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Evoking Positive Emotions by the Use of Virtual Reality in Relation to Technique Acceptance

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Content

Abstract

This study examines the effectiveness of virtual reality (VR) in evoking positive emotions in relation to technique acceptance. Past literature showed VR to effectively induce positive emotions. Technique acceptance is claimed to hypothetically have an impact on the effectiveness of VR. Following a between-subject pre-post measure design, 80 participants were allocated randomly over control and experimental condition. All respondents filled in questionnaires to measure emotional affect (Positive and Negative Affect Schedule; Krohne, Egloff, Kohlmann & Tausch, 1996) and technique acceptance (Technology Usage Inventory; Kothgassner, Felnhofer, Hauk, Kasthofer, Gomm & Kryspin-Exner, 2012). The participants in the experimental condition received a virtual reality exercise in a virtual beach environment. In the control condition respondents received a guided meditation. The data were analysed with repeated measure ANOVA, t-tests and regression analysis. The results showed that the VR device was not significantly more effective in evoking positive emotions than the guided meditation. In contrast, it was found that the positive emotions significantly reduced after the interventions took place. Moreover, Technology anxiety was significantly reduced after the usage of VR. Finally, the effectiveness of VR on evoking positive emotions was not moderated by technique acceptance. Thus, technique acceptance had no influence on the effectiveness of VR interventions on inducing positive emotions. This study had some limitations such as technological boundaries, which could interrupt the implementation of positive emotions. Because this study was one of few control studies examining the effectiveness on evoking positive affect, there is need for further investigations.

1. Introduction

In March 2016, Samsung sold their new Smartphone Galaxy S7 in combination with a fitting virtual reality (VR) device (“The Gear VR Offer”, 2016). This is an example of the recent hype around VR technologies. Given the growing interest in and access of virtual reality technologies, many new applications have emerged, such as for gaming. VR was already used in diverse fields, for example in gaming or pilot training. In psychology, VR is used mainly in the exposure therapy (Turner & Casey, 2014). This research focuses on the use of VR for psychological applications, especially in the field of positive psychology. A focal point is the effectiveness of such a device in evoking positive emotions. Furthermore, the research concentrates on technique acceptance and its influence on the effectiveness in inducing positive emotions.

1.1. Positive Psychology and Positive Emotions

According to the two continua model, mental health comprises two dimensions: 1) the absence of psychopathology and 2) the existence of wellbeing (Westerhof & Keyes, 2010). Positive psychology belongs to the second dimension. It is a direction in psychology whit the main object to enhance the life of individuals, communities and society by reinforcing wellbeing, positive emotions and talents. The World Health Organization defines wellbeing as a state “in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community.” ("WHO | Mental health: a state of well-being", 2016). This means that wellbeing is a state in which people can use and develop their full capacities. The aim of the positive psychology approach is to help individuals, communities and the society to flourish (Seligman & Csikszentmihalyi, 2000). Flourishing means growing one’s own self and develop one’s talents further and not just repairing the problems and illnesses, as in psychopathology (Seligman & Csikszentmihalyi, 2000).

Positive emotions are considered to form the basis for the growing and flourishing self (Fredrickson, 1998). According to the Broaden and Build theory (Fredrickson, 1998), positive emotions are especially important to increase the level of subjective wellbeing. According to Fredrickson (1998), the positive emotions joy, interest, contentment and love “broaden (rather than narrow) an individual's thought-action repertoire, with joy creating the urge to play, interest the urge to explore, contentment the urge to savour and integrate, and love a recurrent cycle of each of these urges.” (Frederickson (1998), p.315). This means that positive emotions enrich the amount of thoughts about possible actions that could improve wellbeing. Hence, positive emotions build the foundation for self-flourishing, and it is important to evoke them.

1.2. Positive Technologies

A method to evoke positive emotions involves the use of technology (Mitchell, Vella-Brodrick

& Klein, 2010). These are known as positive technologies (Botella, Riva, Gaggioli, Wiederhold, Alcaniz & Baños, 2012). Technologies should be used as tools to improve the quality of personal experiences and therefore to elicit well-being, to be called positive technologies (Botella et al., 2012). Some of these technologies are used to induce positive emotions (Mitchell, Vella-Brodrick & Klein, 2010; Botella et al., 2012; Baños, Etchemendy, Farfallini, García-Palacios, Quero, Botella, 2014). In a meta-study, three out of five online based positive psychology interventions were found to be effective in promoting wellbeing. Positive emotions were induced through these interventions (Mitchell, Vella-Brodrick & Klein, 2010). Coupled with online interventions, various media types such as music, videos and pictures can be used. These were especially important in evoking positive emotions, because media seemed to be effective in evoking such emotional states (Bottella et al., 2012; Baños et al., 2014). For example, technology-based visualizations were successfully used to produce relaxation. People were shown videos that were designed to induce positive feelings (Botella et al., 2012). Also, in a study of the 'EARTH of well-being system' multimedia was used effectively to induce positive emotions (Baños et al., 2014).

The use of such technologies has advantages in evoking positive emotions. At first, the use of (multi)media showed a higher effectiveness in positive psychology interventions compared to interventions without the use of media (Ritterband, Cox, Gordon, Borowitz & Kovatchev, 2006; Abbott, Klein & Ciechomski, 2008). Secondly, costs for the health care system and the individuals using these technologies are low (Riva et al., 2014; Mitchell, Vella-Brodrick & Klein, 2010). Finally, there is the benefit of accessibility, because a wide range of people can use for example online positive psychology interventions at home (Riva et al., 2014; Mitchell, Vella-Brodrick & Klein, 2010). These advantages also apply to virtual reality technology (Botella et al., 2012; Baños et al., 2014). For example, VR devices have become more accessible due to technological improvements (Baños et al., 2014). Moreover, the use of VR is expected to extend in the future (Botella et al., 2012).

1.3. Definition of Virtual Reality

In this research the following definition of VR will be used: "Virtual Reality is a complex user interface that includes simulations in real time through multiple sensorial channels. These sensorial modalities are visual, auditory, tactile, olfactory, etc." (Burdea, 1993 in Botella, Quero, Baños, Gracia Palacios & Riva, 2006). This broad definition focuses on the human senses to which the technology will adopt or is already adopted.

To amplify this broad definition, there are special attributes of VR devices, called 'the three I's', namely immersion, interactive and imagination. Firstly, VR is immersive, because this technology evokes a feeling of being physically present in the technologically developed environment (Botella et al., 2006). This attribute is also known as 'presence', which is an important factor for this technology (Steuer, 1993). Secondly, VR is interactive because people using it can actively interact with the

technology, for example by moving their head, which results in looking around in the virtual environment. Finally, imagination is ascribed to VR, because it offers a lot of different applications in various areas, such as psychology, medicine and engineering. This means that VR can be used in many creative ways in different professional fields.

1.4. VR Applications in Psychology

The most common use of VR in the clinical setting is in behavioural therapies, such as exposure therapy (Turner & Casey, 2014). In a number of studies, the use of VR has turned out to be effective in line with the therapeutic goals, such as reducing anxiety symptoms in exposure therapy for acrophobia (Rothbaum, Hodges, Kooper, Opdyke, Williforth & North, 1995) or in the treatment of posttraumatic stress disorder (Aiken & Berry, 2015). Additionally, VR was used successfully in the therapy of chronic pain (Wiederhold & Wiederhold, 2007) and physical rehabilitation. In one study, the cognitive skills of schizophrenia patients were recovered by using VR (Moreira da Costaa & Vidal de Carvalhob, 2004). These are examples of the use of VR in psychopathology. But VR could also be used in the positive psychology.

Research examining VR to increase wellbeing and happiness is rare, but the number of such VR studies I expected to expend in future (Turner & Casey, 2014 & Forman, 2010). However, research is rare, VR to promote wellbeing seemed to be effective as well. For example, one meta-study revealed that VR was effective independent of the kind of intervention (Turner & Casey, 2014). Thus, VR interventions were effective in decreasing psychopathological symptoms as well as in increasing psychological well-being. Furthermore, this study expects VR to have more applications to increase wellbeing. Again, Forman (2010) showed a tendency to use VR for skill development. Therefore, studies examining the use of VR in positive psychology are forthcoming. Especially in terms of inducing positive emotions, VR seems to be advantageous. The use of colours, music, sounds and images in VR were effective in evoking positive emotional states (Baños et al., 2014). Moreover, VR is more applicable in daily life than traditional Mood Induction Procedures (MIP) are (Baños et al., 2014). Hence, there is a need for more VR research in positive psychology, especially to induce positive emotions.

There are few studies that discuss the use of VR in evoking positive emotions (Baños, Botella, Rubio, Quero, Gracia-Palacios & Alcaniz, 2008; Felnhofer, Kothgassner, Schmidt, Heinzle, Beutl, Hlavacs & Kryspin-Exner, 2015). One study showed that it was possible to evoke positive emotions like joy and relaxation through the use of VR (Baños et al., 2008). In this research, positive emotions were induced by a virtual park environment, through which the participants could walk. Simultaneously, the respondents listened to a history told from a voice guide, as well as to music and mood induction sentences of Veltens (Baños et al., 2008). Another study reported to have successfully induced the emotions of joy, sadness, boredom, anger and anxiety using a VR technology

(Felnhofer et al., 2015). Different park environments were constructed that evoked different emotions. For example to induct joy, a sunny, calm and quite scenario with the noises of birds was used. To evoke anger, constant noises were exposed to the participants. To induct a feeling of boredom, a square with empty benches and few blade trees were used, while for anxiety a night time park with few shadowy silhouettes and the noises of an owl was used. Finally, to induct a feeling of sadness, a grey and rainy park was created (Felnhofer et al. 2015). Similar to the study of Baños et al. (2008), a study about the 'EARTH of well-being system' evoked positive emotions through VR. In the 'EARTH' study all interventions to induce positive affects were effective, VR as well as MIPs. However, the participants preferred the use of VR and showed an accepting attitude toward this technique (Baños et al., 2014).

1.5. Technique Acceptance

An important factor in the effectiveness of VR applications seems to be technique acceptance (Scharfenberger, 2012). According to the technique acceptance model (TAM), the acceptance of a technology is important for someone's intention to use it, if the technology is not accepted, it is unlikely that it will be used. Technique acceptance is the extent to which people accept a new technology (Davis, 1985). The TAM model is based on the theory of planned behaviour of Fishbein and Ajzen (1975). It originally consisted of three factors. The first factor, called 'perceived usefulness', indicates how useful a possible user perceives the technology to be. The second factor, 'perceived ease of use', describes the perceived comfort to use the technology. The third factor is the attitude towards using the technological device, which has been predicted by the other two factors. The attitude predicts the intention to use the technology, which results in the actual use (Kothgassner, Felnhofer, Hauk, Kasthofer, Gomm & Kryspin-Exner, 2012).

There are different versions and variations of this model. The factors that predict the use of a technology vary strongly. In one version, the TAM has been applied to the use of virtual reality technologies (here named TAM-VR). In one extended TAM model, the factors of curiosity and immersion were added, which were both positively associated with the intention to use VR (Scharfenberger, 2012). A questionnaire of Scharfenberger (2012), developed to measure the technique acceptance of VR, included eight factors to determine the intention to use it and thus the acceptance of VR (see Figure 1). These eight factors are as follows: immersion, curiosity, interest, accessibility, perceived ease of use, perceived usability, technology anxiety and technology scepticism.

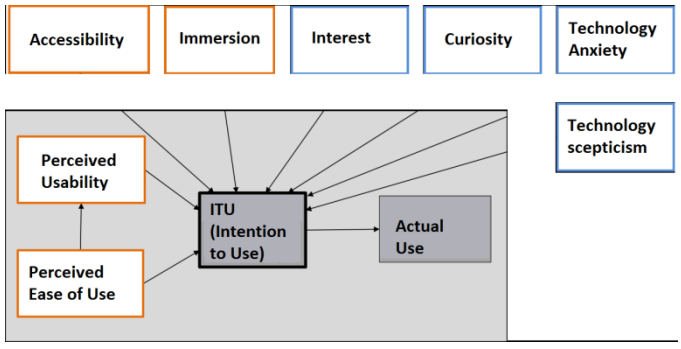


Figure 1. TAM to Predict the Use of Virtual Reality Technologies (Kothgassner, Felnhofer, Hauk, Kasthofer, Gomm & Kryspin-Exner, 2012)

The intention to use is related to the actual use of the VR technology. If VR is not used, it cannot be effective. The dimensions of technique acceptance predict the intention to use a VR. Hence, technique acceptance is indirectly related to the effectiveness of VR. However, it is not yet examined if the effectiveness is related to technology acceptance. Technique acceptance is only hypothetically related to the effectiveness of a VR treatment (Scharfenberger, 2012).

Presently, only few studies examine technology acceptance of VR technologies in psychology (Baños et al., 2014; Moreira da Costaa, & Vidal de Carvalhob, 2004; Gracia-Palacios, Botella, Hoffmann & Fabregert, 2007). One study showed that an internet-based approach was accepted to the same degree as the approach with a professional therapist (Botella, Gallego, Garcia-Palacios, Baños, Quero, & Alcañiz, 2009). This gives some insights into the acceptance of technology in psychological interventions. In a VR study involving schizophrenia patients with cognitive problems, it was reported that all respondents accepted the VR device and that they showed a desire to use them again. The effect of this study was positive, thus the cognitive symptoms decreased (Moreira da Costaa & Vidal de Carvalhob, 2004). Another research compared the acceptance and refusal rates between VR exposure therapy and in vivo exposure therapy (Gracia-Palacios, Botella, Hoffmann & Fabregert, 2007). The results showed that the VR device was better accepted and less often refused (three percent), than in vivo therapy (27 percent refusal rate). However, the effectiveness of the therapy was not examined in this study. In sum these studies showed that the virtual reality was accepted by most of the participants after usage. Although VR treatments were reported to be successful, the results did not show if the effectiveness is related to a positive, accepting attitude towards the VR device. To implement VR technology in practice, it is important to examine such relations (Scharfenberger, 2012).

1.6. Aim of the Study

The aim of the study is to investigate the effectiveness of VR in evoking positive emotions in relation to technology acceptance. Thus, it is determined whether technique acceptance increases the effectiveness. Furthermore, there is a need for control studies in the effectivity of VR treatments (Felnhofer et al., 2015; Turner & Casey, 2014). Additionally, this study investigates the overall acceptance of the VR device, because literature showed the importance of technique acceptance (Scharfenberger, 2012). A high acceptance is expected, because research showed a generally high accepting attitude of VR (Gracia-Palacios, Botella, Hoffmann & Fabregert, 2007; Baños et al., 2014).

This research will examine the following research question:

Is VR effective to evoke positive emotions and to what extent does technique acceptance contribute to the effectiveness of VR to evoke positive emotions?

There are in total three hypotheses:

1. The VR technology is more effective than a control condition to evoke positive emotions.

This was based on the study of Felnhofer et al. (2015) and on the meta-analysis of Turner and Casey (2014).

2. The acceptance of VR is greater after the use of the VR device than before.

This was based on the positive results regarding the acceptance of VR (Botella et al., 2014).

3. Technology acceptance is a moderator to the effectiveness of evoking positive emotions through VR technology.

2. Method

2.1. Design

In this study a between subject pre-test post-test design was employed, with participants using the virtual reality device in the experimental group and respondents exposed to a guided meditation in the control group. The variable technique acceptance was examined as a moderator with as between-subject variable the condition and as dependent variable the level of affect. Furthermore, this study was a randomized control trial. Thus, the participants were randomly distributed over the conditions.

2.2. Participants

The participants included only people who could understand and speak German well and could moderately understand English. The minimum age requirement was 18 years. People who were under psychological treatment or had a serious visual or hearing impairment were excluded. Moreover, participants who needed glasses were asked to wear contact lenses instead.

In total, 80 people participated. Both groups, the experimental and the control group, included 40 participants. The age of the respondents ranged from 19 to 78 years (M=33.25, SD=15.33). Table 1 shows an overview of the gender, nationality, education and profession of the participants. Besides German participants, one Dutch and one Greek person also took part in this study. The majority of the participants were highly educated (85%), most of whom had a general qualification for university entrance. There were few with university diplomas (13.80%). Furthermore, 13.75% were moderately educated and only 1.25% was low educated. Most of the respondents were university students (51.25%). However, there were also 8.75% with other professions, such as dual student, housewives, pensioners and senior teacher. Between the experimental and control group no significant difference was found between gender (X^2(1)= 0.45, p=.50), nationality (X^2(2)=2.00, p=.27), age (X^2(27)=24.61, p=.60), education (X^2(6)=7.79, p=.25) and actual profession (X^2(4)=2.59, p=.63). This shows that the randomization was successful.

Tabel 1. Frequency and percentage of gender, nationality, education and profession.

Classification	Range	Frequency	Percentage (%)
Gender	Men	37	46.25
	Women	43	53.75
Nationality	German	78	97.50
	Other	2	2.50
Education	Low	1	1.25
	Middle	11	13.75
	High	68	85.00
Profession	Trainee	3	3.75
	Employed	26	32.50
	Self-reliant	3	3.75
	Student (University)	41	51.25
	Other	7	8.75

2.3.Materials

2.3.1. Hardware

In this study, a Samsung smartphone (Galaxy S4 mini) was used in combination with a google cardboard to create the virtual reality. Thus, there was a cardboard with lenses, where a smartphone could be put. This apparatus was set up on to the head of the respondents, so that they could look through the lenses on the screen of the smartphone. Additionally, a flexible bandage was bound to the cardboard for the fixation and headphones of the smartphone were used for the sounds of the virtual reality device. Participants had to fill in the questionnaires on a laptop. This was an “HP 350 G2”.

2.3.2. Software

To stimulate a virtual environment to evoke positive emotions, the “Perfect Beach VR” app from nDreams LTD was used. This presented a sunny, calm, and daytime environment on a beach with some calm noises of the sea. See Pictures 1 and 2 for screenshots of this scenery. The chosen environment was based on the study of Felnhofer et al. (2015), where a similar sunny and calm environment was used to induce a state of joy. Moreover, the used application in the current study had a preinstalled guided meditation in English, which was used in both conditions. To construct the online questionnaire the program “Qualtrics” was used.

Picture 1. Virtual Environment Beach.

Picture 2. Virtual Environment Beach with Male Avatar.

2.3.3. Questionnaires

Questionnaires were used in order to measure the relevant variables of this research such as positive emotions and technique acceptance. The whole questionnaire with all constructs and general questions can be found in Appendix A.

Demographic variables. The first part of the questionnaire was designed to gain general information about the participants. The questions were about the participants' gender, age, nationality, education, actual profession and level of computer experiences.

Positive Emotions. The first questionnaire was the German version of the Positive and Negative Affect Schedule (PANAS; Krohne, Egloff, Kohlmann & Tausch, 1996). The original version was from Watson, Clark and Tellegen (1988). The questionnaire measured the actual positive and negative states of mind and had high psychometric quality (Janke & Glöckner-Rist, 2014). The questionnaire included 20 adjectives, ten which were negative while the other ten were positive. For example, a negative adjective was "upset", a positive adjective was "inspired". The items were scored on a five-point Likert-scale. The participants were asked to answer according to their present state of mind by marking their degree of agreement (1 = very slightly or not at all, 5=extremely). The scores of the ten negative adjectives were added and ten positive adjectives were added to build a sum score for the two dimensions. A higher score meant a higher degree of positive or negative emotions. Cronbach's alpha for the positive items was 0.85 while it was 0.70 for the negative items, which meant that the scales were reliable (Cronbach, 1951).

Technology acceptance. The second relevant questionnaire in this research was the Technology Usage Inventory (TUI; Kothgassner, Felnhofer, Hauk, Kasthofer, Gomm & Kryspin-Exner, 2012). This was a German questionnaire to measure the technique acceptance of virtual reality technologies and the intention to use these devices. The TUI had a good psychometric quality (Kothgassner, Felnhofer, Hauk, Kastherof, Gomm & Kryspin-Exner, 2012). In this research, only the pre version of the TUI was used, because the technique acceptance prior to the use of the VR device should be measured. This TUI version consists of eight items, distributed on two scales: 1)curiosity and 2) technology anxiety. An example item for curiosity is: 'I am eager to learn more about this technology.' and for technology anxiety: 'I find it hard to trust technological devices.' Each scale comprised four items answered on a 7-point Likert-scale (1= does not apply, 7= apply to). A sum

score for both scales was made by adding the scores of the individual items. The dimensions of the TUI questionnaire were reliable (Curiosity: α=0.91, Technology anxiety: α=0.90) (Cronbach, 1951).

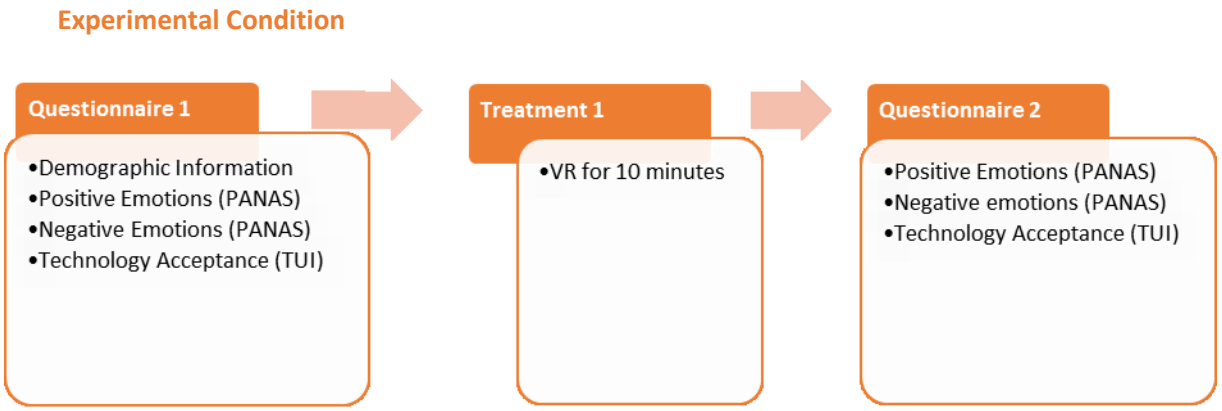
2.4. Procedure

First the study was approved for ethical standards by the ethics commission of the University Twente. The data collection took place from 01.04.2016 until 31.04.2016.

The respondents were recruited through a convenience sampling. Therefore, people from the immediate vicinity of the examiner were asked to take part in the study. The participation in the study was voluntary. The people, who agreed to take part, were randomly distributed over two conditions, the experimental condition and the control condition. The procedure of each can be seen in Figure 2.

The room, where the research took place was primarily located in a neutral place at the respondent's home, such as the living room. Furthermore, they sat in a rotatable chair or one without a back, so that they were free to move around with the VR application on. Additionally, good air conditions and good lightening situations were ensured. For the virtual reality purpose a room without a lot of light variations was appropriate, like a very light room or a dark one. Moreover, the researcher and the participant could comfortably sit together in front of the laptop.

After the respondents agreed to participate in the research, they were welcomed. They were then given an information text (Appendices B1 and B2) depending on the condition they were in. They were informed about the theme and goal of the investigation, the course of actions, the duration (40-50 minutes), and that their data was processed anonymously. Furthermore, they were informed that they could stop at any moment through the experiment. If the participants agreed on the given information, they filled in an informed consent (Appendix C). At this point the research started, which was slightly different for the two groups (see Figure 2, with experimental condition= orange, and control condition= blue, where the light blue part is only relevant for the second hypothesis). First, the experimental condition will be described.



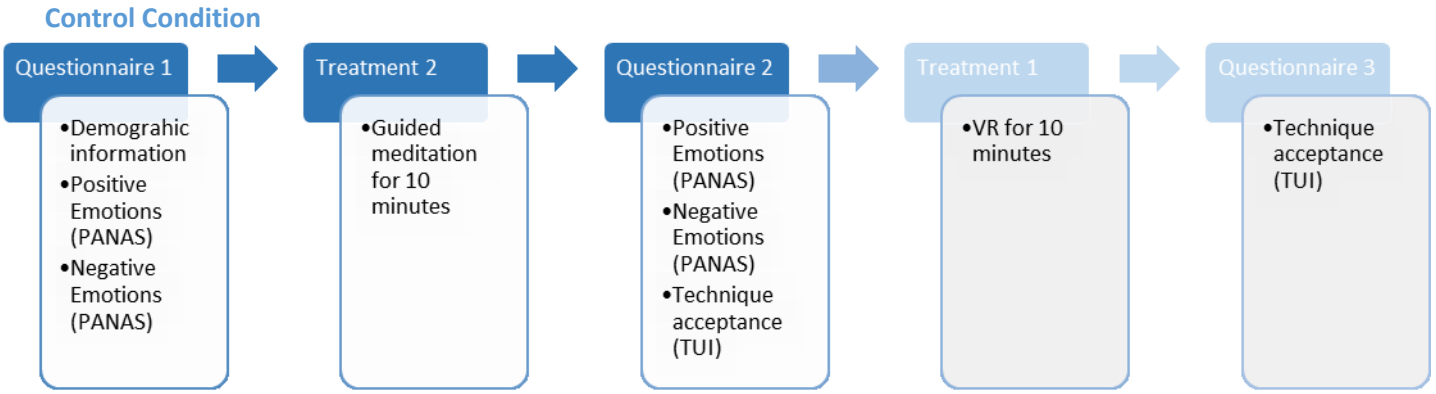


Figure 2. Course of Action of the Experimental and Control Condition

The participants filled in a set of questionnaires that included general questions about their gender, age, education and profession. Then they were required to fill in a questionnaire that measured the affect and technique acceptance. Before the virtual reality exercise was done, the respondents received a short instruction regarding the exercise, such as what they would see (the beach), the time duration of 12 minutes, the guided meditation and the possibility to look around. The participants then received the virtual reality device to look through it and the earphones to put them on. After this, the guided meditation of the perfect beach application was started, and the respondents spent approximately 12 minutes to follow the meditation and look around. After the exercise ended, the respondent filled in a second set of questionnaires, which measured the affect and technique acceptance.

The respondents in the control condition answered the first set of questions like the experimental group, except for the TUI. Then, instead of the virtual reality exercise, they were exposed to the guided meditation. This was the same as the one used in the experimental condition. After they put on the headphones, the participants in the control condition were instructed to imagine a perfect beach. Like the experiment group, they spent 12 minutes on this exercise. Then they filled in a second set of questionnaires that measured the affect and technique acceptance. To get a sufficient number of respondents to describe technique acceptance before and after the use of VR technology (Hypothesis 2), the participants in the control condition also spent about five minutes in the virtual environment, but without the guided meditation. Thus, they only received the VR application and the headphones with the sounds of the waves and the wind on the beach. The participants were instructed to look around and get an impression of this technology. Afterwards, they filled in the TUI to measure technique acceptance.

After the respondents had filled in the questionnaires the research ended with a debriefing. This contained the ultimate goal to reach with the research, the tested variables, a short explanation of the two conditions, in which they were, and the possibility to ask questions and contact the researchers after the research (Appendix D).

2.4. Data Analysis

The analysis was done using a statistic program called SPSS. At first all sum scores of the scales were examined through a histogram for normal distribution. Apart from the scores of the pre and post measures of the negative scale of the PANAS, all sum scores were moderate normal distributed. Because tests with normal distribution are robust and fit best by the data, these were used to test the negative scales of the PANAS for differences. To describe the sum scores of the TUI, the raw scores were converted into stanine values using of a table (Appendix E). To test for randomization, a t-test for independent samples was conducted with condition as between-subject-variable and the pre measures of positive and negative affect. Curiosity and technology anxiety were the dependent variable. In order to examine the first hypothesis, a repeated measure ANOVA was used with between-subject factor conditions (experimental vs control) and dependent variables the pre and post measures of the positive and negative affect. To test the second hypothesis, a t-test for related samples was conducted with the pre and post measurement of the curiosity and technology anxiety scale as variables. Finally, to examine the moderating effect of technique acceptance on the effectiveness of the VR intervention, a regression analysis was performed with the difference of the positive affect before and after the intervention as dependent variable, the group condition as independent variable and a sum score of technique acceptance as moderator. At first, all variables were centred. Then, an interaction variable was made of technique acceptance and the condition. To make the regression analysis more manageable and for the sake of parsimony, a sum score of technique acceptance was computed. Therefore, the scale of technology anxiety was first rescaled.

3. Results

3.1. Descriptive Statistics

Table 2 shows the means and standard deviations of the different scales and the stanine values of the TUI dimensions for the two separate conditions as well as the whole sample. Based on the possible range, the scores on the positive affect before and after the interventions were average. The negative affect scores were very low. According to the stanine values, the dimensions of curiosity and technology anxiety were normal before and after the use of the VR device. The scores of technique acceptance were higher than the possible average.

To test the randomization, differences between the pre measures and the conditions were examined. The t-test revealed no significant difference between the two conditions on the pre measures of positive affects ($t(78)=1.21$, $p=.23$) and negative affects ($t(78)=-1.57$, $p=.13$). Also, on the pre measures of technology anxiety, were no significant difference between the experimental and control condition ($t(78)=-1.87$, $p=.07$). However, the pre measures of curiosity were significantly different between the two groups ($t(78)=2.80$, $p=.01$). In sum, the randomization was successful, apart from the coincidental difference on curiosity.

Table 2. Means and Standard Deviations of the General Sample, Experimental and Control Condition.

Dimensions (Range)					General [c]		Stanine values	Explanation of the stanine values (low vs high)
	Experimental Condition[a]		Control Condition[b]					
	M	SD	M	SD	M	SD		
Pre PA (10-50)	31.43	6.81	33.10	5.49	32.26	6.20		
Post PA (10-50)	29.15	6.83	29.88	7.36	29.51	7.06		
Pre NA (10-50)	12.23	2.40	11.43	2.25	11.83	2.35		
Post NA (10-50)	11.23	2.02	11.18	2.85	11.20	2.46		
Technique acceptance (8-56)	34.75	7.78	40.30	9.02	33.51	8.83		
Pre Curiosity (4-28)	13.9	5.90	17.50	5.57	15.70	5.99	5	Normal
Pre Technology anxiety (4-28)	11.18	4.37	9.20	5.05	10.19	4.80	5	Normal
Post Curiosity (4-28)	14.63	5.96	17.75	6.07	16.19	6.18	6	Normal
Post Technology anxiety (4-28)	10.25	5.02	8.53	5.20	9.39	5.15	5	Normal

Note. PA= positive affect; NA= negative affect
a) N=40
b) N=40
c) N=80

3.2. The Effectiveness of Virtual Reality in Evoking Emotional Affect

According to the first hypothesis, the experimental group gains to higher degree positive emotions than the control group. In Table 3 were the results of the analysis for positive affect. The repeated measure ANOVA revealed a significant effect of time on positive affect ($F(1, 78)= 9.64$, $p<.05$). The means in Table 2 show that there was a decrease in positive affect during the interventions. There was no significant difference between the conditions on positive affect ($F(1, 78)= 0.86$, $p=.36$). Thus, the positive emotions did not differ between the control and the experimental condition. The interaction effect of time and condition was not significant ($F(1, 78)3 =0.42$, $p=.52$). The VR intervention did not increase positive emotions to a higher extent than the control condition.

To state the effectiveness of the intervention, there was also tested for a significant decline in the negative affect. Table 4 shows the results of the analysis for negative affect. The repeated measure ANOVA did not show a significant effect of time on the negative affect ($F(1, 78)=0.56$, $p=.46$). Thus, the negative emotions did not decrease during the interventions. There was no significant difference in the negative emotion scores between the experimental and the control condition ($F(1, 78)=0.78$, $p=.38$). Finally, there was no significant interaction effect of time and condition ($F(1, 78)=2.54$, $p=.12$*).* In other words, the VR intervention did not decrease negative emotions to a higher extent than the control condition. Therefore, the first hypothesis is not confirmed. The VR intervention was not more effective in evoking positive emotions than the guided meditation. In addition, the decrease in the negative affect was not different between the conditions.

Table 3. Repeated Measure ANOVA Statistics for Positive Affect

Source	Sum of Squares	Df	Mean Square	F	Sig.(p)
Time	208.01	1	208.01	9.64	>.05
Condition	57.60	1	57.60	0.86	.36
Time*Condition	9.03	1	9.03	0.42	.52

Note. Sig. = signification level (2-tailed)

Table 4. Repeated Measure ANOVA Statistics for Negative Affect

Source	Sum of Squares	Df	Mean Square	F	Sig.(p)
Time	1.25	1	1.25	0.56	.46
Condition	7.23	1	7.23	0.78	.38
Time*Condition	5.63	1	5.63	2.54	.12

Note. Sig. = signification level (2-tailed)

3.3. The Extent of Technology Acceptance

The second hypothesis was that technique acceptance was higher after the use of VR. Therefore, the scores on curiosity should be higher after the use of VR while the scores on technology anxiety should be lower. Table 5 shows the results of the t-test. The t-test for related samples revealed no significant difference between the scores of curiosity before (M= 15.70, SD= 5.99) and after *(*M=16.19, SD= 6.18) the use of VR ($t(78)=-1.66$, $p=.10$). The t-test for related samples for the scale technology anxiety showed a significant difference before (M=10.19, SD= 4.80) and after (M=9.39, SD= 5.15) the use of the VR device ($t(78)=2.39$, $p=.02$). In other words, technology anxiety decreased after the use of the VR device. Thus, the second hypothesis is partly accepted.

Table 5. T-test Statistics of the Technology Acceptance Scaled Before and After the Use of VR.

Scale	T-test statistics	
	T[a]	Sig. (p)
Post Curiosity – Pre Curiosity	-1.66	.10
Pre Technology anxiety – Post Technology anxiety	2.39	.02

Note. a: df=78
Sig. = signification level (2-tailed)

3.4. Moderator Analysis of Technique Acceptance

The third hypothesis was that technique acceptance is a moderator for the effectiveness of evoking positive emotions through the use of VR applications. The multiple regression analysis showed no significant regression equation ($F(3, 76)=1.19$, $p=.32$) with an adjusted R-squared of 0.05. Thus, the model with the variables condition, technique acceptance, and interaction variable (condition*technique acceptance) was not appropriate to predict the gained positive emotions. The beta values are shown in Table 6. The first main effect of the regression analysis was not significant ($t(76)=1.75$, $p= .08$). Therefore, there was no difference between the control and the experimental condition in the gained positive emotions, which was also shown in repeated measure ANOVA. Additionally, the second main effect was not significant ($t(76)= 1.70$, $p= .09$). Hence, higher technique acceptance scores did not lead to higher gained positive emotions. The regression analysis revealed that there was no interaction effect of the condition and technique acceptance *($t(76)$=*-0.26*, $p= .14$). In other words, the effectiveness of the virtual reality intervention on evoking positive emotions was not moderated by technique acceptance. Thus, the third hypothesis was rejected.

Table 6. Summary of Regression Analysis for Variables Predicting the Gained Positive Emotions (N=80).

Variable	B	SE(B)	*B*	*t*	Sig. (p)
Condition	5.31	3.03	0.41	1.75	.08
Technique acceptance	0.20	0.12	0.27	1.70	.09
Condition*Technique acceptance	-0.26	0.18	-0.33	-1.49	.14

Note. $R^2=0.05$
Sig. = signification level (2-tailed)
Technique acceptance was centered by its mean.

4. Discussion

The study aimed to examine the effectiveness of virtual reality devices on evoking positive emotions. Therefore, the emotional affect of an experimental group, which received a virtual reality exercise, was compared to the emotional affect of a control group that received a guided meditation without any VR device. Additionally, the degree of technique acceptance was investigated to examine its moderating role in the effectiveness of VR devices on evoking positive emotions. Above all, it was tried to answer the following research question: *Is VR effective in evoking positive emotions and to what extent contributes technique acceptance to the effectiveness of VR to evoke positive emotions*? The results indicated that VR is not effective in evoking positive emotions and technique acceptance does not moderate this effectiveness. Three hypotheses were framed to answer this research question. These are discussed in the following section.

4.1. Effectiveness of Virtual Reality on Inducing Emotional Affects

According to the first hypothesis, VR intervention should be more effective in evoking positive emotions than in a control condition. On basis of the literature and previous studies, it was expected that VR interventions would successfully induce positive emotions (Baños et al., 2008; Felnhofer et al., 2015; Baños et al., 2014). The results of the current study showed that VR was not more effective in inducing positive emotions compared to a guided meditation. In contrast, positive emotions were in both conditions significantly reduced in both conditions during the interventions. In addition, it was tested for decreasing negative emotions to examine the overall effectiveness of VR interventions. The results showed that the negative affect did not decrease in both conditions. Moreover, there was no significant difference between those conditions where negative emotions were reduced. This study indicates that both interventions are not effective in evoking positive emotions or reducing negative ones. Hence, this result does not support past studies that showed VR to be effective on inducing positive affects (Baños et al., 2008; Felnhofer et al., 2015; Baños et al., 2014). According to this investigation, VR and guided meditations could not be used to induce positive emotions. This means that other methods have to be searched for evoking positive affects. For example, emotional pictures in combination with music were used effectively to implement positive affects. Such images and music were aimed to remind the respondents of emotional stat experienced in the past (Sanchez, Vazquez, Gomez & Joormann, 2014).

The contrasting results of the current study and previous research (Baños et al., 2008; Felnhofer et al., 2015; Baños et al., 2014) raise the question why they did not support the expectations of an effective VR intervention or were even contrary to these. First of all, the VR devices used in different studies were different form the current study. In the study of Baños et al. (2008) was used a VR device in combination with mood induction sentences of Veltner. In the current study, instead of such mood induction sentences, a guided meditation was used. The sentences of

Veltner are probably more effective in evoking positive affect than the guided meditation, which would explain the different results. However, in Felnhofer et al. (2015) A virtual environment similar to the current study was used by Felnhofer et al. (2015), even though the technical devices were different. They used a virtual reality technology with higher picture resolution. This technique seems to be of higher quality than the cheap cardboard used in the current study. This could make a difference in the results because technological limitations can have influences on emotional states (Pallavicini et al., 2013). For example the study of Pallavicini et al. (2013) showed a VR device with artificially created errors to be ineffective in evoking emotional affect compared to a device without errors. This was theoretically based on the lack of immersion, also named presence. The technological limitations reduced the sense of presence which, in turn, reduced the effectiveness of inducing emotional affect. In another study, the 'Google cardboard' used in the current study was compared with the 'Samsung Gear VR'. The participants there preferred the 'Samsung Gear VR' because of its higher quality and more comfortable usage (Hussein, & Nätterdal, 2015). This can be supported by the current study, because the respondents reported an uncomfortable fit of the cardboard. Thus, the technological limitations and uncomfortable usage of the VR device in the current study could lead to decreased positive emotions.

But such technological limitations do not explain why both methods, VR device and guided meditation, were ineffective in evoking positive affect. A reason could be the use of the PANAS. The positive affect scale of the PANAS contained items that have been constructed as very active, such as 'strong', 'active' and 'alert'. These items could lead to a bias in reflecting the positively felt emotions because being relaxed would lead to responding with disagreement on these items. But feeling relaxed does not mean per se feeling less positive emotions. Furthermore, Jovanović (2015) argues that such items are not categorized as emotions and the PANAS do not contain basic positive emotions such as 'happy', in the scale. Hence, the bias in answering the positive affect scale of the PANAS could reduce the scores of positive emotions in both conditions.

The discussion of the first hypothesis shows that the results could be influenced by the low quality of the used technology and a bias in the positively felt emotions through the use of the PANAS. Hence, from this study it cannot be inferred that the VR device is effective, or that both methods are not appropriate to evoke positive emotions. It can only be said that there was no difference in the effectiveness between the two conditions. To make a statement about the effectiveness further research is needed.

4.2. Technique Acceptance

The second hypothesis dealt with the extent of technique acceptance. According to this hypothesis, technique acceptance is higher after the use of VR devices. On the basis of previous research, a high usage was expected (Gracia-Palacios, Botella, Hoffmann & Fabregert, 2007; Baños et

al., 2014). For example in the study of Baños et al. (2014), a VR device was preferred over the use of other mood induction procedures and the respondents wanted to use the device again. The results of the current study revealed that the scores of technology anxiety were significantly reduced during the use of the VR device. However, the scores of curiosity did not change significantly. In addition, both scales of technique acceptance were normal in comparison to the norm scores. These results indicate that people are less anxious after the use of VR devices and the probability to use the VR technology again is high. Hence, people have to be motivated to use VR devices for the first time to reduce their anxiety. Then the probability of a follow-up usage increases. This could be advantageous where VR is shown to be effective in long-term usage such as in exposure therapy (Turner & Casey, 2014). Furthermore, the results support the study of Baños et al. (2008) because the participants there showed a high probability of using VR devices again. However, the scores of curiosity did not increase. Hence, this inference has to be made carefully because this scale could also influence follow-up usage.

The not increasing curiosity scores could be attributed to the failure to meet the high expectations of the respondents. Many participants reported to have heard of VR devices before; some of them had even used a VR device. Therefore, they formed high expectations of the study. Afterwards, some of the respondents reported to have the knowledge of better devices, like the 'Samsung Gear VR'. Some even reported to be disappointed about the google cardboard. Thus, the high expectations are not met, which could influence the participants' interest in VR devices. However, most of the respondents were enthusiastic about the VR device. From this, it could be interfered that the acceptance of VR devices will possibly increase with the improvement of this technology in future.

4.3. Moderating Effects of Technology Acceptance

The third hypothesis tested technique acceptance as a moderator in the effectiveness of the VR device on evoking positive emotions. The expectation to find a moderating effect of technique acceptance was based on the relation between the intention to use VR and its effectiveness. According to the TAM-VR model, the intention to use VR is predicted by the dimensions of technique acceptance. Thus, technique acceptance is assumed to be indirectly related to the effectiveness (Scharfenberger, 2012). The results revealed that the effectiveness of VR devices in evoking positive emotions is not moderated by technique acceptance. This means that higher technique acceptance did not lead to higher positive emotions through VR devices. Technique acceptance appeared to have no influence on the effectiveness of VR devices in inducing positive emotions. These results suggest that it does not matter if a person with high or low technique acceptance uses a VR device- it would still be effective. Hence, all people could use VR to evoke positive emotions, irrespective of whether they are convinced of its effectiveness or not. This would mean that people have to be motivated to

use VR devices, they could in the following benefit from its effectiveness and a possible follow-up use will increase. Furthermore, the results suggest that other influencing factors of the effectiveness of VR interventions must be explore.

A possible reason for finding no moderating effect of technique acceptance could be that the technique acceptance score did not include all possible factors that predict the intention of using a VR technology. According to the TAM-VR model, eight factors predict the intention to use (Scharfenberger, 2012), but only two of them, curiosity and technology anxiety, can be measured before the VR device was used. Thus, only the two dimensions examine the intention to use a VR device before its actual use. In contrast, the other factors measure the probability of a follow-up usage. This raises questions about what the TAM-VR predicts. It seems more appropriate to predict the intention to use a VR device again. But the current study examined if the technique acceptance before the actual use of the technology had any influence on the effectiveness. Thus, it has to be clarified what the TAM-VR predicts and through which factors the technique acceptance before the use of VR could be measured appropriately. Other factors influencing the technique acceptance before the actual use could influence the moderating effect.

Another possible explanation that the results showed no moderating effect of technique acceptance could be that it not exists. The current study was the first to examine this relation and found no significant influence of technique acceptance on the effectiveness of VR interventions on evoking positive emotions. Because this is the first study revealing no influence of technique acceptance, there is need for follow-up research to support the findings and to infer that this factor could be ignored in examining the effectiveness of VR interventions.

4.1. Strengths and Limitations of this Research

First of all, a strong point of this study is the choice of a randomized control trial. In the literature a need for controlled studies with a comparable intervention was shown (Felnhofer et al., 2015; Turner & Casey, 2014). The current study meets this need. In addition, a randomized control design has the ‘golden standard’ in the research area. It is a very structured design with randomization, which allows the scope for causal inferences. Another strength of this research is a high ecological validity, because it was used a cheap accessible virtual reality device that could be used at the home of the respondents. This is positive because it was tested for a VR technology that could be used in daily life (Baños et al.,2014). Thus, the high ecological validity makes the results generalizable.

Notwithstanding the strengths of this study, there are also limitations. At first, the positive affect scale of the PANAS lead to biased results, as stated in the discussion of the effectiveness of VR. The items of this scale are constructed as very active. According to this, a relaxed feeling would be scored as feeling less positive emotions. However, such relaxation means not to have lesser positive

feelings. Hence, the use of another questionnaire to measure positive emotions is advised. A possible alternative could be the 'Aktuelle Stimmungsskala' (ASTS) (Dalbert, 1992). This is an adjusted version of the 'Profile of Mood State' (POMS). The ASTS positive emotions measures among other emotional states. Quite unlike the items of the PANAS, the items of the ASTS were constructed around common positive emotions such as 'happy' and 'pleasure'. A second limitation of this study is the used VR device. The use of the cheap 'Google cardboard' could interrupt the implementation of positive emotions. Because nearly all participants recorded that the cardboard had an uncomfortable pressure on the forehead and the nose. Additionally, the technique had some limitations like delays in movements and blinding graphics. The erroneous technological quality could be an interrupting factor in inducing emotional states (Pallavicini et al., 2013). Although the google cardboard had some technological shortcomings, its use leads to a high ecological validity in this study. The google cardboard is a cheap and accessible VR technology. Therefore, it can be used by the respondents in their daily life. In sum, the technological shortcoming of the used VR device can also be an advantage to generalize the results.

4.2. Recommendations for the Future

The current study was the first examining the relation between technique acceptance and the effectiveness of VR on evoking positive emotions. Furthermore, this research is one of the few controlled studies about the effectiveness of VR in inducing positive emotions. Because this study is one of few, further research is needed to support or reject the results. Based on the strengths and limitations, it is advised to choose a similar design in follow-up research, but to select a more comfortable virtual reality device that has higher technological quality. A device with higher quality could outweigh some disruptions in evoking positive emotions. Furthermore, it is advised to choose another questionnaire to measure positive affect. As said above, the positive scale of the PANAS biased the results. An alternative could be the ASTA that measures positive emotions as well. But the items are constructed according to the common positive feelings such as 'being happy'. These are mainly methodological advices for follow-up research, but there are also theoretical implications. At first it has to be clarified what the TAM-VR model predicts, the intention to use VR in general or a possible follow-up usage only. Most of the factors predicting the intention to use VR could not be measured before the actual use of VR. This would indicate that the TAM-VR predicts the possible follow-up usage. The original TAM model developed by Davis (1989) predicts the intention to use a technology in general. Thus, there are differences between the original and the extended TAM model in what it predicts. If the TAM-VR should predict the intention to use a VR device in general, the influencing factors should be adjusted. For example the dimension immersion can only be measured after the VR device was used. Hence, the current study arise questions about the actual prediction of the TAM-VR model. However, technique acceptance seems to be an important factor to predict the

actual use of the VR technology (Scharfenberger, 2012). Nonetheless, technique acceptance had no influence on the effectiveness, as shown in the current study. From this could be advertised to search other factors influencing the effectiveness of VR. A possible interesting influencing factor could be the degree of presence. In the discussion it was seen that technological limitations could influence the effectiveness of VR interventions by a decreasing degree of presence (Pallavicini et al., 2015). This would suggest that presence could influence the effectiveness of VR intervention. Another study showed already a relation between the level of presence and the inducing of emotional states by the use of VR (Riva et al., 2007). Finally, according to the current study, it is advised to motivate the people to use VR devices regardless of their technique acceptance. Because the study found no moderating effect of technique acceptance on the effectiveness of VR interventions, people with a low level of technique acceptance could also use it effectively. This is advantageous for clinical practice because patients with a low level of technique acceptance can use VR devices to induce positive emotions as well. They are not excluded from the possible beneficial effects. Thus, therapists should motivate patients to use a VR device, if VR is found to be effective. The patients would probably benefit from the positive effects and their technology-related anxiety would reduce. In this sense, the probability of a follow-up usage is high. The long-term use of VR devices to evoke positive emotions could lead to an improved well-being of the patient, because positive emotions build the foundation for flourishing. In sum, it is important to find ways to motivate people to use VR devices, so that they can promote general well-being.

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6. Appendixes

Appendix A. Questionnaire

Allgemeine Informationen zu Ihrer Person

Q1 Was ist Ihr Geschlecht?

- ❍ Weiblich
- ❍ Männlich

Q2 Wie alt sind Sie?

Q3 Was ist Ihre Nationalität?

- ❍ Deutsch
- ❍ Niederländisch
- ❍ Anders

Q4 Was ist Ihre höchste bisher erreichter Abschluss?

- ❍ Hauptschulabschluss
- ❍ Realschulabschluss
- ❍ Fachabitur
- ❍ Abitur an einer Allgemeinbildende Schule
- ❍ Bachelor
- ❍ Master
- ❍ Anders _____

Q5 Welches ist Ihr momentaner Berufsstand?

- ❍ Auszubildend
- ❍ Berufstätig
- ❍ Selbständig
- ❍ Student
- ❍ Arbeitssuchend
- ❍ Anders _____

PANAS – Positive Affect

Dieser Fragebogen enthält eine Reihe von Wörtern, die unterschiedliche Gefühle und Empfindungen beschreiben. Lesen Sie jedes Wort und tragen Sie dann in die Skala neben jedem Wort die Intensität ein. Sie haben die Möglichkeit, zwischen fünf Abstufungen zu wählen.

Q6 Geben Sie bitte an, wie Sie sich im Moment fühlen.

	ganz wenig oder gar nicht	ein bisschen	einigermaßen	erheblich	äußerst
aktiv	❍	❍	❍	❍	❍
interessiert	❍	❍	❍	❍	❍
freudig erregt	❍	❍	❍	❍	❍
stark	❍	❍	❍	❍	❍
angeregt	❍	❍	❍	❍	❍
stolz	❍	❍	❍	❍	❍
begeistert	❍	❍	❍	❍	❍
wach	❍	❍	❍	❍	❍
entschlossen	❍	❍	❍	❍	❍
aufmerksam	❍	❍	❍	❍	❍

Stress-scale

Stimmung In der folgenden Liste werden unterschiedliche Stimmungen beschrieben. Bitte kreuzen Sie für jede dieser Stimmungen an, in welchem Ausmaß diese auf Sie zutreffen.

Q7 In welchem Ausmaß treffen die Stimmungen im Moment auf Sie zu?

	trifft überhaupt nicht zu	trifft eher nicht zu	teils teils	trifft eher zu	trifft vollständig zu
lebhaft	❍	❍	❍	❍	❍
energiegeladen	❍	❍	❍	❍	❍
aktiv	❍	❍	❍	❍	❍
schläfrig	❍	❍	❍	❍	❍
müde	❍	❍	❍	❍	❍
träge	❍	❍	❍	❍	❍
angespannt	❍	❍	❍	❍	❍
unbehaglich	❍	❍	❍	❍	❍
besorgt	❍	❍	❍	❍	❍
nervös	❍	❍	❍	❍	❍
gelassen	❍	❍	❍	❍	❍
ruhig	❍	❍	❍	❍	❍
zufrieden	❍	❍	❍	❍	❍
friedlich	❍	❍	❍	❍	❍

PANAS – Negative Affect

Dieser Fragebogen enthält eine Reihe von Wörtern, die unterschiedliche Gefühle und Empfindungen beschreiben. Lesen Sie jedes Wort und tragen Sie dann in die Skala neben jedem Wort die Intensität ein. Sie haben die Möglichkeit, zwischen fünf Abstufungen zu wählen.

Q8 Geben Sie bitte an, wie Sie sich im Moment fühlen.

	ganz wenig oder gar nicht	ein bisschen	einigermaßen	erheblich	äußerst
bekümmert	❍	❍	❍	❍	❍
verärgert	❍	❍	❍	❍	❍
schuldig	❍	❍	❍	❍	❍
erschrocken	❍	❍	❍	❍	❍
feindselig	❍	❍	❍	❍	❍
gereizt	❍	❍	❍	❍	❍
beschämt	❍	❍	❍	❍	❍
nervös	❍	❍	❍	❍	❍
durcheinander	❍	❍	❍	❍	❍
ängstlich	❍	❍	❍	❍	❍

Level of Computer Experiences

Erfahrung mit Computern Der folgende Fragebogen umfasst fünf Aussagen über Erfahrung mit Computern (PCs/Laptops). Bitte geben Sie für jede Aussage an inwiefern diese auf Sie zutrifft, indem Sie Gebrauch von der 5-Punkte-Skala machen. Je höher die Zahl, desto höher die Zustimmung. Es gibt dabei keine richtigen oder falschen Antworten. Wenn Sie sich bei einer Aussage unsicher bezüglich Ihrer Antwort sind, dann wählen Sie jene Antwortmöglichkeit die am ehesten auf Sie zutrifft. Bitte antworten Sie dabei spontan, ohne zu lange über die einzelnen Fragen nachzudenken.

Q9 Inwieweit treffen die folgenden Aussagen auf Sie zu?

	trifft gar nicht zu	trifft eher nicht zu	teils teils	trifft eher zu	trifft genau zu
1. Ich würde mich als jemanden bezeichnen der gut mit Computern umgehen kann.	❍	❍	❍	❍	❍
2. Ich mache in meiner Freizeit oft Gebrauch von Computern.	❍	❍	❍	❍	❍
3. Ich fühle mich wohl wenn ich einen Computer bediene.	❍	❍	❍	❍	❍
4. Ich würde mich als jemanden bezeichnen der erfahren ist im Umgang mit Computern.	❍	❍	❍	❍	❍
5. Ich habe in den vergangenen 5 Jahren regelmäßig Gebrauch von Computern gemacht.	❍	❍	❍	❍	❍

Personality

Im Folgenden werden Ihnen Aussagen angeboten auf die Sie angeben wie sehr diese auf Sie zutreffen. Dies tun Sie auf einer Skala von vier Abstufungen von "trifft gar nicht zu" bis "trifft genau zu". Antworten Sie möglichst spontan. Es gibt keine richtigen oder falschen Antworten.

Q10 Inwieweit treffen die folgenden Aussagen auf Sie zu?

	trifft gar nicht zu	trifft eher nicht zu	trifft eher zu	trifft genau zu
Ich bin gerne mit anderen Menschen zusammen.	❍	❍	❍	❍
Ich bin ein Einzelgänger.	❍	❍	❍	❍
Ich will immer neue Dinge ausprobieren.	❍	❍	❍	❍
Ich bin in vielen Vereinen aktiv.	❍	❍	❍	❍
Ich bin ein gesprächiger und kommunikativer Mensch.	❍	❍	❍	❍
Im Grunde bin ich oft lieber für mich allein.	❍	❍	❍	❍
Ich bin sehr kontaktfreudig.	❍	❍	❍	❍
Ich bin ein neugieriger Mensch.	❍	❍	❍	❍
Ich diskutiere gerne.	❍	❍	❍	❍
Ich kann schnell gute Stimmung verbreiten.	❍	❍	❍	❍
Ich reise viel, um andere Kulturen kennenzulernen.	❍	❍	❍	❍
Ich gehe gerne auf Partys.	❍	❍	❍	❍
Am liebsten ist es mir, wenn alles so bleibt, wie es ist.	❍	❍	❍	❍
Ich lerne immer wieder gerne neue Dinge.	❍	❍	❍	❍
Ich beschäftige mich viel mit Kunst, Musik und Literatur.	❍	❍	❍	❍
Ich interessiere mich sehr für philosophische Fragen.	❍	❍	❍	❍
Ich lese viel über wissenschaftliche Themen, neue Entdeckungen oder historische Begebenheiten.	❍	❍	❍	❍
Entdeckungen oder historische Begebenheiten.	❍	❍	❍	❍
Ich bin unternehmungslustig.	❍	❍	❍	❍
Ich stehe gerne im Mittelpunkt.	❍	❍	❍	❍

Empathy

Menschliche Eigenschaften Sie werden jetzt eine Reihe von Aussagen lesen, die jeweils bestimmte (verallgemeinerte) menschliche Eigenschaften oder Reaktionen beschreiben, die alle etwas mit Gefühlen zu tun haben. Bitte kennzeichnen Sie dann auf der 5-Punkte-Skala, inwieweit diese Aussage auf Sie zutrifft; je höher die Zahl, desto höher die Zustimmung. Vielleicht fällt Ihnen auch zu der einen oder anderen allgemeinen Beschreibung ein konkretes Erlebnis ein. Es gibt dabei keine richtigen oder falschen Antworten. Wir danken Ihnen bereits jetzt für Ihre Mitarbeit und Ihre ehrliche Beantwortung der Fragen.

Q11 Bitte beginnen Sie nun .....

	Nie (--)	selten (-)	manchmal (0)	oft (+)	immer (++)
1. Ich empfinde warmherzige Gefühle für Leute, denen es weniger gut geht als mir.	❍	❍	❍	❍	❍
2. Die Gefühle einer Person in einem Roman kann ich mir sehr gut vorstellen.	❍	❍	❍	❍	❍
3. In Notfallsituationen fühle ich mich ängstlich und unbehaglich.	❍	❍	❍	❍	❍
4. Ich versuche, bei einem Streit zuerst beide Seiten zu verstehen, bevor ich eine Entscheidung treffe.	❍	❍	❍	❍	❍
5. Wenn ich sehe, wie jemand ausgenutzt wird, glaube ich, ihn schützen zu müssen.	❍	❍	❍	❍	❍
6. Ich fühle mich hilflos, wenn ich inmitten einer sehr emotionsgeladenen Situation bin.	❍	❍	❍	❍	❍
7. Nachdem ich einen Film gesehen habe, fühle ich mich so, als ob ich eine der Personen aus diesem Film sei.	❍	❍	❍	❍	❍
8. In einer gespannten emotionalen Situation zu sein, beängstigt mich.	❍	❍	❍	❍	❍
9. Mich berühren Dinge sehr, auch wenn ich sie nur beobachte.	❍	❍	❍	❍	❍
10. Ich glaube, jedes Problem hat zwei Seiten und versuche deshalb beide zu berücksichtigen.	❍	❍	❍	❍	❍
11. Ich würde mich selbst als eine ziemlich weichherzige Person bezeichnen.	❍	❍	❍	❍	❍
12. Wenn ich einen guten Film sehe, kann ich mich sehr leicht in die Hauptperson hineinversetzen.	❍	❍	❍	❍	❍
13. In heiklen Situationen neige ich dazu, die Kontrolle über mich zu verlieren.	❍	❍	❍	❍	❍
14. Wenn mir das Verhalten eines anderen komisch vorkommt, versuche ich mich für eine Weile in seine Lage zu versetzen.	❍	❍	❍	❍	❍
15. Wenn ich eine interessante Geschichte oder ein gutes Buch lese, versuche ich mir vorzustellen, wie ich mich fühlen würde, wenn mir die Ereignisse passieren würden.	❍	❍	❍	❍	❍
16. Bevor ich jemanden kritisiere, versuche ich mir vorzustellen, wie die Sache aus seiner Sicht aussieht.	❍	❍	❍	❍	❍

<u>TUI Pre Version</u>

Einstellung gegenüber Technologie Der folgende Fragebogen umfasst 8 Aussagen. Diese beziehen sich auf Einstellungen zu Technologien im Allgemeinen und auf die Einstellung zu der Technologie mit der Sie sich im Folgendem beschäftigen werden. Bitte lesen Sie sich jede Aussage sorgfältig durch. Entscheiden Sie dann, wie sehr die jeweilige Aussage auf Sie zutrifft. Sie haben die Möglichkeit

zwischen sieben Abstufungen zu wählen. Bitte lassen Sie keine Antwort aus. Wenn Sie Schwierigkeiten haben, eine Aussage zu beantworten, dann wählen Sie jene Antwortmöglichkeit, die am ehesten auf Sie zutrifft. Es gibt keine richtigen oder falschen Antworten. Bitte antworten Sie spontan und arbeiten Sie zügig. Bitte beginnen Sie jetzt.
Q12 Wie treffen die folgenden Aussagen auf Sie zu?

	Trifft nicht zu (1)	2	3	4	5	6	Trifft zu (7)
1. Ich bin neugierig auf die Verwendung computerbasierter Verfahren wie der VR-Technologie.	❍	❍	❍	❍	❍	❍	❍
2. Ich mache mir oft Sorgen darüber, dass mich neue technische Geräte überfordern könnten.	❍	❍	❍	❍	❍	❍	❍
3. Ich wollte mich schon früher mit computerbasierten Verfahren wie der VR-Technologie beschäftigen.	❍	❍	❍	❍	❍	❍	❍
4. Wenn ich ein neues technisches Gerät verwenden soll, bin ich erst mal misstrauisch.	❍	❍	❍	❍	❍	❍	❍
5. Ich bin bestrebt, mehr über computerbasierte Verfahren wie die VR-Technologie zu erfahren.	❍	❍	❍	❍	❍	❍	❍
6. Mir fällt es schwer technischen Geräten zu vertrauen.	❍	❍	❍	❍	❍	❍	❍
7. Mich hat die Verwendung computerbasierter Verfahren wie der VR-Technologie schon immer interessiert.	❍	❍	❍	❍	❍	❍	❍
8. Die Vorstellung, bei der Verwendung technischer Geräte etwas falsch zu machen, macht mir Angst.	❍	❍	❍	❍	❍	❍	❍

Information VR
Der erste Teil von insgesamt drei Teilen ist geschafft. Im Folgenden werden Sie nun durch das Google Cardboard die Virtuelle Umgebungsübung ausführen. Dazu wird Ihnen der Leiter des Experimentes nun mehr erzählen.

Information Control Group
Der erste Teil von insgesamt fünf Teilen ist geschafft. Im Folgenden werden Sie nun eine Meditationsübung ausführen. Dazu wird Ihnen der Leiter des Experimentes nun mehr erzählen.

Information VR
Nun beginnt der dritte und letzte Teil der Untersuchung. Bitte folgen Sie den Anweisungen über den Fragebögen.

Information Control Group
Nun beginnt der dritte Teil der Untersuchung. Bitte folgen Sie den Anweisungen über den Fragebögen.

PANAS – Positive Affect

Dieser Fragebogen enthält eine Reihe von Wörtern, die unterschiedliche Gefühle und Empfindungen beschreiben. Lesen Sie jedes Wort und tragen Sie dann in die Skala neben jedem Wort die Intensität ein. Sie haben die Möglichkeit, zwischen fünf Abstufungen zu wählen.

Q13 Geben Sie bitte an, wie Sie sich im Moment fühlen.

	ganz wenig oder gar nicht	ein bisschen	einigermaßen	erheblich	äußerst
aktiv	❍	❍	❍	❍	❍
interessiert	❍	❍	❍	❍	❍
freudig erregt	❍	❍	❍	❍	❍
stark	❍	❍	❍	❍	❍
angeregt	❍	❍	❍	❍	❍
stolz	❍	❍	❍	❍	❍
begeistert	❍	❍	❍	❍	❍
wach	❍	❍	❍	❍	❍
entschlossen	❍	❍	❍	❍	❍
aufmerksam	❍	❍	❍	❍	❍

Stress-scale

Stimmung In der folgenden Liste werden unterschiedliche Stimmungen beschrieben. Bitte kreuzen Sie für jede dieser Stimmungen an, in welchem Ausmaß diese auf Sie zutreffen.

Q14 In welchem Ausmaß treffen die Stimmungen im Moment auf Sie zu?

	trifft überhaupt nicht zu	trifft eher nicht zu	teils teils	trifft eher zu	trifft vollständig zu
lebhaft	❍	❍	❍	❍	❍
energiegeladen	❍	❍	❍	❍	❍
aktiv	❍	❍	❍	❍	❍
schläfrig	❍	❍	❍	❍	❍
müde	❍	❍	❍	❍	❍
träge	❍	❍	❍	❍	❍
angespannt	❍	❍	❍	❍	❍
unbehaglich	❍	❍	❍	❍	❍
besorgt	❍	❍	❍	❍	❍
nervös	❍	❍	❍	❍	❍
gelassen	❍	❍	❍	❍	❍
ruhig	❍	❍	❍	❍	❍
zufrieden	❍	❍	❍	❍	❍
friedlich	❍	❍	❍	❍	❍

PANAS – Negative Affect

Dieser Fragebogen enthält eine Reihe von Wörtern, die unterschiedliche Gefühle und Empfindungen beschreiben. Lesen Sie jedes Wort und tragen Sie dann in die Skala neben jedem Wort die Intensität ein. Sie haben die Möglichkeit, zwischen fünf Abstufungen zu wählen.

Q15 Geben Sie bitte an, wie Sie sich im Moment fühlen.

	ganz wenig oder gar nicht	ein bisschen	einigermaßen	erheblich	äußerst
bekümmert	❍	❍	❍	❍	❍
verärgert	❍	❍	❍	❍	❍
schuldig	❍	❍	❍	❍	❍
erschrocken	❍	❍	❍	❍	❍
feindselig	❍	❍	❍	❍	❍
gereizt	❍	❍	❍	❍	❍
beschämt	❍	❍	❍	❍	❍
nervös	❍	❍	❍	❍	❍
durcheinander	❍	❍	❍	❍	❍
ängstlich	❍	❍	❍	❍	❍

Intro TUI Pre Version for the Control Group

Der folgende Fragebogen umfasst 8 Aussagen. Diese beziehen sich auf Einstellungen zu Technologien im Allgemeinen und auf die Einstellung zu der Technologie mit der Sie sich im Folgendem beschäftigen werden. Bitte lesen Sie sich jede Aussage sorgfältig durch. Entscheiden Sie dann, wie sehr die jeweilige Aussage auf Sie zutrifft. Sie haben die Möglichkeit zwischen sieben Abstufungen zu wählen. Bitte lassen Sie keine Antwort aus. Wenn Sie Schwierigkeiten haben, eine Aussage zu beantworten, dann wählen Sie jene Antwortmöglichkeit, die am ehesten auf Sie zutrifft. Es gibt keine richtigen oder falschen Antworten. Bitte antworten Sie spontan und arbeiten Sie zügig. Bitte beginnen Sie jetzt.

Q16 Wie treffen die folgenden Aussagen auf Sie zu?

	Trifft nicht zu (1)	2	3	4	5	6	Trifft zu (7)
1. Ich bin neugierig auf die Verwendung computerbasierter Verfahren wie der VR-Technologie.	❍	❍	❍	❍	❍	❍	❍
2. Ich mache mir oft Sorgen darüber, dass mich neue technische Geräte überfordern könnten.	❍	❍	❍	❍	❍	❍	❍
3. Ich wollte mich schon früher mit computerbasierten Verfahren wie der VR-Technologie beschäftigen.	❍	❍	❍	❍	❍	❍	❍
4. Wenn ich ein neues technisches Gerät verwenden soll, bin ich erst mal misstrauisch.	❍	❍	❍	❍	❍	❍	❍
5. Ich bin bestrebt, mehr über computerbasierte Verfahren wie die VR-Technologie zu erfahren.	❍	❍	❍	❍	❍	❍	❍
6. Mir fällt es schwer technischen Geräten zu vertrauen.	❍	❍	❍	❍	❍	❍	❍
7. Mich hat die Verwendung computerbasierter Verfahren wie der VR-Technologie schon immer interessiert.	❍	❍	❍	❍	❍	❍	❍
8. Die Vorstellung, bei der Verwendung technischer Geräte etwas falsch zu machen, macht mir Angst.	❍	❍	❍	❍	❍	❍	❍

Introduction Control Group VR use

Der dritte Teil von insgesamt fünf Teilen ist geschafft. Im Folgenden werden Sie nun durch das Google Cardboard die Virtuelle Umgebungsübung ausführen. Sie können diese Umgebung solange auf sich wirken lassen wie Sie möchten, anzuraten wären ungefähr 5 Minuten. Dazu wird Ihnen der Leiter des Experimentes nun mehr erzählen.

Intro Control Group

Nun folgt der letzte Teil der Untersuchung. Bitte folgen Sie den Anweisungen über den Fragebögen.

Presence-scale

Sie sehen nun 14 Fragen bzw. Aussagen darüber, wie und was Sie erlebten. Bitte geben Sie jeweils an, ob die Aussage zutrifft oder nicht. Sie können die gesamte Breite der Antwortmöglichkeiten nutzen. Es gibt keine richtigen oder falschen Antworten, es zählt Ihre Meinung. Ihnen wird auffallen, dass sich manche Fragen sehr ähneln; das ist aus statistischen Gründen notwendig - wir bitten um Verständnis. Und bitte denken Sie daran: beantworten Sie alle Fragen jeweils in Bezug auf dieses eine Erlebnis.

Q17 .

	-3	-2	-1	0	+1	+2	+3
1. Ich hatte nicht das Gefühl, in dem virtuellen Raum zu sein	❍	❍	❍	❍	❍	❍	❍

	-3	-2	Klicken Sie hier zum Bearbeiten von Skalapunkt 5	0	trifft völlig zu	+2	+3
2. Wie sehr glich Ihr Erleben der virtuellen Umgebung dem Erleben einer realen Umgebung	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
3. Ich hatte das Gefühl, in dem virtuellen Raum zu handelen statt etwas von außen zu bedienen.	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
4. Wie real erschien Ihnen die virtuelle Umgebung?	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
5. Ich hatte das Gefühl, dass die virtuelle Umgebung hinter mir weitergeht.	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
6. Ich hatte das Gefühl in der virtuellen Umgebung zu handeln statt etwas von außen zu bedienen.	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
7. Wie bewußt war Ihnen die reale Welt, während Sie sich durch die virtuelle Welt bewegten (z.B. Geräusche, Raumtemperatur, andere Personen etc.)?	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
8. Meine Aufmerksamkeit war von der virtuellen Welt völlig in Bann gezogen.	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
9. Wie real erschien Ihnen die virtuelle Umgebung?	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
10. Wie sehr glich Ihr Erleben der virtuellen Umgebung dem Erleben einer realen Umgebung?	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
11. Wie real erschien Ihnen die virtuelle Welt?	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
12. In der computererzeugten Welt hatte ich den Eindruck, dort gewesen zu sein...	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
13. Ich fühlte mich im virtuellen Raum anwesend.	❍	❍	❍	❍	❍	❍	❍

	-3	-2	-1	0	+1	+2	+3
14. Ich achtete noch auf die reale Umgebung.	❍	❍	❍	❍	❍	❍	❍

Whole TUI

Einstellung gegenüber Technik Der folgende Fragebogen umfasst 30 Aussagen. Diese beziehen sich einerseits auf die Technologie, mit der Sie sich gerade auseinandergesetzt haben und andererseits auf Einstellungen zu Technologien im Allgemeinen. Bitte lesen Sie sich jede Aussage sorgfältig durch. Entscheiden Sie dann, wie sehr die jeweilige Aussage auf Sie zutrifft. Sie haben die Möglichkeit zwischen sieben Abstufungen zu wählen. Bitte lassen Sie keine Antwort aus. Wenn Sie Schwierigkeiten haben, eine Aussage zu beantworten, dann wählen Sie jene Antwortmöglichkeit, die am ehesten auf Sie zutrifft. Es gibt keine richtigen oder falschen Antworten. Bitte antworten Sie spontan und arbeiten Sie zügig. Beginnen Sie jetzt.

Q18 Wie treffen die folgenden Aussagen auf Sie zu?

	Trifft nicht zu (1)	2	3	4	5	6	Trifft zu (7)
1. Ich bin neugierig auf die Verwendung computerbasierter Verfahren wie der VR-Technologie.	❍	❍	❍	❍	❍	❍	❍
2. Ich mache mir oft Sorgen darüber, dass mich neue technische Geräte überfordern könnten.	❍	❍	❍	❍	❍	❍	❍
3. Ich wollte mich schon früher mit computerbasierten Verfahren wie der VR-Technologie beschäftigen.	❍	❍	❍	❍	❍	❍	❍
4. Wenn ich ein neues technisches Gerät verwenden soll, bin ich erst mal misstrauisch.	❍	❍	❍	❍	❍	❍	❍
5. Ich bin bestrebt, mehr über computerbasierte Verfahren wie die VR-Technologie zu erfahren.	❍	❍	❍	❍	❍	❍	❍
6. Mir fällt es schwer technischen Geräten zu vertrauen.	❍	❍	❍	❍	❍	❍	❍
7. Mich hat die Verwendung computerbasierter Verfahren wie der VR-Technologie schon immer interessiert.	❍	❍	❍	❍	❍	❍	❍
8. Die Vorstellung, bei der Verwendung technischer Geräte etwas falsch zu machen, macht mir Angst.	❍	❍	❍	❍	❍	❍	❍
9. Im Laufe meines Lebens habe ich mir viel technisches Wissen angeeignet.	❍	❍	❍	❍	❍	❍	❍
10. In der virtuellen Situation konnte ich meine realen Probleme vergessen.	❍	❍	❍	❍	❍	❍	❍
11. Die Anwendung dieser Technologie würde vieles komfortabler machen.	❍	❍	❍	❍	❍	❍	❍
12. Ich denke, dass die Nutzung dieser Technologie immer mit einem gewissen Risiko verbunden ist.	❍	❍	❍	❍	❍	❍	❍
13. Die Anwendung dieser Technologie ist leicht verständlich.	❍	❍	❍	❍	❍	❍	❍
14. Wenn ein neues technisches Gerät auf den Markt kommt, informiere ich mich darüber.	❍	❍	❍	❍	❍	❍	❍
15. Während der virtuellen Simulation habe ich die Welt um mich herum total vergessen.	❍	❍	❍	❍	❍	❍	❍
16. Diese Technologie würde mir helfen, meine täglichen Aufgaben bequemer zu erledigen.	❍	❍	❍	❍	❍	❍	❍
17. Ich denke, dass diese Technologie Gefahren für mich birgt.	❍	❍	❍	❍	❍	❍	❍
18. Die Anwendung dieser Technologie ist insgesamt einfach.	❍	❍	❍	❍	❍	❍	❍
19. Ich denke, dass sich diese Technologie fast jeder leisten kann.	❍	❍	❍	❍	❍	❍	❍
20. Ich versuche immer aktuelle Informationen über neue technische Entwicklungen zu bekommen.	❍	❍	❍	❍	❍	❍	❍

21. Durch die virtuelle Simulation hatte ich das Gefühl, die Situation wirklich zu erleben.	❍	❍	❍	❍	❍	❍	❍
22. Könnte ich mir diese Technologie leisten, würde ich sie mir anschaffen.	❍	❍	❍	❍	❍	❍	❍
23. Diese Technologie würde meine Alltagsroutine stören.	❍	❍	❍	❍	❍	❍	❍
24. Die Anwendung dieser Technologie ist kompliziert.	❍	❍	❍	❍	❍	❍	❍
25. Ich denke, dass diese Technologie grundsätzlich für jeden zugänglich ist.	❍	❍	❍	❍	❍	❍	❍
26. Ich informiere mich über technologische Entwicklungen.	❍	❍	❍	❍	❍	❍	❍
27. Wenn ich die virtuelle Simulation nutze, dann fühle ich mich wie in einer anderen Welt.	❍	❍	❍	❍	❍	❍	❍
28. Diese Technologie würde mich dabei unterstützen, meine alltäglichen Aufgaben zu erfüllen.	❍	❍	❍	❍	❍	❍	❍
29. Die Anwendung dieser Technologie würde mir mehr Nachteile als Vorteile bringen.	❍	❍	❍	❍	❍	❍	❍
30. Ich denke, dass die Anschaffung dieser Technologie mit wenig Aufwand verbunden ist.	❍	❍	❍	❍	❍	❍	❍

Sie sehen untenstehend drei Fragen mit jeweils einer Antwortlinie darunter. Die Antwortlinie entspricht einem Kontinuum mit den Endpunkten „trifft zu“ (volle Zustimmung) und „trifft nicht zu“ (volle Ablehnung). Sie können Ihre Antwort auf jedem beliebigen Punkt dazwischen setzen. Dazu ziehen Sie bitte den Regler der Antwortlinie an der Stelle, die Ihrer Antwort entspricht.

Q19 Bitte schieben Sie den Regler an die entsprechende Stelle ihrer Antwort.

_____ A. Würden Sie diese Technologie nutzen?
_____ B. Würden Sie sich diese Technologie anschaffen?
_____ C. Würden Sie Zugang zu dieser Technologie haben wollen?

ENDE

Ende Sie haben nun das Ende der Untersuchung erreicht. Vielen Dank für die Teilnahme. Der Leiter des Experiments wird mit Ihnen nun eine kurze Nachbesprechung durchführen.

Appendix B Introduction text

B1. Experimental Group

Dear Participant,

Thank you for taking part in our research. This study aims to investigate what people experience when they are being exposed to a Virtual Reality environment. This research is part of a Bachelor's Thesis, conducted by students from the University of Twente from the faculty of Psychology. In the beginning, you are asked to fill in a general questionnaire about your demographic background. After that you are asked to fill in additional questionnaires that gather information about several psychological constructs. All questionnaires will be filled in on a laptop. This takes approximately 10 to 15 minutes. In the following, you are exposed to a Virtual Reality environment, more specifically a tropical Beach setting, using Google Cardboard, a smartphone and headphones. The exposition to the Virtual environment lasts approximately 12 minutes. After that you are asked to fill in another set of questionnaires. All data will be processed anonymously. You are allowed to end the experiment at any time. If you have further questions, do not hesitate to ask the researcher. Before the study takes place, you will be asked to fill in an informed consent. After that, you can begin with filling in the questionnaires. Thank you for your participation in our study.

The study will begin in a few moments.

B2. Control Group

Dear Participant,

Thank you for taking part in this research. This study aims to investigate what people experience when they are being exposed to a Virtual Reality environment. The research is part of a Bachelor thesis conducted by students from the University of Twente from the faculty of Psychology. In the beginning, you are asked to fill in some general questions about your demographic background. Then, you are asked to fill in additional questionnaires that gather information about different psychological constructs. All questionnaires will be filled in on a laptop. This will take approximately about 10 to 15 minutes. After that, you will receive approximately 12 minutes of guided meditation. Thereafter, you are again asked to fill in three short questionnaires. In the following, you will be exposed to a Virtual Reality environment, more specifically a tropical Beach setting, using Google Cardboard, a smartphone and headphones. You will have as much time as you want to explore the virtual environment. In the end, we would like you to fill in some last short questionnaires. All data will be processed anonymously. You are allowed to end the experiment at any time. If you have further questions, do not hesitate to ask the researcher. Before the study takes place, you will be asked to fill in an informed consent. After that, you can begin with filling in the questionnaires. Thank you for your participation in our study. The study will begin in a few moments.

Appendix C. Informed Consent

Einverständniserklärung:

Titel der Studie: “Die Effekte und der psychologische Hintergrund von Virtual Reality”
Verantwortlicher Untersucher:
Auszufüllen durch den Teilnehmer

Hiermit erkläre ich deutlich und ausreichend informiert worden zu sein über die Art, die Methode und das Ziel dieser Studie. Ich weiß, dass meine Daten und die Ergebnisse der Studie ausschließlich anonym und vertraulich behandelt und an Dritte weitergegeben werden. Meine Fragen wurden zu meiner Zufriedenheit beantwortet.

Ich stimme der Teilnahme an dieser Studie vollkommen freiwillig zu. Dabei behalte ich mir das Recht vor, jederzeit meine Teilnahme an dieser Studie unterbrechen oder beenden zu können, ohne dafür einen Grund angeben zu müssen.

Name Teilnehmer: .....

Datum: ..... Unterschrift Teilnehmer: .....

Auszufüllen durch den ausführenden Untersucher

Ich habe den Teilnehmer mündlich und schriftlich über die Studie aufgeklärt. Weitere Fragen über die Studie werde ich so gut es geht beantworten. Der Teilnehmer wird von einer eventuellen frühzeitigen Beendung seiner Teilnahme an dieser Studie keine nachteiligen Folgen erfahren.

Name Untersucher: .....

Appendix D. Debriefing

Dear Participant,

You have now finished this research. Thank you for your participation. The aim of this study was to investigate the effectiveness of Virtual Reality as an intervention in the domain of psychology. Among other things we looked at the potential of Virtual Reality to increase the positive emotions and to decrease the stress experienced by people. Furthermore the influence of psychological factors such as personality and acceptance of technology on the effectiveness of the Virtual Reality intervention were investigated. We did this with two different conditions: in one condition the focus was on the Guided Mediation and in the other on the Virtual Reality itself, so that we can later on compare those two conditions. You were in the experimental/control condition. We would be very grateful if you would not talk with other participants about the content and the design of this study.

If you have any further questions please feel free to ask them now or to contact one of the researchers under the following email-addresses:

Appendix E. Tabel to Transform Stanine Values of the TUI

	Stanine							
Summenwert	BEN	ZUG	NEU	ANG	SKE	NÜT	IMM	INT
3	1	3	-	-	-	-	-	-
4	1	3	1	2	1	2	2	2
5	1	3	2	4	1	3	2	2
6	1	4	2	4	2	4	3	3
7	2	4	3	4	2	4	3	3
8	2	5	3	5	3	5	3	3
9	2	5	3	5	3	5	3	4
10	3	5	4	5	4	6	4	4
11	3	6	4	5	4	6	4	4
12	3	6	4	6	4	6	4	4
13	4	7	5	6	5	7	5	5
14	4	7	5	6	5	7	5	5
15	5	8	5	6	5	7	5	5
16	5	8	6	7	6	8	5	5
17	6	8	6	7	6	8	6	6
18	6	9	6	7	6	8	6	6
19	7	9	7	7	7	9	6	6
20	8	9	7	7	7	9	6	6
21	9	9	7	8	7	9	7	7
22	-	-	7	8	7	9	7	7
23	-	-	8	8	8	9	7	7
24	-	-	8	9	8	9	8	7
25	-	-	8	9	9	9	8	8
26	-	-	9	9	9	9	9	8
27	-	-	9	9	9	9	9	8
28	-	-	9	9	9	9	9	9

Anmerkung.
BEN = Benutzerfreundlichkeit, ZUG = Zugänglichkeit, NEU = Neugierde, ANG = Ängstlichkeit, SKE = Skepsis, NÜT = Nützlichkeit, IMM = Immersion, INT = Interesse, ITU = Intention to Use

	Stanine
Summenwert (in Millimeter)	ITU
3-11	2
12-34	13
35-98	4
99-150	5
151-198	6
199-250	7
251-287	8
288-300	9