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Online Eye Movement Desensitization and Reprocessing Therapy for Chronic Pain: A Pilot-Controlled Trial

Online eye movement desensitisation and reprocessing therapy for chronic pain: A pilot controlled trial

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Abstract

The study aimed to provide a preliminary evaluation of the acceptability and effectiveness of online eye movement desensitisation and reprocessing (EMDR) compared to waitlist control (WLC). A pilot non-randomised controlled trial was conducted. Eighteen adults experiencing chronic pain completed the study ($n_{EMDR} = 10$; $n_{control} = 8$). The intervention received up to 10 weekly sessions of online EMDR. The control group received treatment-as-usual. Participants completed baseline and post-intervention measures assessing post-traumatic stress, pain severity, pain interference, pain catastrophising, and depression levels. Additionally, the online EMDR group participants provided feedback on intervention acceptability and satisfaction. The online EMDR group demonstrated significant reductions in both trauma and pain-related outcomes; depression levels did not significantly change. No significant change was observed in any outcome within the control group. Additional analysis results, after the WLC also received the intervention, demonstrated similar effects but did not reach statistical significance, except for depression. Overall, online EMDR appeared acceptable and positively received by participants. The study provides preliminary support that online delivery of EMDR may reduce trauma- and pain-related outcomes in individuals experiencing chronic pain. Further large-scale research is warranted to substantiate these findings. Limitations and implications are discussed.

REC ref: 2020/HCSREC/04

Keywords: Eye Movement Desensitization Reprocessing; Chronic Pain; Internet-Based Intervention; Psychological Trauma

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Chronic pain affects a substantial portion of the global population (Fayaz et al., 2016; Mansfield et al., 2016; Sá et al., 2019). Its impact may be complex and profound, challenging quality of life, relationships, occupation, and psychological wellbeing (Burke et al., 2015; Reid et al., 2011). Whilst aetiology of chronic pain experiences may be complex (Mills et al., 2019), trauma is increasingly recognised as one experience that is frequently entwined with persistent pain (Lumley et al., 2022).

Trauma presents as a risk factor for the development of chronic pain. This association includes physical trauma, where pain commonly persists well beyond the initial injury (Castillo et al., 2006; Rivara et al., 2008), but also extends to a broader definition of trauma that incorporates experiences of psychological and emotional adversity (see Lumley et al., 2022). Indeed, compared to the general population, individuals with chronic pain are more likely to report a history of Adverse Childhood Experiences (ACEs) (Davis et al., 2005) and experience post-traumatic stress disorder (PTSD) (Fishbain et al., 2017; Siqveland et al., 2017). Consequently, integrating consideration of trauma into chronic pain intervention could enhance support (Lumley et al., 2022).

Appreciation of trauma's role within chronic pain management support is alluded to within UK-based guidance (National Institute for Health & Care Excellence; NICE, 2021), which recognises the relevance of considering trauma during assessment. However, despite this recognition, trauma fails to feature as a treatment component within the subsequent intervention recommendations. This discrepancy illustrates Lumley and colleagues' (2022) criticism of

current treatment approaches, which typically separate trauma and chronic pain interventions despite their frequent co-occurrence.

Eye Movement Desensitisation and Reprocessing (EMDR) (Shapiro, 2001) therapy could contribute to a more unified and trauma-informed approach to supporting individuals experiencing chronic pain (Lumley et al., 2022). EMDR involves exposure to difficulty and distressing memories alongside attending to bilateral stimulation. This process is theorised to facilitate information processing, reducing the memories' emotional salience and impact. Whilst EMDR has most commonly been applied within the field of PTSD, nascent exploration of the potential application to other difficulties (including chronic pain) is emerging (Cuijpers et al., 2020).

Existing systematic reviews suggest that EMDR may benefit a range of chronic pain conditions, such as phantom limb pain and fibromyalgia (Tefft & Jordan, 2016; Tesarz et al., 2014). However, these reviews also highlight the need for more rigorous evaluation with control comparisons. Where randomised controlled trials (RCTs) have been conducted, evidence supports further investigation. For example, pilot RCTs comparing EDMR with treatment-as-usual (TAU) in samples of individuals experiencing non-specific chronic back pain (Gerhardt et al., 2016) and chronic non-malignant pain (Suárez et al., 2020) have reported moderate to large effects for improvement in pain intensity post-treatment. Additionally, an RCT with individuals with rheumatoid arthritis demonstrated significant reduction in pain severity post-treatment compared to both waitlist control and the active intervention of guided imagery (Nia et al., 2018). Overall, the evidence suggests potential but illustrates the need for further research specifically incorporating suitable control comparisons.

Alongside the potential utility of EMDR for chronic pain, the covid-19 pandemic has impacted on therapy delivery resulting in rapid adoption of technologies, such as the Internet. Whilst the potential of remote delivery to overcome traditional barriers to intervention access is not a new proposition (e.g., Griffiths et al., 2006; Rini et al., 2012), the recent crisis has accelerated the transition. Although clinicians have appeared open to delivering online EMDR (Mischler et al., 2021) and brief guidance has been disseminated (EMDR Europe Standards Committee, 2020), the evidence-base is currently extremely limited.

Lenferink et al.'s (2020) systematic review of online EMDR for individuals experiencing PTSD found a single eligible study (Spence et al., 2013). This study reported an uncontrolled investigation of combined internet-based (Cognitive Behavioural Therapy) CBT and internet-based EMDR. Whilst providing some indication that EMDR may be effectively delivered online, the combinational intervention and lack of control condition compromises the insights afforded. Subsequent research conducted in the wake of the pandemic is promising but limited. Whilst client and clinician experiences appear positive (Bursnall et al., 2022) and improvements has been reported in terms of distress, trauma symptoms, anxiety, and depression (Lazzaroni et al., 2021; McGowan et al., 2021; Mischler et al., 2021; Tarquinio et al., 2020), the majority of outcome evidence has lacked control comparison. One study that did include a comparison group found equivalent effectiveness between online EMDR and online CBT (Perri et al., 2021). However, there remains no investigation of online EMDR for chronic pain despite the potential relevance of the therapeutic approach (Lumley et al., 2022) and potential accessibility benefits (Griffiths et al., 2006; Rini et al., 2012).

The Present Study

Existing evidence demonstrates the relevance of considering trauma as a component of chronic pain support and EMDR as intervention. However, extant research exploring EMDR for individuals with chronic pain remains nascent and investigation of online delivery appears absent. Evaluation of client experience and outcomes in relation to online EMDR with control comparison is warranted. The COVID-19 pandemic forced many psychological services to be delivered online; consequently, the present study utilised this shift in service delivery as an opportunity to undertake a pilot controlled trial of online EMDR compared to waitlist control (WLC) as preliminary investigation of pain- and trauma-related outcomes alongside client experience and satisfaction.

Methods

Design

A pilot non-randomised controlled study was conducted. Participants were allocated to either intervention (online EMDR) or WLC. Primary outcome variables were post-traumatic stress, pain severity, pain-related interference, pain catastrophising, and depression. Secondary outcomes were intervention acceptability and client satisfaction.

Primary outcome variables and measures were selected with reference to guidance provided by the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT; Dworkin et al., 2005). Consequently, the measures included assessment of pain severity, functioning (i.e., pain-related interference) and psychosocial factors (i.e., catastrophizing and depression). Additionally, post-traumatic stress was assessed due to the intervention focus on trauma.

Participants

Thirty-two adults with chronic pain were invited to participate – see Figure 1. Of these individuals, 20 attended and completed the initial screening session. Two participants from the control group did not complete the post-intervention assessment. Consequently, the final sample comprised 18 participants. Seventeen participants consented to their medical records being consulted to obtain demographic data. Of those participants, the sample comprised 15 females and 2 males (mean age = 48.94 years; SD = 14.12 years) who were Caucasian; the average duration of pain was 12.18 years (SD = 9.34) and pain location/condition was most frequently lower back pain (35.29%) and widespread body pain (29.41%). See Table 1 for demographic breakdown across groups.

[INSERT TABLE 1 ABOUT HERE]

Participants were recruited from an outpatient multidisciplinary chronic pain management and rehabilitation clinic. All approached participants were on the service's waiting list for traditional EMDR; correspondingly, participants experienced psychologically traumatic target memories suitable for EMDR treatment and considered the traumatic incident to be impacting their current functioning. In addition, eligible participants: 1) experienced chronic pain (lasting ≥ 3 months), 2) were ≥ 18 years of age, 3) were able to communicate and understand English, 4) had no outstanding medical tests or procedures for conditions expected by the treating medical consultant to interfere with participation in treatment, and 5) had Internet access and suitable confidential space within the home for therapy. Participants were ineligible for participation if: 1) actively suicidal, 2) terminally ill, 3) had dementia, cognitive impairment, or learning difficulties, or 4) where the therapy-delivering clinician determined that there was evidence of significant trauma-related dissociation, either in the medical records or at the assessment session.

[INSERT FIGURE 1 ABOUT HERE]

Materials and Measures

EMDR Intervention

The EMDR intervention was an online delivery of Shapiro's (2001) 8-phase treatment. The intervention targets distressing memories through a combination of exposure and bilateral stimulation. It is theorised that the intervention process facilitates adaptive processing of the traumatic or distressing memory.

The 8-phase treatment comprised: 1) History taking and treatment planning: the initial phase was concerned with establishing the client history and case conceptualization. 2) Preparation: treatment preparation involved establishing therapeutic alliance and client understanding of the intervention. The phase also involved introduction of grounding and stabilisation techniques, as well as psychological resource development training and practice. At this stage, the client was familiarised with the method of bilateral stimulation. Within the online presentation, the stimulation method consisted of *butterfly tapping* (i.e., the client self-tapping their chest with arms crossed). 3) Assessment: identification of a suitable memory target, including an image, a related negative self-evaluation (e.g., "I am weak"), and an activated emotion. 4) Desensitisation: the desensitisation phase aimed to reduce the impact of the target memory. The therapist guided the client to experience and follow all thoughts, feelings, emotions, sensations, and memories that manifest in relation to the target memory, while remaining aware of the stimulation tapping. Approximately every 28-30 taps, the therapist checked-in with the client. The client had control and could stop at any time should they feel excessively distressed by the treatment. 5) Installation: when the client was desensitised to the

target memory (i.e., they reported a Subjective Unit of Distress from 0-1/10), the therapist proceeded to the installation phase. In this phase, the client associated a new positive self-belief with the traumatic target memory (e.g., "I am strong"). 6) Body scan: identifying any remaining tension to target. 7) Closure: returning the client to a state of 'emotional equilibrium' (Shapiro, 2001). 8) Re-evaluation: the final phase involved confirming that targets continue to have been adaptively processed and checking for evidence of generalisation of the newly embedded experience into the client's everyday life.

The Intervention was conducted in up to 10 weekly sessions; however, clients could conclude the treatment earlier if the target memory was resolved ahead of schedule. The number of sessions ranged from 4 to 10 (mean = 7.5) for the intervention group. After the main study, the WLC also received the intervention. For this group the number of sessions ranged from 7 to 10 (mean = 9).

Measures

Impact of Event Scale – Revised (IES-R; Weiss & Marmar, 1997). The IES-R is a 22-item measure of the occurrence of post-traumatic stress experiences. It extends the original version of the Impact of Event Scale (Horowitz et al., 1979) by including items relating to hyperarousal, as well as intrusion and avoidance. The measure generates three subscales for each of these clusters of experience with the authors reporting good levels of internal consistency (subscale Cronbach's αs = .82 - .89). However, within the present study, we used the total score as an overall measure of difficulty post-traumatic stress experiences – whereby a higher score indicates higher levels of post-traumatic difficulty. Items relate to stress experiences over the past seven days, such as "I had trouble sleeping" and "I felt angry and irritable". Participants report the level of distress these experiences have caused them on a 5-point likert scale ranging

from 0 (*Not at all*) to 4 (*Extremely*). The measure has demonstrated convergent validity with related measures of post-traumatic stress and divergent with unrelated measures (e.g., relating to problematic alcohol use) (Weiss, 2004).

Brief Pain Inventory – Short Form (BPI-sf; Cleeland, 2009). The BPI-sf assesses pain severity and pain interference, respectively. Pain severity is assessed in terms of worst, least, average, and current pain. We utilised the average pain severity item, which is consistent with IMMPACT recommendations (Dworkin et al., 2005). Average pain severity is assessed on an 11-point likert-scale ranging from 0 (*No pain*) to 10 (*Worst imaginable pain*). Pain interference is assessed by seven items that relate to different aspects of daily life, such as mood, general activity, and work. Participants indicate the level of interference in each area over the past week on an 11-point likert scale ranging from 0 (*No interference*) to 10 (*Completely interferes*). The BPI-sf has been employed with individuals with chronic pain and demonstrated good internal reliability (Pain interference: Cronbach α =.88) (Tan et al., 2004). Mean scores are reported; higher scores indicate higher levels of pain and inference, respectively.

Pain Catastrophizing Scale (PCS; Sullivan et al., 1995). The PCS is a 13-item measure of pain-related catastrophising – i.e., amplified concern regarding pain experiences. Participants responded to items on a 5-point likert scale ranging from 0 (*Not at all*) to 4 (*All the time*). The measure has three subscales (rumination, magnification, and helplessness); however, for the present study, we used only the total score as an overall measurement of catastrophising – whereby a higher score indicates higher levels of catastrophising. The authors reported good internal consistency for the total score (Cronbach's α = .87). Meta-analysis also supports good internal consistency and test-retest reliability (Wheeler et al., 2019). Elsewhere, evidence of convergent and divergent validity has also been reported (Osman et al., 1997).

Beck Depression Inventory – Fast Screen (BDI-FS; Beck et al., 2000). The BDI-FS is a 7-item measure of depression levels, derived from a selection of items from the Beck Depression Inventory II (Beck et al., 1996). Participants are asked to respond in relation to their experience over the last two weeks. Items relate to experiences associated with depression, such as sadness, anhedonia, and suicidal ideation. Participants endorse items on 4-point scale ranging from no experience of the specified difficulty to high levels of experience of the difficulty. Higher scores indicate higher levels of depression. The measure has demonstrated good internal consistency when employed with individuals experiencing chronic pain (Cronbach's α = .84) (Poole et al., 2009). Furthermore, Poole and colleagues (2009) report a conversion formula that transforms BDI-FS scores to a form comparable with the full BDI-II. Within this study the data were converted to enable comparison with BDI-II assessment.

Client Experience and Satisfaction Questionnaire. Participants completed an 8-item researcher generated measure of client experience of the EMDR therapy and its online delivery. Items were presented as statements (e.g., "I found the therapy sessions easy to access online"; "I would recommend the online EMDR treatment"), which participants endorsed to indicate their experience and satisfaction with the therapy. Responses were made on a 5-point likert scale ranging from '*strongly disagree*' to '*strongly agree*'. For the two items relating to whether the service could be improved and whether pain clinic patients should be offered the service, respectively, participants were also able to provide free-text responses.

Demographic Information. Where participants consented, medical records were consulted to establish the following demographic information: age, sex, ethnicity, pain location/condition, and pain duration.

Procedure

The study was given a favourable ethical opinion by the Government of Jersey Health and Community Services Research Ethics Committee. All participants provided informed consent. Baseline questionnaires were completed ahead of the initial screening session via email or post if preferred. After completing baseline questionnaires, the sample was split equally into two groups based on the patient's place on the waiting list. Random allocation was not considered ethical as participants were recruited from an existing waiting list. Consequently, the 10 participants who had been on the waiting list the longest were allocated to the treatment group and received online EMDR. The remaining 10 participants were allocated to the WLC group and received TAU.

Online EMDR sessions were held approximately weekly and delivered using one of two videoconference platforms (i.e., Zoom or Microsoft Teams), as chosen by the participant. Participants were offered up to 10 sessions. Each session lasted up to 1 hour. Participants were instructed to attend the sessions in a room where they felt safe and would be alone. All sessions were delivered by the same registered clinical psychologist (AA) who was trained in EMDR.

At week 10, all participants (i.e., intervention and WLC groups) were provided with the same questionnaires used at baseline. Participants were able to return the questions by email or post, as preferred. The WLC group was then offered EMDR to ensure that all participants had access to the intervention. Post-intervention data were collected for this group a further 10 weeks later or after their 10^{th} session.

Data were anonymised by the clinical research team and were securely transferred to a member of the team (BR) who had not been part of treatment delivery and was blinded to participant group allocation. Data were analysed by this team member.

Analytic Strategy

All analyses were conducted using Statistical Package for the Social Sciences (SPSS) v25. Non-parametric analyses were preferred given the small sample size and potential indication of non-normal distribution of the data demonstrated by Q-Q plots. Consequently, Wilcoxon signed-rank tests were used to compare within-group difference from baseline to post-treatment for the intervention and control groups, respectively, for each dependent variable. This pragmatic approach was selected over a fully factorial 2x2 mixed analysis to reduce the number of analyses and risk of type-I error whilst still addressing the core research aims. After the main trial, the WLC group also received the intervention. The same analytic approach was conducted with these data. Exact p-values are reported throughout.

It is emphasised that, due to the small sample size, these statistical tests are intended to be informational and by no means conclusive. They provide a tentative initial within-group comparison alongside the assessment of the acceptability and feasibility of the intervention.

Results

Data Cleaning

The initial sample comprised 20 participants. Data from two participants who did not complete post-treatment assessment were excluded from the final analysis. The final sample comprised 18 participants (n_{EMDR} = 10; $n_{Control}$ = 8).

Two participants had one missing IES-R questionnaire item at baseline, respectively. There was no observable pattern to these missing data. To avoid losing otherwise complete data, the two missing items were replaced with the mean values for each item, respectively. Mean values were rounded to the nearest integer, consistent with the item response options. The

limitations of mean substitution are acknowledged (Little & Rubin, 1989). Consequently, this approach was supplemented by multiple imputation. Baseline data were used to generate five predicted imputations for each of the two missing IES-R data points and total IES-R measure scores were calculated. SPSS does not provide test statistic pooling for multiple imputation using non-parametric tests. Consequently, a summary test statistic for the five imputation sets could not be calculated; however, the test results for each individual data set were consistent and comparable with the results generated from mean substitution (*all Zs* ≤ -1.02, *all ps* ≥ .307). Consequently, for clarity of report and interpretation, the results based on mean substitution are reported subsequently.

Descriptive Statistics and Within-Group Change

Primary Results: Intervention and WLC Groups

Descriptive statistics for the intervention and WLC were calculated at baseline and post-intervention period, respectively – see Table 2.

[INSERT TABLE 2 ABOUT HERE]

Wilcoxon signed-rank tests were conducted for all measures at baseline and post-intervention period for both groups, respectively – see Table 2. In the online EMDR group, results indicated significant reductions of medium-to-large effect size in post-traumatic stress (IES-R), pain severity, pain-related interference (BPI), and pain catastrophising (PCS), but no significant change in depression levels (BDI-FS) pre-to-post intervention.

No significant pre-to-post assessment period change was evident in control group for any outcome variable, *all Zs* ≤ -*.76, all ps* ≥ 0.500. All effect sizes were small, *all rs* ≤ .19.

Secondary Results: WLC After Receiving Intervention

After the initial trial, WLC participants were provided access to the intervention. Table 3 summarises the descriptive statistics pre- and post-intervention.

[INSERT TABLE 3 ABOUT HERE]

Wilcoxon signed-rank tests were conducted for all measures – see Table 3. Only depression levels (BDI-FS) demonstrated significant reductions pre-to-post intervention. All other outcomes were not statistically significant but demonstrated medium effect size reductions in the assessed difficulties, *all rs* $\geq .35, \leq .46$.

Intervention Acceptability and Satisfaction

Of the participants who completed the intervention in the main trial (n = 10), 90% reported that: 1) they would recommend online EMDR, and 2) pain clinic patients should be offered the option of this intervention. Overall, the majority of participants felt that the online sessions were easy to access (90% agreement) and that they were able to develop a good working relationship with their therapist online (100% agreement). Since completing the intervention, over half of participants had noticed greater confidence to do things that had previously been avoided (60% agreement). Notably, where participants didn't endorse these questionnaire items, they remained neutral (i.e., neither agreeing nor disagreeing with the statement).

Free-text responses generally expressed positivity towards the therapeutic approach. Individual comments suggested that online delivery may facilitate disclosure and feelings of safety for some. Indeed, 50% of participants felt that online sessions in their own home were safer than face-to-face sessions.

Finally, whilst only 30% of participants believed that online EMDR could be improved, 40% remained neutral on this statement (neither agreeing nor disagreeing), which may suggest some ambivalence. Free-text responses relating to potential improvements were limited but suggested the importance of technology training and client choice in relation to delivery method.

Discussion

The current study aimed to provide pilot investigation of the utility of online EMDR for reducing pain- and trauma-related outcomes in individuals experiencing chronic pain. The primary results suggested that online EMDR may reduce post-traumatic stress, pain severity, pain-related interference, and pain catastrophising. Although depression level reduction was not statistically significant, the observed improvement was of medium sized effect. The secondary results relating to the WLC group after receiving the intervention demonstrated relative consistency in size of improvements (medium-to-large effects across all measures) but did not replicate the statistical significance of the primary findings. Qualitative feedback suggested that the intervention was acceptable to clients. Overall, the findings provide tentative preliminary support for the potential usefulness of online EMDR but strongly emphasise the need for further large-scale investigation.

Primary Outcomes

The study provides tentative evidence that online EMDR may lead to improvements in trauma- and pain-related outcomes. Whilst there was discrepancy in statistical significance between the primary study intervention group findings and secondary results (i.e., after the WLC also received the intervention), the direction of change in outcomes was consistent and effect sizes remained at least medium. The finding that online EMDR may reduce post-traumatic stress is

consistent with meta-analysis of evidence relating to traditional EMDR for PTSD (Cuijpers et al., 2020). EMDR was initially developed to support PTSD and the greatest body of evidence for the therapeutic approach exists in relation to trauma-related difficulties. However, the current study findings that pain severity, pain-related interference and catastrophising may also be improved through EMDR add to the growing suggestion (Gerhardt et al., 2016; Lumley et al., 2022; Nia et al., 2018; Suárez et al., 2020; Tefft & Jordan, 2016; Tesarz et al., 2014) that this approach may have benefits for individuals experiencing chronic pain that extend beyond direct trauma-related outcomes.

Trauma has been demonstrated to be a risk factor for both psychological and physical difficulties (Boullier & Blair, 2018; Lewis et al., 2019; Scott et al., 2013), including chronic pain (Davis et al., 2005; Lumley et al., 2022). In recognising the complexity of trauma's long-term impact, we may discover that trauma-related interventions, such as EMDR, have transdiagnostic relevance. However, despite the prevalence of post-traumatic stress in individuals experiencing chronic pain (Fishbain et al., 2017; Siqveland et al., 2017), pain management programmes do not routinely involve explicit trauma-related components (Lumley et al., 2022). Clients may seek separate treatment for these difficulties despite their frequent concurrence and, without shared care pathways, support may not be integrated and coherent. As Lumley and colleagues (2022) propose, the substantial evidence linking trauma and chronic pain may question the current practice of distinct treatments. The current study findings provide some support for this proposition, indicating that trauma-focused intervention may also encourage pain-related benefits. These findings are consistent with existing RCT evidence that, compared to TAU, EMDR may facilitate improvements in pain-related outcomes, such as pain intensity and pain disability (Gerhardt et al., 2016; Nia et al., 2018; Suárez et al., 2020). Consequently, pain

specialist services may consider developing trauma-focused pathways within their services to meet client need more holistically. Such an approach may not only provide more integrated support from appropriate services, but also reduce the risk of potential re-traumatisation associated with clients repeatedly detailing psychologically distress events to multiple professionals.

The study finding that depression levels may be reduced by online EMDR is important given that chronic pain is associated with depression (Scott et al., 2007). Within the present study, the statistical significance of depression reductions differed from the other outcomes across the primary study results and secondary results after the former WLC received the intervention. Previous review has suggested that EMDR may improve depression levels alongside other pain-related outcomes (Tefft & Jordan, 2016; Tesarz et al., 2014) and these findings are supported by more recent research (Suárez et al., 2020). This existing evidence appears based on small samples; however, meta-analysis of EMDR primarily targeting depression further supports the expectation of improvement (Carletto et al., 2021; Sepehry et al., 2021). Consequently, the observed discrepancy within the current study may reflect a lack of statistical power, as discussed below, rather than a meaningful difference between how depression levels respond to online EMDR compared to the other assessed outcomes. Further investigation is necessary.

Inconsistency between Primary and Secondary Results

The inconsistency in observed statistical significance between the primary study results and secondary results (after the WLC received the intervention) is notable. This inconsistency could be resultant of the differences between the intervention and WLC groups. For example, although the WLC group did not receive online EMDR during the first stage of the study they

did receive TAU, elements of which could have influenced the impact of the intervention when it was subsequently received. However, the inconsistency most likely reflects the impact of the small sample rendering the analyses underpowered. As stated previously, the current study was considered a preliminary evaluation of the possible utility of online EMDR and its acceptability to clients. It is best conceived as a proof of concept. That being said, whilst caution against attributing too much weight to the statistical significance of the reductions observed is encouraged, the finding that all outcomes consistently demonstrated improvement ranging from medium-to-large effect size over all intervention analyses supports the proposition that online EMDR *may* be useful across trauma- and pain-related difficulties in individuals experiencing chronic pain. Evidently, further large-scale investigation of intervention efficacy is warranted to reliably determine the statistical significance and effect size of change in outcomes.

Client Satisfaction

Overall, the online EMDR appeared to be well-received by participants. The majority of participants would recommend the approach and felt that it should be made available to pain patients as a support option. These findings are consistent with Bursnall and colleagues (2022) who also reported that clients were positive towards online EMDR. In terms of areas for improvement, whilst Bursnall and colleagues found internet connectivity, home distractions, and interpretation of body image were potential drawbacks, the current study received relatively few suggested improvements despite the apparent ambivalence around the topic (i.e., 30% considering online EMDR could be improved; 40% remaining neutral on the question). The suggested improvements such as technology support and client choice in therapy delivery method are logical; however, the limited sample size and quantity of qualitative feedback in the present study entails that general recommendations cannot currently be made. Larger-scale

investigation of the relative benefits and areas for improvement in delivering EMDR online is required.

Online Delivery

The current study provides preliminary support for online delivery of EMDR. Research exploring internet-based delivery of EMDR is limited to a small number of studies (e.g., Bursnall et al., 2022; Lazzaroni et al., 2021; McGowan et al., 2021; Mischler et al., 2021; Perri et al., 2021; Spence et al., 2013; Tarquinio et al., 2020) and, to the authors' knowledge, this is the first study of online EMDR for individuals experiencing chronic pain. The findings are preliminary but encouraging, suggesting that EMDR may remain effective via online delivery and that the delivery modality is generally well-received by clients. This finding is consistent with meta-analyses of internet-based delivery of psychological interventions for chronic pain, which suggest online therapy (most typically cognitive and behavioural) is effective (Eccleston et al., 2014; Gandy et al., 2022). Indeed, recent comparison of online EMDR and online CBT demonstrated equivalence (Perri et al., 2021). In addition, existing systematic reviews suggest online intervention delivery may not only help overcome traditional treatment barriers (Griffiths et al., 2006; Rini et al., 2012) but could potentially provide economic savings (Donker et al., 2015). Taken together, this evidence suggests that EMDR may also be translated online, potentially increasing intervention accessibility, providing graded exposure for clients with concerns about physical attendance at a specialist centre, and enabling clients to receive therapy in a place of their choosing. Indeed, both clients and clinicians have reported perceived benefits of online EDMR in terms of feelings of security in their own environment and not needing to travel (Bursnall et al., 2022). Whereas the adoption of online EMDR delivery may have been a

pragmatic response to the coronavirus pandemic, the emerging research results emphasise the importance of continued exploration of the potential of this delivery modality.

Limitations

The study has a number of limitations. The sample size was small, which impacts the reliability of the results (Hackshaw, 2008). Increased risk of type-II error may have contributed to the lack of statistically significant change in depression scores in the primary results. Although efforts were made to reduce the impact of the sample size by restricting the number and type of analyses run, the present study is intended only as a preliminary investigation and future research would benefit from a larger sample. Relatedly, although the predominantly female sample may be reflective of higher instances of PTSD in women (Kessler et al., 1995), further investigation of the intervention involving a more balanced distribution of males and females is warranted.

Whilst a strength of the study was the inclusion of a comparison control group, allocation was not randomised. The approach was taken because the study was conducted within an active service that migrated intervention delivery online due to the COVID-19 pandemic. This necessary transition to online delivery was deemed an opportunity to evaluate the delivery method; however, the situation entailed that participants were recruited from the existing waiting list to receive treatment from the service. Consequently, it was deemed unethical to randomly allocate participants as this approach would disregard their pre-existing position on the waiting list. Future research should seek to conduct full randomised controlled trials, providing comparisons of online EMDR with control groups and traditional face-to-face EMDR.

Whilst the quantity of therapy sessions offered to participants was consistent and in accordance with PTSD guidance (NICE, 2018), not all participant utilised the same number of

sessions. This discrepancy was due to some clients resolving the target distressing memory in fewer sessions. As the intervention focused on only one traumatic experience per participant, reaching this point concluded the intervention. This discrepancy was considered unavoidable without introducing an additional confound of multiple intervention targets across participants.

Finally, the current study utilised the standard EMDR protocol (Shapiro, 2001). However, pain-specific EMDR protocols also exist (e.g., Grant, 2017; Grant & Threlfo, 2002) and some have suggested that these pain-specific interventions may prove most effective (Lumley et al., 2022). The current study results provide some suggestion that generic EMDR may also be useful but cannot determine its relative efficacy compared to more pain-focused intervention. Overall, these results indicate a need to compare the relative efficacy of pain-specific vs. non-pain specific EMDR.

Conclusion

Trauma and post-traumatic distress are common within chronic pain populations (Fishbain et al., 2017; Lumley et al., 2022; Siqveland et al., 2017) and EMDR is a recommended therapeutic intervention for trauma-related distress (NICE, 2018). Evidence supporting the utility of this approach for individuals experiencing chronic pain is encouraging yet nascent (Gerhardt et al., 2016; Lumley et al., 2022; Nia et al., 2018; Suárez et al., 2020; Tefft & Jordan, 2016; Tesarz et al., 2014). The recent coronavirus pandemic has forced the adoption of remote technology, such as the Internet, for EMDR delivery. Whilst this transition online was necessary to maintain service access, the move was pragmatic rather than empirically supported. This study provides preliminary suggestion that online EMDR for individuals experiencing chronic pain may represent a useful and acceptable support option even as opportunity for traditional face-to-face delivery becomes possible again. Further larger scale investigation is required to

substantiate intervention effectiveness, but the preliminary evidence suggests that clients' and clinicians' apparent enthusiasm about online EMDR (Bursnall et al., 2022) could potentially prove justified.

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Figure 1

Participant Flow Diagram

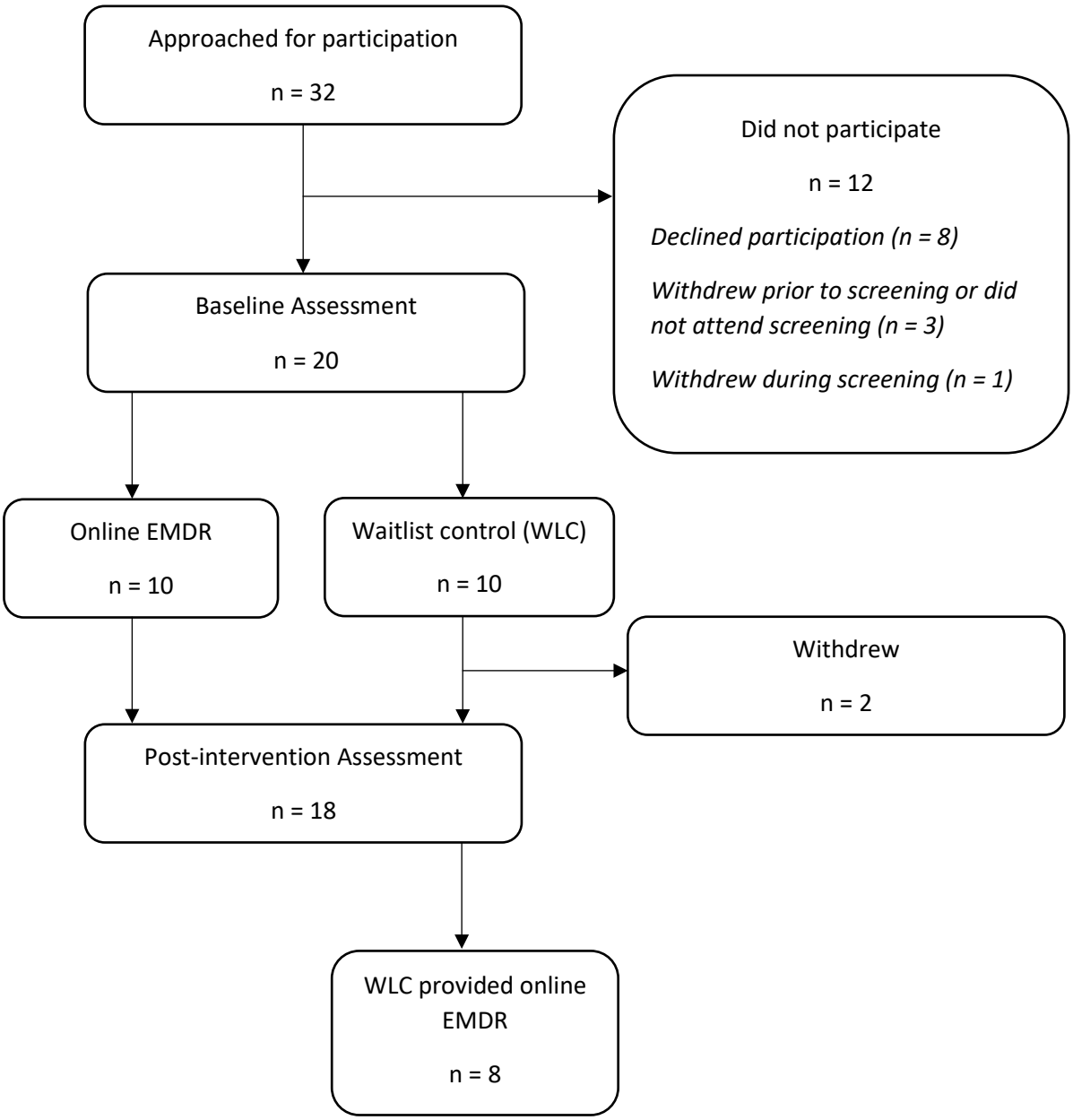

Table 1

Demographics Summary of Participant Age, Sex, and Pain Duration

Group	Number of participants	Sex (n)		Mean age in years (SD)	Mean pain duration in years (SD)
		Female	*Male*		
Online EMDR	10[1]	9	0	49.56 (17.30)	15.00 (10.98)
Control	8	6	2	48.25 (10.61)	9.00 (6.30)
Total Sample	18[1]	15	2	48.94 (14.12)	12.18 (9.34)

[1] Of the 10 participants in the online EMDR group, one participant did not consent to use of their demographic data. Consequently, demographic summary involving this group is based on the remaining nine participants.

Table 2

Descriptive Statistics for All Measures at Baseline and Post-intervention Period, with Wilcoxon Signed Rank Tests of Within-Group Change

	Questionnaire	Baseline		Post-intervention		Wilcoxon signed rank tests		
		Mean (SD)	***Median***	***Mean (SD)***	***Median***	***Z***	***p***	***r***
Online EMDR (n = 10)	*IES-R*	48.90 (12.28)	48.00	31.50 (19.48)	34.50	-2.43	.012	.54
	BPI: Pain severity	5.90 (1.73)	6.00	4.30 (1.64)	4.50	-2.55	.008	.57
	BPI: Interference	6.23 (2.05)	6.71	4.60 (2.33)	5.43	-2.81	.002	.63
	PCS	26.90 (11.06)	30.50	22.80 (11.20)	24.50	-2.08	.043	.47
	BDI-FS	37.95 (11.98)	41.00	30.19 (13.83)	28.53	-1.69	.105	.38
WLC (n = 8)	*IES-R*	42.13 (19.16)*	44.50*	40.38 (19.77)	42.50	-.76	.500	.19
	BPI: Pain severity	5.38 (1.92)	6.00	5.50 (1.20)	5.50	-.38	1.000	.10
	BPI: Interference	6.02 (1.55)	6.00	5.79 (2.57)	6.43	-.34	.813	.08
	PCS	25.38 (11.94)	27.00	25.75 (11.61)	26.50	<.001	1.000	<.01
	BDI-FS	38.57 (14.20)	36.84	39.61 (14.66)	41.00	-.65	.656	.16

* Pre-treatment IES-R includes two missing items replaced by mean substitution.

IES-R: Impact of Event Scale – Revised; BPI: Brief Pain Inventory: Pain Interference subscale; PCS: Pain Catastrophizing Scale; BDI-FS: Beck Depression Inventory – Fast Screen (scores converted to BDI-II equivalent scores); WLC: Waitlist control.

Table 3

Descriptive Statistics for Former Waitlist Control (WLC) Pre- and Post-intervention, with Wilcoxon Signed Rank Tests of Within-Group Change

	Questionnaire	Pre-intervention		Post-intervention		Wilcoxon signed rank tests		
		Mean (SD)	***Median***	***Mean (SD)***	***Median***	***Z***	***p***	***r***
Online EMDR – former WLC (n = 8)	*IES-R*	40.38 (19.77)	42.50	28.25 (22.35)	19.50	-1.68	.102	.42
	BPI: Pain severity	5.50 (1.20)	5.50	4.13 (2.23)	5.00	-1.83	.125	.46
	BPI: Interference	5.79 (2.57)	6.43	4.43 (2.43)	4.43	-1.54	.141	.39
	PCS	25.75 (11.61)	26.50	19.13 (12.76)	17.50	-1.40	.195	.35
	BDI-FS	39.61 (14.66)	41.00	31.30 (15.46)	29.92	-2.21	.031	.55

IES-R: Impact of Event Scale – Revised; BPI: Brief Pain Inventory; PCS: Pain Catastrophizing Scale; BDI-FS: Beck Depression Inventory – Fast Screen (scores converted to BDI-II equivalent scores); WLC: Waitlist control.