Using multisensory body illusions to modulate judgements of body size

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Background

Anorexia Nervosa (AN) patients are thought to over estimate their own body size, which has been implicated in development and maintenance of symptoms[1].

Allocentric lock hypothesis[2] suggests patients with AN base their bodily experience on inaccurate allocentric memories (seeing the body from another person's perspective). New egocentric representations (seeing the body from one's own eyes whilst looking down at own body) and tactile input (e.g. bones protruding etc) fail to update the allocentric perception. Establishing methods to directly access and update these allocentric body representations in AN may be an effective strategy for therapy.

Body illusions can modulate the perceptual and emotional experience of the body[3,4]. Synchronous **visual** and **tactile** feedback can alter perception of the body in eating disorder patients[5,6] because they elicit ownership over new body (parts). Egocentric body illusions suggest therapeutic benefits for eating disorder patients a year later[7]. Allocentric body illusions, however, may access these inaccurate memories more directly.

Current study

Feasibility and pilot study on a non-clinical sample before testing on clinical patients.

Assessing the implementation of augmented reality to target bodily experience in AN. First use of full body illusions involving viewing the participants' own body from an allocentric visual perspective.

Aims

Pilot the use of a multisensory body-swap illusion to adjust allocentric body memories by using allocentric body illusions that allow your to view your own body from an observer perspective.

Measure changes in body size perception using self report and behavioural measures.

Use the results to develop and adjust the procedures for clinical patients.

Participants

Demographic details:

Age M = 24 (20-38)

BMI M = 22.9 (18.3-32)

Exclusion criteria:

Under 18

Current, history or self-identification of eating disorder

Recruitment:

Social media, lab contacts, posters

Measures and Procedure

Measures:

- Visual analogue scale (VAS) asking "what size do you feel your body to be right now?" before and after illusion.
- Likert scales and qualitative measurement asking about experience during the illusion.
- Participant estimation of circumference of hips, waist and shoulders pre- and post- illusion, using length of string.

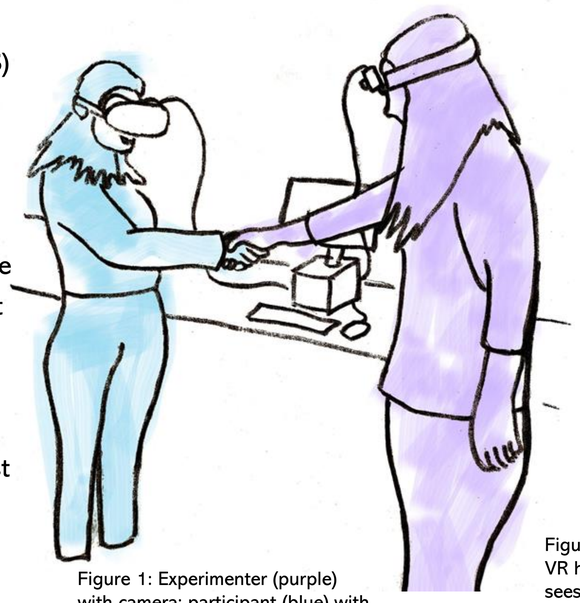


Figure 1: Experimenter (purple) with camera; participant (blue) with VR headset

Figure 2: View from the VR headset – participant sees their own arm (blue), as if it is someone else's

Illusion Procedure:

Participants stand opposite the experimenter whilst wearing a virtual reality (VR) headset, connected to a camera strapped to the forehead of the experimenter (figure 1).

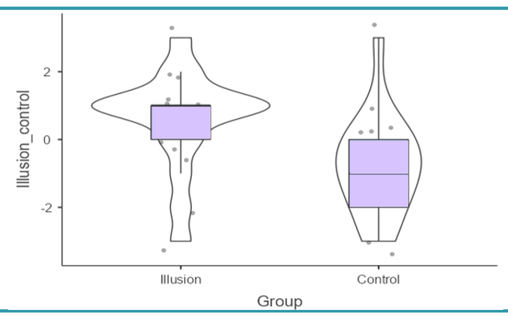
Through the headset participants see images from the camera capturing a stereoscopic image of the experimenter's perspective of the participant's own body (figure 2).

Participants take hold of the experimenter's right hand, as if to shake it, and repeatedly squeeze each other's hands for two minutes to gain multisensory experience.

Results

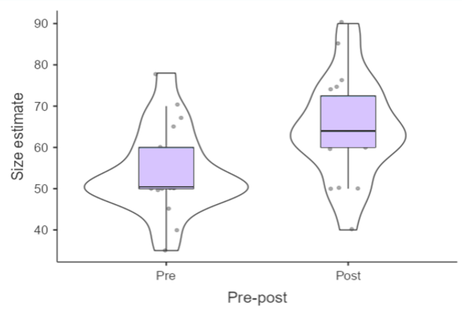
Quantitative data:

Illusion:

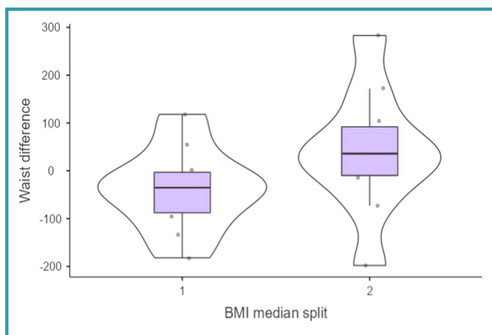


Scores on illusion questions were higher than on control questions, suggesting participants did experience the illusion. This is supported further by qualitative comments (see Qualitative data box →).

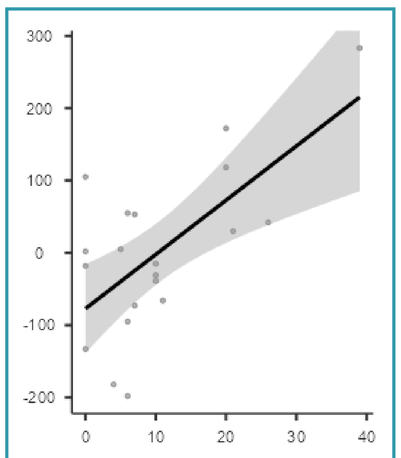
Body Size Judgments:



Overall size estimations using VAS increased after the illusion experience.



Participants with low BMI estimated smaller waist size post-illusion than pre-illusion, and participants with higher BMI estimated larger waist size post-illusion.



Positive correlation between difference in pre-/post-illusion waist estimate and pre-/post- illusion VAS size estimate. Not found for hips or shoulders.

Results

Qualitative data:

"It felt like the researcher's hand and arm were mine."

"When I took the headset off I felt like was at the opposite side of the room."

"When we first touched hands it felt like i was shaking hands with myself."

"I did feel like looking at myself from another person's perspective."

"It did feel as though I was watching myself outside of my body even though it was still me, kind of like I was interacting with myself."

Conclusions

Participants quantitatively and qualitatively reported a genuine experience of the illusion, which did affect their body size perception.
Overall size estimations increased after the illusion, suggesting that the illusion did influence the participants allocentric view of themselves.
When results were considered according to BMI they suggest size estimations were different for lower vs. higher BMI - participants may have developed a more realistic view of their body size.
Correlation between change in waist size estimate and overall size estimate shows waist size is a prominent element in subjective experience of body size.
The illusion uses allocentric perception to update memories of body size.

Future implications

Currently the paradigm is being tested on a bigger sample of non-clinical participants, with a measure of actual body size (shoulder and waist), to be able to assess whether changes in judgments of body size are related to accuracy (participants becoming more accurate).
Following further piloting, will test on AN patients.

References

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