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Intensive one-week internet-delivered cognitive behavioral therapy for panic disorder and agoraphobia: A pilot study

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ABSTRACT

This is the first pilot study to explore the feasibility, acceptability and preliminary efficacy of intensive cognitive behavioral therapy (CBT) for panic disorder and/or agoraphobia delivered via the internet. Ten participants who met DSM-5 criteria for panic disorder and/or agoraphobia (6 males; mean age = 43.40, *SD* = 15.25) completed *The Intensive Panic Program*: a six-lesson exposure-based CBT program, delivered online over seven days. Clinician support was provided via phone and email. All 10 participants completed the program (100% adherence) and high levels of satisfaction were reported. We found large and significant reductions in panic symptom severity at post-treatment (d = 1.40), which were maintained at two-month follow-up. We also found large reductions in agoraphobic avoidance (d = 0.92) and functional impairment (d = 1.04) at follow-up, and days out of role were halved. On average, 132 min (*SD* = 42, range: 47–183) of clinician time was spent per participant during the treatment week. The results provide promising preliminary evidence for the feasibility and acceptability of internet-delivered intensive CBT for panic disorder and/or agoraphobia. A larger, randomized control trial is now needed to evaluate the efficacy of this program compared to a control group and to explore long-term outcomes.

Clinical trial registration number
ACTRN12618001501235

1. Introduction

Approximately 3.5% of the population will meet criteria for panic disorder during their lifetime, and 2.5% will meet criteria for agoraphobia (Kessler et al., 2012; McEvoy et al., 2011). Panic disorder is associated with substantial impairment in functioning, lower quality of life and increased health service utilization (Barrera and Norton, 2009; Bystritsky et al., 2010); and the presence of agoraphobic avoidance is accompanied by increased disability (Barrera and Norton, 2009; Bystritsky et al., 2010).

Cognitive behavioral therapy (CBT) is the most empirically supported psychological intervention for panic disorder with or without agoraphobia (Pompoli et al., 2016), and the first-line treatment recommended by the National Institute for Health and Care Excellence (NICE, 2019). Intensive delivery of CBT may be appropriate for some people with panic disorder, with or without agoraphobia (NICE, 2019). 'Intensive' or 'massed' CBT is characterized by prolonged therapy sessions over a very short period of time, such as several consecutive days. Patients receive a similar total number of hours of therapy to standard CBT, but in a shorter time frame. Exposure techniques are often emphasized during intensive CBT, since exposure is a potent therapeutic component (Pompoli et al., 2018; Sánchez-Meca et al., 2010) and is amenable to massed implementation as it can easily be practiced several times in one session or day. Intensive CBT can facilitate faster reduction in symptoms and return to usual activities, which is important at an individual and societal level (Jónsson et al., 2015; Knuts et al., 2015). The intensive format may also capitalize on patient motivation and therapeutic momentum, reduce drop out, or be preferred by some patients who are balancing work, study or childcare responsibilities (Jónsson et al., 2015).

A growing body of research suggests that it is feasible to deliver CBT for panic disorder and/or agoraphobia in an intensive time frame (2–10 days), and that substantial reductions in symptoms can be achieved. In the earliest study, Foa et al. (1980) explored the short-term

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outcomes for agoraphobia when exposure sessions were delivered over 10 consecutive days versus 10 weekly sessions. In a small sample of 11 participants, both groups reported significant change, with results favoring massed delivery for reduction in avoidance. In a follow-up study, Chambless (1990) compared the longer-term effects of 10 daily exposure sessions versus 10 weekly exposure sessions for agoraphobia. Although the sample was small (N = 19), the results were promising, with equivalent outcomes found for both conditions at post-treatment and six-month follow-up. In more recent research using a larger sample (N = 96), Knuts et al. (2015) explored intensive exposure therapy delivered over five days for agoraphobia with comorbid panic disorder and found large reductions in agoraphobia symptom severity that were maintained at three-month follow-up. These outcomes were comparable to individuals who received 12 bi-weekly sessions over six weeks (Knuts et al., 2015).

Past research has also demonstrated promising outcomes for intensive CBT on panic disorder symptoms. Deacon and Abramowitz (2006) explored the feasibility of two days of intensive CBT for panic disorder, with or without comorbid agoraphobia. The small open pilot study (N = 10), revealed large reductions (d = 1.73) in panic disorder symptoms from pre-treatment to one-month follow-up (Deacon and Abramowitz, 2006). In a larger open pilot study (N = 40), Bitran et al. (2008) reported large reductions (partial η^2 = 0.90) in panic symptom severity following an eight day intensive CBT program. These effects were sustained at follow-up one to six months later.

Despite these encouraging findings for intensive CBT, the clinician time required for a single patient in one week may not be feasible in most clinical settings. The aforementioned studies involved nine to 23 h of clinician contact per participant. To increase efficiency and cost-effectiveness of intensive CBT for panic disorder and/or agoraphobia, several studies have explored group delivery with favorable results (Austin et al., 2008; Bohni et al., 2009; Evans et al., 1991; Lamplugh et al., 2008; Teng et al., 2015). However, these studies still involved a substantial amount of therapist contact (12–26 h) during treatment, and often required multiple therapists to be present, which can be impractical and prohibitively expensive.

Several additional factors limit access to intensive CBT, delivered in individual or group settings. Intensive CBT is typically offered in select specialist services located in urban centers (e.g., university clinics or outpatient clinics at large hospitals; e.g., Bitran et al., 2008; Deacon and Abramowitz, 2006). Patients often travel interstate to access intensive therapy (Bitran et al., 2008), incurring travel and accommodation costs in addition to paying for therapy and the lost income associated with time away from work or other responsibilities. Rural and remote residents are likely to be most disadvantaged by these factors. Additionally, traveling long distances and staying in unfamiliar accommodation may be unrealistic for patients with moderate to severe agoraphobia. Novel delivery methods are needed to overcome these barriers to intensive CBT.

Although CBT has traditionally been delivered via face-to-face therapy sessions, there is now a large body of research supporting the efficacy and effectiveness of internet-delivered CBT for panic disorder with and without agoraphobia (Andrews et al., 2018; Olthuis et al., 2015; Stech et al., 2019). Internet-delivered CBT is structured as an online course, typically involving 6–11 modules delivered over a two to four month period (Stech et al., 2019). It covers the key techniques included in face-to-face CBT, such as psychoeducation, cognitive restructuring, interoceptive exposure and in-situ exposure.

To the authors' knowledge, there have been no past studies evaluating internet-delivered CBT for any anxiety disorder in an intensive format. To our knowledge, the shortest duration of any internet-delivered CBT protocol for an anxiety disorder is four weeks (Schröder et al., 2017). For example, Andersson et al. (2009, 2013) developed an internet-delivered CBT program for spider phobia and another for snake phobia, with weekly modules that focused exclusively on exposure, without any arousal reduction strategies or cognitive restructuring. Across two randomized controlled trials (N = 30 per trial), the programs were each compared to Öst's One Session Treatment (Andersson et al., 2009, 2013). The internet-delivered CBT programs demonstrated similar outcomes to One Session Treatment on almost all measures, with large and significant reductions in phobic avoidance and fear at post-treatment and one year follow-up (Andersson et al., 2009, 2013). These studies provide preliminary evidence to suggest that exposure-based CBT can be successfully delivered via the internet in one month, but it is unclear if exposure-based internet CBT can be delivered in a shorter timeframe.

Delivering intensive CBT remotely - via an online course supported by clinician phone calls – may increase access to intensive CBT, by reaching people across the country and eliminating costs associated with travel. Delivering the key concepts via online modules could limit clinician contact to answering questions and refining implementation of techniques. Past research on CBT for panic disorder has demonstrated that therapist time can be reduced by half without negatively impacting outcomes if patients are assigned self-guided therapeutic materials between contacts (Botella and García-Palacios, 1999). Such task sharing may be an alternative method of increasing efficiency and cost-effectiveness of intensive CBT for panic disorder and agoraphobia. Therefore, we developed a novel internet-delivered intensive CBT program for panic disorder and/or agoraphobia, designed to be delivered over seven days. We focused on exposure-based strategies within the program, in line with past research of face-to-face intensive CBT for panic disorder and/or agoraphobia and due to evidence that exposure-based CBT can be delivered via in the internet with good outcomes (Andersson et al., 2009, 2013).

The primary aim of the current study was to explore the feasibility and acceptability of our internet-delivered intensive CBT program for panic disorder and/or agoraphobia. As a secondary aim, we sought to evaluate the degree of symptom reduction and functional improvement participants experienced at one-week post-treatment and two-month follow-up. We hypothesized that the program would be feasible and acceptable to participants; measured by completion rate, time spent by participants on the program, treatment satisfaction and qualitative reports of side effects. We also sought to examine feasibility in terms of clinician time spent supporting participants through the treatment week. Based on previous studies, we hypothesized that moderate to large reductions in panic/agoraphobic symptom severity and improvement in functional impairment would be observed from pre-treatment to post-treatment and maintained at two-month follow-up.

2. Method

2.1. Design

We used an open pilot trial design. The trial was prospectively registered via the Australian New Zealand Clinical Trials Registry (ACTRN12618001501235) and was approved by the Human Research Ethics Committee at St Vincent's Hospital in Sydney, Australia (HREC/18/SVH/170).

2.2. Inclusion/exclusion criteria

To be eligible for the study, participants needed to: a) be at least 18 years of age; b) live in Australia; c) meet DSM-5 criteria for panic disorder or agoraphobia; d) be fluent in English; e) have access to a phone and a computer with internet; and f) be under the care of a General Practitioner (GP). Being under the care of a GP was initially defined as having attended an appointment with the GP within three months prior to application; however, to reduce barriers to participation, this criterion was later amended to simply providing the GP's contact details.

Applicants were excluded due to: a) self-reported diagnosis of bipolar disorder, psychosis or schizophrenia; b) current self-reported

substance dependence; c) current use of benzodiazepines on a daily basis; d) severe depressive symptoms, indicated by a score > 23 on the Patient Health Questionnaire-9 (PHQ-9); e) current suicidality (active ideation indicating current suicidal intent or suicide plan); f) change in psychotropic medication in the 8 weeks prior to application; g) current participation in CBT; or h) subclinical panic symptoms, indicated by a score of < 5 on the Panic Disorder Severity Scale – Self Report (PDSS-SR).

2.3. Procedure

Participants were recruited across Australia between November 2018 to May 2019 via advertisements on social media and online support networks, media coverage of the study, and flyers in local health services. Individuals provided informed consent and applied for the study via the Virtual Clinic website (www.virtualclinic.org.au). The online screening assessment included demographic details, symptom and treatment history, the PHQ-9, and the PDSS-SR. Potentially eligible applicants were contacted for a phone interview, which included a diagnostic interview, risk assessment, and discussion about what to expect during the program. Excluded participants were directed to alternative services.

Due to the overlap between panic symptoms and several medical conditions (e.g., hypoglycemia, anemia, heart arrhythmia), some precautionary measures were taken to ensure participants' safety. Once participants were accepted into the trial, we notified their GP of their participation by letter. Participants who had not had a medical review of their panic symptoms were encouraged to visit their GP prior to commencing the intervention.

Participants were assessed at pre-treatment (prior to Lesson 1), post-treatment (one-week after the final lesson), and two months follow-up (8 weeks after the final lesson).

2.4. Measures

2.4.1. Diagnostic interview

2.4.1.1. The anxiety disorders interview schedule for DSM-5 (ADIS-5; Brown and Barlow, 2014). To assess for the highest prevalence mood and anxiety related disorders, the following modules of the ADIS-5 were administered in abbreviated form: panic disorder, agoraphobia, social anxiety disorder, generalized anxiety disorder, obsessive compulsive disorder, specific phobia, posttraumatic stress disorder and major depressive disorder. The assessments were conducted by a Masters-level Provisional Psychologist (ES) trained in the administration of the ADIS-5. Any diagnostic uncertainties were clarified through discussion with the supervising Clinical Psychologist (JN). Previous research by our group on the interrater reliability of these ADIS-5 modules found kappa estimates of 0.93 for panic disorder, agoraphobia, and generalized anxiety disorder, 0.80 for major depressive disorder, and 0.60 for obsessive-compulsive disorder (Newby et al., 2017).

2.4.2. Primary clinical outcome measures

2.4.2.1. Panic disorder severity scale – self-report form (PDSS-SR). The PDSS-SR measures panic disorder symptom severity over the past week (Houck et al., 2002). It has good test-retest reliability (ICC over 2 days = 0.83), is sensitive to change following CBT, and correlates strongly with the interviewer-administered PDSS (Houck et al., 2002). A score of eight or more is indicative of clinical levels of symptoms (Shear et al., 2001). The scale had excellent internal reliability in the current sample (Cronbach's $\propto$ = 0.88 at pre-treatment).

2.4.2.2. Mobility inventory – avoidance when alone subscale (MI-AAL). The Mobility Inventory assesses severity of agoraphobic avoidance (Chambless et al., 1985). To reduce the burden on participants, we administered the Avoidance when Alone subscale only, which has stronger psychometric properties than the Avoidance when Accompanied subscale (Chambless et al., 2011). The MI-AAL subscale has shown excellent test-retest reliability (e.g., r = 0.90 over eight days), excellent internal reliability (Cronbach's $\propto \geq$ 0.94), and is sensitive to change following CBT (Chambless et al., 1985, 2011). The suggested clinical threshold for the MI-AAL is 1.61 (Chambless et al., 2011).

2.4.3. Secondary clinical outcome measures

2.4.3.1. Patient health questionnaire - 9 (PHQ-9). The PHQ-9 measures depression symptom severity in the preceding two weeks, with an established clinical threshold of ≥10 (Kroenke et al., 2001) . The scale had good internal reliability in the current sample (Cronbach's $\propto$ = 0.88 at pre-treatment). Additionally, item 9 of the *Beck Depression Inventory – Second Edition* (BDI-II; Beck et al., 1996) was administered to monitor suicidal thoughts and intent throughout the trial.

2.4.3.2. Work and Social Adjustment Scale (WSAS). The WSAS (Mundt et al., 2002) measures functional impairment across five domains. It has good test-retest reliability (r = 0.73 over two weeks) and is sensitive to change following treatment (Mataix-Cols et al., 2005; Mundt et al., 2002). The WSAS had excellent internal reliability in the current sample (Cronbach's $\propto$ = 0.91 at pre-treatment).

2.4.3.3. Days out of role (DOR). Based on two questions from the World Health Organization Disability Assessment Schedule (Buist-Bouwman et al., 2008; Slade et al., 2009), participants were asked how many days in the past four weeks they were completely unable to work or carry out their normal activities (full days out of role) and how many days they had to cut down their usual activities (partial days out of role), due to panic and/or anxiety. As in previous research, partial and full days out of role were summed prior to analysis (Slade et al., 2009).

2.4.4. Feasibility and acceptability measures

2.4.4.1. Credibility and expectancy. The perceived credibility and expected benefit of the program was assessed using the first two questions of the Credibility/Expectancy Questionnaire (Devilly and Borkovec, 2000).

2.4.4.2. Adherence and engagement. Adherence was measured as the number of lessons completed within the treatment week. Before each lesson, participants were also asked how many minutes they spent reading the materials from the previous lesson and completing the assigned activities.

2.4.4.3. Lesson by lesson feedback. Before each lesson, participants were asked to write brief details of any difficulties or adverse events they experienced due to the program, and for feedback about the previous lesson.

2.4.4.4. Treatment satisfaction questionnaire. Based on previous studies (e.g., Newby et al., 2016), participants were asked to rate overall satisfaction with the program (1 = *very dissatisfied* to 5 = *very satisfied*), satisfaction with the tempo (*Much too little time/A bit too little time/ Exactly the right amount of time/A bit too much time)*, how logical the program was (1 = *not very* to 10 = *very*), their confidence that the program was successful in teaching them skills to manage panic and anxiety (1 = *not very* to 10 = *very*), and their confidence in recommending the program to a friend with similar symptoms (1 = *not very* to 10 = *very*). They were also asked an open-ended question for brief details of any wanted or unwanted effects (i.e., side effects) they experienced due to the program.

2.5. Intervention

The Intensive Panic Program consisted of six online lessons delivered over seven days. The program was adapted from the *Panic Program*

developed at the Clinical Research Unit for Anxiety and Depression, researched in previous efficacy and effectiveness studies (Allen et al., 2016; Wims et al., 2008, 2010), and disseminated via the THIS WAY UP online platform (www.thiswayup.org.au).[1] The concepts for each lesson were introduced via an illustrated comic, followed by a Lesson Summary with more detailed information, worksheets, and an action plan for the rest of the day. The program included extra resources such as frequently asked questions and lists of exposure ideas; as well as four video demonstrations, which were a novel element of *The Intensive Panic Program*. The videos modelled therapist-guided interoceptive and in-situ exposure, similar to the exposure modelling videos included in the studies by Andersson et al. (2009, 2013). These extra resources were included to ensure participants had immediate access to clarifying information if needed, so their progression was not delayed.

The program focused on exposure-based techniques for overcoming panic disorder, and did not include controlled breathing, cognitive restructuring or coping statements that were in previous versions of the program. Instead, the four lessons between psychoeducation (Lesson 1) and relapse prevention (Lesson 6) focused on exposure: interoceptive exercises in Lesson 2, in-situ exposure in Lesson 3, troubleshooting obstacles to exposure in Lesson 4, and advanced exposure (combining interoceptive and in-situ tasks, and exposure for social concerns) in Lesson 5. Although it was explained that habituation was likely to occur, an inhibitory learning rationale was emphasized. Participants were encouraged to wait for strong body sensations to pass in time, without relying on arousal reduction strategies. See Table 1 for more detail about the content of the program.

We took several steps to prepare participants for the intervention. During the phone interview, we advised participants that the program involved reading material and implementing practical tasks, and would take a total of three to four hours per day. We also informed participants that the program would require exposing themselves to feared sensations and situations, in a structured and supported manner. We advised participants that the program would be tiring and therefore encouraged them to take leave from work or other responsibilities during the treatment week. Participants were also encouraged to plan ahead for the demands of the treatment week by limiting their other commitments, asking loved ones for support and identifying restorative activities to engage in. Participants who were agreeable to these conditions were then asked to elect a preferred week to complete the program. For example, one participant waited until they were on a break from university, while another scheduled the treatment for when their in-laws could stay with them to assist with childcare. If there was a delay between the phone interview and chosen week, we contacted participants on the Thursday or Friday prior to commencement, to confirm they remained willing and able to start the program.

2.6. Clinician support

Clinical support was provided by ES, a Masters-level Provisional Psychologist, and JN, supervising Clinical Psychologist. Typically, three check-in phone calls were scheduled for the treatment week, and shared between ES and JN based on availability. The first call was scheduled for Monday (Day 1 of treatment) to refine participants' goals and ensure a thorough understanding of the cognitive-behavioral formulation. The second call was scheduled for Tuesday (Day 2) to review the interoceptive assessment and troubleshoot any barriers to commencing interoceptive exposure. The third call was scheduled for Thursday (Day 4) to review progress with in-situ exposure and plan tasks for the remainder of the week. Participants were advised that additional clinical support was available ad-hoc during business hours (Monday to Friday, 9 am to 5 pm) throughout the treatment week. The clinicians also monitored participants Virtual Clinic profiles each day from Monday to Friday, to ensure participants followed the set schedule of one new lesson each day. No clinician support was available on Saturday and Sunday of the treatment week, however we scheduled generic SMS prompts for those mornings to encourage participants to continue with the program. We emailed participants on the following Monday (Day 8) and offered a phone call to debrief any tasks completed over the weekend. We advised participants that they could request booster calls during the two-month follow-up period.

Additionally, participants received automated emails from the Virtual Clinic platform (e.g., to prompt them to start the program or complete questionnaires, and to congratulate them on completing each lesson).

2.7. Data analysis

All analyses were conducted in Statistical Package for the Social Sciences (SPSS version 25 (IBM SPSS, IBM Corp., Armonk, NY, USA). One-way repeated measures ANOVAs with planned contrasts were used to investigate change in symptom measures from pre-treatment to post-treatment and follow-up. Paired samples *t*-tests were used to investigate reductions in functional impairment measures, which were only administered at pre-treatment and follow-up. Effect sizes (Cohen's *d*) were calculated to determine the magnitude of change for each measure, by dividing the difference between means by the standard deviation of the difference. Reliable change on the PDSS-SR from pre- to post-treatment and pre-treatment to follow-up was calculated following the procedures outlined by Jacobson and Truax (1991). We used test-retest reliability estimates of 0.81 from Houck et al. (2002) and *SD* of 6.54 derived from the current sample at pre-treatment. 'Recovered' status was defined as exhibiting reliable improvement and being within the normative range (< 8) on the PDSS-SR.

3. Results

3.1. Participant characteristics

Fig. 1 summarizes participant flow through the study. A total of 67 individuals started an online application for the study. Out of these 67 individuals, 20 did not complete their online application, and a further 19 were not eligible to proceed to the telephone interview. The most common reasons for ineligibility were that they were taking benzodiazepines on a daily basis or were currently receiving CBT. During the telephone interview, seven participants chose to transfer to a study of spaced internet-delivered CBT for panic disorder; three stated they would prefer spaced intervention due to other time commitments, one felt spaced CBT would allow more time for consolidation of gains, and three decided they would prefer a more gradual approach after learning about what the program involved.

The final sample included 10 adults (four females), aged between 21 and 68 years ($M = 43.40$, $SD = 15.25$). Four participants met criteria for panic disorder, one met criteria for agoraphobia, and five met criteria for panic disorder with comorbid agoraphobia. Five participants met criteria for an additional disorder (generalized anxiety disorder = 3, major depressive disorder = 1, social anxiety disorder = 1). The mean score on the PDSS-SR at application was 15.40 ($SD = 4.43$), which is in the severe range (Furukawa et al., 2009). Duration of symptoms ranged from less than six months to > 10 years, with eight participants reporting symptom duration longer than two years. No participants were regularly taking psychoactive medication. One participant was using benzodiazepine medication as needed and receiving monthly supportive counselling. Five participants reported previous use of medication for anxiety and/or depression, and seven reported previous participation in psychotherapy (five had previous experience with CBT).

[1] See the Supplementary material for a table that summarizes how the current intervention differed from past studies by our group on internet CBT for panic disorder delivered over eight weeks.

Table 1
Summary of content in *The Intensive Panic Program.*

Day		Lesson Title	Lesson content	Action plan
Monday	1	Understanding Panic Disorder	• Psychoeducation about panic disorder and CBT • Goal setting using SMART principles • Psychoeducation about the fight-flight response • Formulation of maintenance factors in panic disorder ('panic cycle')	• Set goals for program • Complete individualized panic cycle
Tuesday	2	Overcoming avoidance of panic sensations	• Rationale for using exposure to overcome fear (testing predictions) • Interoceptive assessment • Instructions for practicing interoceptive exposure	• Complete interoceptive assessment • Watch a video demonstration • Practice 3 interoceptive exercises
Wednesday	3	Confronting behavioral symptoms	• Process of recovery: normalizing 'ups and downs' • The role of safety behaviors and avoidance in maintaining fear • Riding the waves of panic: reducing hypervigilance, accepting sensations, and shifting attention to the task at hand • Graded in-situ exposure	• Write a list of avoidance and safety behaviors • Create 2 graded hierarchies for in-situ exposure • Complete 2 in-situ tasks • Practice interoceptive exposure
Thursday	4	Troubleshooting and continuing with exposure	• Avoiding self-criticism and increasing positive self-reinforcement • Troubleshooting difficulties in practicing exposure • Varying the context and difficulty of exposure tasks • Inducing body sensations through activities (e.g. drinking coffee)	• Identify and troubleshoot barriers to exposure • Try one activity to induce body sensations • Continue in-situ and interoceptive exposure
Friday	5	Advanced exposure	• Rationale for exaggerated exposure to maximize learning • Combining interoceptive and in-situ exposure • Exposure to target social concerns	• Practice challenging interoceptive tasks • Complete another 2 in-situ tasks • Plan 2 combined and 2 socially focused exposures
Saturday		*No new lesson*	*n/a*	*Continued from Lesson 5 (advanced exposure practice)*
Sunday	6	Staying well and preventing relapse	• Summary of skills in program • Addressing the myth that one should never have another panic attack • Lapse versus relapse • Relapse prevention plan	• Review goals and progress • Complete relapse prevention plan • Practice interoceptive exposure • Practice in-situ exposure
		Extra resources	- Frequently asked questions for each lesson - List of extra ideas for exposure (interoceptive, in-situ, activities to induce sensations, and advanced exposure) - Worksheets: interoceptive exposure, in-situ exposure - Video demonstrations: running on the spot, hyperventilating, walking up an enclosed stairwell, driving a car in an enclosed parking lot.	

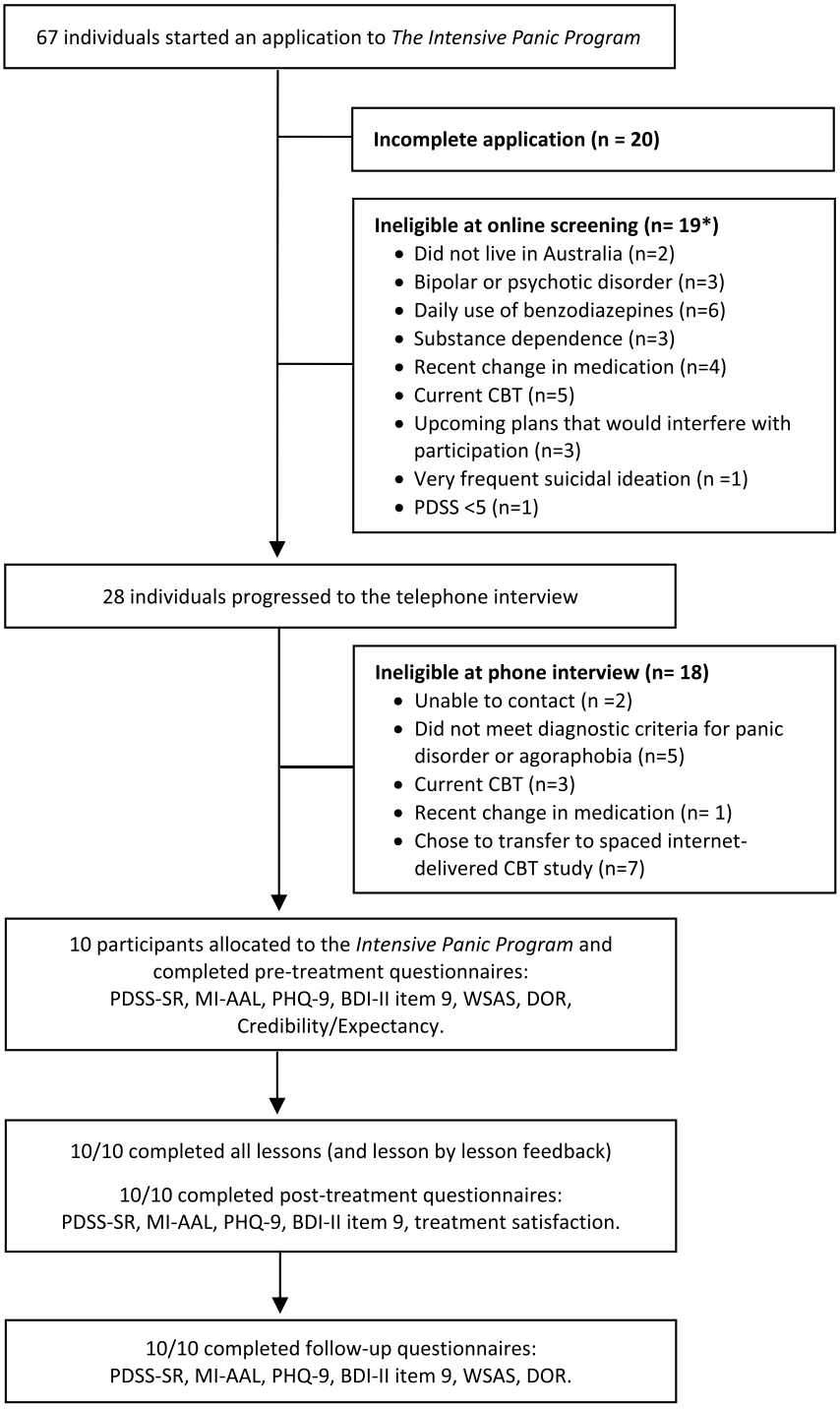

Fig. 1. Participant flow diagram. *Four participants were excluded at the online screening stage for multiple reasons.

All participants were born in Australia and spoke English at home. They lived in four states of Australia; six in urban/central areas and four in regional areas. The majority of participants were married or in a relationship (n = 8), one participant was single/never married, and one was separated. The sample was well educated. Four participants were university students with additional responsibilities (e.g., stay-at-home parent, part-time paid work), three were employed full-time, two were employed part-time, and one was retired. All participants took full or partial leave from their work/education to complete the program.

3.2. Credibility and expectancy

Immediately prior to Lesson 1, the mean rating for how logical the course seemed was 7.10 (*SD* = 1.37, range = 5–9), on a scale from 1 = *not at all* to 9 = *very*. The mean rating for how successful participants anticipated the program would be in reducing their symptoms of panic and anxiety was 6.50 (*SD* = 1.08, range = 5–8), using the same scale.

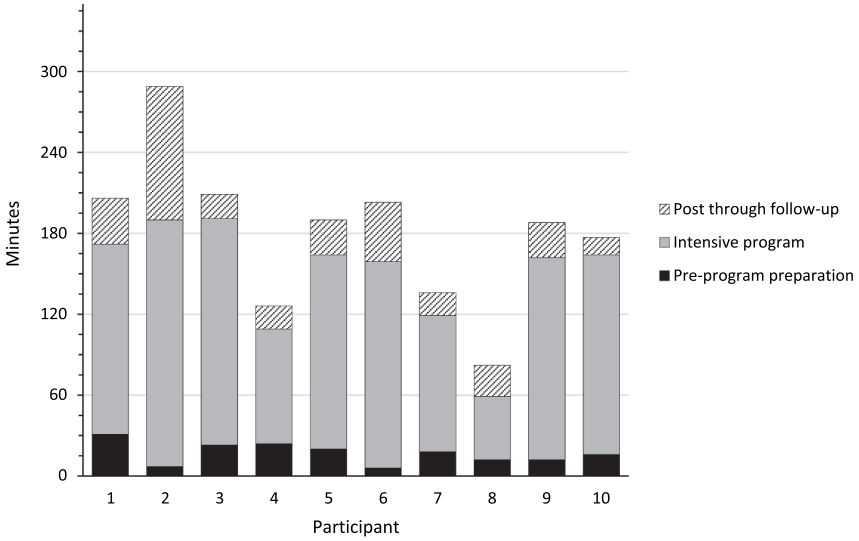

Fig. 2. Number of minutes of clinician contact per participant in each stage of the intervention.

3.3. Adherence

All 10 participants completed the six lessons (100% completion rate). One participant (P8) encountered significant technical issues that prohibited them accessing lessons later in the treatment week, causing their completion to be delayed by one day.

3.4. Engagement with program

Across the treatment week, participants reported spending an average of 69 to 104 min reading the lesson materials each day, and between 48 and 142 min each day practicing the skills taught. As the week progressed, average time spent reading the materials decreased and average time spent practicing the skills increased, which matched the intended shift in emphasis of the program throughout the week from learning about the theoretical model, to focusing on exposure practice. However, there was substantial variance between participants, with time spent reading the lesson materials ranging from 20 to 180 min per lesson and time spent practicing the skills ranging from 0 to 300 min (or 15–300 min, excluding P8) per lesson.

3.5. Clinician contact

Following acceptance into the trial, an average of 17 min (SD = 8) of clinician time was spent per participant prior to the treatment week (e.g. sending the GP letter and brief contact to confirm if the participant planned to proceed). On average, the clinicians spent a total of 132 min (SD = 42) talking on the phone with participants, reading and responding to emails and scheduling text messages during the program (including check-in on Day 8). Clinician contact during the treatment week primarily focused on answering questions, checking progress, planning and reviewing exposure hierarchies, and encouraging participants. On average, an additional 32 min (SD = 25) of clinician contact occurred per participant during the post-treatment and follow-up periods. This contact included prompting participants via text and email to complete questionnaires, providing feedback on questionnaire scores via email and responding to any subsequent email replies from participants. Only one participant (P2) requested a booster call during the two-month follow-up period. Fig. 2 summarizes the clinician time per participant at each time point.

3.6. Clinical outcome measures

Table 2 summarizes the outcome measure results and statistics. On the primary outcome measures, there was a significant and large reduction in panic symptom severity (PDSS-SR) from pre- to post-treatment (d = 1.40), and pre-treatment to follow-up (d = 1.67). We also found a significant overall reduction in agoraphobic avoidance (MI-AAL), of large magnitude (d = 0.83 from pre- to post-treatment).[2] Reductions in panic disorder and agoraphobia symptom severity were maintained from post-treatment to follow-up. For the secondary outcome measures, we found a moderate reduction in depression symptom severity (PHQ-9), which did not reach statistical significance (at post-treatment, d = 0.53, 95%CI: −0.19, 1.24). Nine of 10 participants reported nil suicidal ideation throughout the study. One participant reported suicidal ideation (without intent) at pre-treatment (BDI-II item 9 = 1), which reduced to 0 at post-treatment and two-month follow-up. From pre-treatment to follow-up, a moderate and significant reduction in functional impairment (WSAS) was observed (d = 1.04), and number of days out of role was more than halved (d = 1.05): from 13.2 to 4.8 full or partial days out of role, on average.

Fig. 3 shows the change in panic symptom scores for each individual. Overall, six participants improved from pre- to post-treatment and remained improved at follow up (P1, P3, P4, P5, P7, P10), with five showing reliable change. An additional two participants displayed reliable improvement from pre- to post-treatment, but their symptoms increased slightly from post-treatment to follow-up (P2, P6). Two participants met recovered status at post-treatment (P1 and P2) and three participants met recovered status at two-month follow-up (P4, P5, P7). P8 was an outlier: their panic symptoms appeared to resolve between application and pre-treatment, going from the severe to normal range. However, P8's PHQ-9 scores remained in the severe range throughout. P9's scores on the PDSS-SR dropped from the moderate to normal range from application to pre-treatment; however, their comments to the clinicians during the treatment week indicated ongoing fear and avoidance of panic at a clinical level.

3.7. Treatment satisfaction

Three participants reported they were *very satisfied* with the

[2] P8 answered *0* (*does not apply)* to all items on the MI-AAL at each time point, making their overall scores invalid. Therefore, we excluded P8 from all analysis of the MI-AAL.

Table 2
Means, standard deviations and effect sizes of outcome measures at pre-, post-treatment and two-month follow-up.

	Pre-treatment	Post-treatment	2-month follow-up			Pre- to post-treatment			Pre-treatment to follow-up		
Measure	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	Overall test	*p*	Mean difference	*p*	*d* [95% CI]	Mean difference	*p*	*d* [95% CI]
PDSS-SR	12.40 (6.54)	6.80 (3.68)	6.20 (4.05)	$F(2,18) = 18.66$	< .001	5.60	.002	1.40 [0.68, 2.11]	6.20	.001	1.67 [0.96, 2.39]
MI-AAL^	2.34 (0.83)	1.95 (0.80)	1.97 (0.87)	$F(2,16) = 3.72$	.047	.40	.038	0.83 [0.06, 1.60]	.38	.025	0.92 [0.15, 1.68]
PHQ-9	7.40 (6.55)	4.80 (6.09)	4.70 (5.52)	$F(2,18) = 2.83$	.085	2.60	.131	0.53 [−0.19, 1.24]	2.70	.021	0.88 [0.17, 1.60]
WSAS	17.50 (9.68)	–	12.20 (3.71)	$t(9) = 3.30$	.009	–	–	–	5.30	–	1.04 [0.33, 1.76]
DOR	13.2 (10.57)	–	4.8 (6.66)	$t(9) = 3.31$	.009	–	–	–	8.40	–	1.05 [0.33, 1.76]

Note: ^P8 was excluded from analyses ($n = 9$).

program, six participants reported they were *mostly satisfied*, and one (P8) selected the *neutral* response option. Eight participants reported the scope of the program was *exactly right* in relation to the time allocated, and two participants (P2, P10) indicated there was *a bit too little time*. Overall, participants rated the program as logical ($M = 8.6$, $SD = 1.43$), reported high levels of confidence that it successfully taught techniques to manage panic and anxiety ($M = 7.8$, $SD = 1.14$) and confidence in recommending the program to a friend with similar symptoms ($M = 8.5$, $SD = 1.35$).

3.8. Lesson by lesson feedback

3.8.1. Negative side effects

Two participants reported fatigue in the latter part of the treatment week. For example: *"[I'm] feeling tired, flat (definitely not depression like). Feel like the program requires constant focus even at subconscious level."* (P5, Day 4); *"I am finding the exercises tiring, tough and draining but feel like I am starting to chip away at things I was afraid of through exposure."* (P3, Day 7). Seven participants reported an increase in anxiety between pre- to post-treatment, usually related to increased attention on panic symptoms and graded exposure, but that this anxiety resolved fairly quickly. For example: *"…[I] had some panic symptoms which I was able to control fairly quickly"* (P7, Day 4); *"I am waking up having panic attacks…"* (P3, Day 5); *"I experienced a panic attack yesterday (morning). I also experienced a very mild attack later in the day; it went away very quickly."* (P9, Day 5). Additionally, one participant reported that the abrupt ending of the treatment week prompted anxiety: *"Because the program was delivered in intensive mode, the absence of new lessons made me mildly anxious for first couple of days."* (P5, Post). Two other participants also commented on the timing of the program: *"I would've liked the program to go longer. While the key learnings were done in a week, I feel like they weren't cemented in which allows for a relapse. People doing a seven-day treatment plan have to be extremely committed to continuing it after the week"* (P2, Post); *"I think the one-week program could potentially be stretched out into two weeks for optimal timing…"* (P10, Post).

3.8.2. Positive side effects

Many participants reported that overall the program was empowering, and the most helpful strategy was learning to 'ride the wave' of anxiety. For example: *"My anxiety and panic has reduced to almost zero. Even when faced with triggers, I am still able to ride the wave. I have done a huge number of things without panic that I haven't done with panic or fear of panic for years."* (P2, Post); *"[I've experienced] better coping with situations that provoke panic attack by riding the 'panic wave'"* (P5, Post); *"[I'm] feeling more confident to do things I was avoiding, and more hopeful of being able to manage/overcome panic and anxiety"* (P6, Post); *"I am pleased that I haven't used diazepam for anxiety/panic since starting the program. I am also happy that I am able to endure situations more, knowing that the symptoms will pass."* (P9, Post).

4. Discussion

This study explored the feasibility and acceptability of an internet-delivered intensive CBT program in a sample of 10 participants with a DSM-5 diagnosis of panic disorder and/or agoraphobia. To our knowledge, this was the first attempt to condense internet-delivered CBT for any anxiety disorder into an intensive one-week format.

The first aim was to evaluate the program's acceptability and feasibility. All 10 participants completed the six-lesson program in one week. Engagement was high during the treatment week, with participants spending an average of 2.5 to 3.5 h per day reading the program materials and practicing the skills taught. Additionally, nine of the 10 participants reported they were mostly or very satisfied with the program. Regarding side effects, seven of 10 participants reported an increase in anxiety between pre-treatment to one-week post-treatment, which was usually related to increased attention on panic symptoms or

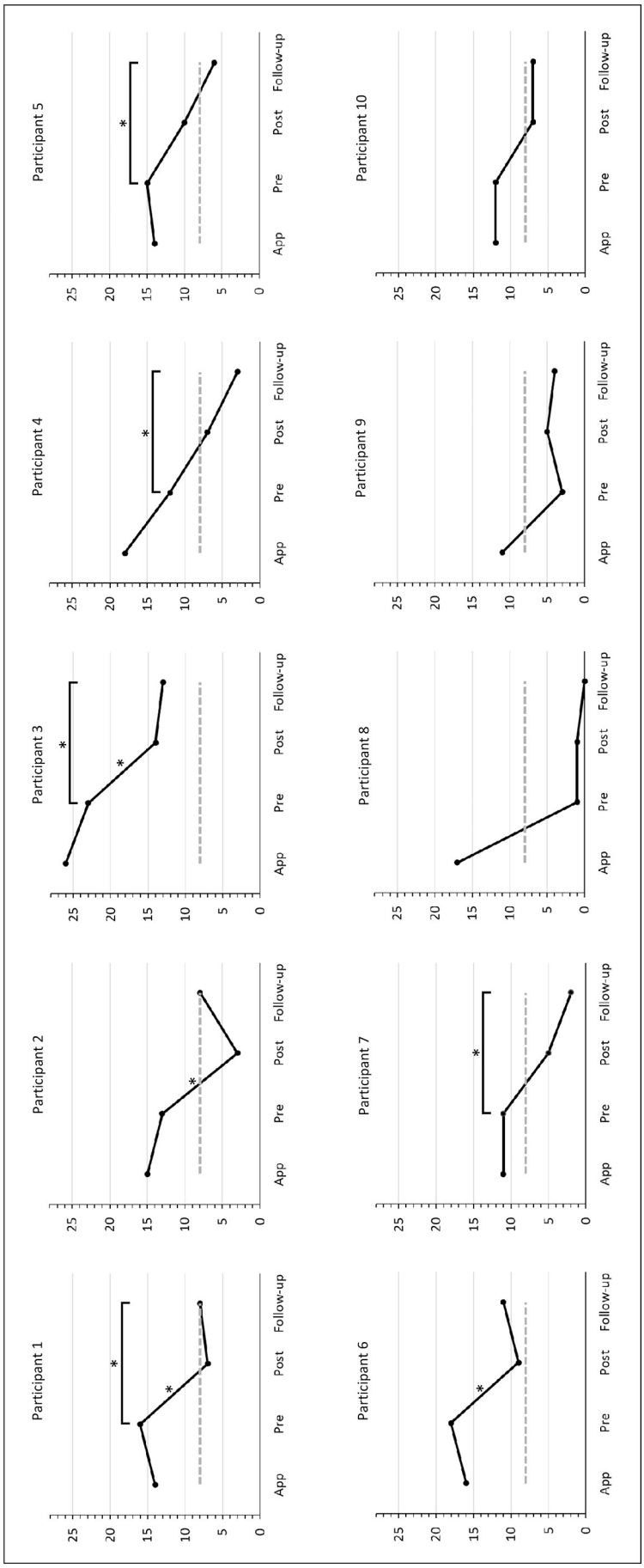

Fig. 3. Changes in PDSS-SR score for each participant from application to pre-treatment, post-treatment and two-month follow-up. *Note:* Grey dashed line represents the clinical threshold; * = reliable change from pre- to post-treatment, or pre-treatment to follow-up (indicated by brackets extending from pre-treatment to follow-up).

commencing graded exposure, although they reported that this anxiety resolved quickly. Some participants also reported fatigue during the treatment week. However, almost all participants reported finding the program empowering or beneficial. Therefore, it may be helpful to prepare individuals that they may experience a temporary increase in anxiety during internet-delivered intensive CBT, but that overall the program will likely be an empowering and helpful experience.

Secondly, the results showed that on average the participants experienced positive outcomes during their internet-delivered intensive CBT program for panic disorder/agoraphobia. We found a large and significant overall reduction in panic symptom severity between pre- and post-treatment (d = 1.40), which was maintained at two-month follow-up. We also found large and significant reductions in agoraphobic avoidance (d = 0.92) and functional impairment (d = 1.04) from pre-treatment to follow-up. Importantly, days out of role were more than halved, which may indicate a considerable increase in participants' productivity. We did not find a significant change in depression; however, the mean PHQ-9 score at pre-treatment was in the mild range and below clinical threshold, suggesting there was less room for improvement.

The clinical outcomes of the current study were consistent with previous research on intensive face-to-face CBT for panic disorder and/or agoraphobia delivered over five to eight days (Bitran et al., 2008; Knuts et al., 2015; Lamplugh et al., 2008). However, in the current study, each participant had an average of 2.2 h of clinician contact during the treatment week, which is substantially lower than previous studies of face-to-face intensive CBT delivered individually (23 h in Knuts et al., 2015; approximately 20 h in Bitran et al., 2008) or in a group format (20 h in Lamplugh et al., 2008, with 5 participants per group). The current results suggest that participants undergoing internet-delivered intensive exposure-based CBT can experience substantial and rapid improvements in panic and agoraphobia symptoms, with relatively little clinician time required compared with face-to-face alternatives, although they await replication.

Typically, participants received three clinician support calls during the treatment week: on Day 1 (Monday), Day 2 (Tuesday) and Day 4 (Thursday). This schedule was chosen for pragmatic reasons related to the clinicians' other commitments. However, in future we would change the third scheduled call from Day 4 (Thursday) to Day 3 (Wednesday). Participants often did not commence in-situ exposure on Day 3 because they were waiting until opportunities for exposure arose naturally and needed to be coached in creating opportunities for in-situ exposure. For example, visiting a shopping mall multiple times in one day, for the purpose of exposing oneself to an enclosed and busy environment. Additionally, although three participants commented that tapered clinician contact would be helpful, only one participant asked for a phone call during the follow-up period. Including *scheduled* calls as part of the standard protocol may increase uptake of booster calls, and help participants feel more confident about maintaining their gains.

The delivery format of this intervention - an automated online course supported by clinician phone calls - may facilitate dissemination of intensive CBT and integration into usual care settings. From our location in Sydney, we were able to reach people across Australia, including in rural areas. Participants stayed in their own homes during the treatment week, thereby eliminating travel and accommodation costs or the need to arrange overnight childcare. By task sharing with an automated online course, the clinicians were able to supervise up to three people per week through the program whilst maintaining a busy workload of other clinical and research responsibilities. Additionally, the primary clinician (ES) was only available three days per week for most of the study, so clinical support for most participants was shared with another clinician (JN). This arrangement appeared acceptable to participants and was easy to coordinate between the clinicians. Delivering intensive CBT via the internet offered increased flexibility for both participants and clinicians.

Importantly, condensing internet-delivered CBT for panic disorder into an intensive one-week timeframe did not require new technology. The format of the lessons was the same as in our previous studies and we used our existing web platform to deliver the online lessons to participants. The major modifications relative to our group's past studies of internet-delivered CBT for panic disorder were: focusing on exposure therapy techniques, which are amenable to massed implementation; preparing participants during the assessment interview for what was involved in the treatment week; encouraging participants to complete 3–4 h of therapy activities *per day* rather than *per week*; and arranging scheduled and more frequent support calls during the program (see Supplementary Material for full summary of adaptations relative to our past studies). Therefore, it may be possible for other existing clinics that provide internet-delivered CBT to explore intensive delivery of their programs.

This study takes a step towards increasing treatment options for patients pursuing internet-delivered CBT for panic disorder. The 10 participants who completed the program were motivated to complete intensive internet-delivered CBT for various reasons. For example, they wanted to achieve faster reductions in symptoms and impairment, or they felt it would be easier to stay motivated and prioritise the program over the short timeframe, compared to a two month period in conventional internet-delivered CBT. As mentioned earlier, one participant completed the program during a break in university classes, when they had less demands on their time for a brief period. However, a conventional timeframe for internet-delivered CBT was preferred by seven people who applied to this study. They chose to take part in a separate study of a spaced internet-delivered CBT program, because work or other commitments prevented them from taking part in the intensive study, or because they indicated preference for a more gradual treatment approach. Future research should explore user preferences for internet-delivered CBT in greater depth so that treatments can be tailored to match personal preferences.

4.1. Limitations

The findings from this study need to be interpreted in light of several limitations. The most significant limitation is the lack of control group, which precludes the conclusion that outcomes were solely due to the intervention rather than the passage of time, regression to the mean, or non-specific therapeutic factors (e.g., therapeutic alliance). Future studies should employ a waitlist control or psychological control (e.g., relaxation) to delineate the specific effects of the program. Secondly, the study relied exclusively on self-report measures and would have benefitted from blind clinician diagnostic assessments at follow-up. Thirdly, only 10 individuals took part in the program, out of 67 who started an application. The relatively small proportion of people included in the final sample may limit the generalizability of the findings. Of the 67 individuals, 30% did not progress because they did not complete their application, and it is not clear why those participants did not proceed with their application. Additionally, 14 participants were excluded as they were receiving concurrent treatment (current CBT, recent change in medication, or daily use of benzodiazepines). It remains unclear how these treatment factors would impact internet-delivered intensive CBT for panic disorder, and future studies could examine whether providing the intensive program as an adjunct to existing treatment facilitates faster recovery. The final sample was small, well-educated and self-motivated to apply for an internet-delivered intensive CBT program, and five had prior experience with CBT. Although these factors limit the generalizability of the findings, the eligibility criteria were deliberately inclusive to approximate usual care settings, where individuals are often non-responders to prior treatment, use benzodiazepines as-needed, and have comorbid anxiety and depressive disorders. Individuals were not excluded from our study due to these reasons. Finally, the follow-up period was only two months. Future studies should explore the longer-term effects of internet-delivered intensive CBT, and compare outcomes to standard internet-

delivered CBT protocols delivered over a longer time-frame (e.g., 8–10 weeks).

4.2. Conclusions

This pilot study demonstrates that internet-delivered intensive CBT for panic disorder and/or agoraphobia is feasible, acceptable to participants, and associated with large improvements in symptom severity and functional impairment. The intervention was time efficient, with both rapid gains reported by participants and substantially less clinician time required than previous intensive CBT interventions. Delivering intensive CBT via the internet enabled us to reach people across the country and eliminated travel for participants. Further research is needed to evaluate *The Intensive Panic Program* in a larger sample with a longer follow-up period to explore the generalizability and durability of the findings. Comparison to a control condition and conventional 'spaced' internet-delivered CBT over several months is also needed, to establish the relative efficacy of the program and understand which groups of patients are most suitable for intensive treatment. This innovative internet-delivered format has great potential to increase access to intensive CBT and thereby expand the treatment options available to patients.

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Declaration of competing interest

The authors report no relationships that could be construed as a conflict of interest.

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