VR-aided Victim-Offender Mediation: How Immersion in a VR Encounter Predicts Offenders' Willingness to Apologize to their Victims

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Abstract

The goal of this study was to investigate if an avatar-based VR application (VRA) in which offenders can practice and offer their apology to a victim avatar, can pose a valuable addition to victim impact courses (VIC) to encourage offenders to reach out to their real victim. Offenders are informed about the possibility of victim-offender mediation (VOM) after VIC, but only 18% on average take the opportunity to register for a VOM programme. Using a VRA in VIC and giving offenders the opportunity to apologise to a representation of their victim could have a positive impact on VOM participation rates.

Self-affirmation was manipulated to investigate if it reduces defensiveness in offenders and increases their willingness to apologize to a victim avatar. The VR apology was manipulated to test whether apologizing in VR increases offenders' willingness to apologise to their actual victim. An experiment with 119 students was conducted where they had to think of an unresolved conflict from their life in which they have harmed someone else. Participants were randomly allocated to perform a self-affirmation task or not and to apologise to an avatar in VR or not. Overall, no effects of the experimental manipulation and therefore no support for the proposed expectations were found. However, feeling immersed and present was associated with participants willingness to apologise to their actual victim if they felt a sense of control while apologizing. This suggests that certain aspects of experiencing the VRA predict offenders' motivation to apologize to their victim.

One person […] talked about what happened to him, and then to my absolute astonishment, spoke the path of forgiveness of this one's perpetrator. You have a few profound moments in your life, and this was certainly one for me! […] It made me want to strive to be a better human being. (Howard, n.d.)

Jeremy spent 15 years in an Australian prison going through multiple rehabilitation programmes, when hearing a person talk about their victimization in a victim impact course (VIC) helped him to re-evaluate his delinquent behaviour in the past. He is only one of many offenders that take the step towards taking responsibility for their crime and striving for change.

Around the world, VICs offer convicted crime offenders the possibility to work on becoming more aware of the consequences their actions have had for others – which helps to work towards restoration. Examples in the Netherlands of such restorative victim impact courses are the Puinruimen, SOS (both for adult prisoners), and DAPPER course (Zebel et al., 2016). A number of such VICs are inspired by the Sycamore Tree Project which is a voluntary in-prison programme developed to teach offenders the principles of restorative justice (RJ), and learn about the victim's perspective and needs of both parties resulting from the offence (Feasey & Williams, 2009). One of the goals of the VICs is to bring unrelated victims and offenders together to discuss causes and consequences of the crimes they were involved in. The courses are set up to start from a broad point of view (i.e., impact of crimes on victims in general) and become more concrete and personal (i.e., meeting an unrelated victim). During this process offenders are supported by experienced facilitators in gaining perspective on the impact they might have had on their own victim and in discussing the possibilities of restitution without the direct confrontation with one's own victim (Centre for Justice and Reconciliation, 2021). Evaluations of the Sycamore Tree project in England and Wales by Feasey and Williams (2009) demonstrated positive changes in the perpetrators' attitudes toward their offence and the victim suggesting greater recognition of offenders' negative impact on the victim and their responsibility for the victims' suffering.

After VIC, if the desire for a meeting between the perpetrator and their actual victim arises, the possibility for victim-offender mediation (VOM), one of the most common RJ practices, exists and can be offered. VOM adopts a dialog-driven approach that allows victims and perpetrators of a crime to meet voluntarily in a safe setting in the presence of a professional mediator (Hansen & Umbreit, 2018; Stewart et al., 2018). Victims and offenders get the opportunity to share their experience with the offence they were involved in, ask and

answer questions, and receive or deliver an apology (Hansen & Umbreit, 2018). Research findings suggest that parties are often highly satisfied with the VOM procedure and can benefit greatly from the process. Specifically, victims report to have found closure after mediation and are less angry and fearful of the offender (Laxminarayan et al., 2015; Strang et al., 2013; Zebel, 2012). Offenders have been found to take responsibility for their actions through VOM while explaining the offence to the victim and offer reparations (Choi et al., 2010; Hansen & Umbreit, 2018; Shapland et al., 2007; Strang et al., 2013; Umbreit & Armour, 2011). Moreover, participation in VOM has been associated with reduced recidivism rates in offenders (Jonas-van Dijk et al., 2020; Strang et al., 2013).

Despite these positive effects and high satisfaction rates, only 18% to 21.4% of those who participate in Dutch VIC decide to join a VOM programme afterwards (Zebel et al., 2016). Non-participation might not only stem from offenders' unwillingness, but also from offenders being willing to approach their victims but feeling incapable of engaging with them (Mainwaring et al., 2019). Therefore, these rather low participation rates after VIC warrant the investigation of a potentially new method for VIC, that is based on offenders' established motivations, who make the decision to participate in VIC.

Therefore, in this thesis, an avatar-based virtual reality application (VRA) is designed and examined for VICs aimed at enhancing offenders' readiness to participate in VOM. In such a VRA, the offender is invited to sit down with an avatar who represents the victim from their actual offence and apologise to them. This allows a test-run that otherwise would not be possible since the offender and victim do not meet each other before actual mediation. Hence, this experience is supposed to have a preparatory effect for offenders in VIC before actual VOM.

At the present time, VR applications are already used successfully in many other related contexts. That is, virtual reality (VR) is known to be highly immersive, largely successful in eliciting emotions in role plays (Jouriles et al., 2009, 2011), and effective in teaching interpersonal communication skills (Howard, 2017; Howard & Gutworth, 2020). Interpersonal communication skills, such as perspective taking or expressing empathy, are crucial for the outcomes of VOM, as a lack of it might lead to dissatisfaction on both sides. Further, the use of VRAs was also found to be highly successful in exposure therapy for phobia and anxiety treatment, such as fear of heights and social anxiety (Freitas et al., 2021), suggesting that engagement in VR during interventions encourages behaviours that transfer to daily life.

However, stressful and potentially unknown experiences like facing a person one has severely harmed, can increase resistance to participation in VOM and the VRA. In VOM, offenders' reasons for non-participation are assumed to be the inability or unwillingness to show understanding for the victim's perspective and to take responsibility for their wrongdoing (Mainwaring et al., 2019). Similarly, these processes might also predict non-participation in a VRA. Further, offenders might be motivated to avoid associations of themselves as perpetrators of harmful actions (i.e. committing a crime), as this is likely to pose a serious threat to their self-integrity (Cohen & Sherman, 2014; Mainwaring et al., 2019; Schumann, 2014) and sense of power (Okimoto et al., 2013).

That is, according to self-affirmation theory (Steele, 1988), self-threatening events or actions, such as committing a crime or harming someone raise doubts about one's overall perception of virtuousness and are usually combated with defensiveness to reduce association with such events (Schumann, 2014). This suggests that offenders might decline to participate in VOM to avoid the confrontation with one's wrongdoing as a defensive strategy (i.e., avoiding responsibility taking). Accordingly, these processes might also affect perpetrators' readiness to participate in an experience that is simulating the moment that they would apologise in.

Nevertheless, VOM is well known to be beneficial for offenders. Through the engagement with the victim, offenders have the opportunity to apologise, make amends and feel like they can move on with their life (Choi, 2008; Hansen & Umbreit, 2018; Shapland et al., 2007). This highlights only a couple of positive impacts offenders might experience once they feel as if these outweigh the negative feelings related to the confrontation with their offence. Subsequently, instead of choosing non-participation, self-affirmation could be an alternative response to reducing the threat one's wrongful actions (i.e., offences) posed to one's self-integrity; in order to be open toward engaging with one's victim.

Self-affirmation theory (SAT) describes an individual's motivation to protect their self-integrity when they become subject to self-threating events (Sherman, 2013). Accordingly, an individual's self-integrity refers to their conviction of being an overall morally good person and when this is threatened, self-affirmation can be consciously utilised to re-gain a more holistic positive view of the self (Steele, 1988). Concretely, SAT postulates that when faced with threats to the self, the individual's positive aspects and important values are intentionally made more salient which draws focus to an overall positive self (Schumann, 2014). Consequently, this will result in less defensive and more productive behaviours in response to the threat (Sherman, 2013). Hence, self-affirmed offenders who are reminded of

what makes them who they are, beyond the self-threatening event of having committed a crime, could be more likely to engage with an avatar that represents their victim and subsequently accept an offer for participating in VOM.

Therefore, considering the shared notion between VIC and VOM as well as the impact of self-affirmation on integrity and defensive strategies in conflict situations, great potential can be observed in stimulating convicted perpetrators in VIC through self-affirmation interventions to accept the offer of participating in VOM or even take the initiative themselves to start the process. This could be initiated by giving offenders the opportunity (1) to expand their self-perception after a crime to core values that are important to their self-integrity (Schumann, 2014), (2) to experience a glimpse of VOM as well as their role in it, and (3) to prepare them for eventually taking part in a real mediation process in the future.

Right now, in VIC, one way to increase awareness and understanding for the victim's perspective and consequences of criminal behaviour is by letting unrelated victims share their experiences (in person or via a video) and then asking the offenders what they would like to say to the unrelated victim. A VR exercise can go one step further by adding an even closer representation of one's victim and allowing a more effective and unique learning experience compared to a traditional method (Howard & Gutworth, 2020). This might pose a valuable addition to such VIC activities in supporting the offender (and eventually the victim) to work through the circumstances and consequences of the offence.

For these reasons, the current study focuses on the following research questions: (1) To what extent does self-affirmation impact perpetrators' willingness to participate in an avatar-based VR application to apologise for their harmdoing? (2) To what extent does the experience of apologising to a victim in VR increase perpetrators' willingness to participate in actual VOM?

Potentials of Using VR in Victim Impact Courses

Users of VRAs are known to experience similar psychological processes and behave similarly to real-life trainings due to the realistic nature of VR environments (Coffey et al., 2017). Consequently, learning outcomes can be largely effective (Coffey et al., 2017). Adding a VRA to VICs in which the offender can engage with a representation of their own victim, rather than only imagining them or engaging with an unrelated victim, can increase offenders self-efficacy. Morina et al. (2015) conducted a study in which non-clinical participants with reported high and low levels of social anxiety had a virtual interaction with an avatar that represented a stranger as a form of exposure therapy. While people with social anxiety feel

distressed about social interactions in general (Heimberg et al., 2014) offenders might perceive the interaction with their victim in particular as distressing. Three months after the virtual interaction, the high social anxiety group reported lowered anxiety levels and both groups experienced higher levels of self-efficacy (Morina et al., 2015). Subsequently, a similar effect of the VRA on offender's self-efficacy can be expected when they apologise to an avatar representing their victim.

Further, Ganschow et al. (2021) found that a perspective taking exercise in VR leads to more successful outcomes compared to a traditional perspective taking exercise. Specifically, participants were instructed to perform an empty chair exercise in which they had to switch between their own and their future self's perspective in vivo or in VR. Afterwards, the level of future self-continuity was measured in each group. While after the VR exercise participants experienced a significant increase across all four domains of self-continuity, in the in vivo group this was the case for only two domains (Ganschow et al., 2021). Thus, in the VIC context offenders could also experience improved outcomes in taking the perspective of the victim and delivering an apology if they participate in the VRA.

Consequently, allowing offenders to have such a VR experience shows great potential in becoming a beneficial tool in VIC and VOM. Especially when taking into account that victims of offenders who participated in the VRA could benefit from their offender's developed skills, too. That is, Schumann (2014) found that an apology increases a victim's forgiveness while reducing feelings of anger toward the offender. Similarly, research by Berndsen et al. (2018) showed that a victim's perception of the offender's perspective-taking serves as a facilitator in ascribing moral emotions, such as remorse, to the offender while also increasing trust and forgiveness if the perceived perspective-taking was high.

Therefore, allowing offenders to address a victim in VR as an addition to the course can increase their self-efficacy and need for forgiveness which might favourably influence their willingness to participate in VOM.

Self-Affirmation to Overcome Resistance

Further, although offenders might long for forgiveness, Leunissen et al. (2014) found that the averseness of delivering an apology is often overestimated by offenders producing similar threatening effects to their self-integrity and sense of power as found by Okimoto et al. (2013), Schumann (2014) and Shnabel and Nadler (2008). Accordingly, a resistance to experiencing a similar situation to mediation in VR can be expected among offenders as well: They might be unwilling to even imagine meeting the victim in VR.

Research on self-affirmation in the context of apologising yielded promising outcomes that may offer a solution to the resistance offenders might feel about meeting the victim in VR. Specifically, self-affirmed perpetrators provide more comprehensive apologies and are less defensive during the apology expression than perpetrators that did not engage in self-affirmation tasks first (Schumann, 2014). Besides that, self-affirmation was also found to contribute to openness during negotiations (Cohen et al., 2007) as well as on acknowledging one's ingroup's responsibility for an outgroups harm (Čehajić-Clancy et al., 2011).

As mentioned before, self-affirming one's values protects a person's self-integrity through an expanded self-view which in turn weakens the impact of a threat to one's integrity. also increasing the ability to refrain from defensive strategies to avoid such threats (Schumann, 2014; Sherman, 2013). More specifically, In Schumann's (2014) study, participants were asked to recall an unresolved conflict and instructed to write an apology to the person they harmed. In the experimental condition, participants received a self-affirmation task first in which they had to think and write about their most important value which resulted in more elaborative apologies to the harmed person and fewer defensive strategies compared to participants who did not perform a self-affirmation task (Schumann, 2014). This indicates high effectiveness of self-affirmation in reducing defensiveness in offenders. Subsequently, it is expected that self-affirmation will also have a positive impact on offenders' willingness to participate in VR exercises to apologise to their victims.

H1: High self-affirmation among offenders will result in higher willingness to participate in a VR exercise to apologise to their victim.

Offenders' Needs and Motivation to Participate in VOM

Generally, offenders indicate that they participate in VOM to regain social approval, to possibly avoid severe sanctions from court, and to move on from the incident (Choi et al., 2010; Karp et al., 2004). These reasons are further accompanied by wanting to talk to the victim about and apologising for the crime (Choi et al., 2010; Shapland et al., 2007). In a recent qualitative study, Mainwaring et al. (2019) interviewed multiple RJ mediators about victims' and offenders' reasons for participation, as well as change in values after the engagement. It was found that offenders seem to be more willing to participate when they place large importance on self-transcended and benevolence-related values including responsibility taking, wanting to apologise, repair the caused harm and help the victim, showing empathy toward the victim, and feeling remorseful and ashamed for their actions (Mainwaring et al., 2019). Similarly, although this is not true among all perpetrators, it is

assumed that a need for social acceptance emerges in offender's after perpetrating a crime since such a socially unacceptable action damages their perceived social-moral image (Shnabel & Nadler, 2008, 2015). Subsequently, this explains the high willingness to participate in VOM among offenders with victim-oriented motivations.

Through the interaction, the deprived psychological resources after the crime can be restored by satisfying the needs of both parties, which symbolically erases the roles of the victim and offender leading to a more equal moral standing of both parties (Shnabel & Nadler, 2008). This therefore opens the way for reconciliation.

How can the needs of victims and offenders be met through constructive interactions? Shnabel and Nadler (2008) argue that a message from the victim towards the offender consisting of acceptance and forgiveness should produce the desired effect. In order to meet the victim's need for power, the offender has to offer an apology (Shnabel & Nadler, 2015).

In accordance with the victim-oriented motivations offenders can have to participate in VOM, an exercise giving the offender the opportunity to practice apologising to the victim in VR seems to be most suitable. Might apologising in VR then be enough for offenders to fulfil their needs, precluding thus participation in actual VOM? I argue that it is not: Beyond the norm that after a harmful action an apology has to follow, there is also the normative (and empirically demonstrated) expectation that victims grant forgiveness in return (Adams et al., 2015; Thai et al., 2023). Also, offenders might feel guilty, shameful, and morally inferior after committing a crime, which increases their desire to be forgiven by the victim (Shnabel & Nadler, 2008). Since experiencing and receiving forgiveness and understanding from the victim would not (and do not need to) be included in such an exercise, it is expected that offering an apology will lead to an increased interest in participating in actual VOM to experience (full) restoration of their needs.

H2: Apologising to a victim avatar in VR increases perpetrators' willingness to apologise to the actual victim.

The Role of Apologies

In face-to-face mediation as well as indirect mediation, an apology is most often a crucial part of restitution for victims, even being viewed as the only acceptable kind of symbolic reparation (Choi & Severson, 2009; Dhami, 2016). Since victims attend the process with expectations, they may be disappointed when the offender's apology is perceived as insincere (Choi et al., 2010; Dhami, 2016). More specifically, Choi et al. (2010) found that

victims are sometimes especially dissatisfied with the delivery of the apology because the offender did not adequately engage in eye contact, did not appear as being remorseful, and did not speak with a respectful tone.

Accordingly, Dhami (2016) and Schumann (2014) found that a full or comprehensive apology contained aspects of the offender explaining the offence, taking responsibility for their actions and the consequences, acknowledging the harm that was caused and the illegitimacy of it, expressing remorse or regret for the caused harm, offering reparations, promising to not repeat such behaviour in the future, as well as asking the victim for forgiveness. Consistent with that, research suggests that delivering a full apology can have a positive effect on the reconciliation of the involved parties, decreasing aggression and anger toward the perpetrator while increasing trust and forgiveness (Berndsen et al., 2018; Fehr et al., 2010). In contrast, apologies entailing defensive strategies such as justifying one's actions, attempting to downplay the consequences of and refuse responsibility for one's behaviour, denying the offence completely or at least one's engagement in it as well as victim blaming (Schumann, 2014), are not considered full apologies and have a negative impact on the reconciliation between the involved parties (Mead, 2008; Woodyatt & Wenzel, 2013). Thus, in the interest of both the offender and victim a comprehensive apology is more desirable.

According to Schumann (2014), a victim's dissatisfaction with a delivered apology, due to perceived insincerity and a lack of eye contact (Choi et al., 2010), can be the result of a defensive offender who is trying to protect his self-worth by delivering an incomprehensive apology. Since, as discussed above, self-affirmation was found to lead to more comprehensive apologies (Schumann, 2014), it can be expected that self-affirmed offenders show a similar pattern in VR by using more apology elements than not affirmed offenders.

H3: Self-affirmation among offenders will result in more comprehensive apologies when apologising to their (alleged) victims in VR.

Aim of This Study

In order to test the hypotheses derived from literature and attempt to reproduce Schumann's (2014) findings in VR, an experiment was performed in which participants (imaginative offenders) were first asked to think about an unresolved conflict from their personal life in which they seriously harmed another person. They were then randomly allocated to perform a self-affirmation task or not. Afterwards, they were asked to write down an apology for the victim. Following, participants were asked to indicate the extent to which

they would like to deliver the apology they wrote down to an avatar in VR that represents their victim; after this, they were randomly allocated to actually do so or only sit across an avatar without apologising in VR. After that, participants were asked to what extent they were willing to apologise to the actual victim or not.

Method

Design

This study employed a 2×2 between-subject design in which the independent variables *self-affirmation* (self-affirmation vs. control) and *participation in VR apology (*apologising in VR vs. control) were experimentally manipulated. The dependent variables were *willingness to participate in the VR exercise, willingness to apologise to the actual victim*, *comprehensiveness of the written apology*, and *comprehensiveness of the VR apology.*

Participants

This study included 119 participants of which 15 participants were excluded because they did not write an apology that *directly* addressed their victim but described what they would say in an apology to them. Respectively, 104 participants in total were included in data analysis. One of the 104 participants, one did not answer the demographic questions. Of the 104 remaining participants, 63 (60.6%) individuals were female, and 40 (38.5%) were male. The participants' age ranged from 18 to 29 (*M*=21.12, *SD*=2.30). In this sample, out of all participants, 70 (67.3%) were Dutch, and 24 (23.1%) were German. Further, the sample included two participants from Greece, two from China, and one from each of the following, Hungary, Kazakhstan, Poland, Spain, and Turkey.

Out of all participants, 89 indicated a high school diploma as their highest finished education (85.6%), followed by 12 participants who obtained a bachelor's degree (11.5%) and one participant who obtained a master's degree (1%). Additionally, one participant indicated to have obtained the Dutch propedeuse in applied psychology (1%).

Further, the sample included 99 students (95.2%), two participants who were employed for wages (1.9%), one who was doing an internship (1%) and one who was not employed but searching for work (1%). Additionally, 98 participants had an income of under 20,000€/year (94.2%), two individuals earned between 20,001€-40,000€/year (1.9%), two participants made 40,001€-60,000€/year (1.9%), and one participant had an income of 100,001€/year or over (1%).

Lastly, participants were asked about their religious identity and commitment. In that

regard, most participants were Atheists (47.1%), while 24 participants indicated to be Christian (23.1%). Additionally, three participants indicated to be Muslim (2.9%), and two individuals were committed to Hinduism (1.9%). Further, 22 individuals indicated that they were committed to beliefs that were not listed (21.2%). This includes eight participants with no beliefs at all (6.7%). Lastly, 75 participants indicated that they were not committed to their religion (72.1%), 27 participants stated that they were committed (26 %), and one individual preferred not to make a statement (1%).

Materials and Measures[1]

Types of Conflicts

Figure 1

Types of Conflicts Participants (n=104) Were Involved in, Categorisation Based on De Dreu (2010, p. 998)
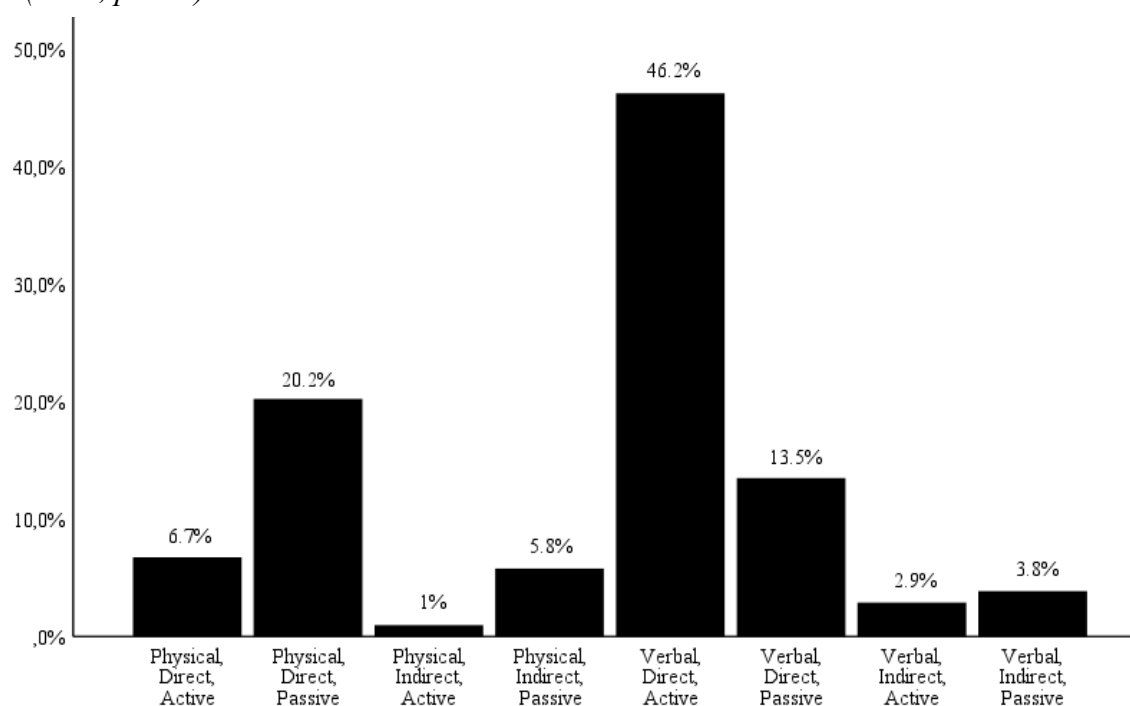
Before the self-affirmation task, participants were asked to describe the unresolved conflict in which they have harmed someone else by providing information about what they concretely did to hurt the other person, who the involved person was, what happened after the harmful action, how they felt after the hurtful action, and their understanding of 'unresolved'.

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[1] Self-esteem, implicit person theories, emotionality, honesty-humility, and perspective-taking were included as pre-measures to account for potential individual differences that exert a strong impact on the results.

Based on the responses, the conflicts were categorised according to the scheme of the De Dreu (2010). Most conflicts fell under the verbal, direct, and active category (46.2%) which means that participants in such conflicts have made sarcastic or hostile comments, yelled at or insulted the other person. The second common type of conflicts were physical, direct, and passive (20.2%). In such cases, participants were habitually late or neglected the relationship (e.g., showing no initiative in establishing contact with the other person and waiting for them to reach out) with the other person. Next, verbal, direct, and passive conflicts (13.5%) included cases in which participants have started to ignore or refuse to help the other party. In physical, direct, active conflicts, participants have physically harmed someone else (6.7%) while in physical, indirect, passive conflicts (5.8%) participants have made the other person look bad. Out of all conflicts, 3.8% were verbal, indirect, and passive which means that participants withheld information from the other person. Further, in verbal, indirect, and active conflicts (2.9%), participants talked about the other person behind their back. Finally, the least conflicts were physical, indirect, and active (1%). In this case, the participant has destroyed another person's property.

The most common responses to participants' understanding of 'unresolved' were that there was no closure or apology delivered after the conflict, that the parties did not talk about the issue or in general anymore, and that the perpetrator felt guilty, remorseful, ashamed and not forgiven after the conflict. Multiple participants also indicated a failed attempt to reconcile as their understanding of an unresolved conflict. Lastly, on average they indicated the conflict that they described as moderately serious (M=5.69, SD=2.31; 0=Not serious at all, 10=Extremely serious).

Independent Variable: Self-Affirmation

As described in Schumann's (2014) study, the self-affirmation task entailed a list with representative pictures of personal characteristics and values (i.e. athletics, artistic skills, creativity, relations with friends/family, spontaneity, and physical attractiveness; Sherman et al., 2000) which participants were asked to rank from most important (1) to least important (7) to them (Schumann, 2014). Following in the self-affirmation condition (n=51), participants had to indicate why their fist-ranked value was most important to them, while in the non-affirmation condition (n=53) participants where asked why the 6th-ranked value on their list might be important to someone else (Schumann, 2014).

A 7-point Likert scale was used to measure all variables, unless stated otherwise. Participant indicated the extent to which they agree with a statement from 1=strongly disagree

to 7=strongly agree. The validity of the scales that were developed for this study, was assessed by computing principal component analyses (PCA) with oblimin rotation.

Self-Affirmation Manipulation Check. This measure consisted of six items that were set up to measure whether participants were self-affirmed after completing the self-affirmation task. The PCA indicated a two-factor solution, explaining 70.1% of the variance. Three items loaded on Factor 1 (all loadings > 0.67) which comprised the salience of positive self-aspects (e.g., 'The task made me think of positive aspects about myself', $\alpha= 0.75$, $\lambda=0.75$). The other two items loaded strongly on the second factor (all loadings > 0.55) and entail the salience of personally relevant aspects (e.g., 'The task made me think about things personally important to me', $\alpha= 0.58$, $\lambda=0. 58$).

Two separate UNIANOVAs were computed to check if the self-affirmation manipulation has worked as intended. 'Self-Affirmation' and 'VR apology' were the between-subject factors and 'Salience of positive self-aspects' and 'Salience of personally relevant aspects' were the DVs. The first analysis generated no significant effect of 'Self-Affirmation' on 'Salience of positive self-aspects', $F(1,100)=0.19$, $p=0.66$, $\eta_P^2=0.002$. The second UNIANOVA yielded no significant effects of 'Self-Affirmation' on 'Salience of personally relevant aspects', $F(1,100)=1.35$, $p=0.25$, $\eta_P^2=0.01$. Hence, the manipulation did not work as intended.

Independent Variable: Participation in VR Apology

Participants were randomly allocated to apologise to an avatar that represents the person they have harmed in VR (apologising in VR condition; n=55) or to not apologise and imagine the moment right before apologising to an avatar that represents the person they have harmed in VR (control condition; n=49). It was pointed out, that the avatars are generic and only their sex, skin and hair colour can be slightly adjusted. In total, a selection of 40 characters was created for this purpose (see Figure 1). Participants were asked what, sex, skin and hair colour the person that they have harmed had, to select the respective avatar. The avatars were able to greet the participants in English and German ("Hi, what do you want to say to me?") and thank the participant for their apology (Thank you for your apology"). The researcher had to be present in the same room as the participant during the experiment to trigger these responses on the computer, therefore, to ensure as much privacy as possible, her ears were plugged during the apology delivery. The VR room was designed rather simple with a table and two chairs in the centre (see Figure 2). In the apology condition, before the actual VR experiment began, participants were presented with a text, explaining the possibility of *apologising* to an avatar that represents the person that they have harmed, and

they had to indicate their willingness to engage in such a scenario. In the control condition, participants were informed that they can *experience* an avatar that represents the person they have harmed.

Additionally, in the VR apology condition, participants were asked to create a personal ID with six characters based on three questions for matching purposes between their written apology and delivered apology in VR. When they agreed on being audio recorded, participants' consent was taped. Once participants felt ready, they were put into the VR room and given a moment to get used to the transition, the researcher plugged her ears and started the recording.

In the control condition, this was not necessary since participants were instructed not to say anything to the avatar and only try to imagine the moment right before making the apology. In both conditions, they were reminded to try imagining the person they had in mind as well as they could (see Appendix A).

VR Apology Manipulation Check: Did Participants Make an Apology? This measure included 5 items (e.g., 'I apologised to the avatar') that assessed if both conditions where perceived as intended. A PCA with oblimin rotation extracted one factor, explaining 81.58% of the variance. All items loaded strongly on Factor 1 (all loadings > 0.83; α= 0.94, λ=0. 95). A UNIANOVA was performed to test whether the VR apology manipulation had worked as intended. The between-subject variables were 'Self-Affirmation' and 'VR apology' and the DV was 'VR apology manipulation check'. The analysis demonstrated a significant effect of 'VR apology' on 'VR apology manipulation check', $F(1,99)=449.90$, $p=0.00$, $\eta_p^2=0.82$. As intended, individuals reported that they apologised in the treatment condition ($M=6.34$), whereas participants in the control condition reported that they did not ($M=2.24$).

Figure 1

Examples of Avatars

Figure 2

The VR Environment

Dependent Measures

      Willingness to Participate in VR Apology. Before the VR experiment, one item per condition was presented to the participants to assess the extent to which they were willing to apologise to an avatar in VR (treatment condition, 'I am willing to apologise to an avatar that

represents the person I have harmed') or to experience an avatar in VR (control condition, 'I am willing to experience an avatar that represents the person I have harmed'). The control condition question was adjusted to avoid the deceiving expectation of having to apologise among participants.

Perception of the Avatar. Six items measured how the avatar's body movement and facial expression were perceived by the participants. A PCA with oblimin rotation extracted two factors, explaining 65.41% of the variance. Four items were related to the avatar's body movement (e.g., 'The avatar's body movements looked mechanical', recoded) and loaded on Factor 1 (all loadings > 0.55) while 'The avatar looked slightly angry' and 'The avatar looked neutral' (recoded) were related to the avatar's facial expression and loaded strongly on Factor 2 (all loadings > 0.84). Hence, one perception of avatar's physical human likeness scale (α= 0.75, λ=0.77) and one perception of avatar's anger scale was created (α= 0.74, λ=0. 74).

Immersion and Presence in VR Environment. An adapted version of the Spatial Presence Experience Scale (SPES) consisting of 8 items was used to measure participants' presence in the VR environment (Hartmann et al., 2015). For clarification, each item was reformulated from '… the area of the presentation' to '…the VR room' (e.g., 'I felt like I was actually there in the VR room'). This scale demonstrated good reliability, α= 0.86, λ=0.87.

VR Perception. The two items 'I was able to see the VR environment' and 'I was able to see the avatar sitting in front of me' measured if participants perceived the fundamental elements of the experiment. They correlated positively and strongly (r=0.84, α= 0.91, λ=0.91).

Perceived Victim-Avatar Similarity. The extent to which participants perceived the avatar similar to the victim of their unresolved conflict was measured with five items (e.g., 'It was easy for me to imagine that the avatar was the person I have harmed'). A PCA with oblimin rotation extracted one factor, explaining 59.49% of the variance. All factor loadings were above 0.34 (α= 0.81, λ=0.84).

Sincerity of Apology. Two items, "My apology is genuine" and "My apology is sincere", r=0.75, p<0.01; α= 0.86, λ=0.86, measured participants perception of their own apology.

Effects of Apologising. This variable measured the effects that apologising had on the participants (relief, their own perceived morality, meeting their need for power/forgiveness, anticipated acceptance of the apology). A PCA with oblimin rotation indicated a three-factor solution, explaining 59.80% of the variance. Items related to participants' needs and relief (e.g., 'I think that I can move on from this conflict', 'I want the person that is involved in this

conflict to forgive me') loaded on Factor 1 (all loadings > 0.34). 'I believe that the other person would accept my apology' and 'I think that the other person would reject my apology' (recoded) loaded on Factor 2 (all loadings > 0.69) and correlated positively and strongly ($r=$ 0.73; $\alpha=$ 0.84, $\lambda=$ 0.84). Items that measured participants' perceived morality ('I think that I am a morally good person', 'I think that apologising makes the people around me see me as a morally good person') loaded on Factor 1 (all loadings > 0.36), and together with 'I think that apologising makes people around me see me as a morally bad person' also on Factor 3 (all loadings > 0.36). After removing this latter item because it was ill-formulated and re-running the analysis, the third factor disappeared so that the items with cross loadings could be included in the initial factor ($\alpha=$ 0.76, $\lambda=$ 0.78).

Perception of VR Apology. In order to measure how easy/difficult, pleasant/unpleasant, humiliating, empowering, and realistic apologising in VR was to participants, 7 items were included. A PCA with oblimin rotation indicated a two-factor solution, explaining 68.74% of the variance. The items "Giving an apology in VR was hard", "I think that apologising in VR was easy", "Giving an apology in VR was unpleasant", "Delivering an apology in VR was stressful" loaded on Factor 1 which relates to the perceived difficulty of apologising in VR (all loading > 0.62, $\alpha=$ 0.84, $\lambda=$ 0.84). Additionally, "Apologising to the avatar felt realistic", "Apologising made me feel as if I have control", and "Apologising in VR was humiliating" loaded on factor 2 but were treated as single items due to a lack of cohesion.

Willingness to Apologise to the Actual Victim. Three items (e.g. 'I would like to apologise to the actual person involved in this conflict now') were used to measure the participants' willingness to apologise to the actual victim after they have participated in the VR experiment. A PCA with oblimin rotation indicated a one factor solution, explaining 69.01% of the variance. All items loaded on Factor 1 (all loadings > 0.69; $\alpha=$ 0.77, $\lambda=$ 0.81).

Apology Elements in Written Apologies/VR Apologies. This measure entailed the coding of two raters based on the amount of apology elements (e.g., admission of wrongdoing, acceptance of responsibility, repair) used by participants in their apologies to indicate the comprehensiveness (see Table 1). The more apology elements were detected by the raters, the more comprehensive the apology was and vice versa.

Defensive Strategies in Written Apologies/VR Apologies. This measure consists of the coding of two raters based on the number of defensive strategies (e.g., excuses, justification, victim blaming) applied by participants in their apologies to indicate the comprehensiveness (see Table 1). The more defensive strategies were detected by the raters

the less comprehensive the apology was and vice versa. After data collection, two observers who were blind to conditions coded the written (Coder 1, $n_{apologies}$=104; Coder 2, $n_{apologies}$=52) and VR apologies (Coder 1 and 2, $n_{apologies}$=50) by indicating the presence or absence of each apology element (see Table 1; written apologies, κ=0.79; VR apologies, κ=0.84) and defensive strategy (see Table 1; written apologies, κ=0.95; VR apologies, κ=0.79) per apology. Sections in which the meaning of a code seemed to have been misinterpreted were re-evaluated together and disagreements on the appropriateness of a code for a section were not revised. Further, coders rated the sincerity and remorse of the apologies on a scale (1=Not sincere/remorseful at all, 7= Extremely sincere/remorseful). The written apologies were perceived as moderately sincere (M=4.24, SD=1.76) and remorseful (M=3.73, SD=1.81). The coders strongly agreed on the sincerity (r=0.89, p=0.01) and remorse (r=0.88, p=0.01) of the written apology. Overall, VR apologies were perceived as moderately sincere (M=4.61, SD=1.59) and remorseful (M=4.17, SD=1.75). Both coders highly agreed on the sincerity (r=0.73, p=0.01) and remorse (r=0.75, p=0.01) of the VR apologies.

Participants' Additional Remarks. Semi-structured interviews were conducted to document participants' impressions of the VRA that could not be expressed in the post questionnaire. The interviews lasted for approximately five minutes.

Table 1

Description of Apology Elements and Defensive Strategies (Schumann, 2014, p.90)

	κ*	κ**	Description	Quotes
Apology elements	0.79	0.84		
Remorse	0.96	0.65	Expressing a statement of apology	"I am truly sorry"
			Expressing regret or distress about one's actions	"I've come to deeply regret ending it the way I did"
Acceptance of responsibility	0.96	0.78	Stating that one accepts responsibility for offence	

			Stating the offence using responsibility-accepting language	"I'm sorry for revealing your secret to our friends even after you asked me not to"
Repair	0.91	0.86	Offering to compensate for or fix the problem caused by one's actions	"I will make sure that I remember to call this week"
			Attempting to repair the damage by making the victim feel better/loved	"I want you to know that I do truly value the time that we spent together"
Explanation	0.86	0.80	Trying to explain one's actions without applying an external attribution	"I just thought it was my duty as a friend to say something, to stop something that isn't right in my eyes, that hurts my values and maybe others"
Forbearance	0.85	0.78	Promising to behave better in the future	"I just want you to know that I learned from it. I changed, and what I did, I would never do it again"
Acknowledgement of harm	0.95	0.95	Stating how the victim has suffered or been inconvenienced by one's actions	"I know my words hurt you"
Admission of wrongdoing	0.68	0.87	Stating that one's actions were wrong or unfair	"The way I handled the situation was not right"

			Stating that one should not have acted in the way that one did	"I shouldn't have just left you without a friend"
Request for forgiveness	0.93	1	Asking the victim for forgiveness	"Please forgive me"
Defensive strategies	0.95	0.79		
Justification	0.91	0.85	Attempting to defend one's behaviour	"I never wanted to hurt you in the first place but the situation we were in was hurting me"
Victim blaming	1	0.73	Attempting to place some or all of the responsibility for the offence on the victim	"I just felt like you also didn't try and was just pushing us away, so I let you"
Excuse	1	0.69	Attempting to mitigate responsibility for the offence	"I was drunk"
Minimization	1	0.88	Attempting to downplay the consequences of one's actions	"It was just a joke"

Note. *κ for apology elements and defensive strategies in written apologies, **κ for apology elements and defensive strategies in VR apologies.

Procedure

Before starting this study, the Ethics Committee BMS (department for Behavioural, Management and Social Sciences) of the University of Twente granted their approval for carrying out this research (#220080). The study started with an informed consent that reassured anonymity and voluntariness of the participation, explicitly stating that withdrawal from the study is possible at any moment. First, in the survey, participants had to answer questions about their personality (self-esteem, implicit theories, honesty-humility, and emotionality) and tendencies for perspective taking. Next, they had to think of an unresolved conflict in which they have harmed somebody else and describe the details of this conflict (i.e., what happened, relationship with the harmed person, own understanding of 'unresolved

conflict', perceived seriousness).

Afterwards, they were randomly allocated to either perform a self-affirmation task or not. Right after, the manipulation check questions were presented to participants, and they were forwarded to the next page where they were asked to write down an apology for the person they have harmed.

Before the VR part of the experiment, participants were randomly allocated to apologise in VR or imagine the moment before apologising. Once the participant has called in the researcher, as instructed, the VR experiment could begin as described above. It was explained that they will encounter an avatar that is supposed to represent the person that they had in mind. Once participants finished their session, the researcher instructed them to move on with the remaining questions and left the experiment room again. These included questions about the effects of writing the apology, perception of apologising in VR, immersiveness in the experience, the victim-avatar similarity, and if they would be willing to apologise to the actual victim. Finally, demographic variables (age, gender, occupation, nationality, income per year, religious commitment, and religion) were measured and participants were debriefed about the true aim of this study. Right after, they still had the opportunity to withdraw from the study. Overall, participants took between 30-60 minutes to finish the study (see Appendix B).

Results

Descriptives

Table 2

Means, SDs and Correlations of all IVs, DVs, and Age (n=104)

Variables	M	SD	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. Salience of positive self-aspects	4,96	1,12	0,37	0,01	0,10	0,21	0,08	**0,23**	-0,05	0,04	0,01	0,01	0,04	0,13	0,05	-0,06	0,01	0,14	0,01	-0,02	0,12	0,15	-0,14	0,09
2. Salience of personally relevant aspects	5,71	0,96	1,00	0,12	0,12	0,16	0,15	0,17	**-0,32**	0,15	0,09	0,16	0,10	0,15	-0,05	-0,07	0,17	0,07	0,19	0,11	0,15	0,07	0,12	-0,03
3. Willingness to experience an avatar in VR	5,76	1,01		1,00	.	0,10	-0,10	0,10	0,14	-0,04	0,07	0,02	-0,08	0,09	-0,07	.	.	.	.	-0,04	-0,02	0,00	0,08	**-0,41**
4. Willingness VR apology	4,85	1,56			1,00	**0,34**	**0,37**	0,26	-0,02	0,21	0,16	**0,41**	0,22	**0,42**	0,16	-0,15	**0,46**	**-0,45**	**0,41**	**0,38**	0,19	-0,08	0,22	-0,16
5. Willingness to apologize to the real victim	5,09	1,35				1,00	0,18	**0,37**	0,01	0,09	0,07	**0,20**	**0,21**	**0,40**	-0,11	-0,25	**0,39**	-0,17	**0,45**	**0,28**	0,03	-0,06	0,08	-0,07
6. Immersion and Presence in VR	4,71	1,06					1,00	**0,34**	-0,05	**0,31**	0,03	0,13	0,15	**0,42**	0,04	0,00	**0,50**	-0,18	**0,55**	0,09	0,10	0,00	**0,40**	**0,19**
7. Victim-Avatar Similarity	4,73	1,24						1,00	-0,08	**0,47**	0,07	**0,20**	0,14	**0,21**	-0,09	**-0,29**	**0,72**	**-0,39**	**0,45**	**0,27**	0,16	-0,08	**0,34**	0,12
8. Perception of Avatar's anger	3,90	1,36							1,00	-0,02	-0,12	**-0,22**	**-0,26**	-0,15	-0,02	0,03	-0,19	0,19	-0,03	-0,13	-0,15	0,10	**-0,23**	-0,10
9. Perception of Avatar's physical human likeness	4,19	0,98								1,00	0,14	-0,10	0,16	0,10	-0,01	-0,05	**0,48**	**-0,32**	0,11	**0,22**	-0,19	0,20	**0,33**	0,19
10. Perception VR environment	6,85	0,37									1,00	-0,05	0,08	-0,07	-0,13	-0,06	-0,05	0,02	-0,08	**0,20**	0,08	0,06	0,19	0,15
11. VR Manipulation check	4,39	2,27										1,00	0,06	**0,26**	-0,04	**-0,39**	**0,40**	**-0,37**	**0,35**	-0,07	-0,02	**-0,24**	-0,01	-0,09
12. Anticipated Acceptance of Apology	5,33	1,29											1,00	**0,29**	-0,06	-0,17	0,26	-0,15	0,13	0,18	0,18	-0,04	0,00	0,00
13. Effects after apologizing	4,74	0,91												1,00	0,00	**-0,39**	**0,51**	**-0,40**	**0,72**	**0,20**	0,03	-0,03	0,16	0,07
14. I think that apologizing makes the people around me see me as a morally bad person.	2,08	1,16													1,00	0,23	0,11	0,15	0,05	-0,09	0,07	-0,12	0,12	-0,13
15. Perception of VR Apology	3,42	1,34														1,00	-0,22	**0,40**	-0,25	-0,21	0,15	-0,02	0,05	-0,09
16. Apologizing to the avatar felt realistic.	4,39	1,50															1,00	**-0,44**	**0,56**	**0,42**	0,08	-0,13	**0,46**	-0,02
17. Apologizing in VR was humiliating.	2,33	1,50																1,00	**-0,33**	**-0,48**	-0,13	0,19	-0,26	0,00
18. Apologizing made me feel as if I have control.	4,52	1,65																	1,00	0,22	0,05	-0,11	0,27	-0,08
19. Perceived Genuiness	5,99	1,12																		1,00	**0,25**	-0,05	**0,34**	0,10
20. Apology elements	2,39	1,17																			1,00	**-0,27**	0,20	0,06
21. Defensive strategies	0,36	0,65																				1,00	0,05	0,14
22. Perceived seriousness	5,69	2,31																					1,00	0,09
23. Age	21,12	2,30																						1,00

Note. Bold values are significant at the p<0.05 level.

Table 3

Means, SDs and Correlations of Apology Elements, Defensive Strategies, Perceived Sincerity and Remorse in Written Apologies (n=104) and in VR Apologies (n=48)

	M	SD	1	2	3	4	5	6	7	8
1. Apology elements	2.39	1.17	1	**-0,27**	**0,44**	**0,42**	0.14	0.08	0.12	0.15
2. Defensive strategies	0.36	0.65		1	-0.10	-0.17	-0.10	**0,31**	-0.14	-0.02
3. Perceived sincerity written apologies	4.24	1.76			1	**0,86**	0.18	0.03	**0,33**	**0,42**
4. Perceived remorse written apologies	3.73	1.81				1	0.06	-0.19	**0,29**	**0,50**
5. Apology elements in VR	2.77	1.28					1	**-0,31**	**0,58**	**0,44**
6. Defensive strategies in VR	0.53	0.60						1	**-0,35**	**-0,48**
7. Perceived sincerity VR apologies	4.58	1.59							1	**0,69**
8. Perceived remorse VR apologies	4.16	1.74								1

Note. Bold values are significant at the p<0.05 level.

The means and SDs of both Self-affirmation checks (*M*=4.96, *SD*=1.12; *M*=5.71, *SD*=0.96) indicated that most participants felt highly self-affirmed after the self-affirmation task. As Table 2 shows, 'Salience of positive self-aspects' and 'Victim-Avatar similarity' correlated weakly and positively. Hence, participants who were thinking about positive aspects of themselves were more likely to perceive the avatar similar to their actual victim.

In the case of 'Willingness to experience an avatar that represents the harmed person' (*M*=5.76, *SD*=1.01) and 'Willingness to apologise in VR' (*M*=4.85, *SD*=1.56), participants' willingness was high for both, but significantly more people were highly willing to simply experience an avatar in VR than to apologise in VR, t(101)=3.45, *p*=0.001. 'Willingness to apologise in VR' significantly and positively correlated with 'Willingness to apologise to the actual victim' which means that individuals who were willing to apologise in VR were afterwards more likely to indicate that they are willing to apologise to the real victim. Similarly, participants mostly indicated that they were very willing to apologise to the actual victim (*M*=5.09, *SD*=1.35).

As shown in Table 3, participants did not use many apology elements (M=2.39, SD=1.17; M=2.77, SD=1.28) nor defensive strategies (M=0.36, SD=0.65; M=0.53, SD=0.60) in their written as well as VR apologies. However, in both cases participants used more apology elements than defensive strategies. Interestingly, the amount of apology elements used in written apologies did not correlate with the use of apology elements or defensive strategies in VR while the use of defensive strategies correlated positively and significantly with defensive strategies in the VR apologies (see Appendix C for extensive descriptives).

Effect of Self-Affirmation on Willingness to Apologise to an Avatar in VR

A one-way ANOVA was computed to test the first hypothesis "High self-affirmation among offenders will result in higher willingness to participate in the VR exercise to apologise to their victim". 'Self-Affirmation' was added as the between-subject variable and 'Willingness to participate in VR apology' was the DV in this instance. The analysis yielded no significant effect of 'Self-Affirmation' on 'Willingness to participate in VR apology', $F(1,53)$=2.07, p=0.16, η^2=0.04. Consequently, Hypothesis 1 was rejected.

Effect of Apologising in VR on Willingness to Apologise to the Actual Victim

A UNIANOVA was run to test the second hypothesis "Apologising to a victim avatar in VR increases perpetrators' willingness to apologise to the actual victim". Besides including 'Self-Affirmation' as the between-subject factor, 'VR apology' was also added to test the effect of apologising in VR. The DV was 'Willingness to apologise to the actual victim'. The analysis generated insignificant effects of 'Self-Affirmation', $F(1,99)$=1.22, p=0.27, η_p^2=0.01, and 'VR apology' on the DV, $F(1,99)$=1.25, p=0.27, η_p^2=0.01. Lastly, the interaction effect of 'Self-Affirmation' and 'VR apology' had no significant effect on the DV either, $F(1,99)$=0.69, p=0.41, η_p^2=0.01. The second hypothesis was therefore rejected.

Effect of Self-Affirmation on the Comprehensiveness of Apologies

First, to investigate if Schumann's (2014) findings that self-affirmation leads to more compresehnsive apologies were replicated, a UNIANOVA was computed with 'Self-Affirmation' as the between-subject factor and the number of 'Apology elements in written apologies' as the DV. 'VR apology' was excluded in the following analyses because apologies were written down before the VR conditions. The effect of 'Self-affirmation' on 'Apology elements' was not significant, $F(1,102)$=0.67, p=0.42, η_p^2=0.01. Further, a UNIANOVA with 'Self-Affirmation' as the between-subject factor and 'Defensive strategies

in written apologies' as the DV was run to test the effect of self-affirmation on the use of defensive strategies. No significant effect was found either, $F(1,102)=1.35$, $p=0.25$, $\eta_p^2=0.01$.

To test the final hypothesis "Self-affirmation among offenders will result in more comprehensive apologies when apologising to their (alleged) victims in VR" a UNIANOVA was computed with 'Self-Affirmation' as the between-subject factor and 'VR Apology elements' as the DV. 'VR apology' was excluded in the following analyses because the DV only entails data of participants in the apology condition anyway. Self-affirmation had a significant effect on the number of apology elements used in the VR apology, $F(1,48)=10.36$, $p=0.002$, $\eta_p^2=0.18$. However, contrary to expectations, more apology elements were used in the control condition ($M=3.35$) than in the self affirmation condition ($M=2.28$). This unexpected finding will be elaborated upon in the discussion. Further, a UNIANOVA with the same IV and 'VR Defensive strategies' as the DV was performed. The effect of 'Self-Affirmation' on 'VR Defensive strategies' was not significant, $F(1,48)=1.07$, $p=0.31$, $\eta_p^2=0.02$.

Finally, four UNIANOVAs were run to test the effect of 'Self-Affirmation' on 'Perceived sincerity' and 'Perceived remorse', as well as on 'Perceived sincerity in VR' and 'Perceived remorse in VR'. For the reasons mentioned before, 'VR apology' was excluded from these analyses. No significant effect of 'Self-Affirmation' on 'Perceived sincerity', $F(1,102)=0.05$, $p=0.82$, $\eta_p^2=0.00$, 'Perceived remorse', $F(1,102)=0.07$, $p=0.79$, $\eta_p^2=0.001$, 'Perceived sincerity in VR', $F(1,46)=1.55$, $p=0.22$, $\eta_p^2=0.03$, or 'Perceived remorse in VR', $F(1,46)=0.04$, $p=0.84$, $\eta_p^2=0.001$, was found.

Explorative Analyses

Although the between-subject factor 'VR apology' did not have a significant effect on participants' 'willingness to apologise to the actual victim', multiple variables related to the VR experience correlated positively and significantly with their willingness to apologise to the real victim (see Table 2). Therefore, a number of explorative analyses were perfomed to further investigate the effects of being and apologising in VR on the participants' willingness to apologise to their victim. Multiple mediation analyses were carried out. Following the steps outlined by Kenny (2021) to test for mediation, in step 1 it was tested whether 'Salience of positive self-aspects' and 'Willingness to apologise to the actual victim' were correlated. The regression of 'Willingness to apologise to the actual victim' on 'Salience of positive self-aspects' was positive and significant, $b=0.27$, 95% CI [0.01,0.54], $t=2.08$, $p=0.04$. The covariate 'perceived seriousness' of participants' unresolved conflicts was added to control

for the variation in conflicts, and was not significantly correlated with the 'Willingness to apologise to the actual victim', b=0.07, 95% CI [-0.06,0.19], t=1.05, p=0.30. This means that participants that were thinking about positive aspects of themselves indicated to be more willing to apologise to the actual victim. In step 2, the regression of the mediator 'Victim-Avatar similarity' on 'Salience of positive self-aspects' was positive and significant as well, b=0.33, 95% CI [0.11, 0.56], t= 2.90, p= 0.005. This means that individuals who were thinking about positive aspects of themselves perceived the avatar as more similar to the actual victim. 'Perceived seriousness' was also significantly and positively associated with 'Victim-Avatar similarity', b=0.21, 95% [0.10, 0.32], t=3.83, p=0.0002. According to step 3 of the mediation, the mediator 'Victim-Avatar similarity' was positively and significantly associated with 'Willingness to apologise to the real victim', b=0.33, 95% CI [0.10, 0.58], t=2.83, p=0.01. 'Salience of positive self-aspects' did not correlate significantly with participants willingness to apologise to the actual victim anymore when 'Victim-Avatar similarity' was included in the model, b=0.16, 95% CI [-0.10, 0.42], t= 1.22, p=0.23. This was also the case for 'Perceived seriousness', b=-0.01, 95% [-0.13, 0.12], t=-0.08, p=0.94. Lastly in step 4, the indirect association of 'Salience of positive self-aspects' with willingness to apologise to the actual victim through 'Victim-Avatar similarity' was positive and significant, b = 0.11, 95% BCa CI [0.02, 0.26]. Hence, this demonstrates complete mediation (Figure 3). The positive relationship between thinking of positive aspects of yourself and willingness to apologise to the actual victim was mediated by perceiving the avatar and victim as similar, regardless of differences in the participants' perceived seriousness of their conflict.

Figure 3

Victim-Avatar Similarity Mediates the Relationship between Salience of Positive Self-Aspects and Willingness to Apologise to the Actual Victim
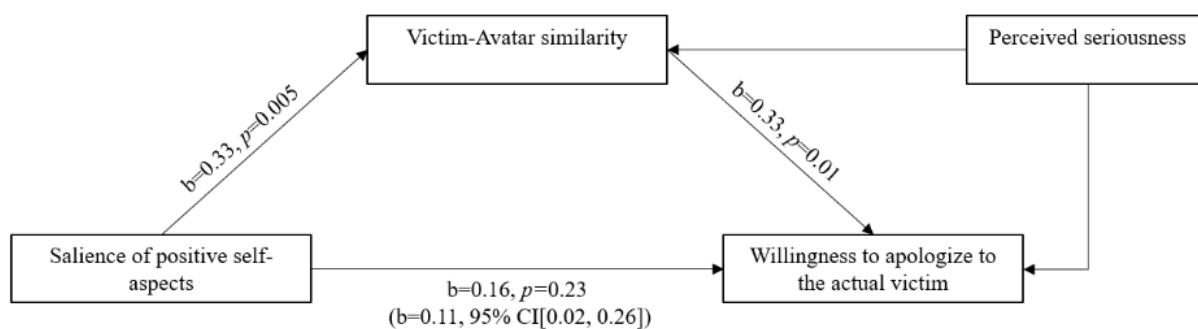
Next, 'Immersion and presence in VR' was included as the predictor, 'Apologising made me feel as if I have control' was the mediator and 'Willingness to apologise to the actual victim' was used as the DV. In the first step of the mediation process, 'Immersion and presence in VR' was positively and marginally significantly correlated with participants' willingness to apologise to the actual victim, b=0.29, 95% CI [-0.05, 0.62], t=1.71, p=0.09. Hence, participants that felt immersed and present in VR indicated to be more willing to apologise to the actual victim. In step 2, 'Apologising made me feel as if I have control' regressed positively and significantly on 'Immersion and presence in VR', b=0.77, 95% CI [0.44, 1.10], t= 4.70, p= 0.00. Individuals who indicated to be immersed in VR while apologising also indicated to perceive more control while doing so. In step 3, the mediator 'Apologising made me feel as if I have control' was positively and significantly associated with the DV, b=0.40, 95% CI [0.14, 0.67], t=3.04, p=0.004. However, 'Immersion and presence in VR' did not predict participants willingness to apologise to the actual victim anymore, b=-0.02, 95% CI [-0.39, 0.35], t=-0.12, p=0.90. Lastly in step 4, the indirect association of 'Immersion and presence in VR' with 'willingness to apologise to the actual victim' through 'Apologising made me feel as if I have control' was positive and significant, b=0.31, 95% BCa CI [0.06, 0.60], which demonstrates complete mediation (Figure 4). The positive relationship between feeling immersed and present and willingness to apologise to the actual victim was mediated by feeling a sense of control while apologising.

Figure 4

Perceived Control over Apologising in VR Mediates the Relationship between Immersion and Presence in VR and Willingness to Apologise to the Actual Victim
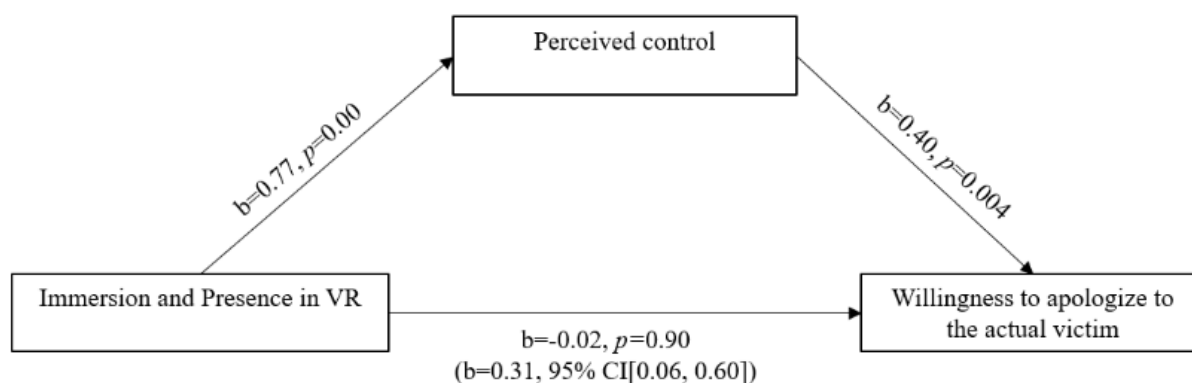
For the final mediation analysis, the IV was 'Apologising in VR felt realistic', 'Willingness to apologise to the actual victim' was the DV, and 'Apologising made me feel as if I have control' was included as the mediator. In the first step of mediation, the association between 'Apologising in VR felt realistic' and participants' willingness to apologise to the actual victim were positive and significant, b=0.38, 95% CI [0.13, 0.63], t=3.09, p=0.003. Consequently, participants that perceived apologising in VR as realistic indicated to be more willing to apologise to the actual victim. In step 2, the variable 'Apologising in VR felt realistic' and 'Apologising made me feel as if I have control' were positively and significantly correlated, b=0.62, 95% CI [0.36, 0.87], t= 4.87, p= 0.00. Individuals who indicated that apologising felt realistic also reported that apologising elevated their sense of control over apologising. In step 3, the association between the mediator 'Apologising made me feel as if I have control' and the DV was significant and positive, b=0.29, 95% CI [0.03, 0.55], t=2.21, p=0.03. In addition, 'Apologising in VR felt realistic' did not correlate significantly with participants willingness to apologise to the actual victim anymore, b=0.20, 95% CI [-0.08, 0.49], t=1.42, p=0.16. Finally in step 4, the indirect association of 'Apologising in VR felt realistic' with 'willingness to apologise to the actual victim' through 'Apologising made me feel as if I have control' was positive and marginally significant, b= 0.18, 95% BCa CI [-0.03, 0.37], which demonstrates complete mediation (Figure 5). The positive relationship between perceiving apologising in VR as realistic and willingness to apologise to the actual victim was mediated by feeling a sense of control while apologising.

Figure 5

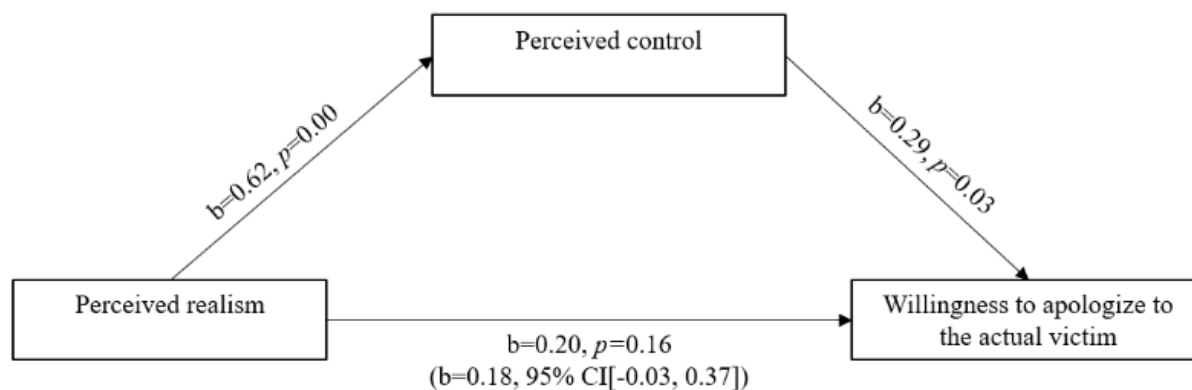*Perceived Control over Apologising in VR Mediates the Relationship between the Perceived Realism of the VR Apology and Willingness to Apologise to the Acual Victim*

Participants Additional Remarks

In the semi-structured interview, the overall impression was positive. The most common answer was that the VRA and apologising in it felt realistic. The avatar supported the participants in imagining the person they had in mind. However, it was still mentioned by a small number of participants that they had to put in more effort into imagining their victim because the features of the avatar that could be changed were too restrictive. Regarding the avatars facial expression, the results are mixed. On one hand, many participants perceived the avatar as tense, angry and mad but on the other hand, a fair number of individuals did not recognize any emotion and felt that the expression of the avatar's face is neutral and not strong enough. The large majority perceived the body movement of the avatar as natural, while only a few individuals felt like the movement was mechanical. One participant pointed out that they were not paying attention to the body movement because they were focused on the face. Regarding the speech of the avatar, most participants found it unnatural and disruptive. Lastly, remarks regarding the VR environment were related to participants expectation to be in a familiar space since most of them imagined a victim that they know well and who they would visit at their home.

Discussion

This study was aimed at exploring the applicability of an avatar-based VR application in which offenders have the chance to apologise to an avatar that represents their victim in the context of VIC to increase their readiness to participate in VOM. It was investigated (1) if self-affirmation positively influenced offenders' willingness to apologies to an avatar that represents their victim in VR and (2) whether using an avatar-based VR application positively influenced offenders' willingness to apologise to the actual victim. Unfortunately, none of the hypotheses were accepted. Self-affirmation did not lead to a higher willingness to apologise in VR and apologising in VR did not increase participants willingness to apologise to their actual victim. Lastly, contrary to expectations, being self-affirmed led to less comprehensive apologies in VR.

However, it was found that making positive-self aspects salient, feeling immersed and present in the VRA, perceiving the avatar as similar to the victim, and experiencing a sense of control while apologising in VR are positively associated with participants willingness to apologise to the actual victim.

Regarding the first hypothesis that self-affirmation increases offenders' willingness to apologise in VR, no effect of performing a self-affirmation task on offenders' willingness to

apologise in VR was found. Importantly, there was no difference between participants that received a self-affirmation tasked compared to those that did not – all participants felt highly self-affirmed. This unexpected finding might be explained by considering the recency of the unresolved conflict that participants had in mind. Participants were instructed to think of an unresolved conflict from their life without any restrictions for how recent the conflict had to be. Many conflicts that participants have described occurred during their time in school and on average, participants have graduated multiple years ago.

According to the self-affirmation theory, individuals have a general motivation to protect their positive self-image (Steele, 1988). Therefore, it is likely that participants have naturally self-affirmed themselves shortly after their unresolved conflict has occurred. Consequently, the threat of their wrongdoing in the past did not pose a large threat to their self-image anymore (Howell, 2017; Schumann, 2014) and participants were highly affirmed regardless of performing a self-affirmation task or not.

Moving on, as intended, only participants who were instructed to apologise in VR actually did apologise to the avatar. However, the expectation that apologising in VR increases offenders' willingness to apologise to the actual victim was not substantiated. Interestingly, this finding is not in line with multiple studies on the effectiveness of virtual exposure therapy (VET) for social anxiety. VET is a comparable context to the use of the VRA in VICs because while individuals with social anxiety are distressed by social interactions and social consequences such as rejection (Heimberg et al., 2014), many offenders associate talking to their victim with negative feelings such as nervousness as well (Shapland et al., 2007). Hence, research on VET for socially anxious individuals might be relevant when considering the potential effectiveness of a VRA in VICs. In their systematic review and meta-analysis, Horigome et al. (2020) evaluated 22 experiments that yielded promising results on VET for social anxiety. Multiple scholars were able to demonstrate a significant decline in negative symptoms when VRET was applied, although the difference between control and treatment trials were not significant. Nevertheless, the effectiveness of VET was similar to traditional exposure therapy and is considered an acceptable method for anxiety treatment (e.g., Kampmann et al., 2016; Morina et al., 2015; Wallach et al., 2011).

These studies substantiated that engaging in the designated behaviour in VR encourages the actual execution of these behaviours outside of VR. Possibly, a similar effect could not be observed in this study because of the conservative approach that was taken. All participants wrote down an apology, regardless of if they also apologized in VR or not.

Alternatively, similar to the approach in VRET studies, only one group should apologize in VR and on paper, while the other group does not. This increases the potential for observing an effect of the VRA.

Lastly, it could not be concluded that self-affirmed offenders delivered more comprehensive apologies in VR which contradicts Schumann's (2014) in vivo findings. Instead, perpetrators who did not perform the self-affirmation task utilised more apology elements than participants who engaged in the self-affirmation task and therefore self-affirming oneself had the opposite effect.

As discussed regarding hypothesis 1, all participants might have been affirmed because they naturally engaged in self-affirmation shortly after their unresolved conflict. Subsequently, the self-affirmation task in this study might have increased the threat of their unresolved conflict instead of reducing it. Higgins (1987) proposed the self-discrepancy theory (SDT) which assumes that individuals compare the so-called actual self to their ideal and ought self. If an individual perceives a substantial discrepancy between the actual self and ideal/ought self, they are likely to experience discomfort and a motivation to diminish this discrepancy (Higgins, 1987). In this study, participants who performed the self-affirmation task might have used more defensive strategies and less apology elements than participants who did not perform the self-affirmation task, because the reminder of having harmed someone was directly contrasted by aspects they perceive as positive about themselves.

In terms of Higgins (1987): The discrepancy between their actual self (having harmed someone) and ideal/ought self (thinking of one's values) was increased which triggered a more defensive response. The defensive response (e.g., minimization, excuse) reduced the discrepancy by preventing that the offender associates themself with their wrongdoing. Not affirmed participants on the other hand, were not confronted with this discrepancy which might have facilitated delivering a comprehensive apology in VR.

Beyond the tested hypotheses, additional findings that are supportive of the VRA emerged. Participants that were thinking about positive self-aspects indicated to be more willing to apologise to the actual victim, if they also perceived the avatar as highly similar to their own victim. The salience of positive self-aspects is an expected effect of self-affirmation (Schumann, 2014), so that its positive influence on participants' willingness to apologise to their actual victim predicts the effectiveness of self-affirmation in this context.

Further if participants were immersed and felt that apologising in VR was realistic, they also indicated to be more willing to apologise to the actual victim, which the findings suggested might be mediated by the sense of control that apologising in VR increased. This

finding suggests that the need for control also arises on the side of the offender, unlike the initial notion in the literature that mainly victims experience a need for and restoration of their sense of control (Shnabel & Nadler, 2008, 2015). Recently, Woodyatt et al. (2022) discussed how both parties can be deprived of their agency and social-moral image after a crime. The threat to offenders' sense of agency might arise because they do not have control over the punishment they might face (Woodyatt et al., 2022). Through the engagement with a representation of the other party in VR and apologising to them, perpetrators might re-gain their sense of control, now that they are actively but indirectly involved in repairing the harm their offence has caused. However, since the interaction in the VRA for VICs occurs without the actual victim, but victims' engagement is crucial to restore offenders' sense of agency and social-moral image, perpetrators' willingness to apologise to them might have increased.

Limitations

One central aspect in this study was to compare self-affirmed and not self-affirmed participants which was not fully possible because a difference between these groups could not be achieved in terms of reported self-affirmation. Both groups had to rank values from most to least important to themselves. Afterwards, participants that were supposed to get affirmed where asked to explain why the first ranked value was most important to them, while participants that should not be self-affirmed were asked why the sixth ranked value might be important to someone else. It can be assumed that creating a ranking of one's values had a strongly affirming effect, that the question afterwards could not fully mitigate.

Further, participants were not restricted in how recent the unresolved conflict they thought of should be. Consequently, many described conflicts seemed to have occurred further in the past. Therefore, affecting the response participants have to their unresolved conflict through a self-affirmation task might have been more challenging after considered time has passed. Hence, individuals in a very recent unresolved transgression might have experienced the self-affirmation task differently.

In the context of the apology delivery, a general limitation is that most students apologised in English which was not their first language and affected their apology delivery when looking at the transcripts compared to the written apologies. Pauses to search for words were made and more grammatical errors occurred, sometimes to a point where sentences were incomprehensible. Further, the fact that the comprehensiveness of the written apologies was not associated with the comprehensiveness of the VR apologies might be a reflection of this as well. This only highlights the importance of providing an opportunity to offenders to

apologise in a language they are fluent in, so that they can articulate their standpoint as they intended.

Finally, a deductive approach was used to code the apologies, so that reoccurring statements that were judged as apology elements by the coders, but did not fit any of the code definitions, were not included. Consequently, multiple apologies had to be rated lower although they seemed to be comprehensive. Additionally, according to theory a full apology has to include the aforementioned apology elements (Dhami, 2016), however, perceptions of a comprehensive apology might differ on an individual level so that offenders might have felt that their apology was comprehensive but they received low ratings because they did not meet the criteria of a full apology.

Strengths of this Study

This is, to our knowledge, the first proof-of-concept avatar-based VR prototype in the context of VIC demonstrating its potential for practice. The findings of this study can be viewed as an inspiration for future research and developments of such a VRA for offenders in VICs. This VRA give them the opportunity to experience a realistically simulated session with a representation of their victim to gain the courage to reach out to their own victim and experience a part of the benefits that participants in VOM experience.

Future Research

The implementation of a VRA in the context of VIC and VOM has not been investigated yet, so that the possibilities for future research are extensive. This study focused on the applicability of the VRA as a preparatory tool for offenders. Research should be deepened and expanded to victims' perspective as well to explore potential benefits of such a VRA. Additionally, the VRA itself should be further developed to elevate users' experience. Manipulating the immersion of the VR experience could give insights into the value of the VRA for imagining apologizing to the victim. Exploring how an instructed VR apology compared to a spontaneous VR experience with a victim avatar influences participants' willingness to apologize to their actual victim could give indications for how the VRA can be elevated.

In reality the victim and the offender interact with each other in a conversation, so that using artificial intelligence (AI) to enable the avatar to respond to the offender and ask questions could make a positive difference in offenders' responses and experiences. Also, in the process of VOM, a mediator or someone who guides the preparation is present who is considered to be a crucial instance considering the support they provide to both parties in the

process. Thus, it would be interesting to explore the effect of including the mediator or facilitator actively in the VR experience.

In order to investigate such an application, attention should be paid to Woddyatt's et al. (2022) theory that an offence threatens the sense of agency and social-moral image of the offender as well as the victim, to gain insights into the offender/victim-avatar dynamic and ensure that such an VRA addresses these subsequental needs victims and offenders might experience. Lastly, in the future it is recommended to compare the VRA to a traditional exercise that is already implemented in VIC to investigate the VRAs true added value to the existing course.

Overall, this study demonstrated that the avatar based VRA creates an immersive and realsistc experience for individuals who want to cope with their unresolved transgressions. The findings tentatively suggest that engaging and immersing oneself in a VR exercise to apologize to a victim avatar may motivate individuals to make up for their severe wrongdoing to the actual victim. As such, this makes the VRA an intriguing tool for victim impact courses worth of further exploration.

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Appendix A

Instructions for the VR Experiment

Treatment condition

After writing down your apology, you can also apologize in VR. You can pick an avatar that represents the person you have in mind the most. The avatars are generic. They have the same face, same hair style and same clothing. They mainly differ in their sex, hair colour and skin colour. So, please try to imagine that this avatar is the person you want to apologize to as good as possible. If the first avatar you chose is not representative enough, let me know. We can quickly switch avatars.

When you put on the VR glasses in a moment, you will have to set the floor level in VR. This means that we match the floor in VR to the floor in the room we are sitting in. I will guide you through that step by step after reading the instructions to you.

After setting the floor level, you will be placed in the VR room. In the beginning, please make sure to sit still so I can adjust your position, once I have done that, you can look around the room and let me know when you are ready. Please inspect the avatar carefully and try to imagine that this is the person you want to apologize to.

I would also like to know if you are ok with me recording your apology. This audio will be treated the same as the rest of your data: anonymously and confidentially. It will not be possible to link the audio to you personally. I will put in noise-cancelling ear plugs to ensure privacy. This was tested out before, and I really can't understand a word once they are in. Do you agree with this? I will ask you this again once the recording has started.

After recording your consent. I will finally put the ear-plugs in. I will need a thumbs up from you when you are ready and when you are finished. If something is bugging in the VR environment or you have a question, raise your hand.

Lastly, I will let you know when to take the glasses off, and you can go back to the questionnaire.

You can't see the apology you have written down in VR, so if you want to go back and check your apology, you can do that now.

1. **Record the participant's consent**

2. **Explain the VR glasses and controller to the participant**

In the back of the VR glasses is a wheel that you can spin to adjust the size of the band. There is also a button that you have to hold down to adjust how far or close you want the glasses to your face. Now to the controller: When you select something in the menu you press the X. For when you are in VR: The X is the lower button- so you can feel it with your thumb. Then we have a button in the back that you will press with your index finger when setting the floor level, I will explain to you more in a minute.

The participant has time to put the glasses on, adjust them and get familiar with glasses and the controller.

3. **Setting the floor level**

Choose the settings on the grey panel in front of you, then you choose Guardian > Set up guardian > Continue. Purple crosses should appear in front of you and follow the movement of your controller. Put one of the controllers to the floor and press the button on the back. Once you have pressed the button, the purple crosses should stay on the floor. When this is the case, you can come up again and click on Continue. Additional instructions will follow, that you can "Skip" and "Acknowledge".

I take the controllers from the participant because they are not needed in VR. Also, they float since the participant has no hands (or body) in VR.

4. **Avatar selection**

Now, you will select an avatar. What was the sex of the person you would like to apologize to? The skin colour? Hair colour?

I select the avatar and put the participant in VR. I adjust their position and ask if the avatar is fitting. If yes –> step 5. If no -> try different avatar

5. Reminder

I remind the participant that I won't be able to hear them in a second, so they have to put their thumb up when they are ready. I also remind them to try imagining that the avatar is the person that they want to apologize to as good as possible and tell them that the avatar will cue them to start with their apology.

I put the ear plugs in and get ready to press the keys of the avatars Welcome and Goodbye statements.

6. VR apology

I continue the recording, press the key for the Welcome statement and the participant apologizes.

Once they have finished, I stop the recording and tell the participants that they can take of the VR glasses.

Control condition

After writing down your apology, you will be in the presence of an avatar that represents the person you have in mind but you will not apologize to them. Only imagine the moment right before you would apologize. You can pick an avatar that represents this person the most. The avatars are generic. They have the same face, same hair style and same clothing. They mainly differ in their sex, hair colour and skin colour. So, please try to imagine that this avatar is the person you want to apologize to as good as possible. If the first avatar you chose is not representative enough, let me know. We can quickly switch avatars.

When you put on the VR glasses in a moment, you will have to set the floor level in VR. This means that we match the floor in VR to the floor in the room we are sitting in. I will guide you through that step by step after reading the instructions to you.

After setting the floor level, you will be placed in the VR room. Then you can look around the room and let me know when you are ready. Please inspect the avatar carefully and try to imagine that this is the person you want to apologize to.

Is everything clear?

1. Explain the VR glasses and controller to the participant

In the back of the VR glasses is a wheel that you can spin to adjust the size of the band. There is also a button that you have to hold down to adjust how far or close you want the glasses to your face. Now to the controller: When you select something in the menu you press the X. For when you are in VR: The X is the lower button- you can feel it with your thumb. Then we have a button in the back that you will press with your index finger when setting the floor level, I will explain to you more in a minute.

The participant has time to put the glasses on, adjust them and get familiar with glasses and the controller.

2. Setting the floor level

Choose the settings on the grey panel in front of you, then you choose Guardian > Set up guardian > Continue. Purple crosses should appear in front of you and follow the movement of your controller. Put one of the controllers to the floor and press the button on the back. Once you have pressed the button, the purple crosses should stay on the floor. When this is the case, you can come up again and click on Continue. Additional instructions will follow, that you can "Skip" and "Acknowledge".

I take the controllers from the participant because they are not needed in VR. Also, they float since the participant has no hands (or body) in VR.

3. Avatar selection

Now, you will select an avatar. What was the sex of the person you would like to apologize to? The skin colour? Hair colour?

I select the avatar and put the participant in VR. I adjust their position and ask if the avatar is fitting. If yes –> step 4. If no -> try different avatar

4. Reminder

Do not apologize to the avatar, try to imagine that you are in the moment before apologizing. Try to immerse yourself in the situation. When you are ready, let me know and you can take off the glasses.

Appendix B

Questionnaire

Welcome!

Thank you for taking part in this study! Please read the following information carefully.

Intro

DISCLAIMER:

This study involves revisiting a personal unresolved conflict and might lead to emotional discomfort.

Purpose of the study: This study investigates the applicability of virtual reality (VR) in the context of interpersonal conflict situations. This research is conducted in the context of my Master thesis in Psychology of Conflict, Risk, and Safety.

What is your task: As a participant, you will be asked to imagine an unresolved conflict and write down what you would like to say to the involved person(s). Additionally, you will be asked a number of questions.

Who can take part: Anyone over the age of 18 can take part. Further, please be aware that all materials are presented in English.

Risks of taking part: This study involves imagining an unresolved problem that you are involved in. If you feel that this is likely to cause you distress you should not take part in this study.

How you can withdraw: You can withdraw from the study without explaining the reason at any moment. You can withdraw by closing your browser at any time. Also, right before

submitting the questionnaire, you are asked if you consent to your data being included. Here you have the possibility to withdraw in case you changed your mind after participating. However, your data cannot be excluded after you gave consent and submitted the survey, since all data is anonymous.

Data storage and security: If you are taking part in this research, you consent that the researcher is allowed to collect and keep your data anonymously (without sufficient detail for personal identification) according to the data policy of the BMS faculty at the University of Twente.

Benefits of participating in our study: If you are a student at Twente University then you will be credited 1.5 SONA-points for taking part in this study.

Contact details:
Jana Schmidt: j.schmidt-4@student.utwente.nl

Contact Information for questions about your rights as a research participant:
If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the supervisor of this project by s.zebel@utwente.nl.

Consent I read and understood the above-mentioned conditions and agree to participate in this study. Moreover, I participate out of my free will and I am aware of the fact that I can withdraw from this study at any time without providing a reason.

○ Yes, I agree with the aforementioned points and want to participate in this study. (1)

○ No, I do not agree and would like to withdraw from this study. (2)

Skip To: End of Survey If I read and understood the above-mentioned conditions and agree to participate in this study. More... = No, I do not agree and would like to withdraw from this study.

End of Block: Informed consent

Start of Block: Personality Measures

RSES First, a number of statements are presented to you about how you might feel about yourself. Please read them carefully and indicate the extent to which you agree with them. Remember that there are no right or wrong answers.

	Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly agree (4)
I feel that I am a person of worth, at least on an equal plane with others. (1)	○	○	○	○
I feel that I have a number of good qualities. (2)	○	○	○	○
All in all, I am inclined to feel that I am a failure. (3)	○	○	○	○
I am able to do things as well as most other people. (4)	○	○	○	○
I feel I do not have much to be proud of. (5)	○	○	○	○
I take a positive attitude toward myself. (6)	○	○	○	○
On the whole, I am satisfied with myself. (7)	○	○	○	○
I wish I could have more respect for myself. (8)	○	○	○	○
I certainly feel useless at times. (9)	○	○	○	○
At times I think I am no good at all. (10)	○	○	○	○

Implicit person theory Following, you can see a number of statements that relate to how you might perceive yourself. Please, read these statements carefully and indicate the extent to which you agree with them.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
The kind of person someone is, is something basic about them, and it can't be changed very much. (1)	○	○	○	○	○	○	○
People can do things differently, but the important parts of who they are can't really be changed. (9)	○	○	○	○	○	○	○
Everyone is a certain kind of person, and there is not much that they can do to really change that. (10)	○	○	○	○	○	○	○
As much as I hate to admit it, you can't teach an old dog new tricks. People can't really change their deepest attributes. (14)	○	○	○	○	○	○	○

Everyone, no matter who they are, can significantly change their basic characteristic. (15)	○	○	○	○	○	○	○
People can substantially change the kind of person they are. (19)	○	○	○	○	○	○	○
No matter what kind of a person someone is, they can always change very much. (20)	○	○	○	○	○	○	○
People can change even their most basic qualities. (18)	○	○	○	○	○	○	○

HEXACO HonHum&Emo In the following, you will find a series of statements about you. Please read each statement and decide how much you agree or disagree with that statement.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I would feel afraid if I had to travel in bad weather conditions. (1)	○	○	○	○	○	○	○
I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed. (2)	○	○	○	○	○	○	○
I sometimes can't help worrying about little things. (3)	○	○	○	○	○	○	○
If I knew that I could never get caught, I would be willing to steal a million dollars. (4)	○	○	○	○	○	○	○
When I suffer from a painful experience, I need someone to make me feel comfortable. (5)	○	○	○	○	○	○	○

Having a lot of money is not especially important to me. (6)	○	○	○	○	○	○	○
I feel like crying when I see other people crying. (7)	○	○	○	○	○	○	○
I think that I am entitled to more respect than the average person is. (8)	○	○	○	○	○	○	○
When it comes to physical danger, I am very fearful. (9)	○	○	○	○	○	○	○
If I want something from someone, I will laugh at that person's worst jokes. (10)	○	○	○	○	○	○	○
I worry a lot less than most people do. (11)	○	○	○	○	○	○	○
I would never accept a bribe, even if it were very large. (12)	○	○	○	○	○	○	○

I can handle difficult situations without needing emotional support from anyone else. (13)	○	○	○	○	○	○	○
I would get a lot of pleasure from owning expensive luxury goods. (14)	○	○	○	○	○	○	○
I feel strong emotions when someone close to me is going away for a long time. (15)	○	○	○	○	○	○	○
I want people to know that I am an important person of high status. (16)	○	○	○	○	○	○	○
Even in an emergency I wouldn't feel like panicking. (17)	○	○	○	○	○	○	○

I wouldn't pretend to like someone just to get that person to do favors for me. (18)	○	○	○	○	○	○	○
I remain unemotional even in situations where most people get very sentimental. (19)	○	○	○	○	○	○	○
I'd be tempted to use counterfeit money, if I were sure I could get away with it. (20)	○	○	○	○	○	○	○

Perspective taking Please, indicate to what extent the following statements describe you. Remember that there are no right or wrong answers.

	1 Does not describe me well (1)	2 (2)	3 (3)	4 (4)	5 Describes me very well (5)
I often have tender, concerned feelings for people less fortunate than me. (1)	○	○	○	○	○
I sometimes find it difficult to see things from the "other guy's" point of view. (2)	○	○	○	○	○
Sometimes I don't feel very sorry for other people when they are having problems. (3)	○	○	○	○	○
In emergency situations, I feel apprehensive and ill-at-ease. (4)	○	○	○	○	○
I try to look at everybody's side of a disagreement before I make a decision. (5)	○	○	○	○	○

When I see someone being taken advantage of, I feel kind of protective towards them. (6)	○	○	○	○	○
I sometimes try to understand my friends better by imagining how things look from their perspective. (7)	○	○	○	○	○
When I see someone get hurt, I tend to remain calm. (8)	○	○	○	○	○
Other people's misfortunes do not usually disturb me a great deal. (9)	○	○	○	○	○
If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. (10)	○	○	○	○	○
Being in a tense emotional situation scares me. (11)	○	○	○	○	○

When I see someone being treated unfairly, I sometimes don't feel very much pity for them. (12)

○ ○ ○ ○ ○

I am often quite touched by things that I see happen. (13)

○ ○ ○ ○ ○

I believe that there are two sides to every question and try to look at them both. (14)

○ ○ ○ ○ ○

I would describe myself as a pretty soft-hearted person. (15)

○ ○ ○ ○ ○

When I'm upset at someone, I usually try to "put myself in his shoes" for a while. (16)

○ ○ ○ ○ ○

Before criticizing somebody, I try to imagine how I would feel if I were in their place. (17)

○ ○ ○ ○ ○

Now, please think about an **unresolved conflict in which you have seriously hurt, insulted or harmed someone else**. You can think about any conflict that comes to your mind. It does not matter what type of conflict it is or who the other person involved is.

Take as much time as you need to recall such a situation.
When you have a conflict in mind, please answer the following questions.

Please describe the event that led to the situation in which you hurt, seriously insulted or harmed someone else (and that has not been resolved to date).

_____

_____

_____

_____

_____

What exactly did you do or say that made the other person feel hurt, seriously insulted or harmed?

_____

_____

_____

_____

_____

What happened after you hurt, seriously insulted or harmed the other person?

_____

_____

_____

_____

_____

Describe as accurately as possible, how you felt when you had hurt, seriously insulted or harmed the other person.

_____

_____

_____

_____

_____

Apart from yourself, who is the other person that was involved in the unresolved conflict you have in mind? Please indicate the relationship you have with them below (e.g., friend, partner, mother, coworker).

_____

_____

_____

_____

_____

You have just thought about a serious conflict that has been unresolved. What do you understand by this - that the conflict has not been resolved?

_____

_____

_____

_____

_____

Please indicate how serious this unresolved conflict is to you.

10: Extremely serious
0: Not serious at all

0   1   2   3   4   5   6   7   8   9   10

Ranking values

Here you can see a list of different values in no particular order. Core values are the fundamental beliefs and highest priorities of a person.

Please indicate how important each value is to you by ranking them from **most important (1)** to **least important (7)**. You can do that by dragging and dropping them in the intended place.

_____ **Athletics** (1)

_____ **Artistic skills** (2)

_____ **Creativity** (3)

_____ **Family** (4)

_____ **Friendship** (5)

_____ **Spontaneity** (6)

_____ **Physical attractiveness** (7)

Self-Affirmation (Control)

Please indicate why the value that you ranked as **sixth** might be important **to someone else**:

_____

_____

_____

_____

_____

End of Block: Control

Start of Block: Self-affirmed

Ranking values

Here you can see a list of different values in no particular order. Core values are the fundamental beliefs and highest priorities of a person.

Please indicate how important each value is to you by ranking them from **most important (1)** to **least important (7)**. You can do that by dragging and dropping them in the intended place.

_____ **Athletics** (1)

_____ **Artistic skills** (2)

_____ **Creativity** (3)

_____ **Family** (4)

_____ **Friendship** (5)

_____ **Spontaneity** (6)

_____ **Physical attractiveness** (7)

Self-Affirmation (Treatment)

Please indicate why the **first-ranked** value is most important **to you**:

_____

_____

_____

_____

_____

Manipulation check

Please answer the following questions about the values task you just did:

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
The task made me think of positive aspects about myself. (1)	○	○	○	○	○	○	○
The task made me focus my attention on who I am. (2)	○	○	○	○	○	○	○
The task made me aware of things I value about myself. (3)	○	○	○	○	○	○	○
The task made me think about things personally important to me. (4)	○	○	○	○	○	○	○
The task made me think about my most important values. (5)	○	○	○	○	○	○	○

Apology writing

Now that you have an unresolved conflict in mind in which you have seriously hurt, insulted or harmed another person, I would like you to formulate an apology to that other person. What would you like to say to that person if you had the chance to apologize?

Please try to come up with an apology even when you are unsure whether you would actually apologize to that person. (You can do this in German if you prefer.)

_____

_____

_____

_____

_____

End of Block: Apology writing

---

no VR apology (control)
Sometimes, we do not get the opportunity to talk to a person directly. Especially after a conflict that has not been resolved. This can be a burdensome situation for some people. However, in virtual reality (VR), it is possible to talk to an avatar that represents the person you have seriously hurt, insulted or harmed. This way it would be possible to still deliver an apology.

Therefore, please indicate the following:

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I am willing to **experience an avatar** that represents the person I have seriously hurt, insulted or harmed. (2)	○	○	○	○	○	○	○

Thank you for indicating how willing you are to experience an avatar that represents someone you know in VR!

For future research, we would like to explore how **being in the presence of an avatar** that represents the person you would apologize to is perceived and experienced.

Please inform the researcher when you are ready to begin your VR experience.

You will receive further instructions and information from the researcher now. If you have any questions, feel free to ask!

End of Block: no VR apology

Start of Block: After VR

Perception of VR environment and avatar Please read the following statements about your VR experience and indicate the extent to which you agree with them.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I was able to see the VR environment. (1)	○	○	○	○	○	○	○
I was able to see the avatar sitting in front of me. (2)	○	○	○	○	○	○	○
I was immersed in the experience. (3)	○	○	○	○	○	○	○
The avatar looked slightly angry. (14)	○	○	○	○	○	○	○
The avatar's body movements looked realistic. (18)	○	○	○	○	○	○	○
The avatar moved naturally. (17)	○	○	○	○	○	○	○
The avatar looked neutral. (15)	○	○	○	○	○	○	○
The avatar looked stiff. (16)	○	○	○	○	○	○	○
The avatar's body movements looked mechanical. (19)	○	○	○	○	○	○	○

The avatar was talking to me. (6)	○	○	○	○	○	○	○
The avatar was interacting with me. (7)	○	○	○	○	○	○	○
I apologized to the avatar. (8)	○	○	○	○	○	○	○
It was easy for me to imagine that the avatar was the person I have harmed. (9)	○	○	○	○	○	○	○
It was difficult for me to imagine that the avatar was the person I have harmed. (10)	○	○	○	○	○	○	○
I did not say anything to the avatar. (12)	○	○	○	○	○	○	○
I thought about apologizing but did not say anything. (13)	○	○	○	○	○	○	○

SPES Please read the following statements about your VR experience carefully and indicate the extent to which you agree with them.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I felt like I was actually there in the VR room. (1)	○	○	○	○	○	○	○
It seemed as though I actually took part in the action of the VR room. (2)	○	○	○	○	○	○	○
It was as though my true location had shifted into the VR room. (3)	○	○	○	○	○	○	○
I felt as though I was physically present in the VR room. (4)	○	○	○	○	○	○	○
The objects in the VR room gave me the feeling that I could do things with them. (5)	○	○	○	○	○	○	○

I had the impression that I could be active in the VR room. (6)	○	○	○	○	○	○	○
I felt like I could move around among the objects in the VR room. (7)	○	○	○	○	○	○	○
It seemed to me that I could do whatever I wanted in the VR room. (8)	○	○	○	○	○	○	○
I could imagine the avatar being the person I have an unresolved conflict with. (9)	○	○	○	○	○	○	○
When I saw the avatar in VR, it disrupted me in thinking about the person I have an unresolved conflict with. (10)	○	○	○	○	○	○	○

Effects after apologizing After writing the apology and your VR experience, here are a number of statements about how you might feel now. Please indicate the extent to which you agree with the following statements.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
My apology is genuine. (1)	○	○	○	○	○	○	○
My apology is sincere. (2)	○	○	○	○	○	○	○
I feel relieved after the apology. (7)	○	○	○	○	○	○	○
I think that I can move on from this conflict. (3)	○	○	○	○	○	○	○
I think that I am a morally good person. (4)	○	○	○	○	○	○	○
I feel like the apology made me powerful. (12)	○	○	○	○	○	○	○
I feel like I am forgiven for harming the person involved in this conflict. (5)	○	○	○	○	○	○	○

I want the person that is involved in this conflict to forgive me. (6)	○	○	○	○	○	○	○
I believe that the other person would accept my apology. (10)	○	○	○	○	○	○	○
I think that apologizing makes the people around me see me as a morally good person. (8)	○	○	○	○	○	○	○
I think that apologizing makes the people around me see me as a morally bad person. (9)	○	○	○	○	○	○	○
I think that the other person would reject my apology. (11)	○	○	○	○	○	○	○

End of Block: After VR

Start of Block: Real life apology

Willingness to apologize to the actual victim If the other party would ask for a conversation in the presence of a mediator woud you be willing to participate in it and apologize to the person you have harmed?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I feel like I am able to apologize to the actual person involved in this conflict now. (1)	○	○	○	○	○	○	○
I would like to meet the person that is involved in this conflict now. (2)	○	○	○	○	○	○	○
I would like to apologize to the actual person involved in this conflict now. (3)	○	○	○	○	○	○	○

End of Block: Real life apology

VR apology (treatment)

Sometimes, we do not get the opportunity to talk to a person directly. Especially after a conflict that has **not been resolved**. This can be a burdensome situation for some people. However, in virtual reality (VR), it is possible to talk to an **avatar that represents the person you have seriously hurt, insulted or harmed**. This way you have the possibility to still deliver your apology.

Please indicate the extent to which you are willing to deliver your apology in VR to an avatar.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I am willing to apologize to an avatar in VR that represents the person I have harmed. (1)	○	○	○	○	○	○	○

Thank you for indicating how willing you are to apologize to an avatar in VR!

For future research, we would like to explore your experience with **apologizing to an avatar** that represents the person you have in mind.

Please inform the researcher when you are ready to begin your VR experience.

You will receive further instructions and information from the researcher now. If you have any questions, feel free to ask!

Code to match audio

Before you continue, please create your personal code that consists of six letters and numbers. This code will be used to anonymously match your apology to the questionnaires you filled out.

Your code should consist of:

1. The first two letters of your mother's first name

2. The last two letters of your birthplace

3. The day you were born

Example: The participant's mother is called Anne. The participant was born in Amsterdam and their birthday is the 7th of May.

Their code would be: Anam07

Please write down your code according to this principle below.

_____

Perception of VR apology (only in treatment condition)

After apologizing in VR, here are a number of statements about how you might feel now.

Please, indicate the extent to which you agree with each statement. Remember that there are no right or wrong answers.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I think that apologising in VR was easy. (1)	○	○	○	○	○	○	○
Apologizing to the avatar felt realistic. (19)	○	○	○	○	○	○	○
Giving an apology in VR was unpleasant. (4)	○	○	○	○	○	○	○
Delivering an apology in VR was stressful. (5)	○	○	○	○	○	○	○
Giving an apology in VR was hard. (6)	○	○	○	○	○	○	○
Apologizing in VR was humiliating. (7)	○	○	○	○	○	○	○
Apologizing made me feel as if I have control over the unresolved conflict. (17)	○	○	○	○	○	○	○

Finally, I would like to ask you some background questions.

What is your gender?

○ Male

○ Female

○ Non-binary / third gender

○ Prefer not to say

Please indicate your age.

_____

In which country do you currently reside?

▼ Afghanistan (1) ... Zimbabwe (1357)

What is your highest completed education?

○ No formal education

○ High school diploma

○ Vocational training

○ Bachelor's degree

○ Master's degree

○ Doctorate degree

○ Professional degree

○ Other _____

What is your main daily activity/employment status?

○ Student

○ Employed for wages

○ Internship

○ Not employed but looking for work

○ Not employed and currently not looking for work

○ Self-employed

○ A homemaker

○ Military

○ Retired

○ Unable to work

What is your income (a year)?

○ Under 20,000€

○ 20,001€-40,000€

○ 40,001€-60,000€

○ 60,001€-80,000€

○ 80,001€-100,000€

○ 100,001€ or over

Do you consider yourself to be committed to a religion?

○ Yes

○ No

○ Prefer not to say

Religion 2 What religion do you identify with?

○ Christian

○ Muslim

○ Hindu

○ Other _____

○ Atheist

End of Block: Demographics

Debriefing

Thank you for your participation!

First, I would like to thank you for participating in this study. In the beginning, I stated that I am interested in investigating the applicability of VR in interpersonal conflict situations. In order to avoid biases, I had to withhold some information.

This study is investigating

(1) If self-affirmation increases the readiness of participants to apologize in VR(2) If self-affirmation leads to more comprehensive apologies(3) If apologizing in VR increases the willingness of participants to also apologize to the harmed person in real life.

Self-affirmation is the process of expanding one's self-perception to reduce threats to our integrity and self-worth. Specifically, every individual has a self-concept that consists of our self-image (physical features, social roles, personality traits), self-esteem (our evaluation of oneself, also based on comparisons with others) and ideal self (who we would like to be). According to Rogers, humans strive to be as close to their ideal self as possible and threats to the self-image push individuals further away from that.

In conflict situations, perpetrators sometimes avoid proper apologies as a defensive strategy to protect the self from the threat of being associated with a wrongful act. By using self-affirmation, the focus can be shifted away from this threat by focusing on other aspects of the self. This leads to more productive strategies to cope with threatening situations (i.e., appropriate apologies).

The background of this research is the idea to implement VR exercises in in-prison programmes for offenders who are willing to become more aware of the consequences their actions have had for others and work towards restitution. Usually, such programmes include that offenders meet an unrelated victim to listen to their experience. It was demonstrated that such programmes have positive effects on the offender's attitude.

However, the ultimate goal of this study is to investigate if apologising to a victim avatar in VR will increase participation rates in victim-offender mediation (VOM) after such programmes since currently only about 17% of offenders decide to participate. VOM gives victims and offenders the opportunity to meet each other voluntarily in a safe environment in the presence of a trained mediator. This allows both parties to discuss the crime they were involved in. Usually, a restitution plan is created together to decide how the offender can repair the harm they have caused which oftentimes incudes delivering an apology. This goal is hoped to be achieved by giving offenders the opportunity to apologize to a representation of

their victim in VR which should make them more confident in apologizing while they still have an unsatisfied need for forgiveness which only the real victim can meet.

Since you gave consent to participate in this study based on different information than now, I would like to inform you that you can still withdraw from this study if you decide that you do not want me to use your data anymore. In that instance, your answers will be deleted from the data set.

If you have further questions, feel free to contact me: Jana Schmidt j.schmidt-4@student.utwente.nl

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Consent

I still agree to participate in this study.

○ Yes

○ No

End of Block: Debriefing

Appendix C

Extended Descriptives

Table C1

Means, SDs and Correlations of All Variables (n=104)

	M	SD	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1. Self-Affirmation check 1	4.96	1.12	0.37	0.01	0.10	0.21	0.08	**0.23**	-0.05	0.04	0.01	0.01	0.04	0.13	0.05	-0.06	0.01	0.14	0.01	-0.02	0.08	0.03	-0.14	**0.27**	-0.02	-0.13	-0.05	0.01	0.09
2. Self-Affirmation check 2	5.71	0.96	1.00	0.12	0.12	0.16	0.15	0.17	**-0.32**	0.15	0.09	0.16	0.10	0.15	-0.05	-0.07	0.17	0.07	0.19	0.11	0.15	0.09	0.12	0.10	-0.15	0.16	0.05	0.02	-0.03
3. Willingness to experience an avatar in VR	5.76	1.01		1.00	.	0.10	-0.10	0.10	0.14	-0.04	0.07	0.02	-0.08	0.03	-0.07	.	.	.	.	-0.04	0.07	-0.05	0.08	0.14	-0.16	0.03	0.22	0.21	**-0.41**
4. Willingness VR apology	4.85	1.56			1.00	**0.34**	**0.37**	0.26	-0.02	0.21	0.16	**0.41**	0.22	**0.42**	0.16	-0.15	**0.46**	**-0.45**	**0.41**	**0.38**	0.15	-0.05	0.22	0.05	0.17	-0.05	-0.12	0.16	-0.16
5. Willingness to apologize to the real victim	5.03	1.35				1.00	0.18	**0.37**	0.01	0.03	0.07	**0.20**	**0.21**	**0.40**	-0.11	-0.25	**0.39**	-0.17	**0.45**	**0.28**	0.03	-0.03	0.08	-0.04	0.08	0.10	0.05	0.07	-0.07
6. SPES	4.71	1.06					1.00	**0.34**	-0.05	**0.31**	0.03	0.13	0.15	**0.42**	0.04	0.00	**0.50**	-0.18	**0.55**	0.03	0.15	0.11	**0.40**	0.03	-0.11	-0.03	-0.17	0.08	**0.19**
7. Victim-Avatar Similarity	4.73	1.24						1.00	-0.08	**0.47**	0.07	**0.20**	0.14	**0.21**	-0.03	**-0.29**	**0.72**	**-0.39**	**0.45**	**0.27**	0.18	-0.02	**0.34**	0.16	0.02	-0.02	-0.15	-0.03	0.12
8. Perception Facial Expression	3.90	1.36							1.00	-0.02	-0.12	**-0.22**	**-0.26**	-0.15	-0.02	0.03	-0.13	0.13	-0.03	-0.13	**-0.22**	0.13	**-0.23**	-0.06	-0.05	-0.13	0.01	-0.01	-0.10
9. Perception Body Movement	4.19	0.98								1.00	0.14	-0.10	0.16	0.10	-0.01	-0.05	**0.48**	-0.32	0.11	**0.22**	**0.27**	0.20	**0.33**	0.15	0.09	-0.13	-0.15	0.05	0.13
10. Perception VR environment	6.85	0.37									1.00	-0.05	0.08	-0.07	-0.13	-0.06	-0.05	0.02	-0.08	**0.20**	0.03	0.08	0.13	0.14	0.06	-0.10	-0.08	0.04	0.15
11. VR Manipulation check	4.33	2.27										1.00	0.06	**0.26**	-0.04	**-0.33**	**0.40**	**-0.37**	**0.35**	-0.07	-0.01	-0.03	-0.01	-0.02	-0.02	-0.04	-0.06	-0.06	-0.03
12. Anticipated. Response	5.33	1.23											1.00	**0.29**	-0.06	-0.17	0.26	-0.15	0.13	0.18	**0.29**	-0.03	0.00	-0.05	-0.06	0.04	-0.08	0.12	0.00
13. Effects after apologizing	4.74	0.91												1.00	0.00	**-0.39**	**0.51**	**-0.40**	**0.72**	**0.20**	0.11	0.05	0.16	0.09	0.02	0.04	0.00	0.18	0.07
14. I think that apologizing makes the people around me see me as a ...	2.08	1.16													1.00	0.23	0.11	0.15	0.05	-0.09	-0.11	-0.12	0.12	-0.07	-0.11	0.01	0.14	-0.09	-0.13
15. Perception of VR Apology	3.42	1.34														1.00	-0.22	**0.40**	-0.25	-0.21	0.13	-0.07	0.05	-0.10	-0.20	0.11	-0.08	0.04	-0.09
16. Apologizing to the avatar felt realistic.	4.33	1.50															1.00	**-0.44**	**0.56**	**0.42**	**0.28**	-0.03	**0.46**	0.06	-0.11	0.11	-0.03	0.11	-0.02
17. Apologizing in VR was humiliating.	2.33	1.50																1.00	-0.33	**-0.48**	-0.16	0.18	-0.26	0.03	-0.22	0.01	0.11	-0.18	0.00
18. Apologizing made me feel as if I have control.	4.52	1.65																	1.00	0.22	0.07	-0.12	0.27	-0.07	-0.03	**0.28**	-0.03	**0.31**	-0.08
19. Perceived Genuiness	5.39	1.12																		1.00	**0.31**	-0.09	**0.34**	-0.07	0.04	0.10	-0.03	**0.29**	0.10
20. Apology elements	2.63	1.19																			1.00	**-0.20**	**0.25**	0.08	-0.13	-0.01	-0.16	0.12	0.06
21. Defensive strategies	0.29	0.54																				1.00	0.10	-0.02	-0.09	-0.05	0.06	-0.17	0.06
22. Perceived seriousness	5.69	2.31																					1.00	0.06	0.05	0.07	-0.15	**0.21**	0.09
23. Rosenberg's Self-Esteem Scale	2.88	0.48																						1.00	0.11	**-0.42**	-0.04	-0.11	**0.23**
24. Implicit Person Theory Scale	4.61	1.11																							1.00	-0.16	-0.10	0.14	0.16
25. HEXACO Emotionality subscale	4.53	0.83																								1.00	0.05	**0.34**	-0.21
26. HEXACO Honesty & Humility subscale	3.38	0.92																									1.00	-0.25	-0.01
27. Perspective Taking Scale (Davi's)	3.65	0.41																										1.00	0.00
28. Age	21.12	2.30																											1.00

Note. Bold values are significant at the p<0.05 level.

The means and SDs of both Self-affirmation checks (*M*=4.96, *SD*=1.12; *M*=5.71, *SD*=0.96) indicate that most participants felt highly self-affirmed after the self-affirmation task. As Table 2 shows, 'Salience of positive self-aspects' and 'Victim-Avatar similarity' correlate weakly and positively (*r*=0.23, *p*<0.05). Hence, participants who were thinking about positive aspects of themselves were more likely to perceive the avatar similar to their actual victim.

In the case of 'Willingness to experience an avatar that represents the harmed person' (*M*=5.76, *SD*=1.01) and 'Willingness to apologize in VR' (*M*=4.85, *SD*=1.56), participants' willingness is high for both, but significantly more people were highly willing to simply experience an avatar in VR than to apologize in VR, t(101)=3.45, *p*=0.001. 'Willingness to apologize in VR' significantly and positively correlated with 'Willingness to apologize to the actual victim' (*r*=0.34, *p*<0.05), 'Immersion and Presence in VR' (*r*=0.37, *p*<0.01), 'Effects after apologizing' (*r*=0.42, *p*<0.01) and 'Perceived genuineness' (*r*=0.38, *p*<0.01). This means that individuals who were willing to apologize in VR were afterwards more likely to indicate that they are willing to apologize to the real victim, felt immersed and present, perceived their VR apology as genuine and more positive effects of apologizing. Similarly, participants mostly indicated that they are willing to apologize to the actual victim (*M*=5.09, *SD*=1.35). This variable significantly, positively but weakly correlated with 'Victim-Avatar similarity' (*r*=0.37, *p*<0.01) which means that people who perceived the avatar very similar to the actual victim, also indicated that they would like to apologize to the actual victim more. Further, participants were also more willing to apologize to the real victim when they felt that apologizing in VR gave them a sense of control (*r*=0.45, *p*<0.01) and felt realistic (*r*=0.39, *p*<0.01).

Further, participants felt highly immersed and present in VR ('SPES', *M*=4.71, *SD*=1.06). This variable positively and significantly correlated with 'Victim-Avatar similarity' (*r*=0.34, *p*<0.01) and 'Apologizing made me feel as if I have control' (*r*=0.55, *p*<0.01). Thus, participants that felt immersed and present in VR also perceived the avatar and their victim as similar, as well as a sense of control while apologizing.

Generally, participants agreed to the statement that the avatar and victim looked similar (*M*=4.73, *SD*=1.24). A negative and significant relationship between 'Victim-Avatar similarity' and 'Perception of the VR apology' can be observed (*r*=-0.29, *p*<0.05) which means that participants who perceived the avatar and their victim as similar also felt that the VR apology was less difficult and stressful. The variables 'Apology elements' and 'Anticipated acceptance of the apology' (*M*=5.33, *SD*=1.29) were positively and significantly

correlated ($r=0.29$, $p<0.01$), meaning that participants who used more apology elements anticipated that their victim would accept their apology.

The effects after apologizing were indicated to be positive ($M=4.74$, $SD=0.91$) which correlates positively and significantly with 'Apologizing made me feel as if I have control' ($r=0.72$, $p<0.01$). This means that participants who indicated to experience positive effects after apologizing in VR also felt a sense of control while apologizing in VR. Lastly, participants used more apology elements and defensive strategies in the VR apology ($M=2.77$, $SD=1.78$; $M=0.53$, $SD=0.60$) than in the written apologies ($M=2.39$, $SD=1.17$; $M=0.36$, $SD=0.65$).

As shown in table 3, participants did not use many apology elements ($M=2.39$, $SD=1.17$; $M=2.77$, $SD=1.28$) nor defensive strategies ($M=0.36$, $SD=0.65$; $M=0.53$, $SD=0.60$) in their written as well as VR apologies. However, in both cases participants used more apology elements than defensive strategies ($r=-0.27$, $p=0.01$; $r=-0.31$, $p=0.01$). Further, 'Apology elements' correlated positively and significantly with 'Perceived sincerity' ($r=0.44$, $p=0.01$) and 'Perceived remorse' ($r=0.42$, $p=0.01$) which means that written apologies that contained more apology elements were perceived as more sincere and remorseful by the two coders. Similarly, 'Apology elements in VR' correlated positively and significantly with 'Perceived sincerity VR apologies' ($r=0.58$, $p=0.01$) and 'Perceived remorse VR apologies' ($r=0.44$, $p=0.01$). Consequently, VR apologies that entailed more apology elements were perceived as more sincere and remorseful by the coders. Interestingly, the amount of apology elements used in written apologies did not correlate with the use of apology elements or defensive strategies in VR while the use of defensive strategies correlated positively and significantly with defensive strategies in the VR apologies ($r=0.31$, $p=0.01$).