

Testing Social Emotion Regulation in a Virtual-Reality Cyberball Game

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Introduction

To test the efficacy of social emotion regulation (ER) in immersive virtual reality (VR), we created challenging situations to induce negative emotions with and without social support.

We recreated the Cyberball paradigm to assess ostracism and presented a fellow pupil, a virtual agent, to offer social support.

What is the Cyberball paradigm?

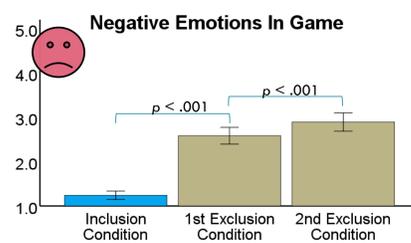
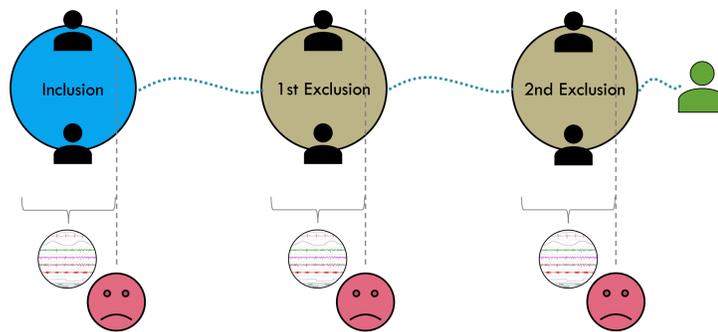
A partial or total exclusion in a ball game resulting in a feeling of ostracism in the player. This effect has been recreated repeatedly over the years with the game reduced to online interaction with avatars or the computer and mere clicks on a screen (Scheithauer et al., 2013).

Material and method

-  HTC Vive Head-Mounted Display and controller
-  3 consecutive Cyberball conditions on the playground of a virtual school environment
-  Social support given by a virtual agent
-  Self-report on a negative Smiley scale from 1 to 5
-  Psychophysiological measurements: ECG, Heart Rate Variability (HRV)

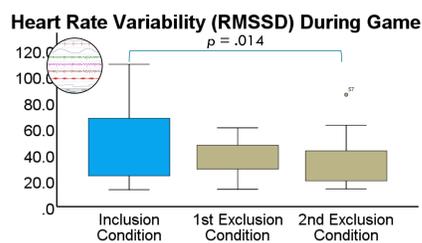
Results: Ostracism

Sample: N = 29 participants, Age: 18-32 years (M = 23)



Participants reported the least negative emotion when included and the most negative after being excluded twice.

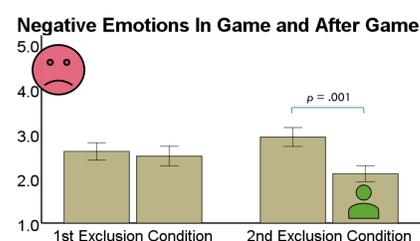
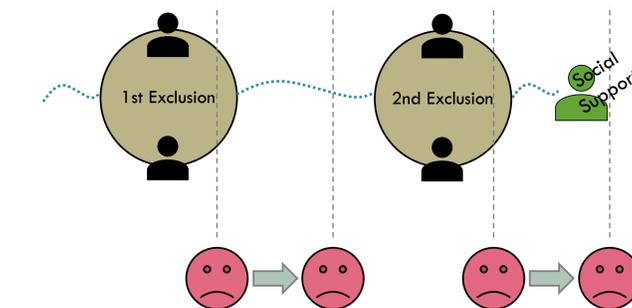
$F(1,36.4) = 48.8$
 $p < .001$ $\eta^2 = 0.6$



Participants showed the highest HRV values when included and the lowest HRV after being excluded twice.

$F(2,40) = 4.5$
 $p = .02$ $\eta^2 = 0.2$

Results: Social Support



Participants reported less negative emotion after receiving social support, while there was no effect in the condition without it.

Interaction:
 $F(1,27) = 10.2$
 $p = .004$ $\eta_{part}^2 = 0.3$

Conclusions

We were able to induce negative emotions with the Cyberball paradigm in VR as well as decrease these negative emotions through the virtual agent's social support.

This means:

- **Our scenario is able to elicit differentiated emotional responses in VR.**
- **Social emotion regulation can be efficacious in VR with virtual agents.**

In future studies, we aim to assess the efficacy of social emotion regulation in individuals with developmental disorders, who tend to have difficulties self-regulating their emotions (Cai et al., 2018). Should they be able to benefit from social emotion regulation in VR, this will pave the way to developing interventions in immersive VR.

Literature cited

Cai, R.Y., Richdale, A.L., Uljarević, M., Dissanayake, C., & Samson, A.C. (2018). Emotion regulation in autism spectrum disorder: Where we are and where we need to go. *Autism Research*, 11(7), 962-978.
Scheithauer, H., Alsaker, F., Wölfer, R., & Ruggieri, S. (2013). Cyberball: A reasonable paradigm for research in developmental science? *International Journal of Developmental Sciences*, 7, 1-6.

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Further information

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