

# Development of a Virtual Reality Application Affecting Relaxation and Well-being

Carolin Straßmann, Sabrina C. Eimler, Alexander Arntz, Dustin Keßler, Sarah Zielinski, Gabriel Brandenburg, Vanessa Dümpel, Uwe Handmann  
firstname.surname@hs-ruhrwest.de  
University of Applied Sciences Ruhr West  
Institute of Computer Science  
Bottrop, Germany

## ABSTRACT

The present work aims to develop an immersive technology that has a positive effect on users' relaxation and well-being. Based on adaptation and customization, the virtual reality application can match the users' needs and preferences and actively foster relaxation and well-being. Such technologies are valuable to reduce high stress levels and therewith connected mental health issues.

## CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**.

## KEYWORDS

virtual environment, positive computing, relaxation, well-being

## 1 POSITIVE EFFECTS OF VIRTUAL REALITY

Large companies often use immersive sleeping capsules to provide possibilities of short-term relaxation to enhance employee's well-being and concentration. However, those capsules are expensive and do not exclude distractions from the outside environment. As studies support relaxation potential of virtual reality (VR) [1, 4], the basic idea of the developed application is that, based on the immersive nature of VR environments, users can escape more from reality, are less interrupted from the outside and a relaxing effect will occur quickly. In addition, the application is prospectively assumed to be customized by the users and to adapt automatically to their physiological responses. This will actively support the relaxing effect and enhance positive outcomes. As a first step the VR environment was created and an evaluation study compared the relaxing effect of it to those of the aforementioned sleeping capsule.

## 2 EVALUATION STUDY

To investigate the relaxing effects of virtual environment and immersion, an experimental study was conducted. In a 2 (virtual reality application vs. audio only) X 2 (simple deckchair vs. immersive sleep capsule) between-subjects design the effects of the developed application were tested with regard to positive and negative affect, perceived strain and technology acceptance. Therefore, participants (N = 61) filled in questionnaires (control variables and baseline measures of strain and mood), used one of the four different application versions for 15 minutes and afterwards evaluated it again with questionnaires (PANAS [2]; State Trait Anxiety Inventory [3]; Technology Acceptance Model [5]) and qualitative

statements (e.g. advantages and disadvantages). Qualitative statements support the assumption that virtual environment enhances immersion, escapism from reality and consequently relaxation. In contrast, analyses of the self-reported questionnaire data did not show significant differences between the virtual reality application and the audio only version. Moreover, the sleeping capsule did not lead to more relaxation than the simple deck chair. However, in all conditions participants were more relaxed after the relaxation phase ( $M = 1.77$ ;  $SE = .05$ ) than before ( $M = 1.99$ ,  $SE = .05$ ),  $F(1, 57) = 45.370$ ,  $p < .001$ ,  $\eta^2 = .443$ .

## 3 CONCLUSION AND FUTURE WORK

Although first results of the evaluation are ambiguous, users valued in their qualitative statements the immersive nature and customization option of the developed application. So far the tested application did not adapt to the user nor had the users a chance to choose the presented virtual stimuli. Hence, users' physiological data needs to be embedded into the application so that it can adapt and response to the users' needs. Moreover, this data can also be visually embedded into the virtual reality, since it might have a meditative effect watching one's own physiological responses. Since no significant difference between the sleeping capsule and the deck chair occurred, such expensive capsule are not necessary to foster relaxation and well-being.

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## REFERENCES

- [1] Ilkka Kosunen, Mikko Salminen, Simo Järvelä, Antti Ruonala, Niklas Ravaja, and Giulio Jacucci. 2016. RelaWorld: neuroadaptive and immersive virtual reality meditation system. In *Proceedings of the 21st International Conference on Intelligent User Interfaces*. ACM, 208–217.
- [2] Heinz Walter Krohne, Boris Egloff, Carl-Walter Kohlmann, and Anja Tausch. 1996. Positive and Negative Affect Schedule—German Version. <https://doi.org/10.1037/t49650-000>
- [3] Lothar Laux. 1981. *Das State-Trait-Angstinventar (STAI) : theoretische Grundlagen und Handanweisung*.
- [4] Florian Soyka, Markus Leyrer, Joe Smallwood, Chris Ferguson, Bernhard E. Riecke, and Betty J. Mohler. 2016. Enhancing stress management techniques using virtual reality. In *Proceedings of the ACM Symposium on Applied Perception*. ACM, 85–88.
- [5] Viswanath Venkatesh, Michael G. Morris, Gordon B. Davis, and Fred D. Davis. 2003. User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly* 27, 3 (2003), 425. <https://doi.org/10.2307/30036540>