University of Twente

Bachelor Thesis

Virtually encounter your offender: Exploring potential users' attitudes towards VR when traditional Victim-Offender Mediation is unfeasible

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Myrthe Sophie Anne von den Benken **s1861417**

Faculty: Behavioural, Management and Social Sciences

Department: Psychology of Conflict, Risk and Safety

Supervisor: Dr Sven Zebel

Second Supervisor: Florian Bonensteffen (MSc)

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Abstract

Background: Victim-Offender Mediation is one of the most used forms of restorative justice worldwide (Hansen & Umbreit, 2018). VOM is always on voluntary basis, so victim and offender both need to accept the invitation in order for mediation to occur. Half of the people decline this invitation, depriving the other party of VOM. Currently, there is no alternative for this deprived party but due to discovered psychological benefits of VOM, it is worth to look for an alternative. An alternative in Virtual Reality (VR) with an Avatar could be an option, in which a victim can meet his/her offender. However, nothing has been researched about it and written down in literature yet. This thesis explores what participants, who saw a video of a real robbery and who had to imagine being the victim of this crime, think about a potential VR application as an alternative when traditional VOM is unfeasible.

Method: An explorative research design with repeated measures was used. A convenience sample of 54 participants was taken from the researcher's own social network and a minority of undergraduate students participated as well. An online questionnaire had to be filled in. In Measurement 1 (N = 54), participants saw a video of a real robbery and imagined being victim of this robbery, had to think about a VR application themselves and answer questions regarding the potential alternative. In Measurement 2 (N = 52), after seeing a video showing the state-of-art of VR, they had to state if and how their opinions changed and what they *now* think of a VR alternative.

Results: A significant increase between the means of the construct Participation Intention has been obtained, indicating that participants became more willing to participate in VR VOM as alternative in Measurement 2. However, people were neutral about participation in Measurement 1, and stayed this in Measurement 2 because both means centre around the middle of the scale. Participants stated clear requirements like improving (non-)verbal communication and making the visuals less cartoon-like. They stated to believe that beneficial outcomes, which are in line with beneficial outcomes of traditional VOM, could be achieved as well in a VR alternative.

Conclusion: This research was a first step towards exploring the perspectives of potential users regarding an alternative in VR with an Avatar, when traditional VOM is unfeasible. Results showed that self-oriented motives might be predictors to participate in VR VOM. Participants' intention to use a potential VR application became stronger after they obtained more information about the state-of-art in VR, but they stayed neutral about to what extent they would be willing to try out an alternative in VR when they would be a victim themselves

Introduction

What is VOM?

Victim-Offender Mediation (VOM) was firstly introduced in the criminal justice system in the 1970s as the Victim-Offender Reconciliation Program (VORP) in Elmira, Ontario (Zehr, 1994). VORP obtained more and more attention due to potential positive and beneficial aspects of this process, and evolved into VOM during the years (Umbreit, 1994; Umbreit & Armour, 2011; Umbreit & Hansen, 2017). Hansen and Umbreit (2018) stated that VOM has been completely integrated in criminal and juvenile justice systems all around the world and that it is the most widespread form of restorative justice (RJ) practice.

Due to the potential positive and beneficial aspects, many researchers looked in those aspects, and tried to discover factors why victims and offenders would want to take part in VOM. In this Bachelor thesis, it is researched what victims of a partly imagined, partly visualized robbery by means of a video think about VOM, if they would like to have such a mediation session, and what they think of a possible alternative in Virtual Reality (VR) when traditional VOM is unfeasible because the offender declined the invitation to participate. Since this research asks of participant to imagine being a victim of a robbery, this thesis is victim-focused as well.

There is an important aspect in VOM, compared to the general way in which offenders mostly serve a prison sentence and in which victims can only ‘see’ their offenders getting a sentence or see them in court; victim and offender get the opportunity to talk to each other under guidance of a mediator (Hansen & Umbreit, 2018). When participating in Victim-Offender Mediation, a mediator is trained to help and prepare the victim and the offender a priori in order to have an effective mediation process (Hansen & Umbreit, 2018). The mediator prepares both victim and offender by means of an individual conversation before the start of the face-to-face meeting (Umbreit, Coates, & Vos, 2004). In this preparation, the mediator talks about and tries to coordinate realistic expectations, in order to reduce the possibility of disappointment after the session (Morris & Maxwell, 2001). During the mediation, both parties talk about what happened, and try to make things right in a safe setting.

Distinction between VOM and other RJ practices

VOM distinguishes itself from the other kinds of restorative justice practices like family group conferencing, community service, and restorative circles (Umbreit & Armour, 2011).

VOM focusses on the active interaction between only the victim and offender of a specific crime, rather than interactions with a whole family or people from a community (conferencing). Bradshaw and Roseborough (2005) emphasize that during VOM, the dialogue is between the victim and the offender, and the mediator helps to talk about how to repair or compensate the damage that has been done and how this could be prevented next time. If other parties or a community would also be present, they call it conferencing and all parties would be actively involved to come to an agreement and to prevent future discontinuities between the parties (Bradshaw & Roseborough, 2005). It can be argued that the active interaction between only victim and offender instead of a whole community is a unique aspect of VOM because it is a unique situation that victim or offender can say anything to the opposing party without other people than the mediator present in order to make things right again.

Observed advantages for victims who participated in mediation

But why is it important or beneficial to meet up with an offender later on, and why would a victim do that in general at all? The literature indicates a number of reasons why actual victims of a crime would want to meet up.

Firstly, crime victims report consistently that they are better off after joining an RJ face-to-face meeting than they were before because their fear towards the offender has reduced strongly and they felt significantly less angry towards their offender (Strang, Angel, Sherman, & Woods, 2006). Strang et al. (2006) additionally found that the empathy towards the offender increased almost three times on average after such a meeting, that this kind of RJ practice provides a higher opportunity for empathy to occur towards an offender, and that this helps the victim with processing what happened as well. Buchan (2004) elaborates on this empathy matter and explains why it is beneficial for victims to understand the life stories of the offenders and learn about them. If victims never meet their offenders or learn anything about them, it could be the case that victims keep on fearing their offender as monsters for the rest of their lives (Buchan, 2004).

There are more factors that explain why victims would want to take part in VOM. Firstly, according to the Needs-Based Model of reconciliation (Shnabel & Nadler, 2008), the status and power of a person are threatened once they are victimized. They might feel that they have less power now they have become a victim, and their social status might have been downgraded. In order to counter this threat, people must restore their feelings of power, and wanting to counter this might explain why victims would want to participate in VOM.

Secondly, Hansen and Umbreit (2018) explored the positive effects on the victim when the offender is able in VOM to compensate for the bad behaviour he/she showed during the crime. Receiving a well-meant apology with an emotional touch from the offender can help victims getting closure.

Furthermore, VOM is based on a humanistic approach regarding dialogue since both parties can say and decide as much as they want during a session. This ensures the conversation reaches a deep level of communication and connection between the parties (Lewis & Umbreit, 2015). It often leads to mutual feelings and agreements as well. In addition, Hansen and Umbreit (2018) discovered that both victims and offenders feel more satisfied with the process of VOM and the outcomes in general. Since many positive outcomes are researched and known, it could be the case that if these positive outcomes are known by victims or explained to them on forehand, these might be reasons as well to participate in VOM.

However, since VOM is always voluntary, one of the involved parties can decline the invitation to participate in VOM. According to Hansen and Umbreit (2018), various studies showed that at this moment, the general participation rate from offenders and victims in VOM varies between 40 to 60%. The fact that these participation rates are not higher, can be due to several factors. Since this research has a victim-perspective focus, only reasons for victims will be described. Victims either think the crime is too minor to invest any more time in, they are afraid to meet up with their offender, or they want to see that the offender gets a harsh punishment (first) (Coates & Gehm, 1985). More recent studies found that offender-oriented reasons might explain as well why victims would not want to meet up, namely that they have negative and/or angry feelings towards the offender (Bolivar, 2013) and this diminishes their willingness to meet up with the offender again (Umbreit et al. 2004). Moreover, it is found that uncertainty about the mediation process and anxiety that comes from the criminal experience of the victim, could be factors why victims do not want to participate (Paul & Schenck-Hamlin, 2017).

Alternatives when meeting up with a/in person is unfeasible

Almost half of the people who are offered VOM decline the invitation to take part (Hansen & Umbreit, 2018). At this moment, there is not yet a suitable replacement or alternative for the ‘deprived’ party who is willing to participate but cannot benefit from VOM because the other party declined the invitation. Since there are many psychological benefits for victims (and offenders as well), it might be useful to search for alternatives, so that the deprived party can

still benefit the positive sides of Victim-Offender Mediation.

Fortunately, there are already therapies or interventions known that actually can take place with a victim only, with regards to processing a bad experience (like abuse et cetera), when the victim wants to or must talk about it, but is not able to do that with the perpetrator him- or herself. An often used therapy for this purpose is called Empty Chairwork, in which a client must engage in a dialogue with an imagined other who sits in the empty chair (Pugh, 2016), under supervision of a therapist or mediator. This other person could be a past abuser or a troubled family member for example. The purpose of this dialogue is exposure and emotional processing for the victim, and he or she can say anything that comes to mind, without having to have restricted feelings since the real abuser is not present – this is called external chairwork (Kellogg, 2004).

In addition, nowadays it is more and more researched what the impact and use could be of software techniques that create and use avatars as an extension of the Empty Chair technique for example, when the other party cannot be present (Stefaniak, Sorokosz, Janicki, & Wciórka, 2017). In their research, Stefaniak et al. (2017) had a patient who suffered from schizophrenia (with chronic negative auditory hallucinations). With the use of an Avatar, they made a representation of these hallucinations and this helped the patient to change his/her opinions about the source of the hallucinations. Stefaniak et al. (2017) found this patient able to look closer to past experiences that triggered emotions/hallucinations and in doing so, it was possible for the patient to understand these emotions better. Since the patient was able to talk with the Avatar about feelings, emotions, and difficult situations, it can be concluded that the patient felt safe enough with the Avatar on a social level to talk about difficult, personal issues (Stefaniak et al., 2017). This unique example shows that with the help of an Avatar in therapy, positive outcomes can be achieved.

However, not much is researched and written down already in literature with regards to VOM and this triggered the curiosity about what VR and an Avatar could do in other situations for a victim, when traditional VOM is unfeasible because for example the offender does not want to participate. Since software techniques are used in the above mentioned example, an interesting question is how this could be used as well regarding VOM. An interesting software technique is called Virtual Reality (VR). Since technological improvements develop very fast (Ali & Nasser, 2017), it is interesting to look at the possibilities and options VR can offer regarding the situation in which one party desires VOM, but the other party declines. But first, what exactly is VR?

Virtual Reality and the state-of-art

Virtual Reality, can be described best as a simulated interactive environment. This interactive environment is "created by a three-dimensional (3D) computer-generated graphics system in combination with various interference devices" (Shen, Ho, Ly, & Kuo, 2018, p.313). These special environments offer an immersive experience and users of these environments can explore it completely themselves and interact with the environment due to the interactive and 3D characteristics (Shen, Ho, Ly, & Kuo, 2018).

Contemporary, it is already quite normal and accepted for people to have VR glasses for recreational purposes at home. Something slightly less familiar than VR glasses is called a wearable head-mounted display (HMD) which can be expanded with headphones playing sounds and music, to make the experience even more real (Ali & Nasser, 2017). These devices have become much more user friendly and affordable, and many people own such a device currently (Pan & Hamilton, 2018).

With a specific software package that implements a VR experience with virtual characters, a social experience can be created in an immersive world (Pan & Hamilton, 2018). In such a software program, an 'Avatar' or 'Agent' can function as opponent for the user of the VR experience, and Pan et al. (2018) argue that the word 'Avatar' should only be used for characters in VR that are completely controlled by a person in real time. The word 'Agent' should be used for characters that are completely controlled by algorithms and/or Artificial Intelligence (AI)[1]. Due to the technological improvements over the years of the software that underlies the Avatar or Agent, studies on mimicry have now shown that they can even copy the user's head motions and even torso movements as well (Hale & Hamilton, 2016).

Furthermore, current programs inside HMD devices are able to record and respond real-time to participant's behaviour, meaning that the behaviour of the participant can be integrated directly into the program, and that the person can get real and adequate responses back (Pan & Hamilton, 2018). However, even though nowadays amazing technologies exist to capture all these behavioural movements (hands, head, body, face, and eyes) from participants, the challenge for software programs due to technical limitations remains to capture correctly all the facets of human behaviour, to interpret this correctly, and especially doing all this at the same time (Pan & Hamilton, 2018).

[1] In the questionnaire of this research, no distinction is made or explained between Agents and Avatars. In the Materials and Procedure section, it is explained why this decision has been made.

Current utilization of VR in Psychology and practical examples

Specific features and applications of VR that make it so interesting to use, test, and research in social sciences and therefore in Psychology as well, will be described. Firstly in the social (learning) sciences, it has been stated that learning in an artificial environment is successful (Hanson & Shelton, 2008), since students can construct knowledge on a cognitive level themselves (Shelton & Hedley, 2003). As shortly stated by Stefaniak et al. (2017), VR made it possible to transform vague and abstract hallucinations into more understandable visualisations.

Regarding Psychology, VR could give researchers maximal control over a social situation that might be very complex regarding social behaviour in specific settings (Pan & Hamilton, 2018). In a study regarding prosocial behaviour, participants had to escape a fire in VR and they had the opportunity to rescue someone else on their way out of the building in which the fire arose (Zanon, Novembre, Zangrando, & Silani, 2014). The question was if they would try to rescue the other person, or if they would only rescue themselves. Logically, it is not possible to investigate this in real-life, so VR brought a good alternative.

Pan and Hamilton (2018) state that VR is already used in experimental surveys, in which it can be hard for researchers to make sure that all participants encounter the exact same situation in the exact same environment. Therefore, VR is more and more used in studies where reproducibility is hard to achieve. The beneficial effect of this is that once a VR scenario is programmed and created, it can be used over and over again in different cities and even in different countries, making it easier to account for all participants to have experienced the same setting, thus increasing ecological validity (Pan & Hamilton, 2018).

Moreover, VR has been used in exposure therapy, for example fear, PTSD, and substance abuse (Weir, 2018), were patients can be exposed to their fears in a convenient and cost effective way, and most importantly, in a safe environment. In addition, it is suggested that Virtual Reality Exposure (VRE) can largely decline anxiety symptoms, shows the same effectiveness compared to traditional exposure therapy sessions, and could have a powerful real-life impact with stable results over time (Maples-Keller, Bunnel, Kim, & Rothbaum, 2017). A practical example of an application is Ellie, an autonomous virtual human interviewer who is programmed to assess the mental health status of participants and to find issues like PTSD, depressions, or anxiety. Ellie is able to talk autonomously with participants for 15 to 25 minutes, and participants told the researcher afterwards that they felt comfortable enough to share personal details and stories. They stated that they maybe had not shared certain details within 25 minutes with a human interviewer because some questions were too

personal, but they had a trusting feeling towards the robot and felt secure and willing enough to actually do share it with a virtual human interviewer (DeVault, et al., 2014).

There are more practical and concrete examples of how far VR has already been developed regarding social interaction which give a good indication of what is already possible in VR looking at psychological objectives. At Carnegie Mellon University, SARA has been designed; a Socially-Aware Robot Assistant. It is able to look for and analyse verbal as well as non-verbal signals (Zhao, Sinha, Black, & Cassell, 2016). With the help of AI, SARA is able to react to things that have just been said to it by the participant. It can show emotions and respond adequately. According to Zhao et al. (2016), this is quite new and remarkable, because SARA makes use of socially-aware artificial intelligence, an extension to current AI.

Secondly, in a project called SEMAINE (Sustained Emotionally coloured Machine-human Interaction using Non-verbal Expression), a system with four autonomous agents is created which all have a different personality and they are called the Sensitive Artificial Listeners (SALs) (Schröder, 2012). The emphasis lies on their non-verbal skills, detecting and analysing vocal and facial signs related to emotion. The system can engage a person in a conversation, fitting with what has been (non-verbally) said or done before.

Taking all this information together, it can be concluded that VR is already very much developed and that almost everything a person can think of, can be programmed and can happen in a virtual environment, with a big range of end purposes. It has been used in many occasions already, and for psychological studies, therapies, and treatments as well.

Aim of this research

There is no literature yet available about applications of VR to VOM when the offender of a crime declines the invitation, and herewith, deprives the victim of the opportunity to get Victim-Offender Mediation. It can be argued that it is unfortunate nothing has been researched yet regarding if and how a VR application could function and help when traditional VOM is unfeasible. One thing somehow in the direction of this topic actually has been researched already, which showed that 30% of the convenience sample consisting of undergraduate students from the University of Twente would be inclined to make use of a VR application in order to get to know VOM, so using VR in *preparing* both parties a priori to VOM (Bernhard, 2019). It stated nothing however about what the role could be of a VR application when traditional VOM is not possible because one party does not want to meet up, but the other party does want to meet up. Therefore, the aim of this research is finding out

what people think of a potential VR application with an Avatar when traditional VOM is not possible. With open questions, it is asked what their requirements are for such an application to be a success, what their thoughts about (dis)advantages are, and to what extent have opinions changed after seeing the state-of-art of VR in an explanatory video. Besides those open questions, seven constructs are created with 3 to 5 items to each construct, in order to see if answers to open questions are in line with answers to these constructs. The constructs are: (1) Realness, (2) Genuineness, (3) Safety, (4) Willingness to Talk, (5) Applicability, (6) Perceived Ease of Use, and (7) Perceived Usefulness. The constructs 1 up to 5 have not been researched and described in literature yet in this specific context, but it is interesting to explore how participants think about these specific constructs because they are thought to be complementary to answers that can be obtained at the open questions. Realness (1) intends to measure how real participants would perceive the Avatar and the interaction with it, (2) intends to measure how genuine participants would perceive the Avatar and the responses from it, (3) intends to measure if people feel safe and comfortable enough to talk with the Avatar, (4) intends to measure if people are willing to talk with the Avatar in a VR application, and (5) intends to measure to what extent participants think a VR application could be applicable to different settings (so not only as an alternative when traditional VOM is not possible). Constructs 6 and 7 are based on factors coming from the Unified Theory of Acceptance and Use of Technology (UTAUT) model that explains specific factors that are thought to be necessary in order to use new technologies in a new specialized domain (Venkatesh, Morris, Davis, & Davis, 2003). In this model, the factor Effort Expectancy describes the degree of ease associated with the use of a certain system or product. In this research, construct (6) Perceived Ease of Use has been derived from the UTAUT model, and intends to measure how easy participants think a VR application with Avatar can be used. Lastly (7) Perceived Usefulness, derived from the factor Performance Expectancy from the UTAUT model as well, intends to measure how useful participants think an alternative in VR could be. Taking the above described open questions and constructs together, the following research question is determined:

To what extent do victims of a crime think a Virtual Reality application can function as a proper replacement when traditional VOM is unfeasible?

Method

Design

An explorative research design with repeated measures was used to examine how participants' opinions about an alternative in VR for VOM might change after having seen a state-of-art demonstration of VR. In Figure 1, a flowchart with the set-up of the questionnaire is displayed. Open questions about opinions and thoughts were asked, and closed questions about the constructs on a 5-point Likert scale were asked. As stated in the Introduction, the following constructs were used: Realness, Genuineness, Safety, Willingness to Talk, Applicability, Perceived Ease of Use, and Perceived Usefulness[2]. Moreover, one construct named Participation Intention with two items was analysed, but not taken together with the seven constructs. The seven constructs function as potential extra explanations of why and how opinions might have changed, while the construct Participation Intention functions as a separate construct, measuring to what extent participants would be willing to try an alternative variant in VR with an Avatar. Because of the repeated measures design, two measurements were distinguished and named: Measurement 1 – before seeing the state-of-art video of VR, and Measurement 2 – after seeing the state-of-art video. Moreover, a distinction was made between participants who were not willing to participate in traditional VOM (Unwilling group) and participants who indicated to be willing to participate in traditional VOM (Willing group).

[2] See Appendices A – H for all corresponding items

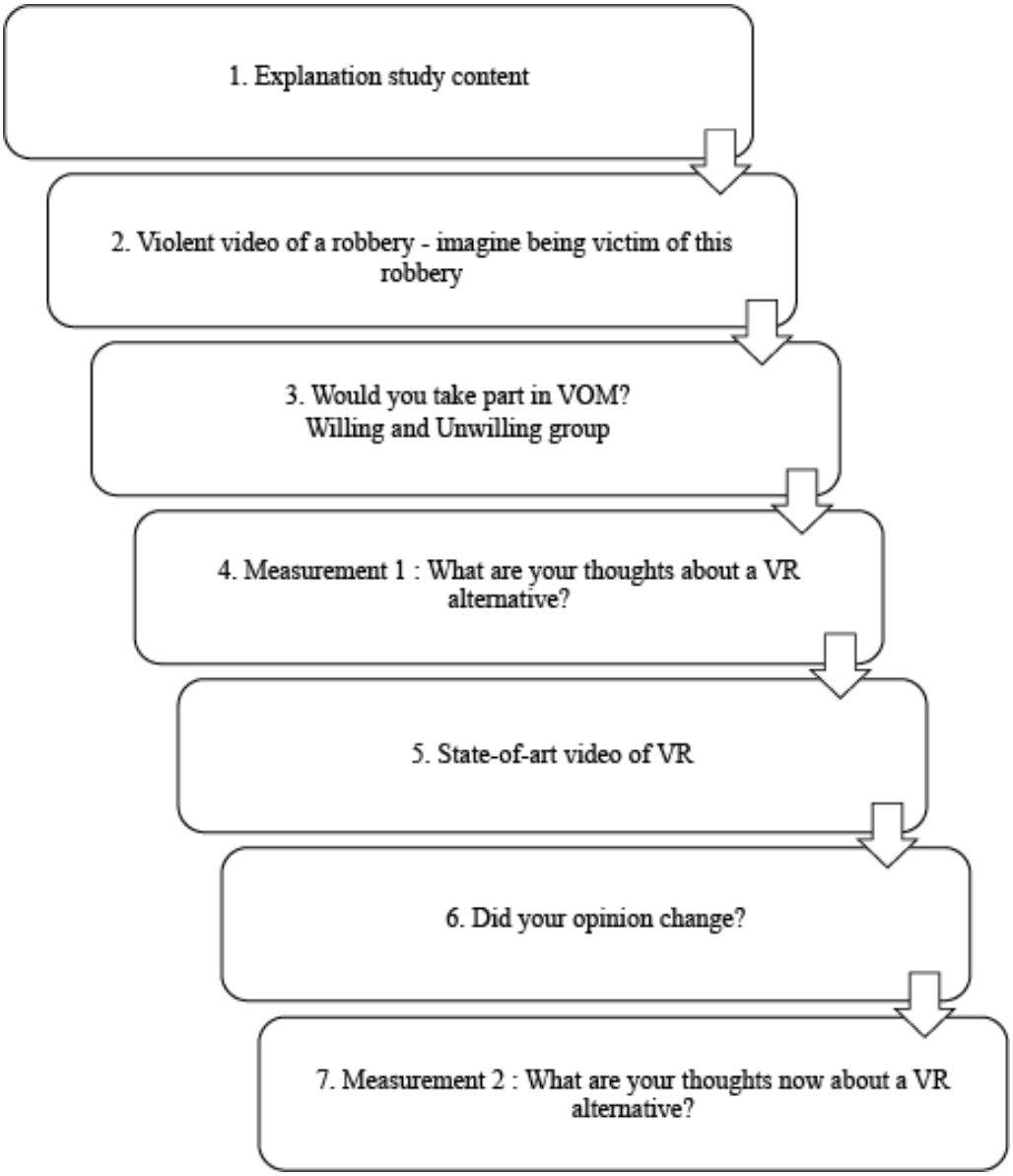

Figure 1. Set-up of the questionnaire: Explorative research with repeated measures design.

Participants

A convenience sample of 71 people from the researcher's own social network and a few (under)graduate students from the University of Twente was taken. However, 17 participants had to be excluded due to the fact that they either only answered the informed consent or due to the fact that they got excluded from the online questionnaire during their participation due to technical problems with the SONA system. These participants were hindered to continue at different questions, but most of them did not answer the important questions regarding the constructs; they only filled out their age and nationality for example. Since they did not fill out anything useful for the purpose of the study, it was decided to leave those participants out of the analyses. In addition, 1 participant got the attention of the researcher, because he/she

filled out many ‘1s’. This seemed to indicate a participant who did not take part seriously, but because he/she filled in the open questions seriously and explained things properly, it did not seem to be a participant who only participated for the SONA credits for example. Therefore, 54 participants (N = 54) between 18 and 57 years old (M = 25.63; SD = 8.82) took part in this survey.

Among the participants, 51,9% was male (n = 28) and 48,1% was female (n = 26). Moreover, 68,5% (n = 37) was currently a college or university student from cities all over the country, 29,6% (n = 16) was working and one person stated to be searching for work at the moment. Lastly, 94,4% of the participants had the Dutch nationality, 5,6% had the German nationality, and there were no participants with other nationalities.

In order to check how acquainted participants are with the topic of the questionnaire, it was asked if the participants had either been a victim, or had been convicted of a crime, and if they had experience with VOM. From a total of 54 participants, 11,1% (n = 6) stated to have been a victim of a crime or misdemeanour themselves, and 37% (n = 20) stated that someone in their close environment had been a victim of a crime. In addition, no participants indicated that they had been convicted of a crime, and 11,1% (n = 6) stated a friend or family member actually had been convicted of a crime or misdemeanour before. Moreover, only two participants (3.7%) stated that someone in their close environment had participated in Victim-Offender Mediation before and no participants indicated to have experience with VOM themselves, concluding that most of the participants were not really acquainted with VOM.

Materials and Procedure

This study was based on an online questionnaire in Qualtrics with in addition to that, two short videos as explained above. The links with the video can be found in Appendix I. Firstly, participants had to read an informed consent in Qualtrics and by clicking on proceed, they assured their participation (see Appendix J). Secondly, they had to read about the content of the study and it was shortly explained what VOM means and what VR is. It was not told on forehand that the questionnaire contained a repeated measures design, because the researcher wanted to see if and how opinions changed after seeing the state-of-art video without telling them on forehand that they would obtain more information about VR later on. This was chosen because in Measurement 1, participants had to use their imagination or current knowledge about VR and a potential application to answer the questions, and in Measurement 2, they have had obtained probably more information.

Before Measurement 1, it was asked on a 5-point Likert scale to what extent

participants would be willing to take part in a VOM session after imaging being a victim of a robbery (1. Extremely unlikely; 2. Somewhat unlikely; 3. Neither likely nor unlikely; 4. Somewhat likely; 5. Extremely likely), and this resulted in two groups. For the Willing group, it was told that the offender unfortunately declined the invitation, meaning that the traditional VOM session could not take place. In addition, it was told that an alternative option was offered in VR with an Avatar[3]. For the Unwilling group, it was firstly asked if they could explain why they did not want to participate in VOM, and it was asked for the purpose of the study, to imagine that they actually would want to take part in a session, but that then the offender declined the invitation (similar as for the Willing group). Likewise, for the Willing group, an alternative option in VR with an Avatar was then offered. After this information, both groups had to think about this alternative, and give answers to the following open questions:

*1. "What are requirement for this VR application **you** think are necessary for you to feel able and comfortable enough to speak with a VR Avatar about what happened?"*

2. "What do you think you might gain (so what are beneficial outcomes for you) after having talked with the Avatar?"

3. "What could be possible risks or disadvantages for you of talking with an Avatar instead of talking with a mediator in person?"

Participants had to indicate their opinion on a 5-point Likert scale about the seven constructs and the construct Participation Intention. Their answers were analysed with Factor and Reliability analyses[4].

[3] For the sake of not overloading the participants with information, no distinction was made between Avatars and Agents. The difference between these two has been described in the Introduction. It can be argued that participants are be more able to imagine how an Avatar would work/function than an Agent, since the word Avatar is more (commercially) used regarding VR than the word Agent. Moreover, it has not been researched yet which Virtual Character (Avatar or Agent) would be most applicable in this specific situation, and this is beyond the scope of this thesis. Therefore, it is chosen to only use the word Avatar in the questionnaire.

[4] Two factor analyses were done with all 25 items together as well to see how many underlying factors the seven constructs have. This resulted in the first measurement in six underlying factors, and in the second measurement in five underlying factors. In both Rotated Factor Matrices, it was visible that the seven intended constructs were roughly recognizable and that most of the items of the constructs were loading on 1 factor. However, not all of them. This probably means that certain items have overlap with two or more constructs/factors, and it is not excluded that some constructs might be related to each other. Since one of the aims of this research was to compare the mean scores from before and after seeing the state-of-art of VR, it was necessary to have the same constructs/factors in both conditions. Unfortunately, it was deemed impossible to group the same constructs and items together in both measurements. In addition, the factor analyses, items, and constructs are not the main results on which the conclusion of this research will be based, since the items are used as a possible additional explanation for the opinions participants stated in the open questions. Therefore, it is decided together with the mentor to keep the seven constructs in both measurements, in order to be able to compare the means, make conclusions, and to be able to use the outcomes as possible additional arguments for changes in opinion from participants throughout the questionnaire.

Constructs Measurement 1

Realness. To measure the construct Realness, participants had to answer three items like: *"The interaction with the Avatar would feel real."*. Factor analysis showed one underlying factor with an Eigenvalue of 2.12, and explained 70.66% of the total variance. In addition to that, the reliability of this construct is good (α = .79).

Genuineness. With a total of five items like: *"I would believe what the Avatar would say to me."*, analysis showed one underlying factor with an Eigenvalue of 3.32. This factor explained 66.40% of the total variance within this construct. Reliability was measured and turned out to be very high (α = .87).

Safety. This construct has three items like: *"I will feel safe enough to talk with the Avatar."* and with only one Eigenvalue higher than 1, namely 2.53, this showed one underlying factor which explained 78.34% of the total variance. The internal consistency of this construct is very high, with α = .86.

Willingness to Talk. This construct with three items like: *"I will want to talk with the Avatar."*, showed one underlying factor with an Eigenvalue of 2.34. This factor explained 77.95% of the total variance and has a high internal consistency (α = .86).

Applicability. With a Cronbach's Alpha of .81, this construct with three items (*"This specific VR application with an Avatar can be used for many people."*) has a reliable scale. In addition to that, analysis showed one underlying factor with an Eigenvalue of 2.17. This factor explained 72.19% of the total variance.

Perceived Ease of Use. With a total of three items like: *"I would be capable of using it."*, analysis showed one underlying factor with an Eigenvalue of 1.96. This factor explained 65.28% of the total variance and has a somewhat high reliability (α = .73).

Perceived Usefulness. This construct has five items like: *"Seems as a useful alternative to me."* and showed one underlying factor with an Eigenvalue of 3.23. Moreover, this factor accounted for 65.53% of the total variance, and lastly, this construct has a very high internal consistency (α = .87).

Next, participants had to answer to the construct Participation Intention with two items like: *"To what extent would you be willing to try such an alternative variant in VR with an Avatar if this would be offered to you after the robbery?"*, in order to be able to analyse whether this intention became higher in Measurement 2 and they had to explain why they gave their specific answer to these items.

In Measurement 1, participants were neutral regarding this construct, and were even

more tending to the negative side with a mean of 2.78 (*SD* = .92). A moderate positive correlation between the two items (r = .52; p <.001) was found, and the internal consistency obtained was α = .69.

After this, the video about the state-of-art of VR was shown to all participants, they had to answer the following question on a 5-point Likert scale: *"After seeing the state-of-art of VR in the previous video, to what extent has your opinions changed towards using a VR application with an Avatar when traditional VOM is not possible?"*, and they had to answer this open question: *"In what way has your opinion changed? What made your opinion more/less positive or negative?"*. Furthermore, two open questions were asked which are somewhat similar to the open questions in Measurement 1:

1. "What are requirement or elements you think are necessary to add, in order to make a potential VR application as replacement for VOM even better?"

2. "What do you think ***now*** *you might gain (so what are beneficial outcomes for you) after having talked with such an Avatar?"*

Moreover, it was said to the participants that they had to give answers again to the exact same seven constructs and the construct Participation Intention as before, and that while answering to those constructs again, they had to keep in mind the (new) information they obtained from watching the state-of-art video.

Constructs Measurement 2

Realness. With a total of three items in this construct like: *"The Avatar would respond in a real way."*, analysis showed one underlying factor with an Eigenvalue of 2.19. This one factor explained 72.92% of the total variance within this construct. Moreover, the reliability of this construct is high with α = .81.

Genuineness. With a total of five items in this construct like: *"The responses of the Avatar will be genuine."*, analysis showed one underlying factor with an Eigenvalue of 3.65. This factor explained 73.07% of the total variance within this construct. Reliability was measured and turned out to be very high (α = .91).

Safety. This construct has three items (*"I will feel comfortable around the Avatar."),* and with only one Eigenvalue higher than 1, namely 2.44, this showed one underlying factor which explained 81.44% of the total variance. The internal consistency of this construct is very high, with α = .89.

Willingness to Talk. For this construct with three items like: *"I feel willing and invited to talk."*, an Eigenvalue of 2.56 showed one underlying factor for this construct. This factor

explained 85.39% of the total variance and has a very high internal consistency (α = .91).

Applicability. With a Cronbach's Alpha of .93, this construct with three items like: *"This specific VR application is applicable to many settings."* has a very reliable scale. In addition to that, analysis showed one underlying factor with an Eigenvalue of 2.65. This factor explained 88.33% of the total variance.

Perceived Ease of Use. With a total of three items in this construct (*"I could use the application without firstly consulting a guiding manual."*), analysis showed one underlying factor with an Eigenvalue of 1.99. This factor explained 66.45% of the total variance and has a somewhat high reliability (α = .73).

Perceived Usefulness. This construct has five items like: *"Would help me deal with feelings of anger towards the offender."* and showed one underlying factor with an Eigenvalue of 3.40. In total, this factor accounted for 68.00% of the variance. This construct has a very high internal consistency (α = .88).

Next, the same two items of Participation Intention were asked again, and in Measurement 2, participants became somewhat more enthusiastic (*M* =3.08; *SD* = 1.16) than in Measurement 1. However, since the mean lies still at the middle of the scale, participants' intention to participate can still be seen as neutral. The two items had a much stronger positive correlation ($r = .75$; $p < .001$) with a high internal consistency of .86.

Lastly, to get a general feeling of their thoughts about a possible VR application, three separate closed questions were asked like: *"To what extent would you recommend a possible VR application in general?"*.

Results

Several steps were conducted to be able to answer the research question: *"To what extent do victims of a crime think a Virtual Reality application can function as a proper replacement when traditional VOM is not possible?"*. Since this is an explorative research with a repeated measures design, open and closed questions were asked two times (Measurement 1 and 2). Therefore, several analytical steps had to be conducted, starting with descriptive statistics measuring means and correlations to get a general feeling of the answers. Secondly, descriptive research has been conducted, analysing the seven constructs in both measurements and the construct of Participation Intention to see how participants stand upon the whole alternative VR option, using Pearson's correlation and paired-samples t-tests. Lastly, the open

questions have been analysed and coded, with answers of both the Willing and the Unwilling group together. Interesting differences and similarities between requirements and possible gains between the two groups in Measurement 2 can additionally be found in Appendix K.

Descriptive statistics

Firstly, most participants (n = 40) answered benevolent to the question before Measurement 1 whether or not they would want to take part in Victim-Offender Mediation after being a victim of a robbery (M = 3.33; SD = 1.15). This means that 40 participants indicated 3 or higher and that 14 participants chose 2 or lower on the 5-point Likert scale, resulting in 40 participants in the Willing group, and 14 participants in the Unwilling group.

Secondly, participants were quite neutral in Measurement 1 regarding the construct Participation Intention. As can be seen in Table 1, Measurement 2 shows a significantly higher mean than Measurement 1 (t(51) = -3.26; p = .002), indicating that people became more willing to try out an alternative variant in VR with an Avatar after seeing the state-of-art of VR. However, it should be noted that in Measurement 2, participants are still somewhat neutral about it since the mean score centres around the middle of the scale. Another additional analysis is done regarding Participation Intention for the Unwilling and Willing group separately. In Measurement 1, the Unwilling group had a mean score of 2.36 (SD = .93) and in Measurement 2 this was higher (M = 2.61; SD = 1.18) but the difference was not significant (t(13) = -1.39, p = .187), and this group tends more to a negative intention to participate. The Willing group had a higher mean in Measurement 1 (M = 2.92; SD = .91) than the Unwilling group. In Measurement 2 this was even higher (M = 3.25; SD = 1.12) and the difference was significant (t(37) = -2.94, p = .006). It should be taken into account however that the sample size of the Unwilling group is only 14, which is considered to have too little power to obtain significant differences.

Lastly, the final questions about how participants think about a general VR application resulted in that most participants were neutral about recommending a possible VR application in general (M = 3.38; SD = 1.03), were neutral about recommending a possible VR application when traditional VOM is unfeasible (M = 3.35; SD = 1.06), and were neutral about recommending a possible VR application to their friends (M = 3.23; SD = .98).

Descriptive research

Correlations

As can be seen in Table 1, the correlations between all constructs for Measurement 1 and Measurement 2 are displayed. Below the diagonal, the values of Measurement 1 can be seen.

Above the diagonal, the values of Measurement 2 can be seen. In addition to that, means, standard deviations, answer ranges, *p*-values, and upper and lower limits between the means (difference score) with a 95% Confidence Interval are displayed as well.

Starting with Measurement 1, it can be seen that many constructs have significant positive correlations. Some notable strong correlations will be described in detail. Firstly, the constructs Safety and Willingness to Talk have a strong significant positive correlation (r = .70; $p < .01$) which indicates that at the moment participants think about the VR application as being safe and when they feel comfortable around the Avatar, they are also more willing to talk with the Avatar. Secondly, there is a strong positive significant correlation between Perceived Usefulness and Willingness to Talk (r = .72; $p < .01$), which indicates that at the moment participants see this alternative in VR with an Avatar as useful, they feel also more willing and invited to talk with the Avatar. Moreover, the constructs Participation Intention and Willingness to Talk have a strong significant positive correlation (r = .64; $p < .01$), suggesting that the higher participants' intention to participate in a VR VOM session got, the more they were willing to talk with the Avatar. Furthermore, the constructs Participation Intention and Perceived Usefulness have a strong positive significant correlation (r = .63; $p <$ .01), indicating that the more useful the participants thought the VR application would be, the more they were willing to try out such an application. In addition, the constructs Perceived Usefulness and Realness, Perceived Usefulness and Genuineness, and Willingness to Talk and Realness for example have all also significant positive correlations, but are not as high or strong as the above described correlations.

Measurement 2 in Table 1 displays many constructs that have significant positive correlations as well. Firstly, the constructs Genuineness and Realness have a strong positive significant correlation (r = .76; $p < .01$), much stronger than in Measurement 1, indicating that after seeing the state-of-art of VR, participants think the Avatar will be more genuine when the interaction with the Avatar feels realer. Secondly, again the constructs Perceived Usefulness and Willingness to Talk have a very strong positive correlation in Measurement 2 (r = .84; $p < .01$), indicating that at the moment participants see this alternative in VR with an Avatar as useful, they become even more willing and feel more invited to talk with the Avatar. Thirdly, the constructs Participation Intention and Willingness to Talk have a very strong positive correlation (r = .79; $p < .01$), suggesting that the higher participants' intention to participate in a VR VOM session was, the more they were willing to talk with the Avatar. Moreover, for example the constructs Willingness to Talk and Safety, Perceived Usefulness

and Participation Intention, and Applicability and Willingness to Talk have strong positive correlations which are all significant at the $p < .01$ level.

Paired-samples T-tests

Paired-samples T-tests were conducted to compare the means of the seven constructs and the construct of Participation Intention from Measurement 1 and Measurement 2. As can be seen in Table 1, all the means are higher in Measurement 2, except for the construct Realness. However, for 50% of the constructs, there is not a significant difference between the means, since the *p*-values are much higher than the preferred significance level ($p < .05$). Looking at the construct Willingness to Talk, there was not a significant difference in the mean scores with Measurement 1 and with Measurement 2 ($t(51) = -1.35$; $p = .182$). The same goes for the constructs Genuineness, and Perceived Usefulness, see Table 1. This indicates that, even though it shows higher means in Measurement 2, this does not actually have to mean that participants notably changed their opinions regarding these constructs.

For the constructs Safety, Applicability, Perceived Ease of Use, and Participation Intention, there is a significant difference, indicating that participants have changed how they thought about and responded to the items of the constructs in Measurement 2. This might indicate that participants thought, after seeing the state-of-art of VR, a potential VR application will feel safe enough to talk about what happened and will be more applicable when traditional VOM is not possible than in Measurement 1, where they had to think about VR themselves. Moreover, participants firstly were somewhat neutral about Perceived Ease of Use, but after seeing the state-of-art of VR, they became more positive and enthusiastic, and the difference is significant ($t(51) = -3.90$, $p < .001$). This indicates that participants thought a potential VR application with an Avatar is easier to use after seeing the video about VR.

With the reasons mentioned above, it can be concluded that the video with the state-of-art of VR had a positive significant influence on how participants thought about the constructs Safety, Applicability, Perceived Ease of Use, and Participation Intention.

However, since this is an explorative research, it is asked of the participants to explain opinions and thoughts in open questions, preventing that answers regarding possibilities why and how they might have changed their viewpoints after seeing the state-of-art video about VR must be guessed.

Table 1

Constructs, means, standard deviations, Pearson correlations, significance levels obtained from Paired-samples T-tests for Measurement 1 (N = 54) and Measurement 2 (N = 52)

		M1(*SD*)[5]	*M2* (*SD*)[6]	*p*	*LL*	*UL*	1	2	3	4	5	6	7	8
1.	Realness	3.08 (1.22)	2.94 (1.11)	.424	-.51	.22	1	**.757****	**.527****	**.556***	**.377****	-.167	**.665****	**.517****
2.	Genuineness	2.65 (.99)	2.82 (1.01)	.114	-.04	.36	**.544****	1	**.440****	**.536****	**.338****	-.99	**.555****	**.529****
3.	Safety	3.49 (1.08)	3.70 (.98)	.050	.00	.41	**.319***	**.361****	1	**.653****	**.431****	.256	**.616****	**.597****
4.	Willingness to Talk	3.19 (1.04)	3.35 (1.12)	.182	-.07	.38	**.476****	**.428****	**.699****	1	**.602****	**.319***	**.836****	**.790****
5.	Applicability	3.30 (.98)	3.56 (1.06)	.004	.09	.44	.265	**.300***	**.474****	**.494****	1	.240	**.553****	**.553****
6.	P.E.U.	3.34 (.87)	3.65 (.73)	<.001	.15	.48	.177	.057	.249	**.372****	.166	1	.158	.109
7.	P.U.	3.14 (.95)	3.22 (1.01)	.396	-.10	.26	**.505****	**.533****	**.504****	**.720****	**.532****	.193	1	**.806****
8.	Participation Intention	2.78 (.93)	3.08 (1.16)	.002	.12	.50	**.524****	**.448****	**.510****	**.639****	**.418****	.062	**.625****	1

Note. **p* < .05; ***p* < .01. *M1* is Measurement 1. *M2* is Measurement 2. P.E.U. includes Perceived Ease of Use. P.U. includes Perceived Usefulness. All variables were measured on a scale from 1 to 5. All scales of all constructs had a minimum of 1 and a maximum of 5 with a range of 4, with only one deviation at Perceived Usefulness in M1 (Min = 1; Max = 4.6; Range = 3.6). *p* Indicates significance at the 2-tailed level. *LL* = lower limit; *UL* = upper limit between the means (difference score) with a 95% Confidence Interval.

[5] Measurement 1: the values below the diagonal/ 1's in the table correspond with Pearson correlation values for Measurement 1
[6] Measurement 2: the values above the diagonal/ 1's in the table correspond with Pearson correlation values for Measurement 2

Open questions

Stated exactly in the Method section, open questions were asked serving the purpose that participants can explain their opinions and thoughts. All the answers have been coded, and overlapping answers were searched for, in order to try to group them together under the same code. In addition, answers that were only given by a minority of the people are described as well, in order to give a complete overview of the range of answers. Moreover, percentages of codes are given, in order to have a clear oversight of the prevalence of codes/answers.

Measurement 1

Responses of the Unwilling group

In total, 14 participants indicated to be unwilling to take part in VOM in the beginning, and all 14 participants stated similar reasons, namely, that they would either be too angry to meet up with the offender again, or that they did not think it would help them to overcome their feelings towards the offender and that it would feel weird and not helpful. A participant stated: *"I would not want to face the person that did harm to me. I do not need an apology from him/her, because they intended to hurt me, so an apology is not in place, from my perspective."*. However, for the purpose of the study, it was asked of them to imagine that they would want to take part in VOM, but that the offender declined the invitation and that an alternative in VR was offered with an Avatar. After that, their opinions about requirements, possible positive outcomes/gains, and possible disadvantages were asked in open questions.

Requirements. With a total of 11 participants (78.6%), it was indicated that the Avatar should look real and should look like the real offender, especially regarding the eyes, because this should give a trustful feeling towards the Avatar. Moreover, a trustworthy conversation/relationship and a calm and patient Avatar were stated as important, because otherwise, the participants would not be willing to talk to the Avatar.

Gains. Most participants, 42.9%, stated as important possible outcome, that they might gain closure about the whole situation: *"Some closure, and peace of mind (less anxiety)."*. Moreover, 14.3% indicated that it would be important for them to understand why the offender did what he/she did, and this is named a so-called other-oriented motive to meet up: *"I might understand why the offender did the crime (certain circumstances or something)."* and *"To maybe understand the robber more in what kind of situation he/she was why he/she did this or be able to tell your story, be relieved of your anxiety/anger at the robber."*. Lastly, 7.1% stated that nothing could be gained: *"Because it wouldn't be possible to emotionally connect to the real person who did it."*.

Disadvantages. Firstly, 42.9% thought that the responses of the Avatar would not feel real, and that it might interpret their responses and thoughts in a wrong way: *"Having the feeling that it is still unreal. Still missing the regret of the offender."* Secondly, 57.1% stated that it could feel wrong to not be able to see the real person, and that they would not know if the offender regrets his/her action: *"You may want to see the real person and his/her emotions in order for you to really know how he/she feels about the situation and if he/she regrets it.".*

Responses of the Willing group

A total of 40 participants indicated to be willing to take part in VOM. After the message that traditional VOM is not possible and that an alternative in VR was offered with an Avatar, it was also asked of those participants to indicate requirements, possible gains and disadvantages for such an application.

Requirements. Firstly, participants gave a wide variety of answers about which requirements they think are necessary in order to feel able and comfortable enough to speak with an Avatar about what happened. The most common requirement was that the Avatar and the whole program should look realistic and work real-time, 45% (n = 18) of the participants stated this as the most important requirement: *"Given answers from the VR offender must be similar to real live, based on psychological examination."*, *"For the VR part it's probably a good thing if the VR Avatar looks 'serious' and not cartoony or whatever."*, and *"It must appear human and genuine."*. Moreover, 20% stated a safe environment as requirement and that the mediator should be present in the VR world as well: *"The mediator should be present in the VR 'world' as well, and it should be placed in surroundings where I feel safe."*. In addition, 7.5% stated auditive and visual support to be important: *"I think it is important that the auditive support is in 8D. This will make it look like you are really there because your brain tricks you. Furthermore, it should talk directly back so that it is not a pre-programmed response."*. Another important prerequisite stated by 15% of the participants (n = 6), is that the Avatar should show emotion and should be able to form an emotional connection: *"Emotional connections are very important, more than the realism, because just mimicking the offender's looks will probably not work.".*

Gains. To start with, 47.5% (n = 19) stated that they still might get closure, even if the real offender is not there. It might help them processing what happened: *"As a victim, I might get answers and understand the situation. This way, I might gain closure. The Avatar would be the perfect intermediate that would solve the absence of the real offender."* In addition, 22.5% stated that to hope to get answers from the Avatar/offender, and in this way, better

understand why the offender did what he/she did: *"Better understanding of his intentions."*. Moreover, 15% (n = 6) indicated that they would be able to tell their story to the Avatar/offender and herewith, being heard, this would help them in overcoming the bad experience. Furthermore, 15% stated to be feeling more secure to talk about what happened, because people might feel ashamed towards a real offender/mediator when telling how it made them feel and how afraid they were, so that this might be a safer environment to talk about what happened: *"Closer, understanding the situation of the offender […]maybe even feeling safer due to not being with each other in the same room."*.

Disadvantages. The most often named disadvantage or concern, namely 30% of the time, is that it might not feel real enough and that it might be too artificial or robot like: *"No real emotions, and the real realization does not emerge with the offender, since you cannot tell how hard this was for you."*. In addition, 27.5% stated that they thought this would miss the point of confronting the offender (other-oriented motive to participate), and that it would miss the 'real' feeling: *"Getting a fake sense of resolution of the trauma. In addition, the whole point of confronting the perpetrator is lost."* Lastly, one participant stated something about privacy, namely: *"It can get hacked and people can listen in!"*.

Measurement 2

Among the participants, 48,1% became (extremely) more positive about a possible VR application with an Avatar after seeing the state-of-art of VR. Furthermore, 40.4% indicated that their opinion did neither change positively nor negatively, and 11.5% stated that their opinion changed somewhat negative. Lastly, no participants changed their opinion extremely negative.

Answers of the Willing and Unwilling group together are described regarding changes of opinion after seeing the state-of-art video. Secondly, requirements and possible gains from the two groups together are stated[7].

Somewhat positive change. Firstly, 24 participants (46.2%) stated that their opinion changed somewhat positive. The answers have quite a range, but 58.3% stated that it looked more realistic, or professional or human than expected: *"I envisioned the Avatar and the environment less realistic."*, *"It felt more human than I thought it would be."*, and *"It looks way more real than I reckoned such an Avatar would be, there is more humanity behind it that I thought."*. Moreover, 25% argued that the set-up looks nice and trustable, and that it

[7] Similarities and differences between requirements and possible gains between both groups can be found in Appendix K as additional information.

was also nice to hear other people talk about it: *"I became aware of how the procedure would look like…setting is safer than expected."*, *"It seems more realistic than I thought, and other people talking about it how it helped is a positive incentive."*. In addition, 16.7% stated that the state-of-art of VR surpassed their expectation: *"The fact that they are this far already in VR, gives me a more positive view towards Avatars."* and *"I hadn't figured that the VR would be this full scale."*.

Neither negative nor positive change. With a total of 21 participants, 40.2% indicated that their opinion did not really change either way. Mostly because they either already knew that this was possible, or they were sceptic in the beginning as well and this video did not help to see it in a more positive light. With a total of three participants, 14.3% stated that they thought that it is a nice application for management training as explained in the video, but that they did not see how this could be used in an alternative VOM setting: *"Training to be a better leader I can understand. When it is about mental health I don't know."* and *"It did not, for managerial practices I do think this could/will work."*.

Somewhat negative. With a total of 6 participants, 11.5% stated that their opinion changed somewhat negative, mostly because of the fact (50%) that it was worse than what they had expected: *"I clearly see that the state of VR is not much better than I imagined it would be, confirming my initial convictions."* and *"It looks even less real than expected."*. One of them also stated that it has unrealistic visuals: *"The visuals of the VR body seem too ruddy/unrealistic. It doesn't 'feel' human or capable of expressing human emotions visually."*.

Extremely positive. There was one participant whose opinion changed extremely positive: *"The 3d aspect has changed my opinion strongly. It became more real and I think such a virtual reality can really have its effects on humans."*.

Overall, it can be concluded from these answers, that almost half of the participants changed their opinion positively towards a VR application after seeing the state-of-art video, which is in line with the significantly higher mean on Participation Intention in Measurement 2, and that they were able to tell why their opinion changed positively. In addition, a substantial minority indicated that it did not change their opinion because they already knew what was possible in VR, and that a very small minority indicated a negative change, mostly because it still looked too unrealistic for them.

Requirements or elements ought to be added by all participants

With a total of 52 participants, 19.2% stated to think that the application has to be more real, in order to make a potential VR application as a replacement to traditional VOM even better: *"Less computer-like images."* and *"It needs to feel so real, that it can hardly be distinguished."*. In addition, 13.5% indicated that the non-verbal communication could be improved as well: *"VR needs to better integrate non-verbal communication.",* and *"Better visuals: clearer facial expressions, body language, more natural body movement."*. Moreover, four participants stated that the offender of the crime should be more (visually) present as well: *"Before going in the VR application, send in questions to the offender and have the real answers which can be used by the avatar."*. Lastly, some participants stated that nothing could improve the application in order to make it a potential replacement for a VOM session, because they simply feel very negative about this option: *"I do not believe in this option, so I do not have requirements."*.

Possible gains, thought by all participants

After seeing the state-of-art, after thinking about it themselves twice and after explaining many things about their opinion, at least 36.5% stated to think that there are multiple things to gain, namely release, acceptance, closure, and the possibility to talk about what happened and what it did to them: *"Having a chance to deeply get into my emotions concerning the robbery and talking about it."*, *"Cope better with psychological problems after the crime."*, and *"I think I would believe the answers of the avatar even more!"*. In addition, 15.4% talked about self-realisation and that it might help to speak about it, instead of pushing away feelings and thoughts: *"More reflection on my own feelings.",* and *"Maybe learn about how I come across as I'm talking about the trauma."*. Lastly, one participant stated that he/she would gain nothing: *"Really nothing, I really get the feeling that you have to process a traumatizing event by talking to a sock puppet."*.

Some conclusions can be made, based on the answers to the open questions. Participants gave arguments to take part in (VR) VOM and why they would (not) want to meet up at all, and it has been concluded that there might be self- or other-oriented motives to decide to do so: Some people indicated that they would like to meet up in order to 'just' obtain closure from it (self-oriented motive), while other people stated that they would like to meet the offender, and hear why the offender did what he/she did, in order to understand the whole situation better (other-oriented motive). This indicates that participants might have self- or other-oriented motives to take part in mediation. Furthermore, in Measurement 1, a big majority in the

Unwilling group stated that it might feel wrong not being able to see if the offender regrets his/her actions (other-oriented motive), while the Willing group only did this for a small part. The Unwilling group stated considerably more that the application should look more real than the Willing group did, indicating that the Willing group might perceive the potential application already as quite real or adequately real enough. This is in line with answers given in Measurement 1 by the Unwilling group – there, a big majority already stated that the Avatar should look real and like the real offender, while this was a minority at the Willing group. Lastly, the Unwilling group stated considerably more than the Willing group in Measurement 2 that they do not believe in this option and that there would be nothing to gain with this alternative, because they could not know if the offender regrets his/her action.

Short summary of all the findings

Most participants indicated to be willing to take part in VOM, after they imagined being a victim of a violent robbery. Herewith, two groups have been made, the Willing and the Unwilling group. Participants generally indicated to be neutral about their intention to use a VR alternative in Measurement 1. After seeing the state-of-art of VR in a video, this mean in Measurement 2 was significantly different and somewhat more positive, but still centred around the middle of the scale, indicating that they were still somewhat neutral about their intention to use a VR alternative. The constructs have many positive correlations between them in both measurements, and all constructs have a good internal validity regarding Cronbach's Alpha. For half of the constructs, significant differences are found between the means in both measurements. Both groups stated requirements to make a potential VR application a proper replacement when traditional VOM is not possible, for example that it should look more real and that visuals, like facial expressions and body language should be improved. In addition, almost half of the people in both groups stated that they might gain closure, release, and acceptance in a VR VOM session. Moreover, some elements need to be adjusted like how real the images are, and non-verbal communication before participants think it could function as a real replacement of traditional VOM. Lastly, self- or other-oriented motives might predict whether participants want to take part in (VR) VOM.

Discussion

Taking these results together, it is tried for the first time to chart what participants think about and expect from a potential VR application with an Avatar, when traditional VOM is unfeasible. VOM is one of the most used forms of restorative justice (Hansen & Umbreit, 2018) but still, 40 to 60% declines the invitation to participate. Over the many years that VOM exists, multiple research has been done regarding VOM. However, not like in this research, in which the aim was to find out what people (who had to imagine being victim of a robbery) think of a potential VR application with an Avatar when traditional VOM is not possible, because the offender of a crime declined the invitation to participate in VOM, while the victim actually did want to meet up.

It can be concluded that participants were at the beginning not very enthusiastic about an alternative in VR and they were just neutral, but that the majority of opinions about it changed significantly and positively as they obtained more knowledge about VR from the state-of-art video. However, the mean of the construct Participation Intention in Measurement 2 still centres around the middle of the scale, so they did not become much more enthusiastic, which is in line with the fact that 40.2% stated that their opinion did neither positively nor negatively change after seeing the state-of-art video.

The VR video had a significant positive effect for the constructs Safety, Applicability, and Perceived Ease of Use as well. This could be the case because the video explains in a very simplistic manner what the VR application looks like, how the Avatar responds, and in which kind of setting it takes place (Safety), how it can be applied for psychological purposes (due to the fact that a Performance Psychologist gives information about it) (Applicability), and participants probably agreed with the video that it might be easy to use such an application or program (Perceived Ease of Use). Participants stated reasonable things that should be adjusted or added first to the VR environment, before it would become a proper replacement when traditional VOM is not possible. The following paragraphs dive deeper into the details of the answer given above.

Firstly, the current research showed in Measurement 2 that participants perceived the Avatar itself and the interaction with it as being less real than in Measurement 1 since the mean score of the construct Realness was lower in Measurement 2. However, the result was not significant, but participants stated that, in order to make it a proper replacement and to make the interaction feel real, it should have less computer-like images and (non)-verbal communication should be improved; the video detracted how real participants would perceive

the Avatar itself and the interaction with it.

Secondly, the video about the state-of-art of VR might have caused participants to think more enthusiastically about VR and an Avatar, and to think about it as a proper replacement when traditional VOM is not possible, because participants answered significantly higher to the constructs Safety, Applicability, Perceived Ease of Use, and Participation Intention. This is supported by the fact that 48.1% indicated to have become more positive about this possibility after seeing the video.

Thirdly, participants explained what they already thought to be good about such an application. They had many elements which they thought should be added or changed as well, in order to make it a more proper replacement, or to make it a proper replacement at all, because a few participants stated not to be seeing how this could work at all. Most participants stated quite minor things to add or adjust like stated above, but both groups indicated that even in a VR application, they might gain closure as Hansen and Umbreit (2018) stated for traditional VOM as well. They might obtain better understanding of the situation of the offender (other-oriented motive to participate), and to be able to get over it which Buchan (2004) described as beneficial outcomes for VOM as well, even when the real offender is not there. Concluding, participants stated potential beneficial outcomes of a VR VOM session that are in line with beneficial outcomes of traditional VOM.

More similarities have been obtained between traditional VOM and VR VOM from answers from participants. This is quite remarkable, because only 3.7% (n = 2) stated to know someone in their direct environment to be acquainted with VOM, and nobody from the sample was acquainted with VOM themselves, so participants stated those things from the top of their heads. Therefore, the following outcomes support and extend the current literature about traditional VOM.

Participants stated as requirement that in a VR environment for VOM, a mediator should be present as well to help them with the process and the dialogue, just like stated by Bradshaw and Roseborough (2005) regarding traditional VOM. Moreover, most participants stated that meeting their offender through an Avatar in VR could help them with gaining empathy for the offender and herewith, getting closure which has been described by Strang et al. (2006) as well for traditional VOM. However, a small opposition stated it as a problem that the real offender is not present, because the whole aspect of getting answers from and confronting the offender is lost and they indicated this as necessary in order to get closure. This contradicts the previous statement and shows that real-life active interaction between victim and offender like described by Umbreit and Armour (2011) is thought to be an

essential part of (VR) mediation in order to have a successful session.

In contrast, it was stated that it might be easier to talk about shameful and embarrassing things with an Avatar instead of with the real offender which was also found in the study with autonomous virtual human interviewer Ellie by DeVault et al. (2014). It was stated as well that talking with an Avatar could clear possible feelings of restriction because the real offender is not there, so everything that comes to mind can be said, which is also stated as a benefit with Empty Chairwork by Kellogg (2004). This might be an unexpected benefit regarding VR VOM, because victims who might be too afraid to talk to the real offender, might be willing to talk about it with an Avatar.

However, something notable regarding the Needs-Based Model from Shnabel and Nadler (2008) was found. What Shnabel and Nadler (2008) stated about restoring feelings of power, was never stated amongst the participants as possible gains or as a reason to take part in a VR VOM session. It was also never stated that they felt that their power or status had been threatened by becoming a victim.

Limitations

Limitations that might have had impact on the current study need to be critically and specifically addressed. The first limitation that comes to mind is that participants in this study were not real victims of a violent robbery. Even though the video showed a good example of what it could look and feel like, participants still had to imagine to a certain extent that they were the victim of this robbery, making it maybe not serious enough to indicate that they would want to take part in VOM in the beginning.

At the start of this Bachelor thesis, it was decided to use HMDs/VR glasses in order to show participants a 360 degrees video of a robbery in which they were the victim, in order to not only having to imagine being a victim, but also experience it to a certain extent. Moreover, it would have been a perfect example of how far VR is already developed, what a practical application could look like, and it would have been easy to show to people. Unfortunately, due to Covid-19, this was not possible anymore, and the study had to become a completely online questionnaire, and herewith it is harder to control for external variables. It also detracted the on forehand indicated unique aspect of the thesis.

It was as far as known by the researcher and the mentor, the first time that Participation Intention and the seven constructs have been measured in this specific setting. Therefore, not much literature has been available in order to help with items and scale construction. Factor analyses showed in the first measurement of the constructs six underlying

factors, while there were five in the second measurement. This made it hard to analyse and compare the results from both Measurements while that was specifically of interest. It has been decided to analyse the seven constructs separately from each other, and the internal consistency of the constructs appeared to be most of the time very high. This made it possible to say something about the results obtained with these constructs in this specific and new setting.

In addition, the means of Participation Intention of the Willing and Unwilling group have been compared between Measurement 1 and 2, and a significant difference was obtained for the Willing group. This was not the case for the Unwilling group. It should be taken into account however that the sample size of the Unwilling group is 14. This sample size is expected to be too small and herewith, has too little power to actually say something about the significance value. In addition to that, both groups show an absolute positive increase in means around .3.

Another limitation is that towards the end of the questionnaire, it was noticed that the answers to open questions became shorter and shorter. Since the questionnaire took quite some time, 30 minutes in general while it was estimated to take around 12 minutes, it could be the case that participants got tired of the questionnaire, and that this caused them to give shorter or less thoughtful answers. This was especially the case with open questions regarding possible gains and requirements of a potential VR application with an Avatar in Measurement 2.

It has been described that the Unwilling group named fewer requirements or possible gains than the Willing group did. It can be argued that this does not give clear-cut insight in whether both groups differ in their critical assessment of a potential VR application or that one group is more open to a VR alternative than the other group. It might be the case that participants in the Willing group are more benevolent to an alternative in VR than the Unwilling group, but since this was not the aim of the research, this has not been thoroughly analysed and researched.

Some strong points can be described as well. Firstly, the video that was used to show how a robbery could go and how threatening a real robbery could be was a good addition to the questionnaire, since participants told the researcher that it was pleasant to see how it could go, instead of completely imagining being a victim of a robbery. Participants stated also that the fact that it was a real and not a staged robbery, contributed to their ability to imagine being a victim of a robbery.

Secondly, the clear and short video showing the state-of-art of VR was a good choice,

because this video explained very clearly and to the point with specific practical examples what is possible in VR and how it has been applied already for training/therapy purposes.

Moreover, the constructs used in this research turned out to have high reliabilities and internal consistencies, which indicate that even though this was probably the first time the items corresponding to the constructs where measured in this specific setting, they measured quite well what they should have been measuring.

Lastly, the target group was meant to be as varied as possible regarding the age of participants, because the researcher was interested in whether for example especially elderly people would not like or would disapprove a technological application. Since people up to 57 years old participated in the questionnaire, it can be stated that a varied target group has been obtained successfully. In addition, most participants came from the social network of the researcher herself who were very supportive regarding this thesis and were interested about it. Therefore, they really took the time to fill in the questionnaire, which has probably caused the answers to be elaborate and which made sure that they answered the questionnaire seriously.

Implications

Since this research has probably been the first time in which it is measured to what extent participants would be willing to try out a Virtual Reality application with an Avatar, more research is suggested because results showed that people are somewhat benevolent to try it out and they think there might be beneficial outcomes from a VR VOM session.

It is interesting for further research to make use of HMDs or VR glasses in order to give participants a real VR experience, let them experience being really part of a robbery, and in order to show simultaneously how things work in VR instead of letting participants imagine being victim of a robbery. It could be the case that participants are better able to feel like a real victim, and herewith, answer from a different, more victim-focused perspective.

Moreover, the seven constructs used in this research which were: Realness, Genuineness, Safety, Willingness to Talk, Applicability, Perceived Ease of Use, and Perceived Usefulness, could be examined and analysed again for this specific setting. The same goes for Participation Intention. This research probably addressed those seven constructs ánd Participation Intention in this specific setting for the first time, whereby it became hard or impossible to group the same factors together in both measurements during factor analyses. This resulted in the decision to analyse and describe all the seven constructs and Participation Intention separately from each other, instead of looking how many underlying factors the constructs really have. However, the results of factor and reliability

analyses are promising, and it is interesting to dive deeper into these constructs in this specific setting of VR VOM. A result could be that it becomes possible to group the same factors together for both measurements.

The current research focussed only on victims of a crime, but it also happens that victims do not what to meet up, depriving the offender of a mediation session. Therefore, further research could investigate which requirements, possible gains, and opinions etc. are from offenders of a crime, in order to make a potential VR VOM environment also applicable for offenders who do want to meet up. This might obtain different answers, because it could be the case that offenders want to get different things out of a VR mediation session.

In addition, for the participants, no distinction was made or explained between Avatars and Agents while they both mean something else and have a very different impact on how an application would work. A participant stated that the 'Avatar' should not use pre-programmed or controlled answers, because this would not feel real[8]. Only this participant talked about it, but future research could investigate if an Avatar (a character controlled by a person in real time), or an Agent (a character completely controlled by algorithms and/or AI) is the preferred character to use in VR VOM. An outcome could be that an Agent is expected to be more viable, but that it might feel more real to talk to an Avatar, because people would know that a real human being is producing the answers behind the scenes. A next step could be that offenders who are willing to participate in VOM but unable to meet up due to personal circumstances could answer questions through an Avatar or the person controlling the Avatar could give real answers from the offender since these could be obtained on forehand.

Lastly, some attention has been given to answers from people from the Willing and Unwilling group and some data has been analysed for both groups separately. However, it is attractive to analyse those differences more deeply, since different motives could be discovered. Results from this research suggest that participants who have self-oriented motives might be more likely than participants with other-oriented motives to make use of VR VOM. This is suggested because people with self-oriented motives mostly take part to tell their story and to 'just' obtain closure which might be possible with VR VOM, instead of confronting their offender for example which might not be possible with VR VOM. Therefore, different motives could predict whether participants would be willing to make use of VR VOM and which participants would benefit most from VR VOM. With further

[8] According to Pan and Hamilton (2018), this 'Avatar' should be called 'Agent' because it has controlled and pre-programmed answers coming from algorithms and/or AI.

research, it might become possible to adjust a VR VOM environment to the specific needs of clients/patients, obtained from their motives to participate.

Conclusion

In this research it is tried for the first time to chart what people think of a VR application with an Avatar as a proper replacement when traditional VOM is unfeasible. The results from the construct Participation Intention showed that the group was not very enthusiastic about a VR alternative at the beginning (Measurement 1), but that the video showing the state-of-art of VR caused a significant positive difference regarding the mean of Participation Intention in Measurement 2. This is interpreted as follows: participants generally became somewhat more positive about a potential VR application, which is supported by the fact that 48.1% stated to have become (extremely) more positive about it after the state-of-art video. However, even though the mean score on Participation Intention changed significantly in Measurement 2, the score still centres around the middle of the scale. Therefore, it can be stated that the VR video had a positive significant influence on how willing participants are to try out a VR alternative with an Avatar when traditional VOM is unfeasible, but with the notion that they overall are still quite neutral about an alternative. Some gains or benefits given by participants are in line with researched benefits of traditional VOM, and participants stated that they might gain closure as well with this alternative. Therefore, it is worth it to deeper explore what a potential VR application could do in relation to VOM, because even though participants were generally quite neutral about it at the end, they indicated that beneficial outcomes in line with traditional VOM might be obtained with a certain alternative in VR.

All in all, it can be concluded that this thesis might be a first step towards more research regarding the use of Virtual Reality and an Avatar as alternative when traditional VOM is unfeasible. Self-oriented motives might predict if people would want to participate in VR VOM. Further research might have as result that more clients or patients who are victim (or offender) of a crime can get proper and personally adjusted help in VR with processing what happened and gain closure, as an extension of traditional Victim-Offender Mediation.

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Appendices

Appendix A – Realness

In this VR application with an Avatar, I think

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
the Avatar would look real to me	○	○	○	○	○
the Avatar would respond in a real way	○	○	○	○	○
the interaction with the Avatar would feel real	○	○	○	○	○

Appendix B – Genuineness

In this VR application with an Avatar, I think

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
the responses of the Avatar will be genuine	○	○	○	○	○
I believe that the reactions of the Avatar will be sincere	○	○	○	○	○
the answers of the Avatar will be trustworthy	○	○	○	○	○
the conversation between me and the Avatar will feel sincere	○	○	○	○	○
I would believe what the Avatar would say to me	○	○	○	○	○

Appendix C – Safety

In this VR application with an Avatar, I think

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I will feel comfortable around the Avatar	○	○	○	○	○
I will be able to talk about what happened with the Avatar	○	○	○	○	○
I will feel safe enough to talk with the Avatar	○	○	○	○	○

Appendix D – Willingness to Talk

In this VR application with an Avatar, I think

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I will want to talk with the Avatar	○	○	○	○	○
I want to talk about what happened	○	○	○	○	○
I feel willing and invited to talk	○	○	○	○	○

Appendix E – Applicability

This VR application with an Avatar

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Can be used for many people	○	○	○	○	○
Is easy to implement in therapeutic sessions	○	○	○	○	○
Is applicable to many settings	○	○	○	○	○

Appendix F – Perceived Ease of Use

In this VR application with an Avatar, I think

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I could use the application without firstly consulting a guiding manual	○	○	○	○	○
it would be easy for me to use such an application with VR	○	○	○	○	○
I would be capable of using it	○	○	○	○	○

Appendix G – Perceived Usefulness

Using such an application

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
would enable me to talk about what happened, even when the real offender is not there	○	○	○	○	○
seems as a useful alternative to me	○	○	○	○	○
would be a good option/alternative when traditional VOM is not possible	○	○	○	○	○
would allow me to confront the offender and overcome my feelings of fear	○	○	○	○	○
would help me deal with feelings of anger towards the offender	○	○	○	○	○

Appendix H – Participation Intention

To what extent would you

	Extremely unlikely	Somewhat unlikely	Neither likely nor unlikely	Somewhat likely	Extremely likely
be willing to try such an alternative variant in VR with an Avatar if this would be offered to you after the robbery?	○	○	○	○	○
directly indicate to the mediator that you would like to make use of such an alternative variant in VR with an Avatar?	○	○	○	○	○

Appendix I – The 2 video's

Violent robbery in San Francisco caught on camera:

https://www.youtube.com/watch?v=zDObM0tcL3Y&t=5s

Explaining state-of-art of VR:

https://www.youtube.com/watch?time_continue=4&v=qjZuh0hWO4k&feature=emb_logo

Appendix J – Informed Consent

Informed Consent

Before you proceed this questionnaire in Qualtrics, please carefully read the informed consent information below.

The following study is about discovering what **you**, as participant, think about a possible Virtual Reality application in a mediation setting. In this survey, it is about Victim-Offender Mediation (VOM). Later on in this questionnaire, more will be explained about VOM. This VR application does not exist yet, so I am interested in what you would want from such an application and what your thoughts are about it. This questionnaire will take approximately 12 minutes to complete.

You have to imagine being a victim of a crime scenario, and in order to make it easier for you to imagine this, a short video about a robbery will be shown to you. Beware that violence is present in this video. If you do not want to see this video, click on 'No, I don't agree and do not want to proceed', the questionnaire will be stopped; by agreeing to this informed consent, you will see a video about a real robbery with violence.

Please be aware that participation in this study is entirely voluntary, and that you can stop taking part at any time. Under no circumstances will your real name or identifying information be included in the report of this research. Nobody, except the researcher and the research supervisor, will have access to this anonymized material in its entirety. Your data is treated confidentially and the research results are published anonymously.

If you have any question, you may contact Myrthe von den Benken (m.s.a.vondenbenken@student.utwente.nl). If you have any complaints about this research, please direct them to the Secretary of the Ethics Commission of the faculty Behavioural, Management and Social Sciences at University of Twente through ethicscommittee-bms@utwente.nl.

If you click on proceed, you indicate that you have read and understood the informed consent, agree to participate, and have been informed in a manner which is clear to you about the nature and method of the research.

- ○ Yes, I agree and want to proceed.
- ○ No, I don't agree and do not want to proceed

Appendix K – Similarities and differences in requirements and possible gains between the Willing and Unwilling group

Requirements. Since two groups were differentiated, it might be the case that in Measurement 2, their requirements differ. Therefore, the answers and codes have been analysed again, in order to see if there are noticeable differences between the groups.

To begin with, in both groups, it was stated one time that a third party should be present as well in this VR application. Secondly, in the Willing group, at least 40% stated that they would not know which things to add and in the Unwilling group, this was 21.4%. In the Unwilling group, 28.8% stated that the real offender should be represented somehow: *"Maybe the real head of the offender on a VR body, to be able to read facial expressions."*. For the Willing group, only one participant stated that it would be important to have the offender represented somehow: *"On forehand, send in questions to the offender and have real answers which can be used by the Avatar."*. For the Willing group, 15% stated that the application should look more real and for the Unwilling group, 42.9% indicated that it should look more real: *"Let the situation look more like real life."*.

Notable, there were no participants in the Unwilling group who answered directly that nothing could be added in order to make the VR application an even better replacement when traditional VOM is not possible. At the Willing group, 5% stated directly that nothing could be added to make it a proper replacement: *"I do not believe in this option, so I do not have requirements."* which indicates that these participants were not positive about a VR alternative in the first place, and that they thought that nothing could be added in order to actually do make it a potential alternative. Furthermore, only in the Willing group, it was stated that the software of the VR could be improved (15%): *"VR needs to better integrate non-verbal communication."*. In addition, only in the Willing group it was stated for at least 15% of the time that the session should take place in a safe environment: *"That people also feel safe in the room they are actually in (as you're basically blind with the VR on)."*.

Possible gains. Firstly, both groups indicated that personal gains would be possible. In the Unwilling group, 28.6% stated that this would entail either gaining confidence, or being able to stand up for themselves: *"Having a change to deeply get into my emotion concerning the robbery."* and *"Maybe standing up for myself towards this person and gain more confidence."* are examples of this. In the Willing group, 15% stated this as personal gains or self-realisation: *"Self realisation and that I have shared my experiences out loud."* and *"I*

might be able to have my responses analysed. So that I am able to get feedback on what I can do to overcome my emotions.".

Secondly, both groups stated that it might help them to understand the situation of the offender: *"Closure, better understand of other persons point of view."* Furthermore, in the Unwilling group, 28.6% stated that they might gain closure with it, or being able to deal with what happened: *"Emotional support and closure."*. For the Willing group, 32.5% indicated that a positive outcome would be either release, closure, or dealing with it better: *"Much more. I think I will be able to process the events much better."*.

Lastly, both groups explained why they think that there is nothing to gain in this situation. The Unwilling group indicated this 21.4% of the time, and the Willing group stated this for 10% of the time: *"I still don't think you've gained any more than talking in real life."*.

Furthermore, with the Willing group, 12.5% answered that they did not think to gain anything else than before seeing the video with the state-of-art of VR: *"Same as before, only somewhat more."*.