



RESEARCH ARTICLE

Internet-delivered eye movement desensitization and reprocessing (iEMDR): an open trial [v1; ref status: indexed, <http://f1000r.es/8l>]

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Abstract

Recent research indicates internet-delivered cognitive behavioural therapy (iCBT) can reduce symptoms of post traumatic stress disorder (PTSD). This study examined the efficacy of an internet-delivered treatment protocol that combined iCBT and internet-delivered eye movement desensitization and reprocessing (iEMDR), in an uncontrolled trial. Eleven of the 15 participants completed post-treatment questionnaires. Large effect sizes were found from pre-treatment to 3-month follow-up ($d = 1.03 - 1.61$) on clinician-assessed and self-reported measures of PTSD, anxiety and distress, with moderate effect sizes ($d = 0.59 - 0.70$) found on measures of depression and disability. At post-treatment, 55% of the participants no longer met criteria for PTSD and this was sustained at follow-up. Symptom worsening occurred in 3 of 15 (20%) of the sample from pre- to post-treatment; however, these participants reported overall symptom improvement by follow-up. Future research directions for iEMDR are discussed.

Article Status Summary

Referee Responses

Referees	1	2
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- 1 Alyssa Boasso**, Veterans Affairs Medical Center Boston USA
- 2 Jo Abbott**, Swinburne University of Technology Australia

Latest Comments

No Comments Yet

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Introduction

Results of meta-analyses indicate that both trauma-focused cognitive behavioural therapy (TF-CBT) and eye movement desensitization and reprocessing (EMDR)¹ are effective in reducing PTSD symptoms. However, barriers to accessing these treatments include stigma, cost, distance, low mental health literacy, and long waiting lists^{2,3}.

Internet-delivered psychological treatments may increase access to psychological therapy⁴. TF-CBT has been delivered via the internet and has shown promise in significantly reducing PTSD symptoms in military personnel^{5,6}, university students^{7,8}, and community samples in the U.S.⁷, Holland⁹, Iraq¹⁰, Australia^{11,12} and German-speakers in Europe¹³. For example, in a previous study¹² we evaluated an internet-delivered TF-CBT (iCBT) protocol with Australian adults with a primary diagnosis of PTSD. We found large within-group effect sizes (ESs) and small-to-moderate between-group ESs on measures of PTSD symptoms, depression, anxiety and disability, in a treatment group relative to a control condition.

To our knowledge, there are no reports of studies evaluating the effectiveness of internet-delivered EMDR (iEMDR). Such a treatment may offer another model of remote treatment for PTSD. The present study aimed to explore the acceptability and efficacy of iEMDR when used in conjunction with an iCBT protocol (iCBT/iEMDR course), and evaluated using an open trial design. To increase generalizability of results, inclusion criteria were consistent with those of outpatient services. The primary hypothesis was that the iCBT/iEMDR course would be associated with significant improvements in PTSD symptoms, depression, anxiety, distress, and disability.

Secondary hypotheses were that the treatment would be rated as acceptable to participants and would not be associated with adverse events.

Methods

The study was approved by the Macquarie University Human Research Ethics Committee (HREC#: 5201100382). Participants provided informed consent. The trial is registered with the Australian and New Zealand Clinical Trials registry as ACTRN12611000151932.

Participants and recruitment

Participant flow is shown in [Figure 1](#). Participants were recruited from visitors to a research website that evaluates internet-delivered treatments (www.ecentreclinic.org). During the recruitment period, which ran over 2 weeks during June 2011, 32 individuals applied +as having a principal complaint of PTSD as indicated by total scores above a clinical cut-off recommended to indicate probable diagnosis of PTSD¹⁴ (defined as > 44 on the PTSD Checklist (PCL-C)¹⁵) as well as a confirmed primary diagnosis of PTSD determined by clinician-administered interview using the PTSD Symptom Scale-Interview (PSS-I)¹⁶; (ii) at least one month had elapsed since the primary trauma; (iii) no psychotherapy for PTSD during the treatment period (however, supportive group and individual counselling that did not specifically target PTSD symptoms was permitted); (iv) if using psychotropic medication,

no change in dosage or type of medication 1 month prior to or during treatment; (v) a resident of Australia, (vi) at least 18 years of age, (vii) had computer and internet access, (viii) not *currently* experiencing a psychotic mental illness, extreme current symptoms of depression (defined as a total score > 22 or responding > 2 to Question 9 (suicidal ideation) on the Patient Health Questionnaire - 9 Item (PHQ-9)¹⁷, current suicidal intent and plan, or highly dissociative (defined as a total score above 22) on the Dissociative Experiences Scale – Brief Version (DES-B)¹⁸. Sixteen participants met all the criteria and were offered treatment, and 15 subsequently began treatment and are included in analyses.

Measures

The primary outcome measures were severity of symptoms of PTSD, measured by the PSS-I and the PCL-C. The PSS-I¹⁶ is a 17-item semi-structured clinician-administered interview based on the DSM-IV criteria for PTSD. The PCL-C¹⁵ is also a 17-item, self-report scale of PTSD symptoms based on the DSM-IV criteria for PTSD.

Secondary outcomes measures included the Generalized Anxiety Disorder 7-Item Scale (GAD-7, which measures anxiety)¹⁹, the PHQ-9 (which measures depression)¹⁷, the Mini International Neuropsychiatric Interview (MINI; which was used to determine the presence of a major depressive episode, panic, agoraphobia, social phobia, obsessive compulsive disorder, and generalized anxiety disorder)²⁰, the Kessler 10 Item²¹ (K10; which measures general distress), and the Sheehan Disability Scale²² (SDS, which measures impairment in psychosocial functioning). Traumatic experiences were assessed using the Life Events Checklist (LEC)²³, which provides a list of traumatic events and assesses the occurrence rates of common Criterion A1 (life-threatening) traumas according to the DSM-IV. Additional outcomes included completion rates (percentage of participants who read the six online lessons of the iCBT/iEMDR course within the six weeks of the course), and treatment satisfaction (percentage who reported feeling satisfied with the program or who would recommend it to a friend).

Intervention

The iCBT/iEMDR course is a six lesson online intervention utilising evidence-based principles of TF-CBT²⁴ and EMDR²⁵. The TF-CBT components were similar to those used in a previous internet-based CBT program for PTSD¹². The course comprises text-based information and instructions and educational case stories.

Lesson 1 of the iCBT/iEMDR course includes information about the causes, symptomatology and neurobiology of PTSD, how cognitive, behavioural, and physical symptoms maintain PTSD, and provides instructions for physiological de-arousal strategies. Lesson 2 provides the rationale for using EMDR and detailed instructions about a self-guided iEMDR process. Lesson 3 describes cognitive restructuring strategies. Lesson 4 provides more detail on how to use cognitive restructuring for common trauma-related cognitions. Lesson 5 describes avoidance and safety behaviours and the principles of graded exposure. Lesson 6 describes the principles of relapse prevention.

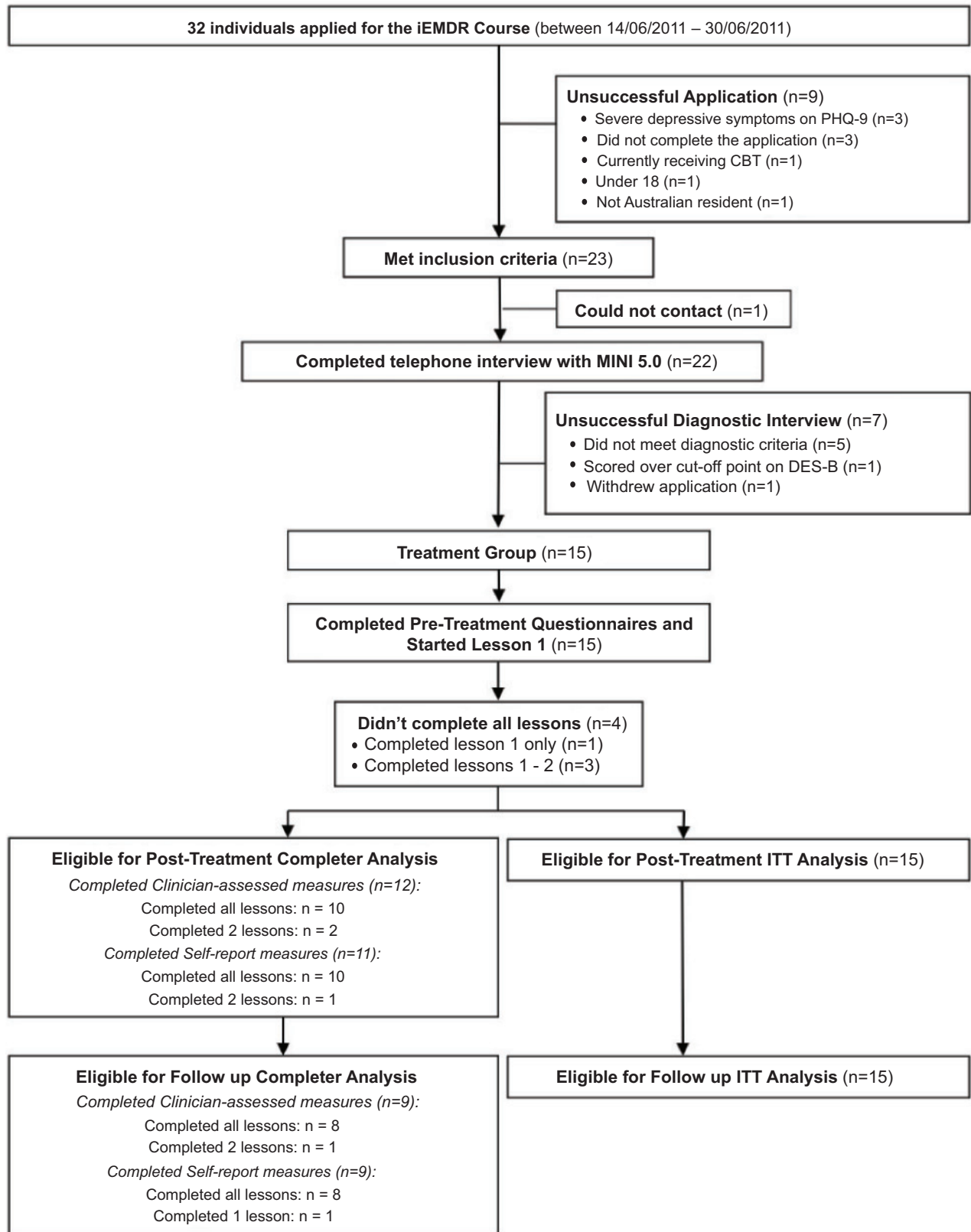


Figure 1. Participant flow chart. iEMDR: Internet-delivered eye movement desensitization and reprocessing. PHQ-9, Patient Health Questionnaire – 9 Item. MINI: MINI International Neuropsychiatric Interview. DES-B: Dissociative Experiences Scale – Brief Version.

iEMDR Intervention: The EMDR intervention follows the standard EMDR treatment protocol by Shapiro²⁵ with the following adaptations for self-directed use via the internet: the protocol was divided into a desensitisation phase (weeks 2–4) followed by a phase aimed at anchoring the positive belief (weeks 5–6). The desensitization phase followed Shapiro's protocol for reducing the Subjective Units of Distress (SUDS) and Validity of Cognition (VoC) rating to less than 2. Participants were instructed to anchor the positive belief in week 5 of the course only for trauma memories that were no longer distressing (VoC < 2).

iEMDR was conducted using a web-based EMDR tool (<http://www.rapidtables.com/tool/EMDR.htm>). The initial session of EMDR was conducted with the support of the therapist (JS) who guided participants by telephone through the procedure while they accessed the web-based EMDR tool. Further therapist-guided EMDR was provided as requested. Participants who reported not having used self-guided EMDR by mid-treatment were contacted and offered a second guided EMDR session. Instructions for working with blockages to processing were provided in an additional resource one week after giving the iEMDR instructions.

Therapist

One Clinical Psychologist (JS) provided all clinical contact with participants, which occurred via weekly telephone calls or secure email. The clinician had received Level I and II training in EMDR by a certified EMDR instructor, and had two years experience in administering iCBT and in facilitating EMDR in face-to-face treatment. The clinician was supervised by NT.

Statistical analysis

Primary analyses were conducted using data only from questionnaire completers, defined as those who completed treatment, post-treatment or follow-up questionnaires. A secondary set of analyses was performed using an intention-to-treat (ITT) model where missing data were addressed by carrying forward the first available data (i.e. baseline-observation-carried-forward model; BOCF).

Pre- to post-treatment and pre-treatment to follow-up changes in questionnaire scores were analysed using paired-sample t-tests. Effect sizes (Cohen's *d*)²⁶ were calculated based on the pooled standard deviation. All analyses were performed in PASW version 18.0 (SPSS, Inc., Chicago, IL).

Changes in prevalence of PTSD and comorbid disorders were calculated based on the results of telephone administered diagnostic interviews administered at pre-treatment, post-treatment and follow-up.

To measure adverse events we used Tarrier's²⁷ definitions of treatment worsening, defined as any increase in symptom scores greater than zero from pre- to post-treatment or follow up, and defined serious adverse events as self-reported hospitalizations, suicide attempts, or onset of substance abuse due to treatment.

Results

Baseline data

The mean age of participants was 47 years (SD = 10.4), and 10/15 (66%) were women. Ten of 15 participants (67%) reported being either married or in a de facto relationship, 4/15 (27%) reported being separated or widowed and 1/15 (7%) reported being single or never married. Four of fifteen (27%) had a tertiary education, 9/15 (60%) reported having a post-high school certificate and 2/15 (13%) reported as having year 10 high school level education. One participant (7%) was in full-time employment, eight (53%) were employed part-time or studying and six (40%) reported being unemployed, retired, or disabled. Fourteen of fifteen participants (93%) reported having had previous mental health treatment and 10/15 (67%) reported taking medication related to their symptoms of anxiety or depression. One half (5/10) of the participants who completed post-treatment questionnaires reported that they were receiving individual or group supportive counselling during the treatment period that was not specifically directed at the treatment of PTSD symptoms (mean sessions = 3; SD = 2.1). Between post-treatment and follow-up, 25% (2/8) of respondents reported receiving ongoing supportive therapy (not specifically for PTSD) and 13% (1/8) commenced treatment with a psychologist specifically for PTSD (mean sessions = 4; SD = 3.5). There were no reported medication changes during the course. One quarter (2/8) of respondents reported changing their medication post-treatment. Five participants (33%) who reported not having used self-guided EMDR by mid-treatment were contacted and offered a second EMDR session guided by the therapist via telephone. None elected to participate in further EMDR, citing that EMDR had led to an increase in re-experiencing symptoms.

Trauma history

The most common reported primary trauma was childhood sexual abuse (9/15; 60%), followed by childhood physical abuse (2/15; 13%), domestic violence as an adult (2/15; 13%), witnessing domestic violence as a child (1/15; 7%), captivity (1/15; 7%) and life threatening illness (1/15; 7%). On average, the primary trauma had occurred 32.8 years prior (SD = 12.5). The average age at which the primary trauma occurred was 13.3 years (SD = 12.9). According to the LEC, participants reported having experienced an average of 9.2 types of trauma during their lifetime. The most common was *physical assault* (13/15; 87%), followed by *assault with a weapon* (12/15; 80%), and *other unwanted or uncomfortable sexual experience* (12/15; 80%).

Attrition

The flow is shown in [Figure 1](#). Eleven participants (73%) completed all six lessons. One participant completed a single lesson, two participants completed two lessons and one participant completed six lessons, but not the post-treatment assessments. There were no pre-treatment differences between completers and non-completers on the PSS-I, PCL-C or the GAD-7 at pre-treatment. Ten participants completed post-treatment questionnaires while eight completed follow-up questionnaires.

Completer analysis

Primary outcome measures. Primary outcome scores for completers improved from pre- to post-treatment as shown in [Table 1](#). Paired-sample t-tests revealed significant reductions on the PSS-I ($t_{10} = 3.66, p = 0.004$) and PCL-C ($t_{10} = 2.73, p = 0.021$) between pre- and post-treatment, and between pre-treatment and follow-up (PSS-I: $t_{10} = 4.90, p = 0.001$; PCL-C: $t_{10} = 4.26, p = 0.002$).

Secondary outcome measures. Paired sample t-tests between pre- and post-treatment indicated significant reductions for completers on the PHQ-9 ($t_9 = 2.66, p = 0.026$), GAD-7 ($t_9 = 2.31, p = 0.047$), K10 ($t_9 = 2.49, p = 0.034$), but not on the SDS ($t_9 = 1.66, p = 0.131$). Significant reductions were reported between pre-treatment and follow-up on the PHQ-9 ($t_7 = 3.13, p = 0.017$), GAD-7 ($t_7 = 4.16, p = 0.004$), K10 ($t_7 = 3.95, p = 0.006$), and SDS ($t_7 = 4.15, p = 0.004$).

Intention-to-treat (ITT) analysis

Primary outcome measures. A paired-sample t-test comparing pre- and post-treatment scores for the ITT sample revealed significant reductions on the PSS-I ($t_{14} = 3.50, p = 0.004$), and this was maintained at follow up ($t_{14} = 4.59, p < 0.0001$). Scores on the PCL-C did not significantly improve from pre- to post-treatment ($t_{14} = 2.12, p = 0.053$). However, at follow-up, scores on the

PCL-C had significantly improved from pre-treatment ($t_{14} = 17.76, p < 0.0001$).

Secondary outcome measures. Paired sample t-tests for the ITT sample revealed significant reductions between pre- and post-treatment on the K10 ($t_{14} = 2.20, p = 0.046$) but not on the PHQ-9 ($t_{14} = 2.12, p = 0.053$), GAD-7 ($t_{14} = 2.02, p = 0.063$), or SDS ($t_{14} = 1.22, p = 0.281$). There was a significant difference between pre-treatment and follow-up scores on the PHQ-9 ($t_{14} = 2.46, p = 0.027$), GAD-7 ($t_{14} = 2.90, p = 0.012$), K10 ($t_{14} = 3.10, p = 0.008$), but not on the SDS ($t_{14} = 2.08, p = 0.056$).

Effect sizes

Using the completer analysis, large effect sizes were reported on the PSS-I, PCL-C, GAD-7, and K10 at post-treatment and a moderate effect size was reported on the PHQ-9 and SDS ([Table 1](#)). Large effect sizes were reported on all measures between pre-treatment and follow-up.

Using the ITT analysis, from pre-treatment to post-treatment a large within-group effect size was found on the PSS-I. Moderate within-group effects were found on the GAD-7, PHQ-9, and K10. A small effect size was reported on the SDS. From pre-treatment to

Table 1. Descriptive statistics and within-group effects on symptom measures at each assessment.

Measure	Pre-treatment Mean (SD)	Post-treatment Mean (SD)	Follow-up Mean (SD)	Within-group effect size	
				Pre- to post-treatment (95% CI)	Pre-treatment to follow-up (95% CI)
PSS-I					
Completers	31.6 (4.7)	19.2 (9.9)	17.1 (8.5)	1.61 (0.65 – 2.47)	2.32 (1.16 – 3.31)
ITT	31.6 (4.7)	22.0 (9.8)	21.5 (8.6)	1.25 (0.44 – 2.00)	1.45 (0.61 – 2.21)
PCL-C					
Completers	59.0 (11.2)	46.9 (14.9)	43.1 (13.3)	0.95 (0.08 – 1.76)	1.33 (0.35 – 2.22)
ITT	59.0 (11.2)	50.1 (13.3)	48.1 (11.5)	0.73 (-0.03 – 1.44)	0.96 (0.18 – 1.69)
GAD-7					
Completers	14.1 (4.4)	9.3 (4.7)	8.0 (4.0)	1.06 (0.18 – 1.87)	1.42 (0.42 – 2.31)
ITT	14.1 (4.4)	11.1 (5.2)	9.9 (3.8)	0.62 (-0.13 – 1.34)	1.00 (0.22 – 1.73)
PHQ-9					
Completers	15.3 (4.2)	11.7 (6.2)	11.3 (5.5)	0.70 (-0.14 – 1.50)	0.86 (-0.06 – 1.72)
ITT	15.3 (4.2)	12.1 (5.3)	11.8 (4.7)	0.66 (-0.10 – 1.37)	0.78 (0.02 – 1.50)
SDS					
Completers	21.3 (5.5)	16.6 (10.8)	12.8 (8.9)	0.59 (-0.24 – 1.39)	1.26 (0.29 – 2.1)
ITT	21.3 (5.5)	18.3 (9.9)	16.6 (8.8)	0.37 (-0.36 – 1.09)	0.65 (-0.1 – 1.36)
K-10					
Completers	32.2 (5.5)	25.8 (7.3)	24.0 (8.0)	1.03 (0.5 – 1.84)	1.28 (0.30 – 2.16)
ITT	32.2 (5.5)	27.7 (6.7)	26.9 (6.7)	0.73 (-0.02 – 1.45)	0.85 (0.08 – 1.57)

Note. Intention-to-treat (ITT) model (n=15) was employed with pre-treatment scores carried forward if post-treatment or follow-up data were not available. Completer data were available for 10 participants at post-treatment and 8 at follow-up. Abbreviations: PSS-I: PTSD Symptom Scale – Interview Version; PCL-C: PTSD Checklist – Civilian Version; GAD-7: Generalised Anxiety Disorder 7-Item; PHQ-9: Patient Health Questionnaire – 9 Item; K10: Kessler 10 Item; SDS: Sheehan Disability Scale.

follow-up, large effect sizes were found on the PSS-I, PCL-C, and GAD-7, and moderate effect sizes for the PHQ-9, and SDS.

Clinical significance

Based on the results of the clinician and telephone-administered PSS-I, 6/11 (55%) participants no longer met criteria for PTSD at post-treatment and 5/9 (56%) no longer had PTSD at follow-up. Based on an ITT approach with the BOCF, 5/15 (33%) no longer met criteria for PTSD at post-treatment and follow-up.

With regard to co-morbid diagnoses for completers as measured by clinician-administered MINI, the average number of co-morbid diagnoses reduced from 2.5 (SD=2.0) at intake to 1.2 (SD=1.0) at post-treatment, and further reduced to 0.6 (SD=1.6) at follow-up. According to an ITT analysis the average number of co-morbid diagnoses reduced from 2.5 (SD=1.7) at intake to 1.4 (SD=0.9) at post-treatment, and 1.1 (SD=1.1) at follow-up.

Adverse events

Three participants reported symptom worsening as defined by Tarrier²⁷ and no participants reported serious adverse events. Of the participants who completed post-treatment questionnaires, three participants showed symptom worsening between pre- and post-treatment on the PCL-C, and one of these had dropped out of treatment after the third lesson. All three improved between post-treatment and follow-up such that no participants worsened between pre-treatment and follow-up. No participants worsened on the PSS-I between any time points.

Acceptability

At post-treatment, 6/11 (55%) reported that they were *very satisfied* with the course, one participant (9%) was *mostly satisfied*, and 4/11 were *neutral or somewhat satisfied*. None of the participants reported being dissatisfied with the course. Nine of 11 (82%) reported they *would recommend this course to a friend with PTSD*.

EMDR open trial data set, Spence *et al.* 2013

2 Data Files

<http://dx.doi.org/10.6084/m9.figshare.639181>

Discussion

This study explored the feasibility of a combined iCBT/iEMDR course for treating PTSD in adults using an open-trial design. The results indicated significantly reduced symptoms of PTSD, depression, anxiety, distress, and disability between pre-treatment and three-month follow-up. By post-treatment, 55% of the participants no longer met criteria for PTSD, and the number of comorbid diagnoses had halved. These reductions indicate that PTSD can be treated via the internet using a combination of CBT and EMDR techniques. With respect to acceptability, this protocol was moderately tolerated, indicating that improvements would be required for further use of this intervention.

Compared with ITT data from our previous trial¹², the within-group effect size (ES) on the PCL-C was lower at post-treatment and follow-up. These differences may be due to changes to the protocol, the use of a patient sample composed primarily of childhood sexual abuse survivors, or due to the influence of attrition on the ITT analysis as a result of using a small sample. However, these results compare favourably to a similar study of iCBT for PTSD in an Australian sample¹¹, as well as several face-to-face interventions for PTSD that used the PCL-C^{28,29}, but less favourably with results of a face to face trial of TF-CBT for motor vehicle accident survivors (Blanchard, 2003 #558).

In our trial, 3/15 (20%) reported symptom worsening between pre- and post-treatment, although all three reported treatment gains by follow-up. Although no serious adverse events (e.g., hospitalizations, suicide attempts, relapse to substance use) occurred during the program, three participants reported that an increase in re-experiencing symptoms led them to discontinue. This potentially contributed to the higher attrition, moderate acceptability, and limited course and questionnaire completion rates, relative to our earlier study.

Limitations

The absence of a waitlist control condition means that the improvements could have been the results of time, repeated measurement or other non-specific effects. The design did not allow determination of whether the effects were due to the iCBT or iEMDR components. The small sample size composed of a high number of multiply traumatized, childhood sexual abuse survivors may not apply to other PTSD populations.

Conclusions

The results of this small feasibility study indicate that the combined iCBT/iEMDR protocol is potentially efficacious. The magnitude of gains did not appear to be as large as our previous study, although these may have been attenuated by differences in the sample and iCBT protocol. These results indicate that future research of the relative benefits of iCBT/iEMDR is warranted.

Author contributions

JS and NT Conceived the study and design, analysed and interpreted the data, and drafted the article. LJ, BFD, BW, MT and JZ Contributed to the design of the study and the revision of the manuscript.

Competing interests

There are no competing interests for any author.

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Current Referee Status:

Referee Responses for Version 1



Jo Abbott

Swinburne University of Technology, Hawthorn, Victoria, Australia

Approved: 21 March 2013

Referee Report: 21 March 2013

This is an important study in that it is exploring the feasibility of an online intervention for PTSD that includes eye movement desensitization as well as CBT. These early stage research studies evaluating novel interventions are important prior to controlled trials and it will be interesting to see how future research can identify the benefits of each component of the intervention.

There were a couple of parts of the flow chart that could be a bit clearer – I too didn't follow where the 16 participants meeting all criteria came from. I also couldn't follow in the flow chart where the following information in the Attrition section fitted: "...one participant completed six lessons, but not the post-treatment assessments", "Ten participants completed post-treatment questionnaires while eight completed follow-up questionnaires."

Regarding reference 11 (Klein et al., 2009) – there is a more recent paper about this same trial that includes follow-up data (Klein et al., 2010) – of relevance given the comparison made to this trial.

I think it is relevant to mention in the discussion that this was a telephone-assisted intervention (not entirely internet-delivered).

I thought that the interpretation of the results would be facilitated if the authors made comment on which of the analyses (ITT or completer) they were placing weight on in drawing their conclusion and why. For example, in the discussion they state that "The results indicated significantly reduced symptoms of PTSD, depression, anxiety, distress, and disability between pre-treatment and three-month follow-up.", but the disability measure was only significantly different between the groups when using completer analyses. It would also be useful if Table 1 also noted which of the mean differences were significant (rather than the reader needing to refer back to the text).

I was also interested to know more about the worsening symptoms that some participants reported. Also, the Discussion states that 3/15 participants reported worsening symptoms but in the Results it reads as though five participants stopped using EMDR because they said it "led to an increase in re-experiencing symptoms".

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.

1 Comment

Author Response

Jay Spence, Macquarie University, Australia

Posted: 24 Mar 2013

Dear Dr Abbott, Thank you for your feedback. We have addressed your suggestions in an updated manuscript that has recently been uploaded. We would welcome any other edits that you feel are required if they are not adequately addressed in the revised publication. Thank you again for your time in improving this paper. Kind regards, Jay Spence

Competing Interests: No competing interests were disclosed.



Alyssa Boasso

Veterans Affairs Medical Center Boston, Boston, MA, USA

Approved: 11 March 2013

Referee Report: 11 March 2013

Overall, the writing is succinct and clear. The analyses are appropriate given the study design and the conclusions are justified. There are a few minor areas where further explanation or clarification is needed, these are detailed below.

- What is the rationale for combining the two therapies? How is iEMDR expected to add to the effectiveness of pre-existing iCBT protocols?
- The section on recruitment does not explain how 23 people qualified, but only 16 were enrolled. In the iEMDR Intervention subsection, the authors state, “the positive belief” but do not previously define it. Also, how many people were provided special therapist-guided EMDR? Is there conjecture about how additional sessions might have affected outcomes?
- In the discussion section, the authors state “these results compare favourably to a similar study...” How is the study similar? Clarifying this may help contrast your findings with the following study which used motor vehicle accident survivors.
- The section on worsening symptoms should address whether other similar studies have encountered the same problem? Also, is there data from the experiment that suggests which aspect of the therapy may be contributing to this issue?

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.
