings of various exercises. A designated therapist had regular email contact with the participants within the encrypted platform. The participants were also able to reach the study personnel via telephone if needed. The content of each module is depicted in detail in Table 1.

## RESULTS

Table 2 presents demographic and clinical information about the included participants at pre-treatment (week 0).

### Feasibility

#### General quantitative process data

Twelve out of the 19 participants (63%) completed all 8 modules ( $M = 6.9$ ,  $SD = 2.1$ ). The therapists spent on average 119.8 minutes ( $SD = 77.1$ ) per participant by responding to messages and homework assignments during the 10-week period. The mean number of messages sent from the participants was 43.0 ( $SD = 20.1$ ), and the mean number of messages sent to the participant from the therapist was 37.8 ( $SD = 28.3$ ). Eighteen (95%) participants were actively engaged in the intervention material. One participant completed only the first module after which he/she did no longer engage with the intervention. One participant dropped out of the study after completing a 4 out of 8 modules. This particular participant felt stressed by the structured online format and wanted to receive face-to-face treatment instead. The 18 participants who actively engaged in the intervention material registered on average 5.7 (range 0–19) behavioural experiments during the course of the intervention.

#### Adverse events

Six participants (32%) reported a total of 9 adverse events during the acute intervention period of 10 weeks. The reported adverse events were increased levels of anxiety ( $n = 4$ ), increased levels of

obsessions ( $n = 3$ ) and general stress ( $n = 1$ ). One serious adverse event was registered in the current study: one participant was admitted to inpatient care for a couple of days during the intervention due to severe depressive symptoms. This participant continued working with the intervention during the study period and completed all modules. At the 6-month follow-up, 3 participants (16%) reported increased levels of anxiety ( $n = 2$ ) and stress ( $n = 1$ ). There were no reported serious adverse events at the 6-month follow-up.

### Ability to understand and apply the I-CT material

Thirteen out of the 18 participants who engaged in I-CT (72%) were assessed by the study therapists to have been able to understand and successfully apply the cognitive framework of taboo obsessions (participant examples are provided in Figure 3). Four of these 13 individuals requested extra telephone support (between 1 and 8 telephone calls per participant, around 5–15 min per call). The main reason for requesting extra support was a sudden increase in anxiety or depressive symptoms. Four of the participants who understood the cognitive model and responded to the treatment were categorized by

TABLE 1 Overview of the I-CT intervention

Module	Content
1	<p>General knowledge about the cognitive model for obsessions</p> <p><i>Overall aim:</i> Introduction of the cognitive model of taboo obsessions.</p> <p><i>Content:</i> General information about obsessions and how negative appraisals of intrusive thoughts is hypothesized to play a key causal role in the development and maintenance of taboo obsessions.</p> <p><i>Homework:</i> Daily registrations of obsessions and negative appraisals in an online worksheet. The aim of this exercise is to get the participant to think distinctively about obsessions and negative appraisals, which is a key part in understanding the cognitive model.</p>
2	<p>In-depth knowledge about the cognitive model for obsessions</p> <p><i>Overall aim:</i> Provide an in-depth understanding of the cognitive model and apply it to own situation.</p> <p><i>Content:</i> Module 2 contains a step-by-step description of the cognitive model illustrated by two fictive patient cases. Case example #1 ‘Cindy’ is struggling with taboo obsessions about killing her son. Case example #2 ‘Hannes’ experience fearsome thoughts of becoming a paedophile or being sexual attracted to his parents. A specific example from Hannes is shown in Figure 1. A similar walkthrough of the cognitive model is also applied to Cindy in the same module.</p> <p><i>Homework:</i> Apply the cognitive model to own situation using an online worksheet in a similar way as in the Hannes case example shown in Figure 1. We regarded this online worksheet as an important proxy if the participant had really grasped the cognitive framework.</p>
3	<p>Elaborate on more nuanced interpretations of intrusive thoughts</p> <p><i>Overall aim:</i> Get the participant to start elaborating on nuanced and flexible interpretations of intrusive thoughts.</p> <p><i>Content:</i> The participant is provided with a practical walkthrough of an exercise called ‘Theory A&amp;B’. In this exercise, the participant first writes down the current interpretations/negative appraisals (Theory A) in an online worksheet (e.g. ‘Cindy: I’m a dangerous person because I think about killing my baby’) and also the evidence supporting this theory/interpretation (e.g. ‘I once read at a blog that people with obsessive thoughts can act out and really do that they are thinking. If this is true; it would provide support for my current interpretation (Theory A)’).</p> <p>The next step in this exercise is to elaborate on alternative interpretations (Theory B), for example, ‘Cindy: My obsessions are only thoughts and nothing I need to care about’ and ‘I have now read in module 1 that 87–95% of people have these kinds of thoughts occasionally, and if Theory A would be true, the rates of parents killing their children would probably be a lot higher than it is today’. After having read through the Cindy case example, the participant is asked to help the fictive patient ‘Hannes’ to make more nuanced interpretations of his intrusive thoughts in an online worksheet. The participant subsequently repeats this exercise but instead apply the principles to his/her own situation.</p> <p><i>Homework:</i> Complete the exercise ‘Theory A&amp;B’ to own situation using an online worksheet.</p>

(Continues)



TABLE 1 (Continued)

Module	Content
4	<p>Shifting attention away from intrusive thoughts</p> <p><i>Overall aim:</i> Learn about the role of attention and why active engagement in intrusive thoughts can actually increase anxiety rather than alleviate it.</p> <p><i>Content:</i> We used the ‘the air traffic controller’ metaphor from Rachman (2003). In this exercise, the participant is first instructed to give maximum attention to his/her intrusive thoughts for a period of 5 minutes (similar to an air traffic controller who is on duty) and rate the degree of focus and discomfort on a 1–10 scale. The next step is to repeat this exercise but instead imagine being an air traffic controller who is off duty (‘Let go of all obsessive thoughts; let them pass through your mind without giving any relevance to them, focus instead on the surroundings, for example, sounds and smells’) and to again rate focus and discomfort. The participant is subsequently instructed to expand this exercise to a longer period of time during the day.</p> <p><i>Homework:</i> Work with the air traffic controller exercise for longer periods during the week and rate levels of focus and distress. The participant is also encouraged to elaborate and discuss the experiences drawn from this exercise in the ‘A&amp;B Theory’ online worksheet (e.g. ‘I can see from my worksheet that I feel less anxious and experience fewer intrusive thoughts when I do not try to control them. This provides me support of Theory B, that is, the data suggest that it is actually the avoidance- and control strategies that increase the frequency and distress of obsessions’).</p>
5 & 6	<p>Behavioural experiments</p> <p><i>Overall aim:</i> Provide the participants with practical guidance how to test out the evidence supporting Theory A (negative appraisal) versus Theory B (alternative interpretation[s] of intrusive thoughts) using behavioural experiments.</p> <p><i>Content:</i> The participant reads about behavioural experiments and examples are provided how to investigate a) the prevalence of intrusive thoughts, b) other people’s attitude to intrusive thoughts, and c) the role of attention and how bodily focus can elicit physical sensations in different ways. A practical example from Cindy is shown in Figure 2.</p> <p><i>Homework:</i> The participant is encouraged to plan, execute and evaluate behavioural experiments and write down his/her experiences in an online worksheet. This is usually done in close collaboration with the online therapist. Conclusions drawn from the behavioural experiments are summarized in the ‘A&amp;B Theory’ online worksheet.</p>
7	<p>Common difficulties</p> <p><i>Overall aim:</i> Present common difficulties when working with I-CT and suggestions how to solve these.</p> <p><i>Content:</i> Common difficulties and how to overcome these are visualized through the Cindy and Hannes case examples. For example, Hannes felt in the beginning of I-CT that everything worked out really well, but after 6 weeks, he starts to feel depressed and interpret this low mood as a sign that he is a bad/immoral person. Hannes decide to test out whether low mood is associated with more negative appraisals. He records both mood and negative appraisals each hour during the week and finds a strong association. He writes the following in his online worksheet: ‘I interpret my obsession as “the truth” when I’m feeling depressed, and just as irrelevant thoughts when I’m feeling good. When I feel depressed, I cannot really believe my own interpretations. The focus should therefore rather be that I engage in anti-depressive behaviours when I feel moody. I will try this strategy the upcoming week and see if it leads to any difference’.</p> <p><i>Homework:</i> Continue to work with behavioural experiments and summarize the conclusions in the online worksheet ‘Theory A&amp;B’.</p>
8	<p>Plan for the future</p> <p><i>Overall aim:</i> Make a strategy for how to continue the work with the I-CT intervention.</p> <p><i>Content:</i> The I-CT intervention is summarized. The participant reads about setbacks and relapses and why it is important to continue with the exercises also after the acute treatment period.</p> <p><i>Homework:</i> The participant is asked to summarize his/her own progress and write an individual plan for maintenance of treatment gains using an online worksheet. This maintenance plan includes reflection about what the initial problem was, what worked during the intervention, what kind of behavioural experiments that he/she needs to continue to work with and strategies to get this work done.</p>

the therapists in the clinical roundtable discussion as ‘therapy drifters’, meaning that they, beside taboo obsessions, to a large(r) degree addressed other psychiatric symptoms with the I-CT framework, for example, excessive worry, health anxiety, depressive symptoms and traumatic memories.

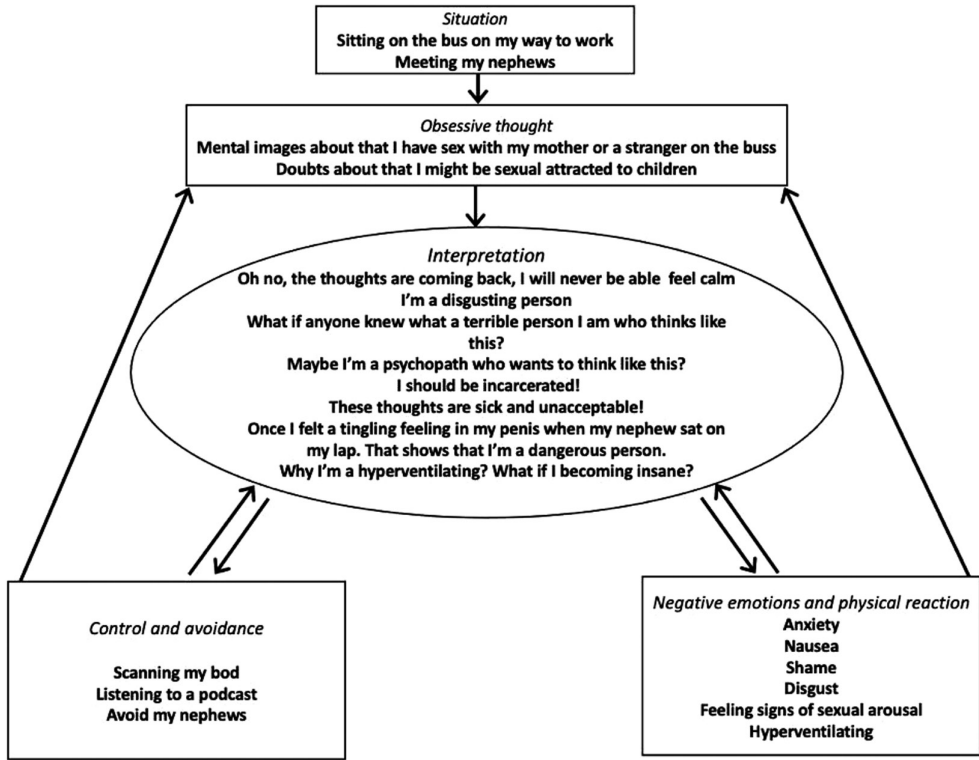


FIGURE 1 Step-by-step description of the cognitive model used in module 2 of the I-CT intervention. The model is illustrated by the case example ‘Hannes’

All five participants who were deemed to not having been able to understand and apply the cognitive framework (see example in Figure 3) received extra telephone support. This telephone support mainly focussed on helping the participant to understand the cognitive model. There was no difference in the mean number of completed modules between the group who was deemed to understand and apply the cognitive model and in the group who was assessed to not fully understand the model,  $R^2 = .38$ ,  $F(1, 16) = 0.22$ ,  $p = .646$ .

### Acceptability

When asked how satisfied the participants were with the intervention, 14 (74%) responded that they were very satisfied or satisfied and that they would recommend the intervention to others. One participant (5%) responded that he/she was somewhat satisfied, and four participants (21%) did not provide an answer.

### Efficacy

The intention-to-treat mixed-effects regression model showed that the participants improved significantly in terms of reduced OCD symptom severity over time ( $b = -10.04$ ,  $Z = -5.29$ ,  $p < .001$ ) with a large effect size (bootstrapped  $d = 1.67$  [95% CI; 0.67 to 2.66]). Twelve of the 19 participants (63%) were classified as treatment responders at post-treatment. Six participants (32%) were classified as treatment

TABLE 2 Participant characteristics and clinical data

Variable	Full sample (N = 19)
Gender, <i>n</i> (%)	
Male	5 (26%)
Female	14 (74%)
Age	
Mean (SD)	28 (6.85)
Min-Max	18–41
Occupational status, <i>n</i> (%)	
Student	8 (42%)
Working full time	5 (26%)
Part-time work	4 (21%)
Unemployed	2 (11%)
Highest education, <i>n</i> (%)	
High school	8 (42%)
University <3 years	2 (11%)
University ≥3 years	4 (21%)
Higher education, not university	5 (26%)
Referral, <i>n</i> (%)	
Patients at a specialist clinic for OCD	14 (74%)
Self-referral	5 (26%)
Previous CBT for OCD, <i>n</i> (%)	
Yes	11 (58%)
No	8 (42%)

Abbreviations: CBT, cognitive behavioural therapy; OCD, obsessive–compulsive disorder; Y-BOCS, The Yale–Brown Obsessive–Compulsive Scale.

remitters. The intervention was associated with significant improvement in all secondary outcome measures, except on depressive symptoms (see Table 3). The gains on the primary outcome (Y-BOCS) were sustained from post-treatment to the 6-month follow-up ( $b = -1.70$ ,  $Z = -0.90$ ,  $p = .366$ ), as did gains on all secondary outcomes except a small decline on the PSWQ ( $b = 2.29$ ,  $Z = 1.98$ ,  $p = .047$ ) and the WSAS ( $b = -2.88$ ,  $Z = -2.35$ ,  $p = .019$ ). Nine out of the 15 participants (60%) who completed the 6-month follow-up were classified as treatment responders, and six participants (40%) were classified as treatment remitters. Due to an administrative error, two participants completed the 6-month follow-up 4-month post-treatment.

## Relationship between OCD symptom severity and negative appraisals

As hypothesized, the time-lagged regression analysis indicated a significant relationship between PSS at week T and self-rated Y-BOCS scores at week T+1, controlling for self-rated Y-BOCS scores at week T ( $b = 0.05$  [ $SE = 0.02$ ],  $p = .001$ ). Conversely, the sensitivity analysis did not show a significant correlation between self-rated Y-BOCS scores at week T and PSS scores at week T+1, when controlling for the PSS scores at week T ( $b = 0.37$  [ $SE = 0.31$ ],  $p = 0.238$ ). This suggests that changes in negative appraisals were associated with subsequent reductions in OCD symptom severity, but not the other way around.

TABLE 3 Effect on primary and secondary outcomes

Variable	<i>M</i>	<i>(SD)</i>	Within group x time interaction effect		Effect size
			<i>Z</i> -value	<i>p</i> -value	Bootstrapped <i>d</i> (95% CI)
Y-BOCS					
Week 0	23.36	(3.21)			
Week 10	12.94	(8.19)	5.29	<.001	1.67 (0.62–2.72)
Y-BOCS self-rated					
Week 0	22.36	(5.58)			
Week 10	14.88	(8.27)	8.64	<.001	1.03 (0.55–1.50)
PSS					
Week 0	91.47	(22.48)			
Week 10	54.19	(29.23)	9.78	<.001	1.09 (0.59–1.60)
MADRS-S					
Week 0	17.00	(7.58)			
Week 10	13.38	(8.66)	1.83	.067	0.41 (–0.90–0.06)
WSAS					
Week 0	15.21	(7.82)			
Week 10	11.00	(9.63)	2.86	<.05	0.48 (0.02–0.94)
TAFS					
Week 0	33.37	(13.82)			
Week 10	22.81	(17.39)	3.57	<.001	0.68 (0.15–1.21)
PSWQ					
Week 0	52.32	(6.44)			
Week 10	47.00	(7.67)	2.60	<.05	0.77 (0.16–1.37)
MCQ-NC					
Week 0	19.58	(3.10)			
Week 10	14.75	(4.54)	3.97	<.001	1.27 (0.58–1.95)
CGI-S					
Week 0	4.16	(0.50)			
Week 10	2.89	(1.23)	5.02	<.001	1.36 (0.51–2.21)

Abbreviations: CGI-S, Clinical Global Impression—Severity; MADRS-S, Montgomery Åsberg Depression Rating Scale—Self Report; MCQ-NC, Metacognitions Questionnaire—Negative metacognitions subscale; PSS, Personal Significance Scale; PSWQ, Penn State Worry Questionnaire; TAFS, Thought Action Fusion Scale; WSAS, Work and Social Adjustment Scale; Y-BOCS, The Yale–Brown Obsessive–Compulsive Scale.

## Post-hoc analyses

Figure 4 shows a post-hoc exploratory analysis comparing participants who were deemed to have understood and successfully applied the intervention model ( $n = 13$ ) compared with participants who did not fully understand the I-CT material early in treatment ( $n = 5$ ). Only participants who had been active during the intervention were included in the analysis ( $n = 18$ ). A group\*time mixed effect regression model indicated that participants who had understood the treatment model had a significantly larger reduction in OCD symptom severity than participants who did not ( $b = 15.31$ ,  $Z = -5.54$ ,  $p < .001$ ) with a large between-group effect size (bootstrapped  $d = 3.71$  [95% CI; 2.23 to 5.20]). Similar results were found on the PSS ( $b = 4.40$ ,  $Z = 6.65$ ,  $p < .001$ ; bootstrapped  $d = 1.59$  [95% CI; 0.94 to 2.23]).

<b>Behavioral experiment</b>		
<b><u>Target interpretation you want to investigate</u></b>	<b><u>Experiment</u></b>	<b><u>Prediction</u></b>
Belief rating (0 – 100%)	How will you test out your hypothesis?  When and where will you conduct the experiment?  With who (or alone)?	What do you predict will happen? What is the likelihood of this happening (0 – 100%)?  What is the worst that could happen? What is the likelihood of this happening (0 – 100%)?  How will you know that the worst has happened?
<i>I will become insane and act out if I think about my obsessions for a long time without controlling them. I will start screaming incoherently and possibly act on my thoughts.</i>  <i>I believe this will happen to 60%</i>	<i>I will sit down for 30 minutes and really focus on my worst obsessive thoughts, which is about killing my baby with a knife. I will not try to stop them. I will do this on Monday at 7 am at home together with my boyfriend. I want to do it with my boyfriend because 1) it feels safer and 2) he can help me to distinguish between if I actually becomes insane, or if I just experience very height levels of anxiety.</i>	<i>I will become dizzy and start rambling (70%).</i>  <i>The worst that could happen is that I will lose my mind and become locked up in an institution (30%).</i>  <i>I would notice if this happens if I can't think clearly anymore.</i>
<b><u>What happened?</u></b>	<b><u>How much do you believe in your current interpretations of the obsessive thoughts (0 – 100%)</u></b>	<b><u>What did you learn from the experiment?</u></b>
What behaviors, thoughts and feelings did you notice?		
<i>I became dizzy and very anxious. I talked faster than usual, but I was not rambling. I felt a pressure over my chest and a tingling in my arms. I felt that I was shaking, but my boyfriend said that he could not see anything strange. The anxiety eased after about 30 minutes.</i>	<i>I think I need to re-evaluate my obsessions. Before the experiment I believed my interpretation to be true to 60%. Now it's more like 40%."</i>	<i>It seems that I won't become insane if I let go of my thought control strategies, so I need to try something else.</i>
<b><u>Write down what you want to investigate further:</u></b> <i>I want to perform the same experiment, but alone this time.</i>		

FIGURE 2 Practical example of a behavioural experiment used in module 5 of the I-CT intervention. The experiment is illustrated by the case example 'Cindy'. The lessons learned from each behavioural experiment are also summarized in the 'Theory A&B' worksheet

## DISCUSSION

To our knowledge, this is the first study investigating the effects of a digital cognitive intervention for patients with taboo obsessions. The current study suggests that a therapist-supported online cognitive intervention is both feasible and acceptable for individuals with OCD who struggle with taboo obsessions. Adherence and engagement during the I-CT intervention was high, and a majority of the participants completed all eight modules. The participants were also highly engaged with their online therapist. About three quarters of the participants reported being satisfied or very satisfied with the intervention and that they would recommend it to others. The reported adverse events were mostly mild and transient. Sixty-eight per cent of the included individuals were deemed by independent raters

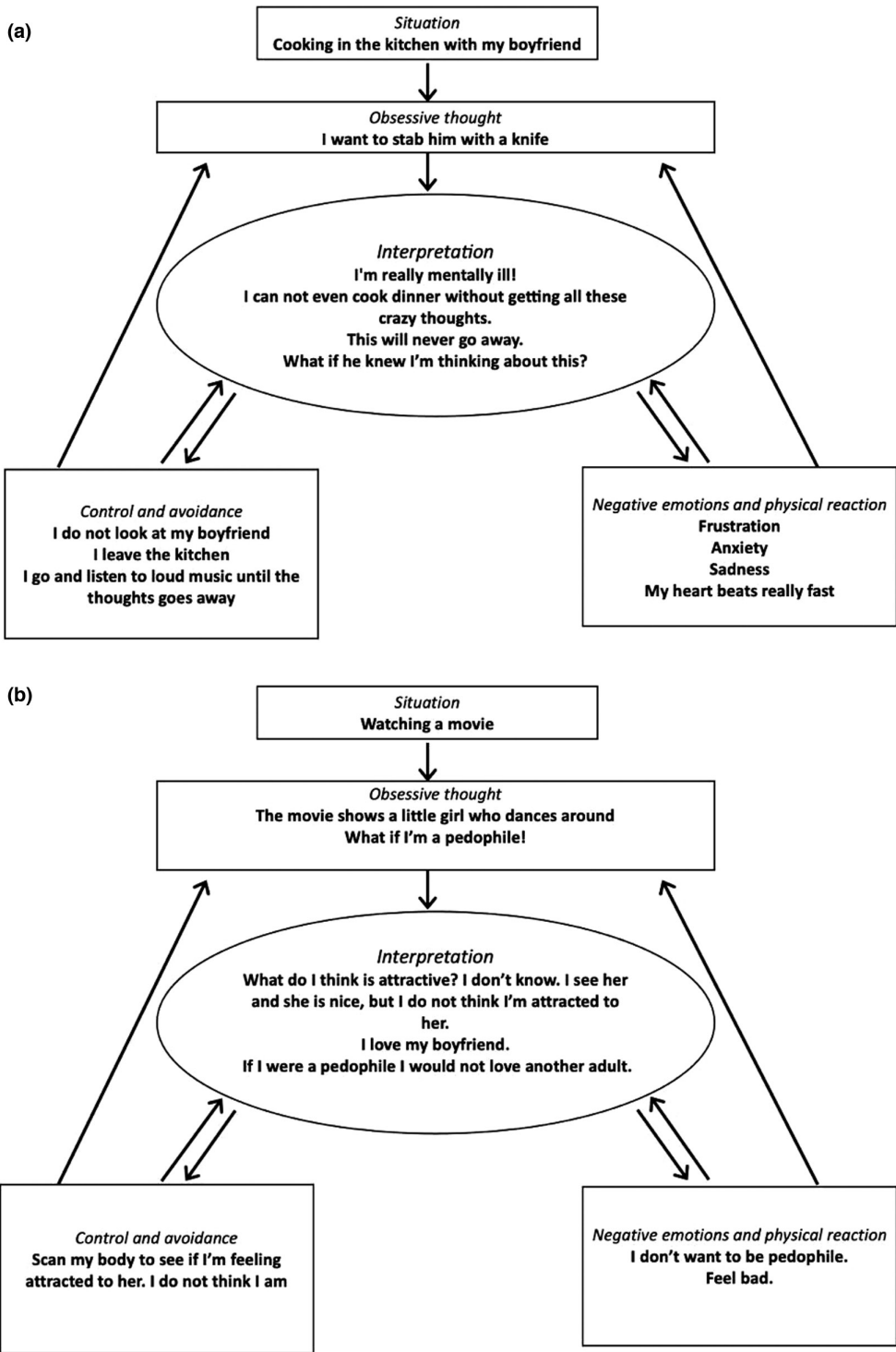


FIGURE 3 Online worksheets of the cognitive model for obsessions. (a) A participant who successfully applied the cognitive framework of obsessions to her/his own situation. (b) A participant who had difficulties to make a meaningful distinction between obsessions and negative appraisals. The examples have been modified to persevere the participants' anonymity



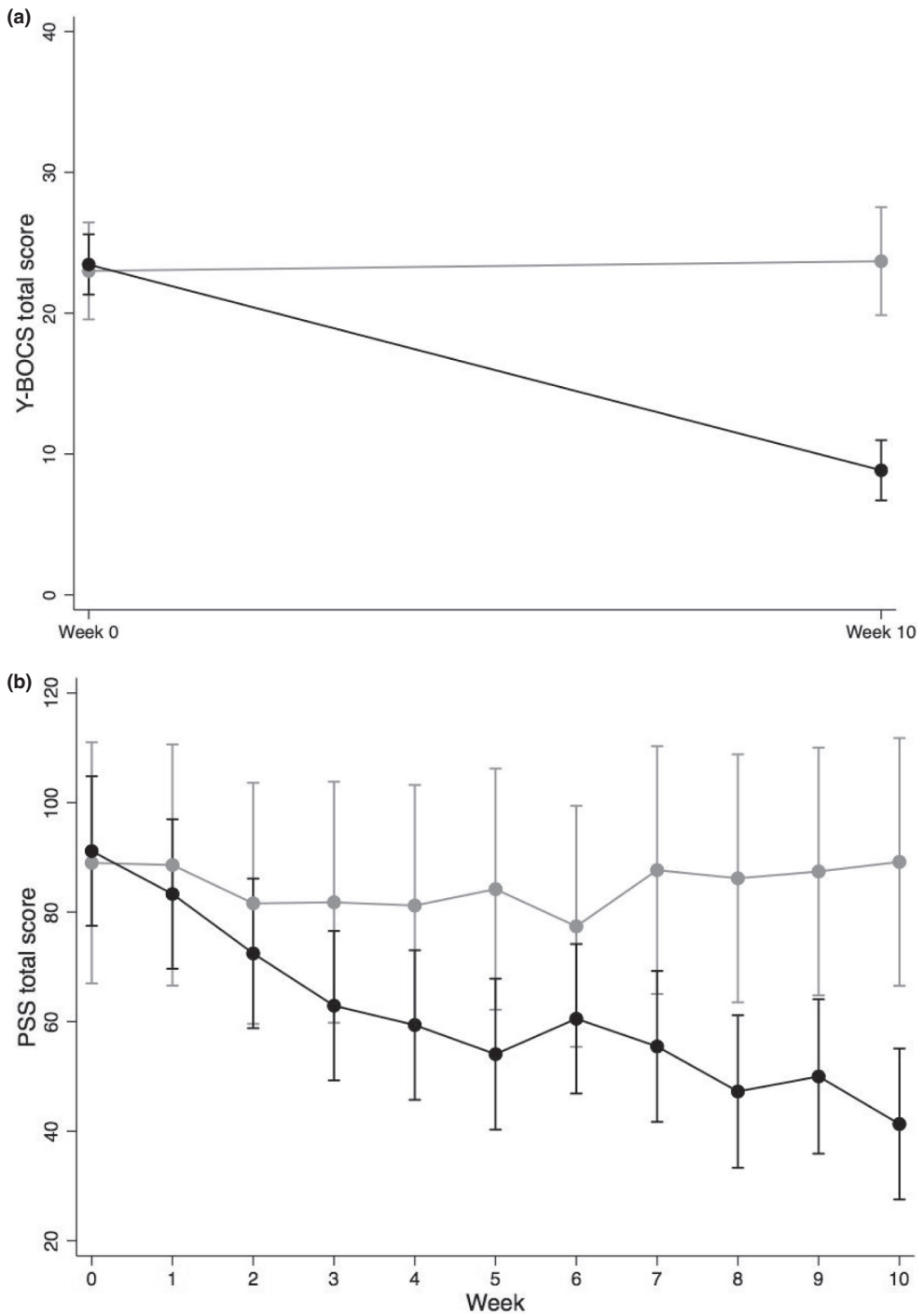


FIGURE 4 Effect of the intervention from the subgroup analysis. The grey line depicts participants who were assessed by the study therapists to not fully have understood or able to apply the cognitive model to their own situation. The black line depicts participants who were assessed to fully understand and apply the model to their own situation. A practical example how this could look like is shown in Figure 1. (a) Yale–Brown Obsessive–compulsive Scale (Y-BOCS) total score ratings at pre-treatment (week 0) and post-treatment (week 10) with 95% confidence intervals. (b) Weekly Personal Significance Scale (PSS) total score ratings with 95% confidence interval

to have understood and successfully applied the cognitive model of taboo obsessions to their own situation. Additionally, I-CT was associated with clinically significant improvements in OCD symptom severity using the clinician-rated Y-BOCS (bootstrapped  $d = 1.67$  [95% CI; 0.67 to 2.66]) with the majority of participants classified as responders and almost one third of the participants being in remission. These results are within the range of previous studies investigating in-person CT for OCD in general ( $g = 2.21$  [95% CI; 1.59 to 2.83]; Öst et al., 2015) and in-person CT for taboo obsessions in particular ( $d = 1.76$  [95% CI; 1.32 to 2.19]; Whittal et al., 2010). The gains were sustained or further improved at the 6-month follow-up. Finally, the time-lagged regression analysis indicated a unidirectional relationship whereby reductions in negative appraisals were associated with less severe OCD symptoms the subsequent week, providing further tentative support for the proposed mechanisms of change in CT.

Traditionally, CT protocols for taboo obsessions require expert therapists and up to 24 1-h face-to-face sessions (Freeston et al., 2001; Whittal et al., 2010). In the current study, the therapist spent on average only 2 h per participant over the full study period of 10 weeks, while still achieving large effect sizes. The results are encouraging as they suggest that it is possible to translate a cognitive intervention to a digital guided self-help format and to achieve both cognitive change and symptom reduction without having a face-to-face therapist in the same room engaging the patient in Socratic dialogue.

Almost three quarters of the sample participants were assessed to have understood and successfully applied the cognitive model for obsessions to their own situation. Post-hoc analyses indicated that the effect sizes in the intention-to-treat analysis were mainly driven by this subsample of participants who actually understood the model. Thus, the individuals who did not grasp the cognitive model and/or had difficulties to apply it to their own situation did not benefit from the treatment. The model was presented for the participants in the first intervention module and was repeated multiple times during the intervention (see Table 1). It is not clear why some participants understood the model, and why some did not, but it does not seem to be a question of compliance. Participants who were not able to successfully apply the cognitive model (example provided in Figure 3) completed a similar number of modules. The higher degree of therapist support that was provided via telephone to these participants did not seem to give any incremental effects. Hence, it is not clear if it was the online mode of treatment delivery, the written material or possibly clinical characteristics of the participants that could explain these results. While likely underpowered, the data from this analysis are clinically important as it suggests that it is possible to detect high-risk individuals at an early stage of treatment. Future research should investigate this issue further. Additionally, future research should investigate whether it is possible to increase the proportion of individuals understanding and applying the cognitive model to their own situation. This could be done, for example, by using videos or even more detailed case descriptions.

If the encouraging results of this trial are confirmed in controlled trials, what role could I-CT play in the future? One idea would be to use this intervention as a complementary treatment to individuals who may be reluctant to engage in exposure-based therapies or to patients who do not respond to ERP-based treatments. Another possible approach could be to make I-CT completely self-guided and develop formats to reach also the wider population of individuals who struggle with taboo obsessions but do not necessarily fulfil diagnostic criteria for OCD. Individuals with subthreshold levels of OCD have comparable levels of functional impairment and psychiatric comorbidity as patients with full-blown OCD (de Bruijn et al., 2010; Fullana et al., 2009). One specific population which is known to struggle with taboo obsessions are new parents (Abramowitz et al., 2003; Fairbrother et al., 2021; Fairbrother & Woody, 2008; Lawrence et al., 2017). It is possible that a completely self-guided easy-to-access online intervention could help these individuals at a time when traditional treatment may be difficult for them to access due to time constraints.

## LIMITATIONS

There are limitations to this study that affect the interpretation of the results. First and foremost, the sample size was small and the study did not include a control group. Therefore, the estimated effect

sizes should be interpreted with caution and need to be replicated in a randomized controlled trial that includes a credible comparator. Second, the majority of the participants were females (74%), possibly limiting generalizability to other populations. Third, the study design did not allow for a full mediator analysis, nor a mechanistic test, to investigate the possible relationship between a reduction of negative appraisals and subsequent reductions in OCD symptom severity. Fourth, the assessors were not blinded to treatment allocation, which could potentially bias the results and increase the risk of type I errors. Future trials should use extensive blinding procedures to avoid these risks (Mataix-Cols & Andersson, 2021).

## CONCLUSION

This feasibility study showed that it is possible to successfully adapt a purely cognitive intervention to a digital guided self-help format and to achieve both cognitive change and meaningful symptom reduction. The results require confirmation in a randomized clinical trial.

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## AUTHOR CONTRIBUTIONS

**Klara Olofsdotter Lauri:** Investigation; methodology. **Kristina Aspvall:** Investigation; methodology; supervision. **Ingvill Bagøien Hustad:** Investigation. **Karin Malmqvist:** Investigation. **Eva Serlachius:** Conceptualization; supervision. **David Mataix-Cols:** Conceptualization; methodology; supervision. **Christian Rück:** Conceptualization; supervision. **Volen Ivanov:** Methodology. **Erik Andersson:** Conceptualization; investigation; methodology; supervision.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors upon request given that the request complies with Swedish and EU laws regulating protection of identifiable data.

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