Embodi**Map**

Virtual Reality (VR) Program
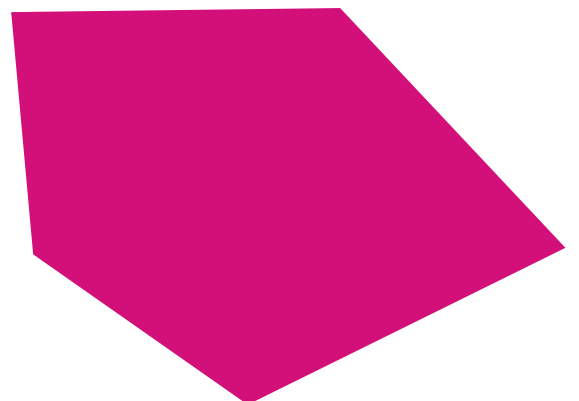
EmbodiMap Virtual Reality (VR) Program:

Overview

Who can use EmbodiMap

EmbodiMap can be used as a facilitated experience with a counsellor, therapist, or creative guide or as a self-guided experience by downloading the EmbodiMap App The fEEL research team can also work directly with facilitators to engage with individual users, pre-established groups, or assemble specific lived experience cohorts to explore the impact of EmbodiMap. Alternatively, facilitators can engage with EmbodiMap app as part of their own research or creative engagement experience.

EmbodiMap experience

EmbodiMap consists of virtual reality (VR) app and protocols for somatic engagements that extend the evidence-based benefits of Body Mapping by transforming the approach into an immersive three-dimensional experience. The EmbodiMap App is accessed using an untethered Oculus VR Headset allowing users to engage with a translucent avatar figure, which may represent themselves, to explore and map sensations and emotions felt in the body.

These protocols provide information on how to use the EmbodiMap app VR tool to conduct facilitated programs to support users' exploration of their bodily sensations. Programs content, frequency and duration can be adapted to suit the needs of a range of cohorts and individual users. The program can be used, for example, to focus on the somatic management of specific anxieties; general emotion regulation; to explore anxiety, stress or trauma relating to lived experience; or for creative mindful engagement. These protocols include information on how to evaluate impact on subjective wellbeing.

EmbodiMap is suitable for all ages and abilities. While 'cybersickness' (nausea or dizziness) is a recognised phenomenon, it is experienced by only a small number of people using VR [1].

Further information is available on our websites.

EmbodiMap Flyer

https://vimeo.com/465643239

https://feel-lab.org/research_projects/embodimap/

EmbodiMap VR Somatic engagement

EmbodiMap informs understandings of how anxiety, stress and trauma manifest as bodily sensations, and felt emotions. It supports explorations of how these feelings impact wellbeing, and can be used for research as part of a therapeutic program run by professional practitioners (EmbodiMap as therapy), to develop mindful practices in relation to care, or as a fun, creative tool to explore feelings and emotions.

EmbodiMap can be used by facilitators and users engaging independently, using these protocols and the verified evaluation scales (Verified scales). Alternatively, participants can engage in ongoing fEEL (felt Experience and Empathy Lab) research studies to further understanding and evaluate how anxiety, stress and trauma are experienced in the body, and contribute to the ongoing development of the EmbodiMap experience, tools, and methodology.

EmbodiMap programs conducted as part of fEEL (felt Experience and Empathy Lab) research studies (only) are approved under UNSW Human Research Ethics Committee (HREC) application number HC200 508 *Immersive media explorations of the felt experience of emotions in the body*. Consent forms are required from participants and data is collected and analysed by fEEL (felt Experience and Empathy Lab) researchers. In these studies, the VR experience and subsequent discussions are recorded and may be transcribed providing qualitative data for analysis. Verified scales are used to analyse body awareness, body responsiveness, emotion regulation, and anxiety and depression.

EmbodiMap as therapy

EmbodiMap draws principally on two areas of practice: somatic psychotherapy including Sensorimotor Psychotherapy [2, 3] and body mapping (creating life-sized body outlines and

reflectively producing images of embodied experience). [4] In addition. it builds on theories relating to how play with 'other' bodies is central to trauma recovery [5-7]. For example, in therapy clients may arrive without a suitable language for their experiences or be confronted by alexithymia and have difficulty identifying feelings and expressing emotions. EmbodiMap supports focus on the body, allowing the development of a language through which the reparation of trauma can be essayed.

EmbodiMap allows for guided, self-directed or facilitator-led explorations of non-verbalized affect, cognition, imagery, memory and sensation, it can augment therapeutic processes, allowing users to experience aspects of self and enact change by means of their own creativity and physical movement. Translucent avatar figure(s) can serve as a proxy human(s), or 'object(s)' to which a relationship is practiced, experimented with, and refined often with increasing degrees of relational freedom. The avatar figure can 'become' the user's body allowing them to engage, inhabit, observe, and interact with their 'self' and their accompanying histories. Case studies have shown how users have, for example, enacted experiences of self in pain, transitioning to freedom from pain [8].

A user can articulate felt experience in a range of embodied ways such as drawing/mapping onto the figure, colouring, holding and/or entering into the avatar figure. Through 'mark-making' and 3D exploration of the avatar figure, EmbodiMap can help users identify sensing and feeling states helping them to develop emotion identification, expression and regulation. It can help locate somatic markers of trauma during the assessment phase of treatment and offer new ways of revealing how trauma may be lodged and encoded in the body. Any diagnoses or presenting problems with somatic symptoms are suitable for EmbodiMap and with support may garner therapeutically beneficial outcomes.

Possibilities and potential benefits include:Exploration of/reduction in somatic markers of chronic pain;

1. Emotion regulation, identification, expression;
2. Exploration of the process of moving from dissociation to embodiment [8];
3. Mapping of
   a. mood such as depression and anxiety;
   b. impulsivity;
   c. emotional inhibition;
   d. experiences related to psychological (bodily) cravings;
   e. experiences of trauma (T/t) in refugee populations or individuals;
4. Exploration of how experiences of trauma are represented and experienced including but not limited to PTSD & C-PTSD and associated difficulties (such as passivity or learned helplessness);
5. Exploration of positive outcome or change markers (e.g. behavioural markers) in those with trauma histories (such as growing assertiveness and the ability to assert interpersonal boundaries).

EmbodiMap for identity and community

As with body mapping, EmbodiMap has been used to explore feelings relating to identity and community [9]. It can support individuals and communities in relation to shared anxieties and concerns, such as refugee backgrounds or communities experiencing trauma. EmbodiMap can support communication and expression, not only of anxieties, but also in the development of sustainable, innovative, and transformative, community-led engagements that support connection and builds resilience. EmbodiMap has been used with, for example, members of the South Sudanese community in Sydney, Australia [10].

EmbodiMap App
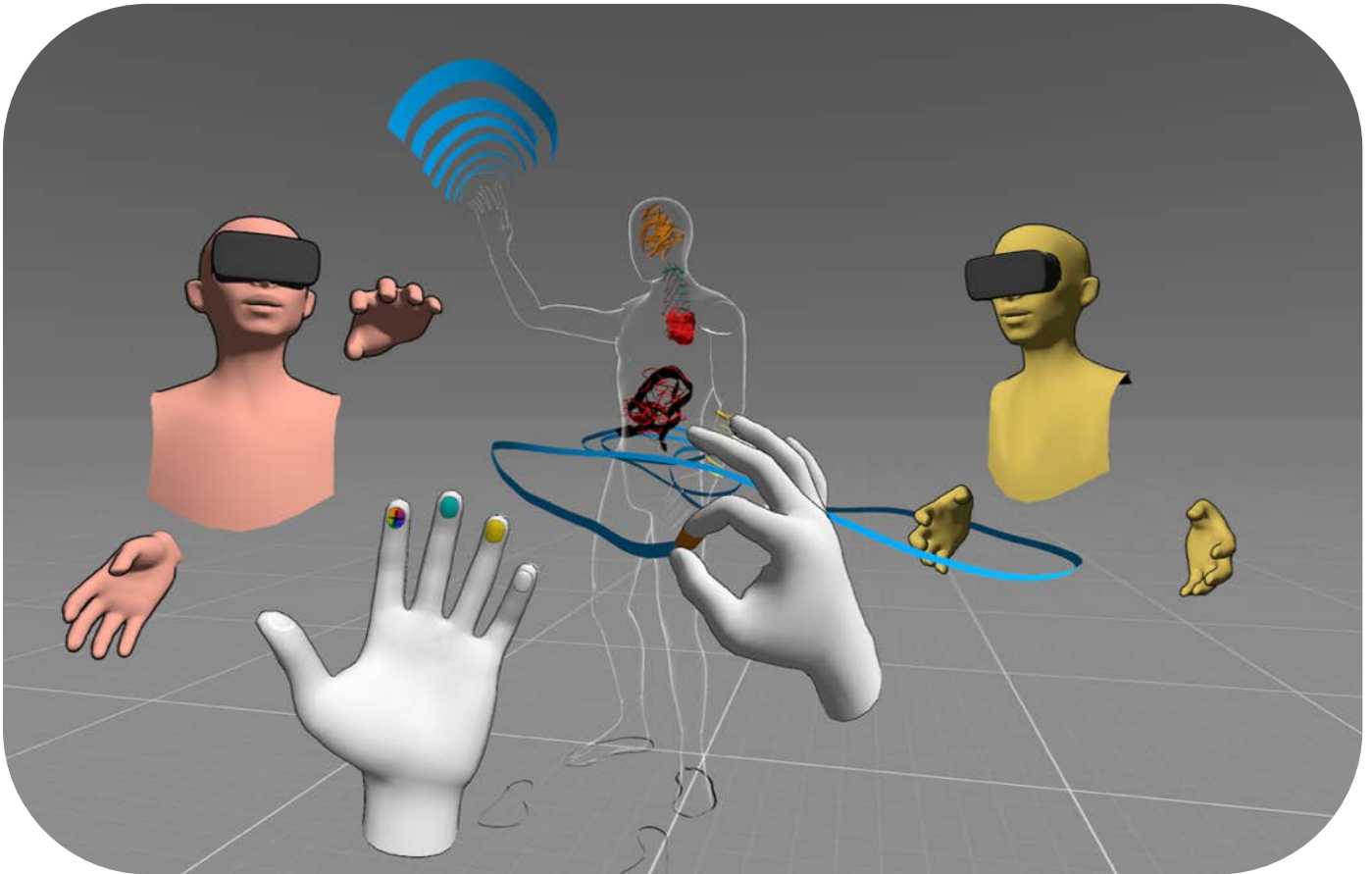
Figure 1 Features of EmbodiMap include using hand tracking to navigate, map/draw, and select colours; stylised male/female avatar figures; each user appearing as half body mannequins in shared experience mode

The EmbodiMap protocols ask users take part in discussion with researchers and/or facilitators before and after using the EmbodiMap app—the somatic VR engagement—to foster understandings of how feelings, sensations and emotions are experienced in the body, find ways to express these feelings, and to develop strategies for working through the experiences.

The EmbodiMap app has a range of features to allow for ongoing customisation of content and to extend and develop ongoing in-depth engagements that suit the needs of cohorts and individual users (see Step by step guide on setting up and using EmbodiMap).

There are four key enabling aspects of the EmbodiMap app (see Figure 1):

- The app offers time and space for body/mind awareness, mindfulness, and meditation.
- Mapping or drawing focuses attention on how the body feels and facilitates expression of feelings as they arise.
- The engagement can be extended by introducing props such as chairs, mirrors, doors and animals, to build scenarios.
- The innovative approach, to understanding how emotions and feelings are experienced by the body, is creative, playful and fun.

Modes of engagement

Currently the EmbodiMap app has three modes of engagement.

Guided

The guided session is a mindful introduction to EmbodiMap. A voiceover leads the user through a series of activities. They include introducing them to the virtual space, raising body awareness, engaging with translucent avatar figures, and beginning to map (draw) sensations onto/into the figure using the hand-tracking gesture interface. The guided experience can be customised.

Solo

Users can engage in a facilitator-led engagement with customised sessions designed according to specific individual or cohort needs. Alternatively, EmbodiMap can be completely self-directed by the user exploring the range of features available and creating their own experience.

Shared.

EmbodiMap allows for multiple users, each with an Oculus Quest headset in remote or the same physical locations, to meet in virtual space, for a shared experience. This feature provides support for users not familiar with VR, for those who need more guidance in using EmbodiMap, or for those who want to engage in a collaborative experience. Users appear as a differently coloured half body mannequin. They can talk to each other and see the movement of each others' mouths and hands (see Figure 1).
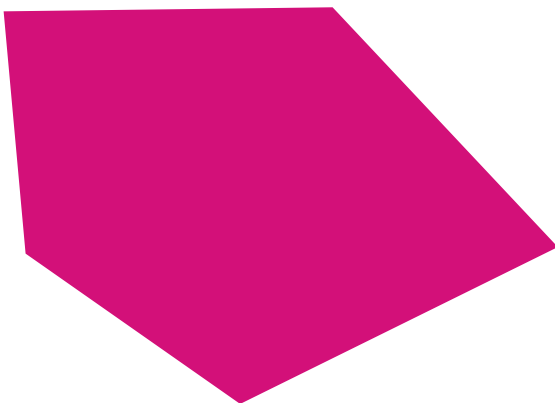
Set up

The EmbodiMap app is installed on the Quest headset using the standard Oculus procedures. Details for setting up the 'guardian' or 'boundary' area is provided (see Step by step guide on setting up and using EmbodiMap). Once installed EmbodiMap offers a range of features and customisations.

Interfaces

EmbodiMap features are accessed using either the hand controllers (see quick guide to hand controllers) or hand-tracking gestures (see Figure 1) (see quick guide to gestures).

Hand controllers are used by the facilitator to initially set up EmbodiMap for the user session.

Hand controllers can be used by the more experienced user to access set-up menus and additional features for more in-depth exploration and to extend the engagement.

Hand-tracking gestures are available for users in the guided, self-directed and facilitator-led sessions. They allow for immediate and intuitive engagement in the virtual space.

Customising the experience

The guided session can be customised, prior to each engagement, according to the specific needs of cohorts or individuals. The facilitator or user can select from a range of environments, gender-stylised avatar figures, voiceovers and the length of engagement.

In facilitator-led or self-directed solo or shared sessions there is scope for further customisation. This includes access to a range of environments, wider choice of avatar figures, engaging with multiple avatar figures, moving and posing avatar figures, the use of props (objects such as chairs, a mirror, a door, deities and animals), and the ability to teleport across the virtual space (see Session 2, 3, 4 Exploring EmbodiMap Features).

EmbodiMap program

Pre-engagement preparation

Before engaging with users, the facilitator or support team need to set up the technology, EmbodiMap app, and customise the engagement according to the specific needs of the user or cohort and the aims or focus of the engagement.

This means ensuring VR equipment is fully charged, the environment is free from obstructions, and the engagement 'boundary' has been established. (see Set up and functions of EmbodiMap). The facilitator needs to select the engagement mode (guided, solo, shared) and select from variables, such as the duration of engagement, virtual environment, number of avatar figures required, the avatar figure gender, and choose the voice for the voiceover.

If data is to be collected for post-event analysis facilitators should set up audio and video recording equipment as needed (see setting up recording equipment) and prepare relevant documentation ready for completion These include:

If the session is part of fEEL (felt Experience and Empathy Lab) study.

1. User information and consent form (see User information and consent form) —This only needs to be done once before session 1 to ensure that users know what to expect from the program and what happens to the data collected (see Onboarding).
2. Verified scales (see Verified scales)

if the program is not part of a fEEL (felt Experience and Empathy Lab) research study.

3. Waiver for use of photographs, information etc. (optional as required by facilitator)

Onboarding

1. Complete documentation with user as follows:

If the session is part of a fEEL research study users complete consent forms (see User information sheet and consent form) and are advised all sessions are audio and video recorded (See Audio and Video Recording). For non-fEEL research study engagement users complete facilitators own waivers, approvals or ethics as needed.

2. Facilitators/researchers engage in a pre-VR discussion with users to introduce the technology, COVID-19 requirements, hygiene and safety issues, get to know/or build on existing knowledge of the user, explore the users' lived experiences, and engage with any concerns (20 minutes).
3. Pre-engagement scales/questionnaires are completed (optional)
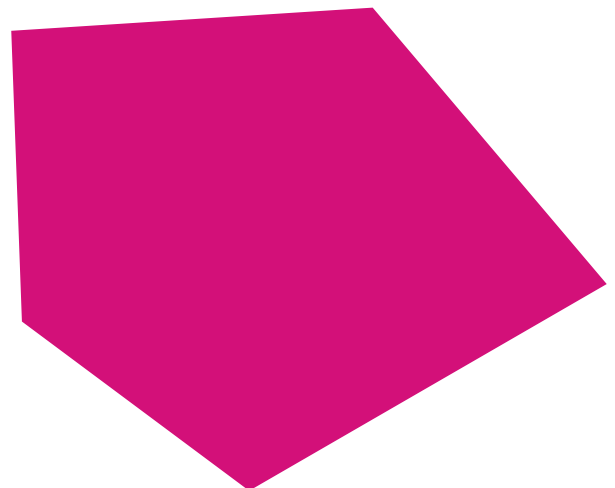
User Sessions

The program consists of four sessions. Further advanced sessions to gain deeper insights, can be developed as the user becomes familiar with EmbodiMap

The first session is a guided introduction with subsequent sessions being user or facilitator-led, exploring the features of EmbodiMap.

Session 1 - Guided meditation

The introductory EmbodiMap VR experience is a guided meditation introducing the user to the tool and functions. A pre-programmed meditation cues the user in noticing thoughts, feelings, and sensations in the body and

introduces the hand-tracking interface—how to use their hands to draw in the VR space (see Introduction to features).

Before engaging the facilitator can choose from a range of options relating to the VR environment, male or female body[1], and male or female voiceover, or negotiate preferences with the user. The facilitator and/or user can choose a 12-minute version focusing on one avatar figure, or a 14-minute session with 2 avatar figures (see set up for Session 1- Guided mediation). Translucent avatar figures appear at the same height as the user. The user can move around and step inside the figures to map sensations felt in their body onto the avatar figure(s).

Sessions 2-4 – Exploring features and somatic experience

After the introductory guided meditation users are encouraged to explore a series of 15-minute[2] VR engagements at their own pace. They are offered a range of features options and experiences to choose from to explore and extend the VR and somatic experience and to 'make the experience their own' (see Step by step guide on setting up and using EmbodiMap). They can engage in further exploration of internal feelings,

emotions, sensations. The facilitator can also enter the VR space alongside the user to engage in a shared experience and/or to demonstrate how to use the extended features, to scaffold the experience, and/or to work with or collaborate with the user.

Offboarding

The VR experience is followed by an open-ended discussion to explore both the immersive, somatic and/or therapeutic experience; how the experience impacts the user; the user relationship with the technology and design of the experiences; and any other issues they would like to explore.

The discussion might explore how EmbodiMap can:

- Support interpersonal process recall (IPR) with users given time-stamped images of their session to assist free recall (with minimal prompts) of their subjective experience.
- Explore what the avatar figure body/bodies represented and any perceived somatic awareness, emotion identification, or emotion management benefits.
- Capture any reflections outside of the VR engagement (from previous sessions) to support the user in reflecting on subjective change processes over time.

Finally, users are asked to complete end of session scale questionnaires (if used) and can be provided with images of the mappings made using EmbodiMap for self-reflection and analysis (see EmbodiMap images)

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[1] The avatar figures are stylised male and female forms (see Figure 1)
[2] 15 minutes is a recommended optimal time depending for VR/comfort, but users may prefer shorter or longer periods.

Setting up and using EmbodiMap

Setting up controllers

Hand controllers

The hand controllers can be used throughout the engagement and can access all features, including some additional features not available to the hand-tracking gestures (see Figure 2). When controllers are sufficiently charged (above 50%) and in proximity of the VR headset, the Oculus system will automatically connect with the hand controllers. The *Trigger* button and *Grip* on the right controller (see Figure 2) are key for setting up the system prior to entering EmbodiMap (see set up guardian boundary engagement area). For detailed information on how to use the hand controllers in the EmbodiMap app see EmbodiMap app interfaces

Figure 2 Hand controllers can be used to initially set up the system and navigate through EmbodiMap features

Hand-tracking gestures

Most hand controller functions are available in hand-tracking. They include setting up the guardian/boundary and selecting mode of engagement, before opening the EmbodiMap app. To turn on the hand-tracking function:

1. Press ⬛ on your right Touch controller to pull up your universal menu.
2. Hover over the clock on the left side of the universal menu. When Quick Settings
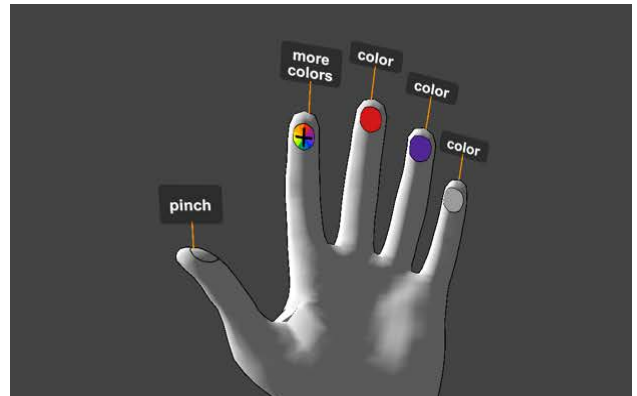
Figure 3 Using hand-tracking the user can interface with EmbodiMap

appears, select it to open the Quick Settings panel.
3. Select ⚙ Settings in the top right corner.
4. Select Device from the left menu, then select Hands and Controllers.
5. Select the toggle next to Hand Tracking to turn it on or off.
6. From here, you can also turn auto switch for hand tracking on or off.[3]

With hand tracking setting on, the headset will automatically switch to hand-tracking when the hand controllers are not in the vicinity of the headset. To revert to hand controllers just pick them up and start using them.

For hand-tracking, hold your hands up to your face. White virtual hands indicate hand-tracking is operating. If it fails to operate check:

1. The light is sufficient for the headset to clearly 'see' the user's hands.
2. The hands are in front of the headset.

Pinch together the index finger and thumb on either hand. A small pointer appears. Use the pointer to select from the onscreen menu or dialogue box. For detailed instruction of all gestures available in EmbodiMap see Index of gestures for hand tracking

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[3] https://support.oculus.com/articles/headsets-and-accessories/controllers-and-hand-tracking/index-controllers-hand-tracking/

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Setting up boundary

You will be prompted to set up a boundary (guardian). Choose room-scale.

1. Define the floor level. Place one controller on the floor or if using hand tracking touch the floor with index finger and thumb 'pinched together'
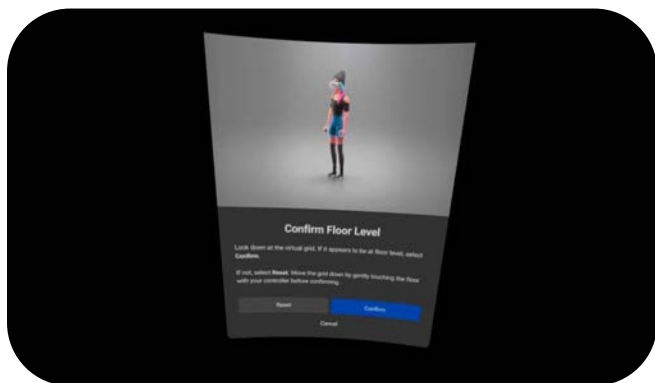
Figure 4 Define the floor level by touching the ground

2. Point your controller (or use hand tracking to gesture) at your feet, and draw out the area you want to play in—a minimum of 1x1m
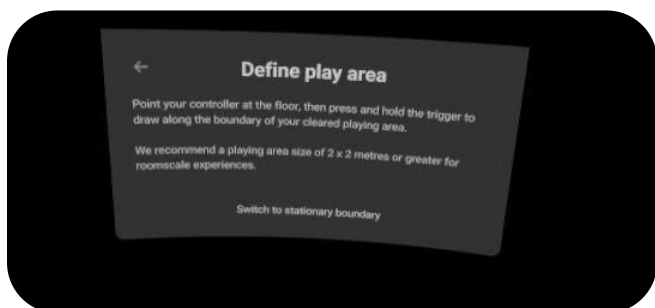
Figure 5 Point to the area you want 'play' in

Note: You don't need to draw it in one go – you can add new sections, walk around and define it until you're satisfied.

Tip: Don't draw your Guardian too close to the wall. Leave a few inches from walls and other solid obstacles.

3. Confirm ok - You'll be alerted to things potentially in the way – the Quest 2 uses the cameras to determine if there are any obstacles, such as things on the floor and the like.
4. More information is available here: (https://www.youtube.com/watch?v=zh5ldprM5Mg).

Installing and opening EmbodiMap
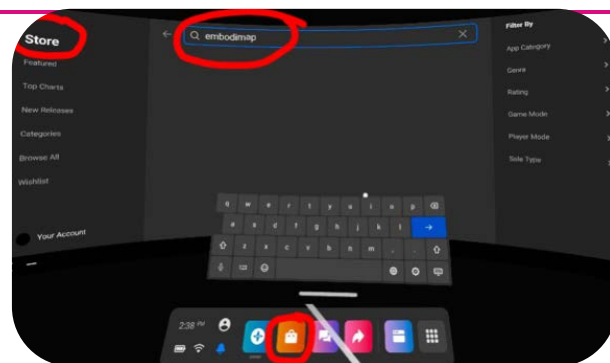
Figure 6 Find EmbodiMap in Quest store in headset

EmbodiMap is designed for Oculus Quest 1 or 2 headsets (https://www.oculus.com/quest-2/). Ensure that the headset is fully charged and has WIFI access to the internet—use Quest instructions to set up WIFI access.
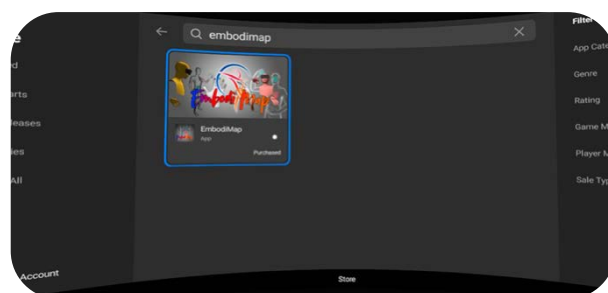
Figure 7 Install EmbodiMap into the Quest library

1. Select Store from the Quest main menu (see Figures 6)
2. Search for *EmbodiMap* (see Figures 6)
3. Click install
4. Locate the Library in the Quest Headset
5. Navigate to EmbodiMap in the Library and Open (see Figure 8)
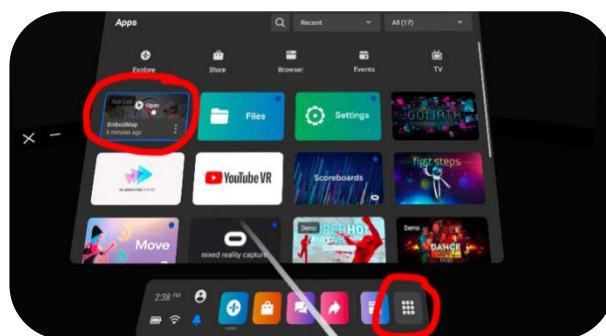
Figure 8 Find and open library and select EmbodiMap

The Oculus system will prompt set-up of the physical and virtual engagement area (the boundary or guardian). Follow instructions for a room-scale guardian to allow users to move around while engaging with EmbodiMap (see Setting up boundary). This involves marking out the physical space to be used. The designated space should be free from obstructions (tables, chairs etc). During the EmbodiMap engagement if a user tries to move beyond the designated physical area, a blue/red boundary 'net appears' to show that the area limits have been reached and prompting the user to return to the area of engagement.

Casting to an external screen

EmbodiMap engagements can be shared with a wider audience by casting the VR experience to an external screen. Ensure the screen and headset are on the same WI-FI network.

1. From inside the headset click Share - looks like a curved arrow on your main control panel.
2. Click **Cast**.
3. You will see a list of available devices on the WIFI network. Click the device you want to cast to and click **Next**.

4. A red dot will appear on the right side of your field of view to indicate a recording or stream is taking place. What you see in the Oculus headset will show up on your TV, smart screen, or phone.
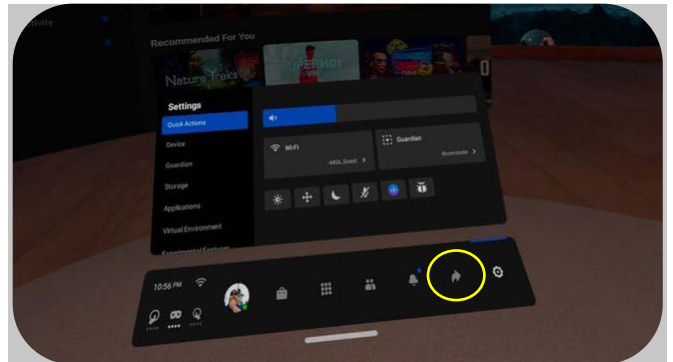
Figure 9 Click on the curved arrow to share the screen
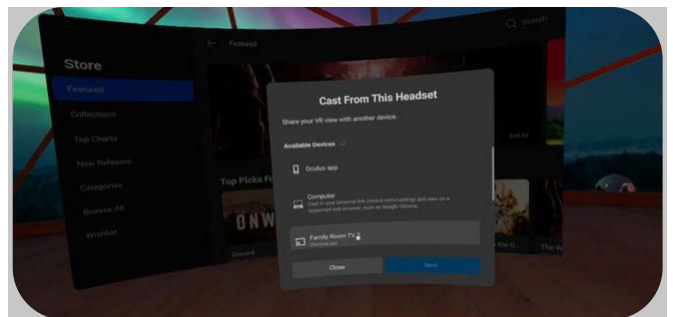
Figure 10 Select the desired screen from the list of available devices

EmbodiMap features and interfaces
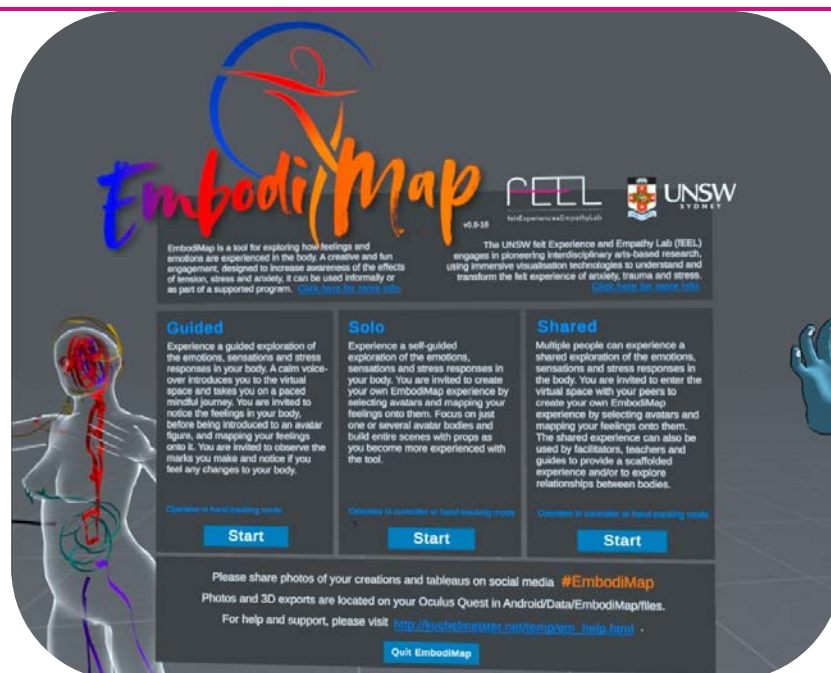
Figure 1 Three modes of engagement are available in the EmbodiMap App

Mode of engagement

EmbodiMap offers three modes of engagement: Guided, Solo, and Shared (see Figure 11). Each can be customised according to user needs and/or aim of the EmbodiMap engagement. The engagement can be extended by using the built-in menu to gain access to a range of features. This section provides an introduction to the EmbodiMap interfaces, customisable features, and how to gain access to the advanced features.

EmbodiMap App Interfaces

EmbodiMap features are accessed using the hand controllers or hand-tracking functions (see Figures 12 and 13 for an overview of features). Some of the advanced functions can only be accessed using the hand controllers

Hand controllers

The hand controllers can be used to set up the customisable features prior to user engagement with EmbodiMap. The facilitator selects 'start' for the required mode (Guided, Solo, Shared). A menu appears allowing selections to be made by ticking the boxes. .

Figure 2 Hand controllers can be used to initially set up the system and navigate through EmbodiMap features

Hand tracking

Figure 13 Hand gesture and finger controls for EmbodiMap

Index of gestures for hand-tracking

Colour selection and 'brush' width

The left hand provides access to a range of 'brush' colours, each finger holds a different colour - red, purple, white (see Figure 13).

To change the colour pinch together the thumb and finger 2, 3, or 4 on the left hand and see the colour on the right-hand forefinger change.

To extend the range of colours available pinch together the thumb and forefinger on the left hand and the colours on fingers 2, 3, 4 will change (orange, blue, green).

To change the width of the 'brush' pinch together the thumb and finger 3 (+) or 4 (-) on the right hand (see Figure 13).

Undo

To undo last the action, bring together the thumb and finger2 on the right hand (see Figure 7).

The 'pinch'

The pinch is the basic hand gesture for hand-tracking in EmbodiMap, it involves bringing together the thumb and finger pads on each hand and provides access to a range of features (see Figure 14). For example, to draw or map pinch

Figure 14 The 'pinch' is the basic gesture for engaging

together the thumb and forefinger the right hand (with fingers 2, 3, 4 pointing up) and smoothly move the hand through the air as if using a 'brush' (see Figure 14).

'Thumbs up'

Figure 15 Two thumbs up create the avatar figure

To create translucent avatar figure (not available in the guided mode) use a 'thumbs up' gesture with both hands (Figure 15). Once to create the figure, which will appear to surround the user's body (which can be seen by looking down to see a translucent figure) and a second 'thumbs up' gesture 'sets' the pose of the avatar (see figure)

Double point (with both hands at the same time)

To teleport around the virtual space (not available in guided mode) point index finger in the direction of travel on **both** hands (Figure 16).

Figure 16 A double point gesture is used to teleport

Closed hand (right)

A closed right hand moves the avatar figure or props, or to poses the avatar figure. Place the closed hand inside the torso of the figure or centre of the prop and move the hand (keeping it closed). To pose the figure place the closed hand inside the avatar figure. A series of white spheres

Figure 17 A closed right hand moves avatars and props, and reposes avatar

appear on moveable joints (e.g. Neck, wrist, ankle). Place the closed hand inside the sphere and move the hand accordingly (Figure 17)

Frame Hands

Figure 18 Frame hands to capture an image

To take an image in EmbodiMap, place both hands in an 'L' shape. A screen will appear which can be repositioned. After a countdown of three clicks a shutter sound will be heard indicating the images has been captured (Figure 18).

Finger up (right hand)
To exit EmbodiMap use a straight middle finger on a closed hand.

Figure 19 Exit with use straight middle finger on right closed hand

Menus
EmbodiMap has a range of menus to support set up and use of advanced features. Menus can be access using hand tracking or using the hand controllers. Note: for the more advanced use of menus hand controllers are often more efficient to use.

Figure 20 Menu for guided EmbodiMap

For example, to pre-select options for session 1 guided meditation (Figure 20), the facilitator can select from a range of options, by clicking tick boxes. Once the options have been made the facilitator can then select 'submit' to enter

Figure 21 Use controllers for initial set up

EmbodiMap, hand the headset over to the user and, once the user is comfortably wearing the headset, they can press the thumbstick. And the guided session will start.

More advance features can be accessed in the solo and shared versions, and can be used to access a range of figures and props by pointing and clicking on the required menu element.
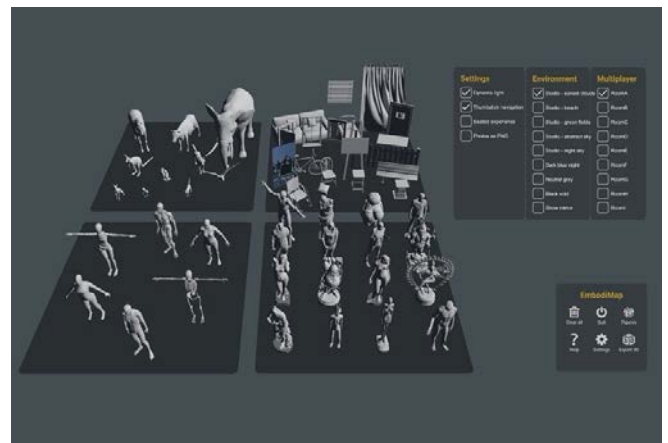
Figure 22 More advanced features can be accessed in solo and shared sessions

EmbodiMap Sessions

Session format

The standard recommended program consists of a two-hour session each week over four weeks, or four sessions conducted on consecutive days. The session format involves:

- Completion of documentation as needed (i.e. consent form if part of research study or general waiver as required by facilitator).
- Introduction to the technology, CoVID-19 requirements, hygiene and safety procedures.
- Introduction to the concept of somatic experiences.
- Completion of evaluation scales.
- Pre-VR Discussion.
- Engagement with EmbodiMap VR tool and experience (15mins)[4].
- Post VR discussion.
- Completion of evaluation scales.

Preparing for EmbodiMap sessions

EmbodiMap can be customised for users based on the pre-selection of:

1. Virtual environment,
2. Duration of engagement,
3. Number of avatar figures used
4. Type of avatar figure
5. Voice over

In addition, more experienced users can:

1. Create multiple avatar figures
2. Move and reposition the figures,
3. Choose figures and props from a menu.
4. Choose the colour and width of the 'brush'
5. Take 'photo' of mappings in the virtual environment
6. Teleport through the virtual space.

Set up for session 1 guided meditation

To prepare the environment for the user the facilitator can access a menu of choices and pre-select a range of options (see Menus).

Once the user enters EmbodiMap the basic gestures needed for Session 1 Guided meditation are the 'pinch' gesture and colour selection, and 'brush' size (width of mark made) (see Index of gestures for hand-tracking)

Changing the VR environment

Figure 23 The virtual environment can be changed to suit individual user needs

The user's EmbodiMap experience is subjective. What is generated during the sessions is specific to them. To support this the virtual environment can be selected from a range of options, using the hand controllers) to support individual needs and enhance the somatic experience at an individual level. In the pre-engagement preparation the facilitator can choose, or negotiate with the user, the virtual space into which the user first enters.

They can choose for example from a white 'studio' with windows and a view of a sunset, a beach, a landscape (see Figure 23). They can choose a darkened expansive empty environment with distant horizons; or a light/bright expansive environment. For some the 'studio' may feel restrictive, for others,

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[4] Timings is limited to avoid potential cybersickness and/or fatigue

EmbodiMap Protocol for engagement and evaluation V1.0

containing. Similarly, the expansive space may offer freedom to some, while it may make others feel vulnerable. At any time during the sessions the environment can be changed by the facilitator (see Setting up the VR Environment)

Choosing the avatar figure

In the first guided EmbodiMap session a translucent avatar figure (See Figure 1) appears alongside the user at a pre-defined distance. The avatar figure is same height as the user (to encourage user identification with the figure as 'this is me' or 'self'). The focus on a single avatar figure encourages exploration of the relationship between it and the user. Furthermore, prior to the session the facilitator or user can, using the hand controllers or the hand-tracking gestures, choose a female or male figure to further—encourage association with the avatar figure (see creating avatar figure). While the avatar figures are gendered they are non-realistic generalised male/female forms (see Figure 1).

Customisation menu

The custom options are available by ticking the relevant boxes on the guided session menu (see menus)

Session 2, 3, 4 Exploring EmbodiMap Features

Creating, moving and posing avatar figure (s)

In subsequent self-guided or facilitator-led sessions the users create their own avatar figure using the hand controllers or hand tracking-gestures (rather than waiting for the figure to appear, as with the guided version). A generic female or male avatar figure can be selected from a menu at the beginning of the engagement or users and facilitators can select from a wide range of available figures (see Figure 22); designing the engagement according to their interests and needs. Users can position the avatar figure anywhere in the virtual space—above or below ground, inside or outside the

room, close by or at a distance and map sensations and feelings onto the figure (see creating avatar figure).

Creating avatar figures

The user stands where they want the avatar figure to appear and close both hands and put both thumbs up—in a 'thumbs up gesture' (see quick guide to gestures)— at chest height in front of them. As the user looks down they see their virtual body glowing. By moving their arms, body, feet and legs they can pose the avatar figure. When the desired pose is achieved they repeat the 'thumbs up' gesture and step away. They now see an avatar figure alongside ready for mapping. (see Appendix creating an avatar figure)

Creating different sized avatar figures

The avatar figures appear the same size as the user establishing a one-to-one relationship and reinforcing a sense of 'this is me'. However, this dynamic can be changed by creating avatar figures of different sizes potentially opening up possibilities for exploring power relations, childhood memories, or different views of self. By crouching, bending or sitting down, or standing on tip toes while using the 'thumbs up' gesture, avatar figures can be created that are smaller or bigger than the user.

Create multiple avatar figures

A shift in dynamic can be created by engaging with multiple avatar figures, allowing attention to be re-focused onto relationships between avatar figures, and between user and avatar figures. Simply repeating the process used to create one avatar figure multiple avatar figures can be created. There is no limit to the number of avatar figures that can be created and where they can be placed in the space (see creating multiple avatar figures).

Posing and re-posing

In the introductory guided sessions, the avatar(s) pose is fixed. However, in subsequent self-directed and facilitator led engagements the hand controllers or hand-tracking gestures can be used to pose the avatar figure(s). This opens

up further possibilities to explore different stances, the impact of open and closed poses, suggest movement in the figure, or explore relationships between avatar figures such as linking hands, embracing etc. Once posed an avatar figure can be changed and the figure can be moved across the virtual space.

Once an avatar figure has been created and the user has 'stepped out' of the figure it can be re-posed using the closed hand gesture (see quick guide to gestures). Placing the closed hand inside the body of the avatar figure activates a series of white spheres at key joints (neck, wrists, trunk). Placing the closed hand inside one of the spheres allows the user to move the joint and to repose the avatar figure. At the end of each movement the user can open their hand to complete the action, and then repeat this with other joints.

Moving the avatar figure

The guided introductory sessions place the avatar figure(s) near the user. In subsequent self-directed or facilitator-led sessions the avatar figure can be moved anywhere in the virtual space (including in the air, beyond the walls of the room, or below the floor). The positioning of the avatar figure(s) can be entirely user directed according to the experiences being explored. Both the hand controllers and hand-tracking gestures can access these features.

Using the 'closed hand' gesture (see quick guide to gestures). Place the closed had inside the chest area of the avatar figure and move the hand to where you want to place the avatar figure. The avatar figure will move with the hand. By twisting the 'closed hand' gesture the user can make the avatar figure lie down or lean at an angle.

Teleporting

Users can navigate the space by physically walking around inside the physical boundary established during the pre-engagement or by using the double point gesture. This allows the user to 'travel' further into the virtual space

Adding props (objects and animals)

As the user gains confidence and familiarity with EmbodiMap they can introduce props (objects such as chairs, a mirror, a door, deities and animals) into the virtual space to create scenarios, stories, and environments. Objects can be placed anywhere in the space, relationships between objects and/or avatar figures can be created, and objects can be drawn or mapped onto them.

Adding internal organs

One of the props that can be selected for further exploration is a set of internal organs that can be placed within the avatar figure bodies to extend the mapping experience. This may be of particular relevance for users exploring bodily manifestations of trauma and PTSD engaging with a facilitator or therapist.

Sharing the experience in the VR space

Using Wi-Fi, up to four people can engage with avatars props and each other in the virtual space. This allows for facilitators to engage in the space at the same time as the user, or users to engage in collaborative engagements. The users can be in the same physical space and meet in the virtual space, or they can be in different physical spaces (i.e., in a different town or country)

Exporting images and environments

Images captured during EmbodiMap sessions can be accessed via the headset by accessing the EmbodiMap 'files' on the data SD Card – via a USB connected to a computer.

Evaluation

The EmbodiMap tool and experience are flexible and can be adapted to suit the needs of individual users and specific cohorts. It can be used as part of therapeutic psychosomatic engagement with trained professionals, or as a creative tool to explores emotions, feelings and sensations. There is a range of ways to evaluate the EmbodiMap experience and outcomes. We use four verified scales that examine emotion regulation, body awareness, body responsiveness and depression and anxiety. We also engage in open-ended discussion with users before and after each VR engagement. The data from these discussions is analysed using interpretative qualitative approaches (see Data Analysis).

Methodology and data collection

EmbodiMap as a method uses creative psychosocial engagement to develop a space where participants can feel safe and able to share their experiences in a meaningful way [11]. The virtual drawings produced in the creative engagement can be analysed to build an understanding of change but need to be understood in the context of what they mean to the participant. They can be also used to help participants reflect on emotions and sensations in relation to the body experienced during the VR engagement. The semi structured interviews provide insights into how the experience makes meaning for the participants, and the context and factors that influenced their responses.

We engage in phenomenological analysis allowing us to gain insights into the perceptions and experiences of the engagements and how meaning is made from the experience [12]. The observations and notes can be analysed by researchers individually or as a group, who may listen to all recordings, choosing to work with the expressive and nuanced expression available in the audio recording (rather than reverting to transcripts [13].

Data can be analysed using Interpretative Phenomenological Analysis (IPA) and Micro-phenomenological analysis (Smith, Flowers & Larkin, 2012; Petitmengin et al 2018; Tuffour, 2017). The IPA method is a bottom-up approach that allows the researcher to work closely with the data in order to get insights into the users' experience and perspectives in the world. Micro-phenomenological analysis enables the researcher to discover dimensions of the lived experience that may not ordinarily be accessible and describe them accurately and reliably. The application of these two methods can help address the research aim of exploring the users' felt experience of emotions in the body, and further enable users to express experiences for which they do not have language available to them.

Verified Scales

Examples of verified scales are attached in the appendices. Each of these scales should be calculated according to the guidelines provided and available online. The following scales are administered at the outset of the study before a user's EmbodiMap session and again at the end of the last session. Pre VR and post VR engagement discussions are held in every session.

Difficulties In Emotion Regulation Scale (DERS) (18-items) (See Appendix DERS)

The Difficulties in Emotion Regulation Scale Short Form (DERS-SF) [11] (Kaufman et al., 2015) is an 18-item measure used to identify emotion regulation issues in adults.

The measure covers 4 dimensions of emotion regulation.

1. Awareness and understanding of emotions
2. Acceptance of emotions
3. Ability to engage in goal-directed behaviour and
4. The ability to manage impulses/refrain from impulsive behaviour when experiencing negative emotions and source effective emotion regulation strategies.

The measure has six subscales.

1. Non-acceptance of emotional responses,
2. Difficulty engaging in goal-directed behaviour,
3. Impulse control difficulties,
4. Lack of emotional awareness
5. Limited access to emotion regulation strategies and
6. Lack of emotional clarity.

The Body Awareness Questionnaire (BAQ) (18-items) (see Appendix BAQ)

Body awareness is defined as the ability to recognise subtle body cues [12] (Mehling et al, 2012). The Body Awareness Questionnaire (BAQ) [13] (Shields, Mallory & Simon, 1989) consists of 18 statements that assess self-reported attentiveness to normal non-emotive bodily processes specifically, sensitivity to body cycles and rhythms, ability to detect small changes in normal functioning, and ability to anticipate bodily reactions. Items are scored on a 7-point Likert scale. The BAQ is considered a reliable and valid instrument ( ) and shows good validity and reliability [12, 14](e.g. internal consistency of 0.89) (Mehling et al, 2012, Tihany et al, 2017).

The Body Responsiveness Questionnaire (BRQ) (7-items) (See Appendix BRQ) –

Body responsiveness is the tendency to integrate body sensations into conscious awareness to guide decision making and behaviour, while at the same time not engaging in suppression nor reacting impulsively to bodily sensations. It is the experience of embodiment, defined as "connection, attunement and equality between the mind and body" [15 p8](Teall, 2015, p. 8). The Body Responsiveness Questionnaire (BRQ) [16] (Daubenmier, 2005) assesses bodily integration and body mind connection/disconnection. Factor analyses of the BRQ show good internal consistency and reliability (Cronbach's alpha 0.82 and 0.83, respectively) in items of positive and negative emotions, spirituality and attention-related body sensations. Seven items of the scale are scored

on a 7 point Likert scale. The questionnaire has been validated for generalisability on European samples [14](e.g Tihanyi et al, 2017). Analyses have revealed two factors in the overall structure of the BRQ - 1) Importance of interoceptive awareness in guiding behaviour and 2) perceived disconnection between body and mind [17] (Cramer et al, 2018).Total BRQ scores correlate positively with body awareness, positive emotion, mindfulness, spirituality, body-mind practice (e.g yoga) and negatively with negative emotions and physical symptoms such as those seen in patients with chronic pain [12, 17](Cramer et al, 2018, Mehling et al, 2012).

The Depression, Anxiety and Stress Scale (DASS) (See Appendix DASS-21)

The DASS-21[18] (Lovibond & Lovibond, 1995a) is a self-reporting scale to measure the negative emotional states of depression, anxiety and stress. This scale is suitable for clinical and non-clinical settings. The scale is based on a dimensional rather than categorical conception of 'psychological disorders', seeing the difference between clinical and non-clinical populations as differences of degree. Scores therefore are descriptive as to the degree of difficulty encountered by the respondent as opposed to any degree of pathology.

Each of the three sub-scales contains 7 items .

- Depression subscale assesses dysphoria (low mood), hopelessness, devaluation of quality of life, lack of interest and inertia.
- Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety and subjective experience of anxious affect.
- Stress scale assesses difficulties in relaxing, nervous arousal, agitation, irritability and reactivity.

The three sub-scales of the DASS (depression, anxiety and stress) have been shown to have high internal consistency well suited to the needs of research where there is a need to measure current state or change in state over time [19, 20] (Osman et al, 2012; Lovibond & Lovibond, 1995b). Evaluations show excellent

reliability of DASS-21 with Cronbach's alpha values of 0.81, 0.89 and 0.78 for depression, anxiety and stress subscales respectively. Guides for interpretation of severity for depression, anxiety and stress levels is available online http://www2.psy.unsw.edu.au/dass/DASSFAQ.htm

Open-ended discussion

All users are invited to engage in pre-VR experience and post VR open-ended discussions. These are semi-structured engagements beginning with questions about the users health and wellbeing, relationship to body, knowledge of somatic engagement, familiarity with mindful or body and mind practices, and knowledge of VR and immersive technologies. Users are free to answer as fully as they like and, at any time, introduce topics or issues that are important to them. The discussions are audio and video recorded for post event analysis (see data collection and analysis) using phenomenological methods and approaches

Visuals

All images produced by users during the VR experience are also made available for analysis (see data collection and analysis)

Setting up recording equipment (data collection)

Participants need to provide written consent if engaged in formal research by the fEEL (felt Experience and Empathy Lab) team. Otherwise verbal or written consent should be gained by the facilitator. Audio recording can be made using smart phone audio apps, or dedicated audio recorders. Use of a Go-Pro camera is recommended for Video and audio as, while the participant is aware they are being recorded, it the small camera is less conspicuous and offputting. Audio and video recorded should capture the entire session including pre, during

and post the VR engagement. Recording can also be carried out inside the virtual space by using the in-headset recording options:

Recording a video via Quest

1. Press ▤ on the right controller to access the universal menu.

2. Select ↪.

3. Select Record Video.

4. Select the toggle next to *Include Mic Audio* for audio select Start Recording.

A red dot will appear in VR to indicate that recording has started.

To stop recording:

1. Press ▤ on the right controller to access the universal menu.

2. Select ↪.

3. Select Recording.

Taking a Screenshot (photos) using Controllers

Automated image capture operates in the guided session. In the solo and shared sessions to capture images press the Oculus button on your right Oculus controller, along with the trigger button. This allows you to take a screenshot. You can use the trigger button from either of your controllers. You should hear a shutter sound like that of a camera.

Screenshot using on-screen controls

1. Press the Oculus button on the right controller. Once you do this it should open the Oculus menu.

2. From here, you can not only take a Screenshot but also record your Spatial session.

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Index

Glossary

Avatar figure (Virtual Body)	A life-sized translucent figure representing the user, corresponding to their height, and able to assume the pose of the user
Virtual Body (Avatar figure)	A life-sized translucent figure representing the user, corresponding to their height, and assuming the pose of the user
Facilitator	
User	
Body Mapping	
EmbodiMap tool	
EmbodiMap Experience	
EmbodiMap App	
Multi-user	
Shared experience	
Mannequin	In multi-user mode users appear in the virtual environment as non-identifiable, differently coloured (yellow, blue, pink, brown) half body mannequins.

APPENDICES

Engagement Checklist

Day before:

- Ensure that headset is charged using mini USB plugged into wall adaptor or computer – ensure headset is switched off for faster charging and to ensure full charge is achieved (Put on headset and view charge indicator is at 100%)
- Replace batteries in hand controllers
- Check if any software updates are required (turn on, and put on headset update messages will appear when applicable – follow instructions
- Familiarise yourself with accessing the EmbodiMap app – using controllers or hands

Immediately before any engagement:

- Use anti-bacterial wipes to wipe headset and controllers (do NOT use alcohol-based wipes on the lenses)
- Identify the area in where the VR experience will take place. Ideally a minimum 2 metre square space person (if several people are engaging in VR at the same time ensure that each person's space does not overlap another
- Clear objects/furniture from the space, check that there are no cables or wires in the space. If the space is adjacent to a wall check that there are no shelves of similar objects jutting out of the wall that could be walked into.
- Ensure that a chair is close by (not in the space) for each person engaging in VR (that can be brought into the space if they experience dizziness of disorientation.

Set up overview

- Place headset on head and turn on
- An oculus logo appears and then fades
- The Oculus VR Headset can be used with the controllers or by using hand tracking (the headset is able to identify the user's hands). The controllers need to be in proximity to be connected and a message will indicate that controllers are connected. For hand tracking the controllers should NOT be in proximity and when the users hands are held up to their face they will be animated.

Set up the guardian boundary 'play' area
- It is necessary to set up the 'play' area or guardian boundary

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Verified scales

Difficulties In Emotion Regulation Scale (DERS) 18-item

AN = Almost Never/S = Sometimes/AH = About Half the Time/M = Most of the Time/A = Almost Always

	AN	S	AH	M	A
1. I pay attention to how I feel.	1	2	3	4	5
2. I have no idea how I am feeling.	1	2	3	4	5
3. I have difficulty making sense out of my feelings.	1	2	3	4	5
4. I care about what I am feeling.	1	2	3	4	5
5. I am confused about how I feel.	1	2	3	4	5
6. When I'm upset, I acknowledge my emotions.	1	2	3	4	5
7. When I'm upset, I become embarrassed for feeling that way	1	2	3	4	5
8. When I'm upset, I have difficulty getting work done	1	2	3	4	5
9. When I'm upset, I become out of control	1	2	3	4	5
10. When I'm upset, I believe that I will end up feeling very depressed	1	2	3	4	5
11. When I'm upset, I have difficulty focusing on other things	1	2	3	4	5
12. When I'm upset, I feel guilty for feeling that way.	1	2	3	4	5
13. When I'm upset, I have difficulty concentrating.	1	2	3	4	5
14. When I'm upset, I have difficulty controlling my behaviours	1	2	3	4	5
15. When I'm upset, I believe there is nothing I can do to make myself feel better.	1	2	3	4	5
16. When I'm upset, I become irritated with myself for feeling that way	1	2	3	4	5
17. When I'm upset, I lose control over my behaviour.	1	2	3	4	5
18. When I'm upset, it takes me a long time to feel better.	1	2	3	4	5

Body Awareness Questionnaire (BAQ)

Listed below are a number of statements regarding your sensitivity to normal, non-emotive body processes. For each statement, select a number from 1 to 7 that best describes how the statement describes you and place the number in the box to the right of the statement.

Not at all true of me   Very true of me

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

1. I notice differences in the way my body reacts to various foods.	
2. I can always tell when I bump myself whether or not it will become a bruise.	
3. I always know when I've exerted myself to the point where I'll be sore the next day.	
4. I am always aware of changes in my energy level when I eat certain foods.	
5. I know in advance when I'm getting the flu.	
6. I know I'm running a fever without taking my temperature.	
7. I can distinguish between tiredness because of hunger and tiredness because of lack of sleep.	
8. I can accurately predict what time of day lack of sleep will catch up with me.	
9. I am aware of a cycle in my activity level throughout the day.	
10. I don't notice seasonal rhythms and cycles in the way my body functions.	
11. As soon as I wake up in the morning, I know how much energy I'll have during the day.	
12. I can tell when I go to bed how well I will sleep that night.	
13. I notice distinct body reactions when I am fatigued.	
14. I notice specific body responses to changes in the weather.	
15. I can predict how much sleep I will need at night in order to wake up refreshed.	
16. When my exercise habits change, I can predict very accurately how that will affect my energy level.	
17. There seems to be a "best" time for me to go to sleep at night.	
18. I notice specific bodily reactions to being over-hungry.	

Body Responsiveness Questionnaire (BRQ)

Listed below are a number of statements regarding your sensitivity to normal, non-emotive body processes. For each statement, select a number from 1 to 7 that best describes how the statement describes you and place the number in the box to the right of the statement.

Not at all true of me   Very true of me

1	2	3	4	5	6	7

Statement							
1. I am confident that my body will let me know what is good for me	1	2	3	4	5	6	7
2. My bodily urges / wants lead me to do things that I end up regretting.	1	2	3	4	5	6	7
3. My mind and body often want to do two different things.	1	2	3	4	5	6	7
4. I suppress my bodily feelings and sensations.	1	2	3	4	5	6	7
5. I 'listen' to my body to advise me about what to do.	1	2	3	4	5	6	7
6. It is important for me to know how body is feeling throughout the day.	1	2	3	4	5	6	7
7. I enjoy becoming aware of how my body feels.	1	2	3	4	5	6	7

Depression, Anxiety & Stress Scale (DASS-21)

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

0 Did not apply to me at all; 1 Applied to me to some degree, or some of the time; 2 Applied to me a considerable, or a good part of the time; 3 Applied to me very much, or most of the time

1 I found it hard to wind down	0	1	2	3
2 My mouth was dry	0	1	2	3
3 I couldn't seem to experience any positive feeling at all	0	1	2	3
4 I had difficulty breathing (for example, I was breathing really rapidly or I was breathless even without doing exercise)	0	1	2	3
5 I found it difficult to work up the motivation to do things	0	1	2	3
6 I tended to over-react to situations	0	1	2	3
7 I experienced trembling (e.g. in the hands)	0	1	2	3
8 I felt that I was using a lot of nervous energy	0	1	2	3
9 I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10 I felt that I had nothing to look forward to	0	1	2	3
11 I found myself getting agitated, wound up and on-edge	0	1	2	3
12 I found it difficult to relax	0	1	2	3
13 I felt down-hearted and blue	0	1	2	3
14 I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15 I felt I was close to panic	0	1	2	3
16 I was unable to become enthusiastic about anything	0	1	2	3
17 I felt I wasn't worth much as a person	0	1	2	3
18 I felt that I was rather touchy	0	1	2	3
19 I felt my heart beating really fast, even though I wasn't doing any physical activity	0	1	2	3
20 I felt scared without any good reason	0	1	2	3
21 I felt that life was meaningless	0	1	2	3

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Notes