**SUPPLEMENTARY MATERIALS**

Overview of study phases

**An overview of the metacognitive intervention therapy**

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| **Session Number** | **Focus** |
| **Session 1** | **Psychoeducation and Identifying Target Flashforward**   * Discuss verbal thoughts vs mental imagery in relation to emotions. * Discuss brain activity and findings from neuroimaging studies. * The brain cannot tell the difference between imagined events and real events – which explains the strong emotional reactions. * Use examples to explain the difficulties and power of mental images vs real situations. This could include participants hearing real music vs imagining hearing music, participants seeing specific facial expressions such as an angry face vs imagining seeing an angry face and imagining taking a penalty vs actually taking a penalty. * Explain that control over images can impact distress caused by the images. * Using positive images to evoke happy and safe feelings. * You can learn to change images, and the brain will react as if it is happening, even if it’s not real, and mood can change. * Identify target flashforward |
| **Session 2** | **Microformulation (see Figure 2 for template)**   * Discuss the central role of control. |
| **Session 3** | **Metacognitive Techniques**   * Examples of attention techniques   Attention training  Switching techniques   * Examples of imagery manipulation techniques   Imagining popping the image like a balloon  Imagining smashing the image like glass  Imagining shrinking the image or blowing it up  Imagining the image on a TV and switching channels  Imagining the image being on the radio and turning down the volume/switching it off  Imagining changing the colour of the image  Imagining the image looking funny  Imagining putting the image in a bottle and throwing it into the sea |
| **Session 4** | **Ending**   * Recall/summarise and reflect on the learning. * Practise application of metacognitive techniques on other flashforwards. * Plan how to continue to implement the techniques in the future and explore how to widen their application (e.g., how to use them for other mental images). |

**Summary of target flashforwards**

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| Participant ID | Flashforward | Examples of metacognitive techniques used |
| P1 | Image of jumping off a bridge | NA |
| P2 | Image of seeing herself as lonely, separate/distant from two sets of nuclear families. | Seeing the image as a photograph and ripping it apart. Seeing a tiger joining the party and communicating with young family members (in a humorous way). |
| P3 | Image of seeing grandfather dead | Imagining joining angels who come to heal grandfather. Imagining filming it on the phone and the phone running out of battery. |
| P4 | Image of finding mother dead | Imaging family playing a prank on them. Seeing the image as a movie and switching off the TV. |
| P5 | Image of cutting herself | Imagining knives being rubberlike/jellylike which turn into worms. |
| P6 | Image of having an angry outburst/being violent with family members | Imagining the scenario as a scene on TV and switching off the TV. Imagining it as a TikTok video and scrolling it away on their phone. |
| P7 | Image of the devil running into her house, trying to harm her. | Imaging being bigger and more powerful than the devil and having magical powers that evaporate the devil away. Imagining the devil as a spider and flicking it away. |
| P8 | Image of getting attacked by a group of people when walking outside. | Imagining being powerful, expanding and becoming a giant and shrinking perpetrators. Seeing self-flying away from perpetrators. |

**Feedback Survey and Responses**

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| **Questions** | **Responses** |
| **Opening:** |  |
| *I’d like to start by asking you, in general, how you found the metacognitive intervention for distressing mental images.* | *I found it enlightening. It’s a new approach I hadn’t come across. It’s very appealing.*  *I was initially a bit sceptical, wondering what difference four sessions could make – but it’s given me a whole different understanding of how the brain works; the power of thinking something is real and what the brain takes from that.*  *I found it comfortable to do it over MS Teams. I am usually a face-to-face person, but it was really good on teams.*  *I am very satisfied with it. I think it’s actually exceeded my expectation.*  *It’s been very beneficial because I wasn’t aware of the impact that visual images have and the power of visual imagery over emotions.*  *It’s been really worthwhile. I noticed a change where I could say to myself, “It’s an image, and it’s not true. You are thinking about an image; it’s not real life”. That’s new because of the intervention.*  *I liked that techniques were suggested but that I could adapt them to my situation, like crumbling the photo or taking it to my uncles’ bonfire; they were appropriate to me, they were personalised and felt appropriate to the distress.*  *The rationale at each session was very clear, everything was explained in bite sizes, and the illustration [Microformulation] was really clear and a reflection of my own experience, which I found helpful to see and understand. It gave me the confidence to engage in the following sessions.* |
| **Acceptability:** |  |
| *On a scale of 0-100%, how satisfied were you with the intervention?* | *Mean = 95.71 (SD = 11.33)* |
| *Do you feel that the techniques were appropriate to address your distress?*  *(1 = yes, 2 = unsure, 3 = no)* | *Yes = 100%*  *Unsure = 0%*  *No = 0%* |
| *Were you able to understand the rationale for the intervention?*  *(1 = yes, 2 = unsure, 3 = no)* | *Yes = 100%*  *Unsure = 0%*  *No = 0%* |
| **Demand:** |  |
| *Did you use the techniques beyond the sessions?*  *(1 = yes, 2 = no)* | *Yes = 100%*  *No = 0%* |
| *Did the intervention meet your expectations?*  *(1 = not at all, 2 = slightly, 3 = unsure, 4 = moderately, 5 = totally)* | *Not at all = 0%*  *Slightly = 0%*  *Unsure = 0%*  *Moderately = 28.5%*  *Totally = 71.5%* |
| *How likely are you to continue to use the techniques in the future?*  *(1 = definitely unlikely, 2 = possibly unlikely, 3 = unsure, 4 = possibly likely, 5 = definitely likely)* | *Definitely unlikely = 0%*  *Possibly unlikely = 0%*  *Unsure = 0%*  *Possibly likely = 28.5%*  *Definitely likely = 71.5%* |
| *Would you recommend the intervention to others?*  *(1 = yes, 2 = no)* | *Yes = 100%*  *No = 0%* |
| **Implementation:** |  |
| *On a scale of 0-100%, how successful did you perceive the intervention to be?* | *Mean = 94.28 (SD = 11.33)* |
| *What affected your ability to use the techniques/engage in the intervention?* | *Having a clear understanding of the rationale and practising how to do it with a neutral image first helped.*  *Closing my eyes when doing the techniques.*  *Being able to talk about images and situations in a new way and having someone understand how scary it can be.*  *Having a reinforcement each week of how the four sessions will pan out.*  *Practising the techniques in the session before doing it on my own for homework.* |
| **Practicality:** |  |
| *What was positive or negative about your experience of this therapy?* | *Positives*  *I liked that it was short and concise. It was straight to the point.*  *The flexibility with booking appointments.*  *I liked that it was on MS Teams. I could do the sessions from the comfort of my house.*  *Being able to learn about mental images before doing the techniques gave me more confidence to face the images. This was hard because I had always avoided them.*  *Negatives*  *It would have been good to have more sessions for the follow-up to be able to practise it a bit more and come back with questions if any new problems or difficulties come up.* |
| **Adaptation:** |  |
| *Have you previously sought support for distressing mental images?*  *1 = yes, 2 = no* | *Yes = 14.28%*  *No = 85.72%* |
| *How was this different?* | *(1 person) We just mentioned it but did not do any treatment for it.* |
| *How was this intervention better or worse?* | *NA* |
| **Integration:** |  |
| *Would you consider the learning to be useful and sustainable? (1 = not at all, 2 = slightly, 3 = unsure, 4 = moderately, 5 = totally)* | *Not at all = 0%*  *Slightly = 0%*  *Unsure = 0%*  *Moderately = 14.28%*  *Totally = 82.72%* |
| **Clinical impact:** |  |
| *Did you notice any differences in yourself during the time and after ending the intervention?* | *I felt more confident about facing the images and knew that I had more control over them, which made me feel less anxious.*  *I used to get really depressed by the image, but as I saw it less and knew that it wasn’t real, I felt more in control and less depressed. I also had some suicidal thoughts, which completely stopped.*  *I didn’t have the image as much, which made me feel less anxious during the week.*  *I felt less anxious, and I started leaving the house more often.*    *I noticed that I was sleeping better. My mind wasn’t as occupied with it.*  *I started spending more time with my family. I used to avoid them before because of the image.*  *Even though I focused on one image, I was able to see that images are the same sort of thing and could apply the work we did with different images. I can now control them, and I don’t have to let the thoughts and images have that much weight on me. I feel relieved and a sense of control. It’s reassuring and nice.*  *I have learnt to manipulate my thoughts and mental images much more. Having the knowledge that this is something that I could even do, has really helped me feel less anxious and more in control.*  *I can now say to myself, “It's an image, and it's not true. It's not real life”. I have been able to adapt the techniques to other images too, so I am hardly experiencing any images any more.*  *I don’t feel anxious about the images anymore. The image of cutting myself was the worst one, and I don’t have it anymore. I have also been able to use the techniques with other images. I have logged it in the back of my mind, so I feel confident that I’ll be able to deal with them when they pop up.*  *I never knew the impact these images could have. I also didn’t know there was something that could be done about them. I have learnt a lot about the brain, and I feel like I understand my brain better, its less frightening. I now know that I have some control over my brain and that there are ways of changing what I see and think.*  *I still sometimes see the devil, but at least I know that sometimes it's just a worry in my mind and that worries can be visual. I feel like I can cope with the worries [mental images] better, not having them as often, which has helped me sleep better at night.*  *I feel like having something I can do about it and being able to manipulate the images is having a big positive effect on my mood. It used to really get me down and stop me from going out. I have been out on my own a few times and do not constantly feel checking and rushing back home.* |
| *What did you learn from this therapy?* | *I learn about how the brain works and how to control my mental images.*  *I now know how powerful mental images can be and how powerful my mind can be in controlling them.*  *I learnt new techniques to focus my attention away from my images and manipulate them so they have less power over me.*  *I’ve learnt that everything I see in my mind is not a true picture of reality and that I can change the pictures in my mind using these techniques.*  *Even though I have many different images, I can use the same techniques for them all. What’s happening in the image doesn’t really matter. This makes me feel reassured.*  *There are things to help with mental images. You just have to keep practising them.*  *I have a lot of control over what happens in my mind.* |
| **Improvements:** |  |
| *Have you got any suggestions for improvements?* | *At least one more follow-up session.*  *A longer gap between the final session and the follow-up session.* |
| *What would have made it more feasible to engage with?* | *No suggestions given.* |

**Summary of participants’ comments about changes noticed following intervention.**

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| Participant ID | Comments |
| P2 | “Even though I focused on one image, I was able to see that images are the same sort of thing and could apply the work we did with different images. I can now control them, and I don’t have to let the thoughts and images have that much weight on me. I feel relieved and a sense of control. It’s reassuring and nice”. |
| P3 | “I have learnt to manipulate my thoughts and mental images much more. Having the knowledge that this is something that I could even do, has really helped me feel less anxious and more in control”. |
| P4 | “I can now say to myself, ‘It's an image, and it's not true, it's not real life’. I have been able to adapt the techniques to other images too, so I am hardly experiencing any images anymore”. |
| P5 | “I don’t feel anxious about the images anymore. The image of cutting myself was the worst one, and I don’t have it anymore. I have also been able to use the techniques with other images. I have logged it in the back of my mind, so I feel confident that I’ll be able to deal with them when they pop up”. |
| P6 | “I never knew the impact these images could have. I also didn’t know there was something that could be done about them. I have learnt a lot about the brain, and I feel like I understand my brain better, its less frightening. I now know that I have some control over my brain and that there are ways of changing what I see and think”. |
| P7 | “I still sometimes see the devil, but at least I know that sometimes it's just a worry in my mind and that worries can be visual. I feel like I can cope with the worries [mental images] better, not having them as often, which has helped me sleep better at night”. |
| P8 | “I feel like having something I can do about it and being able to manipulate the images is having a big positive affect on my mood. It used to really get me down and stop me from going out. I have been out on my own a few times and not constantly feel checking and rushing back home”. |