



# Digitally Delivered Psychological Interventions for Anxiety Disorders: a Comprehensive Review

Evgenia Stefanopoulou<sup>1</sup>  · David Lewis<sup>1</sup> · Matthew Taylor<sup>1</sup> · James Broscombe<sup>1</sup> · Jan Larkin<sup>1</sup>

Published online: 28 November 2018

© Springer Science+Business Media, LLC, part of Springer Nature 2018

## Abstract

Digital interventions for anxiety disorders have been well-researched over the past two decades. However, reviews to date have focused on internet-based cognitive behavioural therapy (iCBT), whereas other psychological interventions have received less attention. The aim of this review was therefore to evaluate the effectiveness of digitally delivered psychological therapies (CBT, Attention Bias Modification, Exposure Therapy, Applied Relaxation, Bibliotherapy, Psychodynamic Therapy, Mindfulness, Behavioural Stress Management, Counselling) compared with control conditions and/or other psychological interventions for anxiety disorders (Social Anxiety Disorder (SAD), Health Anxiety, Obsessive-Compulsive Disorder (OCD), Post-traumatic Stress Disorder (PTSD), Specific Phobias, Panic Disorder (PD), Generalised Anxiety Disorder (GAD)]. 68 randomised controlled trials (RCTs) were reviewed. SAD was the anxiety disorder for which the most RCTs were conducted. Overall, findings support the effectiveness of iCBT for SAD; for the remaining interventions, although some RCTs indicated significant improvement (within groups) at post-treatment and/or follow up, between group findings were less consistent and overall, methodological differences across trials failed to provide strong supporting evidence. Finally, the level of therapist contact or expertise did not appear to affect much treatment effectiveness. Additional large, methodologically rigorous trials are needed to investigate further whether different digitally delivered psychological interventions are equally effective for anxiety disorders. Moreover, further studies are pertinent in order to examine the maintenance of therapy gains after the end of treatments and understand how these work [(e.g. the influence of therapist factors, user engagement and/or satisfaction, potential access barriers and treatments with diverse population groups (e.g. BME groups)].

**Keywords** Anxiety · Review · Digital · Online · Interventions

---

✉ Evgenia Stefanopoulou  
evgenia.stefanopoulou@turning-point.co.uk

<sup>1</sup> Turning Point, Registered Charity, Standon House, 21 Mansell Street, London E1 8AA, UK

## Introduction

A pressing need for mental health services is meeting the growing demand for the treatment of anxiety disorders. Anxiety disorders, including panic disorder (PD) with or without agoraphobia, generalized anxiety disorder (GAD) and social anxiety disorder (SAD) are the most prevalent mental health disorders and are associated with immense healthcare costs and a high burden on health, wellbeing, employment status and social functioning [1]. Specifically, it is estimated that nearly 40% of the population are affected by an anxiety disorder during their lifetime and 14–18% of the population suffer an anxiety disorder each year [2]. Therefore, meeting the needs of people experiencing anxiety is of huge importance.

Cognitive behavioural therapy (CBT) is a well-established, effective treatment for anxiety disorders whilst other psychological interventions such as psychodynamic therapies have also been demonstrated to produce significant improvements [National Institute for Health and Care Excellence (NICE)] [3]. However, limited numbers of qualified therapists can restrict the utility of psychological treatments. Moreover, only 10% to 50% of individuals access appropriate treatment within healthcare services, mainly due to low perceived need (by the individual or healthcare staff), fear of stigmatisation, limited understanding and knowledge about treatment options and a lack of mental health resources, resulting in long waiting lists [4].

Following recent advances in digital technology, there has been significant development and growth of digital interventions for the treatment of anxiety disorders. Such interventions<sup>1</sup> consist of a series of structured, web-based/online sessions that emulate face-to-face psychotherapy and aim at offering an alternative way of improving access to high quality of care to patients who were previously unwilling or unable to obtain these [5, 6]. In addition, digital interventions can improve the cost-efficiency of care and enable treatments to be more precisely tailored to individual patient needs [7].

Digital interventions for anxiety disorders have been well researched over the past two decades [8–10]. However, reviews to date have focused on CBT, while trials of other internet-based treatments have now begun to emerge, such as attention bias modification therapy (iABM), Mindfulness (iMT) or psychodynamic (iPT) therapy. These adaptations have received less research attention than the cognitive behavioural ones.

The aim of this article is, therefore, to provide an up-to-date review of the existing literature about the effectiveness of digitally delivered psychological therapies in the psychological treatment of major anxiety disorders. We also outline major limitations in the current literature and discuss directions for future research.

## Methods

### Inclusion Criteria

Randomised controlled trials (RCTs) published in peer-reviewed journals examining the effects of digitally delivered psychological interventions [CBT, Attention Bias Modification (ABM), Exposure Therapy (ET), Applied Relaxation (AR), Bibliotherapy (Bib), Psychodynamic Therapy (PT), Mindfulness Therapy (MT), Behavioural Stress Management (BSM) therapy, Counselling]

<sup>1</sup> For purposes of clarity, digital interventions in this article refer to interventions delivered through technology, specifically internet and mobile devices (excluding stand-alone telephone apps).

compared with control conditions and/or other psychological interventions for anxiety disorders (as established by diagnostic interviews or self-report measures – and, at either subthreshold or clinical level). In order to limit this review to contemporary studies, only articles published since 2000 were included here.

Outcome measures were i) anxiety, ii) panic or iii) worry scores at post-treatment and follow-up, where available. Only trials reported in English were included.

## Exclusion Criteria

We excluded trials in which pharmaceutical treatments were studied as the main treatment unless they constituted a comparison condition or trials which did not specifically target anxiety symptoms. Studies recruiting participants with unclear, non-defined or mixed symptomatology (e.g. “anxiety disorder”, GAD and/or PD), medical comorbidities (e.g. diabetes, HIV), adolescents, children or older adults ( $\leq 18$  years or  $\geq 65$  years) and case series or studies were also excluded as were trials published in dissertation or abstract form or that did not report quantitative outcome data on anxiety symptomatology.

## Search Strategy

The databases Pubmed, Medline, PsycInfo, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials, Web of Science and Embase were searched from January 2000 and up to the 15th of September 2018.

Search terms for anxiety (e.g. mood, worry, fear) and for each disorder (e.g., panic, phobias, health anxiety), for a range of delivery methods (e.g., online, internet, computer, phone), for therapy (e.g. psychotherapy, intervention) and for specific interventions (e.g., cognitive behavioural, psychodynamic) were used.

Retrieval was limited to RCTs and human participants. Organic backwards (reference list search) and forward (citation search) searches were undertaken to identify additional relevant papers.

## Results

64 RCTs (total  $N = 6131$ ) met the inclusion criteria and are reviewed below. See Table 1 for a detailed description.

### Social Anxiety Disorder

#### Twenty-Two RCTs Were Identified

Nine trials demonstrated superiority of therapist-guided iCBT over waitlist control conditions (WLC) conditions [34, 35, 38, 41, 43, 49, 50, 54, 72]. In a recent meta-analysis, all treatments (excluding the later trial by Tulbure and colleagues [54] conferred a large effect compared to WLC [5]. Participants' improvements over WLC were also maintained after 6 [54] and 30 months [73] and 1 [41, 43] and 4 [74] and 5 years [44]. One trial did not find significant difference between unguided iCBT and WLC [50]. Two trials by Furmark and colleagues [43] found no significant differences between therapist-guided iCBT and i) bibliotherapy and ii) bibliotherapy with access to an online discussion group or internet-delivered applied relaxation (iAR) therapy.

**Table 1** Summary of included RCTs of Internet interventions for major anxiety disorders

| Study                                      | Sample size   | Groups  | Intervention   | Main outcomes  | General comments  |
|--|---|---|--|--|---|
| <b>GAD</b>                                 |   |   |  |  |   |
| Andersson, Paxling, et al. 2012 [11]       | Guided iCBT = 27<br>iPDDT = 27<br>WLC = 27  | 1. Guided iCBT<br>2. iPDDT<br>3. WLC  | 8 weeks<br>3 and 18 months<br>FU   | PSWQ: iCBT/iPDDT > WLC at 3 months<br>FU only  |   |
| Christensen et al. 2014 [12]               | ICBT = 111<br>ICBT + Tel Reminder = 110<br>ICBT + Email reminder = 113<br>Placebo website = 111<br>Placebo website + Telephone reminder = 113 | 1. ICBT<br>2. ICBT + Tel reminder<br>3. ICBT + Email reminder<br>4. Placebo website (health education)<br>5. Placebo website + Telephone reminder | e-Couch programme<br>10 weeks<br>6 and 12 months<br>FU                       | PSWQ: iCBT + Email reminder > Control (placebo website) at PT only   | GAD-7 not sensitive enough for GAD?   |
| Dear et al., 2015 [13]                     | Transdiagnostic iCBT = 170<br>Disorder specific iCBT = 168<br>Clinician Guided iCBT = 168<br>Self-Guided iCBT = 170<br>iCBT = 24<br>WLC = 20  | 1. TD iCBT<br>2. DS iCBT<br>3. CG iCBT<br>4. SG iCBT<br>1. iCBT<br>2. WLC   | 8 weeks<br>3, 12, 24 months<br>FU<br><br>Worry programme<br>6 weeks          | GAD-7: TD iCBT > DS iCBT at 24 months<br>FU only<br>CG iCBT vs SG iCBT: NS<br><br>PSWQ: iCBT > WLC   | Mixed anxiety sample (GAD was the largest subgroup)<br><br>6 sessions, printable summary, homework, automatic emails, and additional resource documents.<br>Weekly emails or tel. contact with a CP<br>University students<br>GAD-7 not sensitive enough for GAD? |
| Lorian et al. 2012 [14]                    | iCBT = 70<br>WLC = 67   | 1. iCBT<br>2. WLC   | Calming anxiety<br>6 weeks   | GAD-7: NS  | More severe GAD cases<br>6 online lessons, weekly homework, and weekly supportive contact<br>Appx 81' of clinician time and 75' of technician time per participant  |
| Richards et al. 2016 [15]                  | iCBT + Non-clinician Support = 50<br>iCBT + Clinician support + forum = 47<br>TAU = 48<br>iCBT = 44<br>WLC = 45<br>iCBT = 25<br>WLC = 23      | 1. ICBT + Non-clinician Support<br>2. ICBT + Clinician support + forum<br>3. TAU<br>1. iCBT<br>2. WLC<br>1. iCBT<br>2. WLC                        | 10 weeks<br>3 months<br>FU<br><br>8 weeks<br>1- and 3- year<br>FU<br>9 weeks | ICBT + Non-clinician Support, ICBT + Clinician support > TAU<br>ICBT + Non-clinician Support vs ICBT + Clinician support: NS<br><br>PSWQ: iCBT > WLC (d = 1.1) at PT and FUs<br>PSWQ: iCBT > WLC (d = 1.1) |   |
| Robinson et al. 2010 [16]                  |   |   |  |  |   |
| Paxling et al. 2011 [17]                   |   |   |  |  |   |
| Titov, Andrews, Robinson, et al. 2009 [18] |   |   |  |  |   |
| Panic disorder                             |   |   |  |  |   |

**Table 1** (continued)

| Study                        | Sample size  | Groups  | Intervention                                 | Main outcomes   | General comments   |
|------------------------------|--|---|--|---|--|
| Bergstrom et al. 2010 [19]   | Guided iCBT = 53<br>Group CBT = 60   | 1.Guided iCBT<br>2. Group CBT   | 10 weeks<br>6 months FU                      | PDSS: NS  | Group CBT utilised considerably more therapist time than iCBT  |
| Boettcher et al. 2014 [20]   | Internet-based Mindfulness Treatment = 45<br>Online forum = 46<br>Total = 41                   | 1.i: Mindfulness Treatment<br>2. Online forum/WLC   | 8 weeks<br>6 months FU                       | BAI: iM > WLC (d = 0.99) at PT and FU   | Mixed anxiety sample, (PD was the largest sub-group)   |
| Carlbring et al. 2001 [21]   |  | 1. iCBT<br>2. WLC   | 6 sessions                                   | BAI: iCBT > WLC   | iCBT: psychoeducation, breathing retraining, cognitive restructuring, interoceptive/ in vivo exposure, relapse prevention.<br>iCBT with minimal therapist contact by email |
| Carlbring et al. 2005 [22]   | CBT = 24<br>iCBT = 25  | 1.CBT<br>2.iCBT   | 10 weeks<br>1 year FU                        | BAI: NS   | Small sample size  |
| Carlbring et al. 2006 [23]   | iCBT = 30<br>WLC = 30  | 1.iCBT + tel. contact<br>2.WLC  | 10 weeks<br>9 months FU                      | BAI: iCBT > WLC maintained at FU  | iCBT included 10' telephone contact per week   |
| Klein et al. 2006 [24]       | iCBT = 19 Guided<br>CBT = 18<br>Information only = 18  | 1. iCBT + email contact<br>2. Guided CBT + tel. contact<br>3. Information only/WLC + tel. contact | 6 weeks<br>3 months FU                       | PDSS: iCBT, CBT > Information only group<br>PD clinician-rated: iCBT > CBT (maintained at FU) | Mean time spent per participant 3.9 h  |
| Klein et al. 2009 [25]       | iCBT + frequent contact = 28<br>iCBT + infrequent contact = 29                                 | 1.iCBT + frequent contact<br>2.iCBT + infrequent contact  | Panic online<br>8 weeks                      | PDSS: NS  | Frequent contact = 3 emails pw<br>Infrequent contact = 1 email pw  |
| Klein and Richards 2001 [26] | iCBT = 11<br>WLC = 12  | 1. iCBT<br>2. self-monitoring/ WLC  | 1 week                                       | BAI: iCBT > WLC   | Small sample size  |
| Kitropoulos et al. 2008 [27] | CBT = 40<br>iCBT = 46  | 1.CBT<br>2.iCBT   | Panic online<br>12 weeks                     | PDSS: NS  |  |
| Orromedia et al., 2016 [28]  | iCBT + Non-scheduled Guidance = 27<br>iCBT + scheduled guidance = 25<br>WLC = 25<br>Total = 68 | 1. iCBT + Non-scheduled guidance<br>2. iCBT + Scheduled guidance<br>3. WLC                        | (Free From Anxiety)<br>8 weeks<br>6-month FU | PDSS: iCBT + scheduled guidance > iCBT + non-scheduled guidance, WLC<br>Maintained at FU      |  |
| Richards et al. 2006 [29]    |  | 1. iCBT<br>2. iCBT + SM<br>3. information only/ WLC   | Panic program<br>8 weeks<br>3 months FU      | PDSS:<br>iCBT + SM > iCBT, WLC at PT, not FU  | iCBT: 6 sessions, homework, online forum, and regular email contact with clinicians.   |

Table 1 (continued)

| Study  | Sample size  | Groups  | Intervention                           | Main outcomes                                       | General comments  |
|--|--|---|--|---|---|
| Ruwaard et al. 2010 [30]                     | iCBT = 27<br>WLC = 31  | 1. iCBT<br>2. WLC   | 11 weeks<br>3 years FU                 | PDSS: iCBT > WLC (d = 0.7) at PT and FU             | Tailored iCBT (approx 5–9 h of therapist's time per participant)  |
| Silfvnagel et al. 2012 [31]                  | Tailored, guided iCBT = 29<br>WLC = 28   | 1. iCBT<br>2. WLC   | 8 weeks<br>12 months FU                | PDSS: iCBT > WLC at PT and FU                       |   |
| Wims et al. 2010 [32]                        | iCBT = 32<br>WLC = 27  | 1. iCBT<br>2. WLC   | Panic program<br>8 weeks<br>1 month FU | PDSS: iCBT > WLC at PT (d = 0.59) and FU (d = 0.72) | iCBT: 6 sessions, homework, online forum, and regular email contact with clinicians. (approx 75' per participant)<br>Email guidance.<br>Mild symptomatology sample<br>Low treatment adherence |
| van Baallegooyen et al. 2013 [33]            | iCBT = 63<br>WLC = 63  | 1. iCBT<br>2. WLC   | Don't Panic<br>Online<br>8 sessions    | PDSS: NS  |   |
| Social anxiety<br>Andersson et al. 2006 [34] | iCBT = 32<br>WLC = 32  | 1. iCBT<br>2. WLC   | 9 weeks iCBT<br>1 year FU              | LSAS: iCBT > WLC at PT (g = 0.73) and FT            | iCBT included 2 group ET sessions and therapist contact via e-mail  |
| Andersson, Carlbring, et al. 2012 [35]       | iCBT = 102<br>WLC = 102  | 1. iCBT + Clinician support<br>2. iCBT + Graduate student support<br>3. WLC | 9 weeks<br>1 year FU                   | LSAS: iCBT > WLC at PT (g = 0.75) and FT            |   |
| Andrews et al. 2011 [36]                     | iCBT = 23<br>CBT = 14  | 1. iCBT<br>2. CBT   | 6 weeks                                | SIAS, SPS: NS                                       | iCBT included 6 sessions, homework access to moderated forum and materials; automatic emails and fortnightly texts (approx 18' clinical time per patient)                                     |
| Berger et al. 2011 [37]                      | iCBT + guidance = 27<br>iCBT w/o guidance = 27<br>iCBT + on demand guidance = 27 | 1. iCBT + guidance<br>2. iCBT w/o guidance<br>3. iCBT + on demand guidance  | 10 weeks                               | LSAS: NS  |   |
| Berger et al. 2009 [38]                      | iCBT = 31<br>WLC = 21  | 1. iCBT<br>2. WLC   | 10 weeks                               | LSAS: iCBT > WLC at PT (d = 0.89)                   | iCBT included regular text-based therapist contact, continuous feedback system and online forum   |
| Boettcher et al. 2012 [39]                   | iABM = 33<br>Sham therapy = 35   | 1. iABM<br>2. Sham therapy  | 4 weeks<br>4 months FU                 | LSAS = NS   |   |
|  | iCBT = 62  | 1. iCBT   | 2 months                               |   | Unguided iCBT   |

**Table 1** (continued)

| Study   | Sample size   | Groups  | Intervention                                      | Main outcomes  | General comments   |
|---|---|---|---|--|--|
| Boella et al. 2010 [40]   | CBT = 36<br>WLC = 29  | 2. CBT<br>3. WLC                                  | 1 year FU   | iCBT, CBT > WLC at PT and FU   | University students  |
| Carlbriing et al. 2007 [41]   | iCBT = 29<br>WLC = 28   | 1. iCBT<br>2. WLC                                 | 9 weeks<br>1 year FU                              | LSAS: iCBT > WLC at PT and FU  | iCBT included weekly telephone calls (appx duration: 95')  |
| Carlbriing et al. 2012 [42]   | iABM = 40<br>Sham therapy = 39  | 1. iABM<br>2. Sham therapy                        | 8 sessions  | LSAS = NS  |  |
| Furmark et al., 2009 [43]; Hedman, Furmark, et al., 2011 [44] (Trial 1) | iCBT = 40<br>Bib = 40   | 1. iCBT<br>2. Bibliotherapy                       | 9 weeks<br>1 year FU                              | LSAS = iCBT, Bib > WLC   |  |
| Furmark et al., 2009 [43] (Trial 2)                                     | WLC = 40<br>iCBT = 29<br>Bib = 29<br>BibDG (with access to discussion group) = 28<br>IAR = 29 | 3. WLC<br>1. iCBT<br>2. Bib<br>3. BibDG<br>4. IAR | 1 year FU<br>5 year FU                            | LSAS: NS   |  |
| Hedman, Andersson, et al. 2011 [45]                                     | iCBT = 64<br>gCBT = 62  | 1. iCBT<br>2. Group CBT                           | 9 weeks<br>1 year FU                              | LSAS: NS<br>d = 0.41PT<br>d = 0.36 FU  | iCBT delivered in a psychiatric setting  |
| Hedman et al. 2014 [46]   | iABM = 30<br>Sham therapy = 29  | 1. iABM<br>2. Sham therapy                        | CBT 15 weeks<br>6 months FU<br>(4 and 5 years FU) | LSAS = NS  |  |
| Neubauer et al. 2013 [47]   | iABM = 30<br>Sham therapy = 29  | 1. iABM<br>2. Sham therapy                        | 9 sessions<br>4 months FU                         | LSAS = NS  |  |
| Schulz et al. 2016 [48]   | i-iCBT = 60<br>g-iCBT = 60<br>WLC = 29  | 1. i-iCBT<br>2. g-iCBT<br>3. WLC                  | 12 weeks<br>6 months FU                           | SPS: i-iCBT, g-iCBT > WLC at PT and FU<br>i-iCBT vs g-iCBT: NS<br>LSAS = iCBT > WLC at PT (d = 0.95) | Clinician -guided iCBT   |
| Titov, Andrews, Schwennecke, et al. 2008 [49]                           | iCBT = 50<br>WLC = 55   | 1. iCBT<br>2. WLC                                 | 10 weeks  |  | iCBT included 6 online lessons; homework; online discussion forum; regular email based therapist contact |
| Titov, Andrews  | iCBT = 43<br>WLC = 45   | 1. iCBT<br>2. WLC                                 | 10 weeks  | LSAS = iCBT > WLC at PT (d = 1.20)   | Participants had appx. 127' of therapist contact, and appx 22 email contacts                             |

**Table 1** (continued)

| Study  | Sample size  | Groups   | Intervention  | Main outcomes   | General comments  |
|--|--|--|---|---|---|
| and Schwenecke 2008 [49]                     |  |  |   |   |   |
| Titov, Andrews, Choi, et al. 2008 [50]       | iCBT + Guidance = 32<br>iCBT w/o guidance = 33<br>WLC = 33                         | 1. iCBT + Guidance<br>2. iCBT w/o guidance<br>3. WLC                                       | iCBT as above<br>iCBT w/o guidance: as above<br>without therapist emails<br>6 weeks | LSAS = iCBT + guidance > iCBT w/o guidance (d = 0.66), WLC (d = 1.04)<br>iCBT w/o guidance vs WLC: NS | plus therapist responses to forum postings  |
| Titov, Andrews, Choi, et al. 2009 [51]       | iCBT + weekly telephone reminders = 86<br>iCBT w/o weekly telephone reminders = 86 | 1. iCBT + reminders<br>2. iCBT w/o reminders   | 6 weeks   | SIAS: reminders condition > no reminders but d = 0.3 (small)  | Participants were asked to complete the six lessons within 8 weeks of starting. No clinical advice during telephone calls |
| Titov, Andrews, Schwenecke, et al. 2009 [52] | iCBT + Telephone Guidance = 43<br>iCBT + Online forum Guidance = 42                | 1. iCBT + Telephone Guidance (technicians)<br>2. iCBT + Online forum Guidance (clinicians) | 8 weeks   | SIAS: NS  | iCBT + Tel group received approx 38' of technician time<br>iCBT + Forum group received approx 37' of clinician time       |
| Titov et al. 2010 [53]                       | iCBT = 56<br>iCBT + MS = 57  | 1. iCBT<br>2. iCBT + Motivational Interviewing   | 11 weeks  | SIAS, SPS: NS   |   |
| Tulbure et al. 2015 [54]                     | iCBT = 38<br>WLC = 38  | 1. iCBT<br>2. WLC  | 9 weeks<br>6 months FU  | LSAS: iCBT > WLC at PT<br>SPIN: iCBT > WLC at PT and FU   | Romanian sample   |
| PTSD Hirai and Clum 2005 [55]                | iCBT = 13<br>WLC = 14  | 1. iCBT<br>2. WLC  | 8 weeks   | BAI: iCBT > WLC   | Subliminal sample   |
| Ivarsson et al. 2014 [56]                    | iCBT = 31<br>WLC = 31  | 1. iCBT<br>2. WLC  | 8 weeks<br>1 year FU  | IES: iCBT > WLC at PT and FU  |   |
| Knaevelsrud and Maercker 2007 [57]           | iCBT = 49<br>WLC = 47  | 1. iCBT<br>2. WLC  | 5 weeks<br>(10 sessions)<br>3 months FU   | BSI: iCBT > WLC at PT, FU   |   |
| Lange et al. 2001 [58]                       | iCBT = 13<br>WLC = 12  | 1. iCBT<br>2. WLC  | 5 weeks<br>6 weeks FU   | SCL-90: iCBT > WLC at PT, FU  | University students   |
| Lange et al. 2003 [59]                       | iCBT = 69<br>WLC = 32  | 1. iCBT<br>2. WLC  | 5 weeks<br>6 weeks FU   | SCL-90: iCBT > WLC at PT, FU  |   |
|  | iCBT = 24  | 1. iCBT = 24   | 8 weeks   | Self-report: iCBT > Counselling at PT   |   |

**Table 1** (continued)

| Study                                       | Sample size   | Groups  | Intervention   | Main outcomes                                       | General comments  |
|---|---|---|--|---|---|
| Litz et al. 2007 [60]                       | Counselling =21   | 2. Counselling  | 3 and 6 months FU  |   |   |
| Spence et al. 2011 [61]                     | iCBT =23<br>WLC =21   | 1. iCBT<br>2. WLC   | 7 weeks<br>3 months FU   | PCL-C; iCBT > WLC at PT, not FU                     |   |
| Spence et al. 2014 [62]                     | Trauma focused iCBT with exposure =59<br>Trauma focused iCBT w/o exposure =66                 | 1. Trauma focused iCBT with exposure<br>2. Trauma focused iCBT w/o exposure =66               | 8 weeks<br>3 months FU   | NS  |   |
| OCD   |   |   |  |   |   |
| Andersson, Enander, et al. 2012 [63]        | iCBT = 50<br>Attention Control = 51   | 1. iCBT<br>2. Attention Control   | 10 weeks<br>4 months FU  | YBOCS: iCBT > AC at PT (d = 1.12) and FU (d = 1.45) | Attention control condition consisted of online supportive therapy<br>Hoarding excluded |
| Andersson et al. 2014 [64]                  | iCBT =47<br>Attention Control = 46  | 1. iCBT<br>2. Attention Control   | Booster sessions<br>3 weeks<br>4 (baseline) & 7, 12 & 24 months FU | YBOCS: iCBT > AC at 7 months only                   |   |
| FU Andersson, Enander, et al. 2012 [63]     |   |   |  |   |   |
| Herbst et al., 2014 [65]                    | iCBT =16<br>WLC = 18  | 1. iCBT<br>2. WLC   | 8 weeks<br>6 months FU   | YBOCS: iCBT >WLC at PT and FU                       |   |
| Mahoney et al. 2014 [66]                    | Technician-administered iCBT =32<br>WLC = 35  | 1. Technician-administered iCBT<br>2. WLC   | 8 weeks<br>6 months FU   | DOCS, OBQ: iCBT >WLC (d = .78 and .82)              |   |
| Kobak et al. 2015 [67]                      | iCBT w/o guidance = 28<br>iCBT + Non-clinician guidance =28<br>iCBT + Clinician guidance = 31 | 1. CCBT w/o guidance<br>2. CCBT + Non clinician guidance<br>3. CCBT + Clinician guidance = 31 | 8 weeks<br>3 months FU<br>12 weeks                                 | YBOCS: NS   |   |
| Wootton et al. 2013 [68]                    | iCBT =17<br>bCBT = 20<br>WLC =19  | 1.iCBT<br>2.bCBT<br>3.WLC   | 8 weeks<br>3 months FU   | YBOCS: iCBT, bCBT > WLC at PT and FU                | Weekly contact with therapist for both CBT conditions<br>b = bibliotherapy              |
| Specific phobias Andersson et al. 2009 [69] | Guided iCBT = 15<br>Exposure therapy (ET) = 15  | 1.Guided iCBT<br>2.Exposure therapy   | iCBT = 5 weekly sessions<br>ET = 3 hrs<br>1 year FU                | BAI: NS   |   |
|   | Guided iCBT =13   | 1.Guided iCBT   |  | BAI: NS   |   |

**Table 1** (continued)

| Study  | Sample size                         | Groups                           | Intervention  | Main outcomes                            | General comments |
|--|-------------------------------------|----------------------------------|---|--|------------------|
| Andersson et al. 2013 [70]                                       | Exposure therapy (ET) = 13          | 2. Exposure therapy              | iCBT = 4 weekly sessions<br>ET = 3 hrs<br>1 year FU |  |                  |
| Health anxiety<br>Hedman, Andersson, Andersson, et al. 2011 [71] | iCBT = 40<br>Attention control = 41 | 1. iCBT<br>2. Attention control  | 12 weeks<br>6 months FU                             | HAI: iCBT > Attention control at PT only |                  |
| Hedman, Axelsson, et al. 2014 [46]                               | ET-based iCBT = 79<br>iBSM = 79     | 1. ET-based iCBT<br>2. iBSM = 79 | 12 weeks<br>6 months FU                             | HAI:<br>ET-based iCBT > iBSM at PT only  |                  |

Key: *CBT* Cognitive Behavioral Therapy; *PDT* Psychodynamic Therapy; *WLC* Waitlist Control; *ABM* Attention Bias Modification; *Bib* Bibliotherapy; *AR* Applied Relaxation; *ET* Exposure Therapy; *BSM* Behavioural Stress Management; *PSWQ* Penn State Worry Questionnaire; *GAD* Generalised Anxiety Disorder; *CP* Clinical Psychologist; *PDSS* Panic Disorder Severity Scale; *BAI* Beck Anxiety Inventory; *LSAS* Liebowitz Social Anxiety Scale; *SAS* Social Interaction Anxiety Scale; *SPS* Social Phobia Scale; *SPIN* Social Phobia Inventory; *IES* Impact of Event Scale; *BSI* Brief Symptom Inventory; *SCL* Symptom Checklist-90; *PCL-C* PTSD Checklist; *YBOCS* Yale-Brown Obsessive-Compulsive Scale; *DOCS* Dimensional Obsessive-Compulsive Scale; *OBQ* Obsessional Beliefs Questionnaire; *HAI* Health Anxiety Inventory; *FU* Follow-up; *PT* Post-treatment; *TAU* treatment as usual; *NR* non-reported; *NS* non-significant

Moreover, Hedman and colleagues [45] found that therapist-guided iCBT was as effective as group CBT at post-treatment and at 6 months follow-up. Similarly, both therapist-guided iCBT [36] and unguided iCBT [40] were found to be as effective as face-to-face CBT. Unguided iCBT was also found to be as effective as guided iCBT with either minimal or on demand therapist support [37].

Titov and colleagues found that therapist-guided iCBT was superior to unguided iCBT [50] and that unguided iCBT but with weekly telephone reminders was superior to unguided iCBT without such reminders [51]. The same team also showed that iCBT with telephone support by technicians and iCBT with online forum support by clinicians did not show any significant differences in social anxiety scores at post-treatment [52]. More recently, they also found no significant differences in treatment effectiveness between unguided iCBT and unguided iCBT with added motivational enhancement strategies [53].

Only one trial examined iCBT in a group format. Specifically, a recent trial by Schulz and colleagues [48] found that clinician-guided iCBT in both group and individual formats were more effective than WLC (with effects being maintained at 6 months follow-up), whereas no significant differences were found between the two treatment conditions.

Finally, three RCTs compared iABM to an identical sham intervention but did not show significant between group differences at post-treatment [42] and/or follow-up [39, 47].

## **Panic Disorder (with or without Agoraphobia)**

### **Fifteen RCTs Were Identified**

Three trials found no difference between therapist-guided iCBT and group CBT [19], or individual CBT [22, 27] in participants diagnosed with PD. One RCT found that iCBT was more effective than therapist-assisted CBT manual-based therapy in reducing anxiety symptoms at post-assessment [24]. Oromendia, Orrego, Bonillo, and Molinuevo [28] showed that iCBT with scheduled support was more effective than iCBT with non-scheduled (on demand) psychological support whilst effects were maintained at 6 months follow-up.

One trial found frequency of contact did not affect results; specifically, Klein and colleagues [25] found no significant differences between iCBT with frequent therapist contact (3 emails per week) and iCBT with infrequent contact (1 email per week).

Regarding control conditions, Klein and colleagues [24] showed that both iCBT and therapist-assisted CBT manual-based therapy were significantly more effective in reducing anxiety symptomatology than an information-only control group. In Wims, Titov, Andrews, and Choi [32], iCBT participants reported significantly reduced symptoms of panic compared to a waitlist control condition and effects were maintained at 1-month follow-up. Further trials have also found that iCBT was superior to WLC conditions on PD and anxiety symptomatology [15, 21, 23, 26, 28, 30, 31] whilst gains were maintained from 6 months and up to 3 years [23, 28, 30, 31] follow up.

One trial found no significant differences between iCBT and WLC [33] although adherence to treatment was low.

In, Richards, Klein, and Austin [29] iCBT, with an added stress management component, was more effective than iCBT alone at post-treatment on PD severity and anxiety, although such differences were no longer apparent at 3-month follow-up.

Only one trial used an Internet-based Mindfulness intervention. In Boettcher and colleagues [20], the treatment condition was superior to a control one at post-treatment and 6 months follow up.

## Specific Phobias

### Two RCTs Were Identified

In Andersson and colleagues [69], therapist-guided iCBT did not outperform brief therapist-led exposure (one introductory session and one three-hour exposure session) for participants with spider phobia.

Similarly, there were no significant differences between therapist-guided iCBT and one-session exposure treatment for participants with snake phobia [70].

## Post-Traumatic Stress Disorder

### Eight RCTs Were Identified

In Spence and colleagues [61] and Hirai and Clum [55], therapist-guided iCBT was superior to WLC. Four more RCTs showed superiority of iCBT over WLC conditions whilst effects were maintained at 6 weeks [58, 59], 3 months [57] and 1 year [56] follow-up.

More recently, Spence and colleagues [62] examined the effects of trauma focused iCBT with or without exposure components and found similar outcomes between treatments.

One trial compared iCBT with another psychotherapy. Specifically, Litz, Engel, Bryant, and Papa [60] found that iCBT was superior to supportive counselling therapy on PTSD measures at post-treatment.

## Obsessive-Compulsive Disorder

### We Identified Seven RCTs

In Andersson and colleagues [63], therapist-guided iCBT was found superior to an attention control condition and improvements were maintained at 4 months follow-up. In a later trial, participants were followed up at 7-, 12- and 24-months post-treatment and analyses showed that treatment gains were maintained across the follow-up time period [64].

Wootton, Dear, Johnston, Terides, and Titov [68] found that both bibliotherapy-administered CBT (bCBT) and iCBT were more effective than WLC condition at post-treatment and 3 months follow up, whilst no differences were found between the two treatments. A later study by the same team revealed that treatment gains were extended to 24 months follow up [75].

Similarly, three more trials found that iCBT was superior to WLC conditions and effects were maintained at 3 [66], 4 [63], and 6 months [65] follow up.

Finally, Kobak, Greist, Jacobi, Levy-Mack, and Greist [67] showed that compared to iCBT alone, the addition of coaching by either a lay coach or a CBT therapist coach did not significantly improve outcomes.

## Health Anxiety

### Two Trials Were Identified

Hedman and colleagues [46] found that exposure-based iCBT led to significantly greater improvements on health anxiety measures compared with internet-delivered Behavioural Stress Management therapy.

A few years earlier, the authors had investigated iCBT over 12 weeks against an attention control condition for people with hypochondriasis and found that the treatment group participants made superior improvements than the control group on measures of health anxiety [71].

## Generalized Anxiety Disorder

### Eight Trials Were Identified

Five RCTs found superiority of therapist-guided iCBT [11, 14, 16–18] to WLC conditions. In three of these trials, effects were maintained at 3 months [11, 16] and up to 3 years [17] follow up. One trial [15] found no significant differences between iCBT and WLC for anxiety symptoms amongst university students with more severe symptomatology.

Christensen and colleagues [12] found no significant differences between iCBT and either iCBT or a control condition (information website) with telephone reminders. Only iCBT with email reminders was found superior to the control condition.

Robinson and colleagues [16] also found no significant differences between clinician-assisted and technician-assisted iCBT for GAD participants.

Dear and colleagues [13] compared transdiagnostic iCBT with disorder-specific iCBT as well as clinician-guided with self-guided iCBT but found no substantive differences between groups.

Finally, only one trial examined an internet delivered psychodynamic psychotherapy intervention and found it had similar effectiveness with therapist-guided iCBT for anxiety symptoms and colleagues [11].

## Discussion

The aim of this study was to provide an up-to-date review of the literature about the effectiveness of digitally delivered psychological therapies in the psychological treatment of major anxiety disorders.

Across 68 RCTs, nine different interventions were identified and discussed. The majority were CBT-based interventions delivered online. Participants were recruited from primary and secondary care and also from the community. A range of support types were included in the studies, from unguided to minimal support and intensive therapist contact; also, a few RCTs examined the role of therapists' expertise (e.g. clinician vs technician) or mode of guidance (e.g. telephone support vs online forums guidance; or, human support vs automated support).

SAD was the anxiety disorder for which the most RCTs have been conducted and iCBT was the intervention included in most trials. Overall, most iCBT trials demonstrated large treatment effects, low/moderate client dropout, with some exceptions [e.g. [11, 14, 17, 20, 29, 33, 46, 55–71, 75]] and sustained long-term effects up to five years after treatment [44]. Equivalent findings in direct comparisons of digital interventions with traditional, face-to-face CBT were also

reported by some trials [e.g. 19, 22, 27, 36, 40, 44], suggesting that iCBT can be an effective treatment for anxiety symptoms in adults [76].

One important consideration for the implementation of Internet-based interventions is whether they should be provided with or without support by a coach or therapist [77]. Although earlier reviews have shown that treatments that include guidance lead to better outcomes than unguided treatments [e.g. 78], unguided treatments are emerging that can work by means of automated reminders and similar solutions [79]. Indeed, some trials in this review examined the effectiveness of unguided iCBT conditions [37, 40, 43, 50, 53] and most of these RCTs found no significant differences to guided therapy comparison conditions [37, 43, 67]. Nevertheless, more research is needed as sample sizes in these studies were relatively small and results may have been confounded by, for example, intensive screening during assessment [37].

To be able to achieve optimal effects of Internet-based interventions, it is also essential to gain more insight into the type and/or level of support provided. In a number of trials reviewed in this study, technician-assisted iCBT interventions were found just as effective as clinician-led interventions and resulted in large effect sizes and clinically significant improvements in anxiety measures, comparable to those associated with face-to-face treatments [e.g. 16]. Similarly, many trials examined whether frequency (e.g. frequent contact vs. infrequent contact [25]) or mode of therapist contact (e.g. email contact vs telephone contact [24], telephone support vs forum-based guidance [52]) affected treatment outcomes, and no significant effects were found. Nevertheless, it might be worth noting here that all RCTs employed technicians under the careful clinical supervision by clinical staff and that all interventions were highly structured (see Table 1, for detailed descriptions). It is therefore unclear whether similar outcomes would be obtained with less structured interventions. Further research is therefore crucial in order to determine the optimal quantity (frequency of support) and quality (structure and delivery modes) of therapist role and support in order to achieve optimal treatment outcomes.

Other findings from this review also suggested that additional factors, such as implementing a fixed schedule for support rather than “on demand” support may be closely associated with better adherence rates and treatment effectiveness [28]. Taken together, the above findings may be helpful for future digital interventions development decisions regarding which particular features and structure of support to utilize in order to maximize treatment effectiveness and cost efficacy. The development and optimization of future digital interventions is critical given the limited numbers of qualified therapists and the rising mental healthcare needs of individuals worldwide.

## Limitations

The findings should be considered in light of a number of limitations. Although this review has presented some of the most prominent findings of the available research up to date, it didn't discuss other important factors in terms of treatment outcomes such as level of user engagement and/or satisfaction, access barriers and individual user characteristics. Moreover, not all trials reported attrition rates. This is of major importance, as poor retention and website utilization (non-usage attrition) are major inhibitors to the effectiveness of digital interventions. Future studies should carefully track participant attrition and evaluate associations with intervention impact and user's experience.

Moreover, there was not enough heterogeneity across studies regarding treatments. For instance, findings from this review showed that iCBT was equally as effective as bibliotherapy and internet delivered AR for social anxiety [43] or psychodynamic therapy for GAD [71], but less effective than iCBT plus stress management therapy [29] for PD. Although such findings

are promising, more trials are needed and therefore, these should be interpreted with caution. Moreover, despite the fact that health anxiety, phobias, PTSD and OCD are common anxiety disorders, there were no direct comparisons of iCBT with face-to-face CBT and no studies on treatments other than iCBT (with the exception of counselling for PTSD) were found. Only one RCT was identified examining the effectiveness of iCBT for subthreshold symptomatology [55]; similarly, research on more severe symptomatology has not been carried out yet using Internet-delivered therapy and future studies should address these gaps in literature. Finally, only a few iABM trials were identified and with small treatment effects [e.g. 42] and future research should delineate the effectiveness of these treatments for anxiety further.

## Future Directions

Internet-based psychological interventions have great potential to provide evidence-based care without high accessibility barriers or costs and minimize clinician input. This review discussed a large and rapidly growing evidence base on Internet-delivered interventions for major anxiety disorders and considered particular features and structure of support in order to maximize treatment effectiveness and cost efficacy.

Overall, iCBT appears to be an effective treatment for specific anxiety disorders in adults, e.g. SAD [76]. However, findings varied significantly across the different diagnostic groups and interventions and RCTs examining therapies other than iCBT are still relatively lacking. Future comparative trials are of crucial importance, in order to investigate whether different psychological interventions are equally effective for anxiety symptoms. Finally, future research is needed to delineate further the influence of therapist factors in guided treatments, the levels of user engagement and/or satisfaction, potential access barriers and individual user characteristics. Moreover, to examine dropout attrition and non-usage attrition rates as well as the maintenance of therapy gains after the end of treatment, and treatments with diverse population groups (e.g. BME groups).

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Ethical Approval** This article does not contain any studies with human participants performed by any of the authors.

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

## References

1. Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. *Dialogues Clin Neurosci*. 2015;17(3):327–35.
2. Wittchen HU, Jacobi F, Rehm J, Gustavsson HA, Svensson M, Jonsson B, et al. The size and burden of mental disorders and other disorders of the brain in Europe 2010. *Eur Neuropsychopharmacol*. 2011;21(9): 655–79. <https://doi.org/10.1016/j.euroneuro.2011.07.018>.
3. National Institute for Health and Care Excellence 2014. Anxiety disorders (NICE quality standard no. 53). Retrieved from <https://www.nice.org.uk/guidance/qs53>. Accessed 10 Sept 2018

4. Williams C, McClay CA, Martinez R, Morrison J, Haig C, Jones R, et al. Online CBT life skills programme for low mood and anxiety: study protocol for a pilot randomized controlled trial. *Trials*. 2016;17(1):220. <https://doi.org/10.1186/s13063-016-1336-y>.
5. Arnberg FK, Linton SJ, Hultcrantz M, Heintz E, Jonsson U. Internet-delivered psychological treatments for mood and anxiety disorders: a systematic review of their efficacy, safety, and cost-effectiveness. *PLoS One*. 2014;9(5):e98118. <https://doi.org/10.1371/journal.pone.0098118>.
6. Hollis C, Morriss R, Martin J, Amani S, Cotton R, Denis M, et al. Technological innovations in mental healthcare: harnessing the digital revolution. *Br J Psychiatry*. 2015;206(4):263–5. <https://doi.org/10.1192/bjp.bp.113.142612>.
7. Shore JH. Telepsychiatry: videoconferencing in the delivery of psychiatric care. *Am J Psychiatry*. 2013;170(3):256–62. <https://doi.org/10.1176/appi.ajp.2012.12081064>.
8. Baumeister H, Reichler L, Munzinger M, Lin J. The impact of guidance on internet-based mental health interventions — a systematic review. *Internet Interv*. 2014;1(4):205–15. <https://doi.org/10.1016/j.invent.2014.08.003>.
9. Mewton L, Smith J, Rossouw P, Andrews G. Current perspectives on internet-delivered cognitive behavioral therapy for adults with anxiety and related disorders. *Psychol Res Behav Manag*. 2014;7:37–46. <https://doi.org/10.2147/PRBM.S40879>.
10. Saddichha S, Al-Desouki M, Lamia A, Linden IA, Krausz M. Online interventions for depression and anxiety – a systematic review. *Health Psychology and Behavioral Medicine*. 2014;2(1):841–81. <https://doi.org/10.1080/21642850.2014.945934>.
11. Andersson G, Paxling B, Roch-Norlund P, Ostman G, Norgren A, Almlöv J, et al. Internet-based psychodynamic versus cognitive behavioral guided self-help for generalized anxiety disorder: a randomized controlled trial. *Psychother Psychosom*. 2012;81(6):344–55. <https://doi.org/10.1159/000339371>.
12. Christensen H, Batterham P, Mackinnon A, Griffiths KM, Kalia Hehir K, Kenardy J, et al. Prevention of generalized anxiety disorder using a web intervention, iChill: randomized controlled trial. *J Med Internet Res*. 2014;16(9):e199. <https://doi.org/10.2196/jmir.3507>.
13. Dear BF, Staples LG, Terides MD, Karin E, Zou J, Johnston L, et al. Transdiagnostic versus disorder-specific and clinician-guided versus self-guided internet-delivered treatment for generalized anxiety disorder and comorbid disorders: a randomized controlled trial. *J Anxiety Disord*. 2015;36:63–77. <https://doi.org/10.1016/j.janxdis.2015.09.003>.
14. Lorian CN, Titov N, Grisham JR. Changes in risk-taking over the course of an internet-delivered cognitive behavioral therapy treatment for generalized anxiety disorder. *J Anxiety Disord*. 2012;26(1):140–9. <https://doi.org/10.1016/j.janxdis.2011.10.003>.
15. Richards D, Timulak L, Rashleigh C, McLoughlin O, Colla A, Joyce C, et al. Effectiveness of an internet-delivered intervention for generalized anxiety disorder in routine care: a randomised controlled trial in a student population. *Internet Interv*. 2016;6:80–8. <https://doi.org/10.1016/j.invent.2016.10.003>.
16. Robinson E, Titov N, Andrews G, McIntyre K, Schwencke G, Solley K. Internet treatment for generalized anxiety disorder: a randomized controlled trial comparing clinician vs. technician assistance. *PLoS One*. 2010;5(6):e10942. <https://doi.org/10.1371/journal.pone.0010942>.
17. Paxling B, Almlöv J, Dahlin M, Carlbring P, Breitholtz E, Eriksson T, et al. Guided internet-delivered cognitive behavior therapy for generalized anxiety disorder: a randomized controlled trial. *Cogn Behav Ther*. 2011;40(3):159–73. <https://doi.org/10.1080/16506073.2011.576699>.
18. Titov N, Andrews G, Robinson E, Schwencke G, Johnston L, Solley K, Choi I. Clinician-assisted internet-based treatment is effective for generalized anxiety disorder: randomized controlled trial 2009 (Vol. 43).
19. Bergstrom J, Andersson G, Ljotsson B, Ruck C, Andreevitch S, Karlsson A, et al. Internet-versus group-administered cognitive behaviour therapy for panic disorder in a psychiatric setting: a randomised trial. *BMC Psychiatry*. 2010;10:54. <https://doi.org/10.1186/1471-244x-10-54>.
20. Boettcher J, Astrom V, Pahlsson D, Schenstrom O, Andersson G, Carlbring P. Internet-based mindfulness treatment for anxiety disorders: a randomized controlled trial. *Behav Ther*. 2014;45(2):241–53. <https://doi.org/10.1016/j.beth.2013.11.003>.
21. Carlbring P, Westling BE, Ljungstrand P, Ekselius L, Andersson G. Treatment of panic disorder via the internet: a randomized trial of a self-help program. *Behav Ther*. 2001;32(4):751–64. [https://doi.org/10.1016/S0005-7894\(01\)80019-8](https://doi.org/10.1016/S0005-7894(01)80019-8).
22. Carlbring P, Nilsson-Ihrfelt E, Waara J, Kollenstam C, Buhman M, Kalso V, et al. Treatment of panic disorder: live therapy vs. self-help via the internet. *Behav Res Ther*. 2005;43(10):1321–33. <https://doi.org/10.1016/j.brat.2004.10.002>.
23. Carlbring P, Bohman S, Brunt S, Buhman M, Westling BE, Ekselius L, et al. Remote treatment of panic disorder: a randomized trial of internet-based cognitive behavior therapy supplemented with telephone calls. *Am J Psychiatry*. 2006;163(12):2119–25. <https://doi.org/10.1176/ajp.2006.163.12.2119>.

24. Klein B, Richards JC, Austin DW. Efficacy of internet therapy for panic disorder. *J Behav Ther Exp Psychiatry*. 2006;37(3):213–38. <https://doi.org/10.1016/j.jbtep.2005.07.001>.
25. Klein B, Austin D, Pier C, Kiropoulos L, Shandley K, Mitchell J, et al. Internet-based treatment for panic disorder: does frequency of therapist contact make a difference? *Cogn Behav Ther*. 2009;38(2):100–13. <https://doi.org/10.1080/16506070802561132>.
26. Klein B, Richards JC. A brief internet-based treatment for panic disorder. *Behav Cogn Psychother*. 2001;29(1):113–7. <https://doi.org/10.1017/S1352465801001138>.
27. Kiropoulos LA, Klein B, Austin DW, Gilson K, Pier C, Mitchell J, et al. Is internet-based CBT for panic disorder and agoraphobia as effective as face-to-face CBT? *J Anxiety Disord*. 2008;22(8):1273–84. <https://doi.org/10.1016/j.janxdis.2008.01.008>.
28. Oromendia P, Orrego J, Bonillo A, Molinuevo B. Internet-based self-help treatment for panic disorder: a randomized controlled trial comparing mandatory versus optional complementary psychological support. *Cogn Behav Ther*. 2016;45(4):270–86. <https://doi.org/10.1080/16506073.2016.1163615>.
29. Richards JC, Klein B, Austin DW. Internet cognitive behavioural therapy for panic disorder: does the inclusion of stress management information improve end-state functioning? *Clin Psychol*. 2006;10(1):2–15. <https://doi.org/10.1080/13284200500378795>.
30. Ruwaard J, Broeksteeg J, Schrieken B, Emmelkamp P, Lange A. Web-based therapist-assisted cognitive behavioral treatment of panic symptoms: a randomized controlled trial with a three-year follow-up. *J Anxiety Disord*. 2010;24(4):387–96. <https://doi.org/10.1016/j.janxdis.2010.01.010>.
31. Silfvermager K, Carlbring P, Kabo J, Edstrom S, Eriksson J, Manson L, et al. Individually tailored internet-based treatment for young adults and adults with panic attacks: randomized controlled trial. *J Med Internet Res*. 2012;14(3):e65. <https://doi.org/10.2196/jmir.1853>.
32. Wims E, Titov N, Andrews G, Choi I. Clinician-assisted internet-based treatment is effective for panic: a randomized controlled trial. *Aust N Z J Psychiatry*. 2010;44(7):599–607. <https://doi.org/10.3109/00048671003614171>.
33. van Ballegooijen W, Riper H, Klein B, Ebert DD, Kramer J, Meulenbeek P, et al. An internet-based guided self-help intervention for panic symptoms: randomized controlled trial. *J Med Internet Res*. 2013;15(7):e154. <https://doi.org/10.2196/jmir.2362>.
34. Andersson G, Carlbring P, Holmstrom A, Sparthar E, Furmark T, Nilsson-Ihrfelt E, et al. Internet-based self-help with therapist feedback and in vivo group exposure for social phobia: a randomized controlled trial. *J Consult Clin Psychol*. 2006;74(4):677–86. <https://doi.org/10.1037/0022-006x.74.4.677>.
35. Andersson G, Carlbring P, Furmark T. Therapist experience and knowledge acquisition in internet-delivered CBT for social anxiety disorder: a randomized controlled trial. *PLoS One*. 2012;7(5):e37411. <https://doi.org/10.1371/journal.pone.0037411>.
36. Andrews G, Davies M, Titov N. Effectiveness randomized controlled trial of face to face versus internet cognitive behaviour therapy for social phobia. *Aust N Z J Psychiatry*. 2011;45(4):337–40. <https://doi.org/10.3109/00048674.2010.538840>.
37. Berger T, Caspar F, Richardson R, Kneubuhler B, Sutter D, Andersson G. Internet-based treatment of social phobia: a randomized controlled trial comparing unguided with two types of guided self-help. *Behav Res Ther*. 2011;49(3):158–69. <https://doi.org/10.1016/j.brat.2010.12.007>.
38. Berger T, Hohl E, Caspar F. Internet-based treatment for social phobia: a randomized controlled trial. *J Clin Psychol*. 2009;65(10):1021–35. <https://doi.org/10.1002/jclp.20603>.
39. Boettcher J, Berger T, Renneberg B. Internet-based attention training for social anxiety: a randomized controlled trial. *Cogn Ther Res*. 2012;36(5):522–36. <https://doi.org/10.1007/s10608-011-9374-y>.
40. Botella C, Gallego MJ, Garcia-Palacios A, Guillen V, Banos RM, Quero S, et al. An internet-based self-help treatment for fear of public speaking: a controlled trial. *Cyberpsychol Behav Soc Netw*. 2010;13(4):407–21. <https://doi.org/10.1089/cyber.2009.0224>.
41. Carlbring P, Gunnarsdottir M, Hedensjo L, Andersson G, Ekselius L, Furmark T. Treatment of social phobia: randomised trial of internet-delivered cognitive-behavioural therapy with telephone support. *Br J Psychiatry*. 2007;190:123–8. <https://doi.org/10.1192/bjp.bp.105.020107>.
42. Carlbring P, Apelstrand M, Sehlin H, Amir N, Rousseau A, Hofmann SG, et al. Internet-delivered attention bias modification training in individuals with social anxiety disorder—a double blind randomized controlled trial. *BMC Psychiatry*. 2012;12:66. <https://doi.org/10.1186/1471-244x-12-66>.
43. Furmark T, Carlbring P, Hedman E, Sonnenstein A, Clevberger P, Bohman B, . . . Andersson G. (2009). Guided and unguided self-help for social anxiety disorder: randomised controlled trial. *Br J Psychiatry*, 195(5), 440–447. doi:<https://doi.org/10.1192/bjp.bp.108.060996>.
44. Hedman E, Furmark T, Carlbring P, Ljotsson B, Ruck C, Lindefors N, et al. A 5-year follow-up of internet-based cognitive behavior therapy for social anxiety disorder. *J Med Internet Res*. 2011;13(2):e39. <https://doi.org/10.2196/jmir.1776>.

45. Hedman E, Andersson G, Ljotsson B, Andersson E, Ruck C, Morberg E, et al. Internet-based cognitive behavior therapy vs. cognitive behavioral group therapy for social anxiety disorder: a randomized controlled non-inferiority trial. *PLoS One*. 2011;6(3):e18001. <https://doi.org/10.1371/journal.pone.0018001>.
46. Hedman E, Axelsson E, Görling A, Ritzman C, Ronnheden M, Alaoui SE, et al. Internet-delivered exposure-based cognitive-behavioural therapy and behavioural stress management for severe health anxiety: randomised controlled trial. *Br J Psychiatry*. 2014;205(4):307–14. <https://doi.org/10.1192/bjp.bp.113.140913>.
47. Neubauer K, von Auer M, Murray E, Petermann F, Helbig-Lang S, Gerlach AL. Internet-delivered attention modification training as a treatment for social phobia: a randomized controlled trial. *Behav Res Ther*. 2013;51(2):87–97. <https://doi.org/10.1016/j.brat.2012.10.006>.
48. Schulz A, Stolz T, Vincent A, Krieger T, Andersson G, Berger T. A sorrow shared is a sorrow halved? A three-arm randomized controlled trial comparing internet-based clinician-guided individual versus group treatment for social anxiety disorder. *Behav Res Ther*. 2016;84:14–26. <https://doi.org/10.1016/j.brat.2016.07.001>.
49. Titov N, Andrews G, Schwencke G. Shyness 2: treating social phobia online: replication and extension. *Aust N Z J Psychiatry*. 2008;42(7):595–605. <https://doi.org/10.1080/00048670802119820>.
50. Titov N, Andrews G, Choi I, Schwencke G, Mahoney A. Shyness 3: randomized controlled trial of guided versus unguided internet-based CBT for social phobia. *Aust N Z J Psychiatry*. 2008;42(12):1030–40. <https://doi.org/10.1080/00048670802512107>.
51. Titov N, Andrews G, Choi I, Schwencke G, Johnston L. Randomized controlled trial of web-based treatment of social phobia without clinician guidance 2009 (Vol. 43).
52. Titov N, Andrews G, Schwencke G, Solley K, Johnston L, Robinson E. An RCT comparing effect of two types of support on severity of symptoms for people completing internet-based cognitive behaviour therapy for social phobia. *Aust N Z J Psychiatry*. 2009;43(10):920–6. <https://doi.org/10.1080/00048670903179228>.
53. Titov N, Andrews G, Schwencke G, Robinson E, Peters L, Spence J. Randomized controlled trial of internet cognitive behavioural treatment for social phobia with and without motivational enhancement strategies. *Aust N Z J Psychiatry*. 2010;44(10):938–45. <https://doi.org/10.3109/00048674.2010.493859>.
54. Tulbure BT, Szentagotai A, David O, Stefan S, Mansson KN, David D, et al. Internet-delivered cognitive-behavioural therapy for social anxiety disorder in Romania: a randomized controlled trial. *PLoS One*. 2015;10(5):e0123997. <https://doi.org/10.1371/journal.pone.0123997>.
55. Hirai M, Clum GA. An internet-based self-change program for traumatic event related fear, distress, and maladaptive coping. *J Trauma Stress*. 2005;18(6):631–6. <https://doi.org/10.1002/jts.20071>.
56. Ivarsson D, Blom M, Hesser H, Carlbring P, Enderby P, Nordberg R, et al. Guided internet-delivered cognitive behavior therapy for post-traumatic stress disorder: a randomized controlled trial. *Internet Interv*. 2014;1(1):33–40. <https://doi.org/10.1016/j.invent.2014.03.002>.
57. Knaevelsrud C, Maercker A. Internet-based treatment for PTSD reduces distress and facilitates the development of a strong therapeutic alliance: a randomized controlled clinical trial. *BMC Psychiatry*. 2007;7:13. <https://doi.org/10.1186/1471-244x-7-13>.
58. Lange A, van de Ven JP, Schrieken B, Emmelkamp PM. Interapy, treatment of posttraumatic stress through the internet: a controlled trial. *J Behav Ther Exp Psychiatry*. 2001;32(2):73–90.
59. Lange A, Rietdijk D, Hudcovicova M, van de Ven JP, Schrieken B, Emmelkamp PM. Interapy: a controlled randomized trial of the standardized treatment of posttraumatic stress through the internet. *J Consult Clin Psychol*. 2003;71(5):901–9. <https://doi.org/10.1037/0022-006x.71.5.901>.
60. Litz BT, Engel CC, Bryant RA, Papa A. A randomized, controlled proof-of-concept trial of an internet-based, therapist-assisted self-management treatment for posttraumatic stress disorder. *Am J Psychiatry*. 2007;164(11):1676–83. <https://doi.org/10.1176/appi.ajp.2007.06122057>.
61. Spence J, Titov N, Dear Blake F, Johnston L, Solley K, Lorian C, et al. Randomized controlled trial of internet-delivered cognitive behavioral therapy for posttraumatic stress disorder. *Depress Anxiety*. 2011;28(7):541–50. <https://doi.org/10.1002/da.20835>.
62. Spence J, Titov N, Johnston L, Jones MP, Dear BF, Solley K. Internet-based trauma-focused cognitive behavioural therapy for PTSD with and without exposure components: a randomised controlled trial. *J Affect Disord*. 2014;162:73–80. <https://doi.org/10.1016/j.jad.2014.03.009>.
63. Andersson E, Enander J, Andren P, Hedman E, Ljotsson B, Hursti T, et al. Internet-based cognitive behaviour therapy for obsessive-compulsive disorder: a randomized controlled trial. *Psychol Med*. 2012;42(10):2193–203. <https://doi.org/10.1017/s0033291712000244>.
64. Andersson E, Stenby S, Karlsson K, Ljotsson B, Hedman E, Enander J, et al. Long-term efficacy of internet-based cognitive behavior therapy for obsessive-compulsive disorder with or without booster: a randomized controlled trial. *Psychol Med*. 2014;44(13):2877–87. <https://doi.org/10.1017/s0033291714000543>.

65. Herbst N, Voderholzer U, Thiel N, Schaub R, Knaevelsrud C, Stracke S, et al. No talking, just writing! Efficacy of an internet-based cognitive behavioral therapy with exposure and response prevention in obsessive compulsive disorder. *Psychother Psychosom.* 2014;83(3):165–75. <https://doi.org/10.1159/000357570>.
66. Mahoney AE, Mackenzie A, Williams AD, Smith J, Andrews G. Internet cognitive behavioural treatment for obsessive compulsive disorder: a randomised controlled trial. *Behav Res Ther.* 2014;63:99–106. <https://doi.org/10.1016/j.brat.2014.09.012>.
67. Kobak KA, Greist R, Jacobi DM, Levy-Mack H, Greist JH. Computer-assisted cognitive behavior therapy for obsessive-compulsive disorder: a randomized trial on the impact of lay vs. professional coaching. *Ann General Psychiatry.* 2015;14:10. <https://doi.org/10.1186/s12991-015-0048-0>.
68. Wootton BM, Dear BF, Johnston L, Terides MD, Titov N. Remote treatment of obsessive-compulsive disorder: a randomized controlled trial. *Journal of Obsessive-Compulsive and Related Disorders.* 2013;2(4): 375–84. <https://doi.org/10.1016/j.jocrd.2013.07.002>.
69. Andersson G, Waara J, Jonsson U, Malmæus F, Carlbring P, Ost LG. Internet-based self-help versus one-session exposure in the treatment of spider phobia: a randomized controlled trial. *Cogn Behav Ther.* 2009;38(2):114–20. <https://doi.org/10.1080/16506070902931326>.
70. Andersson, G., Waara, J., Jonsson, U., Malmæus, F., Carlbring, P., & Öst, L.-G. (2013). Internet-based exposure treatment versus one-session exposure treatment of snake phobia: A randomized controlled trial (Vol. 42).
71. Hedman E, Andersson G, Andersson E, Ljotsson B, Ruck C, Asmundson GJ, et al. Internet-based cognitive-behavioural therapy for severe health anxiety: randomised controlled trial. *Br J Psychiatry.* 2011;198(3):230–6. <https://doi.org/10.1192/bjp.bp.110.086843>.
72. Titov N, Andrews G, Schwencke G, Drobny J, Einstein D. Shyness 1: distance treatment of social phobia over the internet. *Aust N Z J Psychiatry.* 2008;42(7):585–94. <https://doi.org/10.1080/00048670802119762>.
73. Carlbring P, Nordgren LB, Furmark T, Andersson G. Long-term outcome of internet-delivered cognitive-behavioural therapy for social phobia: a 30-month follow-up. *Behav Res Ther.* 2009;47(10):848–50. <https://doi.org/10.1016/j.brat.2009.06.012>.
74. Hedman, E., El Alaoui, S., Lindefors, N., Andersson, E., Ruck, C., Ghaderi, A., . . . Ljotsson, B. (2014). Clinical effectiveness and cost-effectiveness of internet- vs. group-based cognitive behavior therapy for social anxiety disorder: 4-year follow-up of a randomized trial. *Behav Res Ther.* 59, 20–29. doi:<https://doi.org/10.1016/j.brat.2014.05.010>.
75. Wootton BM, Dear BF, Johnston L, Terides MD, Titov N. Self-guided internet-delivered cognitive behavior therapy (iCBT) for obsessive-compulsive disorder: 12 month follow-up. *Internet Interv.* 2015;2(3):243–7. <https://doi.org/10.1016/j.invent.2015.05.003>.
76. Olthuis JV, Watt MC, Bailey K, Hayden JA, Stewart SH. Therapist-supported internet cognitive behavioural therapy for anxiety disorders in adults. *Cochrane Database Syst Rev.* 2016;3. <https://doi.org/10.1002/14651858.CD011565.pub2>.
77. Kleiboer A, Donker T, Seekles W, van Straten A, Riper H, Cuijpers P. A randomized controlled trial on the role of support in internet-based problem solving therapy for depression and anxiety. *Behav Res Ther.* 2015;72:63–71. <https://doi.org/10.1016/j.brat.2015.06.013>.
78. Spek V, Cuijpers P, Nyklicek I, Riper H, Keyzer J, Pop V. Internet-based cognitive behaviour therapy for symptoms of depression and anxiety: a meta-analysis. *Psychol Med.* 2007;37(3):319–28. <https://doi.org/10.1017/s0033291706008944>.
79. Andersson G, Titov N. Advantages and limitations of internet-based interventions for common mental disorders. *World Psychiatry.* 2014;13(1):4–11. <https://doi.org/10.1002/wps.20083>.

**Dr. Evgenia Stefanopoulou** PhD, DCLinPsy is a Clinical Psychologist, specialising in adult mental health. Mr. David Lewis is the head a digital interventions development team. Mr. Matthew Taylor is an assistant psychologist. Mr. James Brocombe is content developer for digital interventions in mental health. Dr. Jan Larkin is a Consultant Clinical Psychologist, specialising in substance misuse.