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SCENARIO METHOD AND THE INFLUENCE OF THE PAST AND PERSONALITY  
TRAITS

*Bachelor Thesis*

A Bar Fight in Virtual Reality

The Hypothetical Scenario Method and the Influence of the Past and Personality Traits

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### **Abstract**

Research in criminal decision making broadly deals with the question of how people decide to get involved in a criminal act and how to predict it. This includes violent and aggressive behaviour against others. In the past, the focus of this type of research has been on declaring offenders as rational actors rather than taking their personality into account. This study aims to gain more insight in the relation between specific personal characteristics and the intention to aggress and what reinforces this relationship, for example reports of criminal behaviour in the past as a victim or an offender. It was hypothesized that three out of six personality dimensions relate to the intention to aggress and that self-reported victimization and offending reinforce these relationships. In addition, this study aims to find evidence of the usefulness of Virtual Reality (VR) as a tool in criminal decision making research. Commonly, a written scenario is presented to the participants with corresponding questions to answer but due to the technical improvements in recent years, VR can be used as well. Rather than only reading and trying to imagine oneself in the situation, VR provides a visual representation of it. It was expected that the participants report a higher degree of presence in the VR-scenario than in the written condition. To test these hypotheses an experiment was conducted. A scenario of a “bar fight” in either written form or in VR was presented to students ( $N = 151$ ). After being exposed to the scenario, the participants answered various questions, including the personality questionnaire HEXACO, self-reported offending, self-reported victimization, presence and intention to aggress. The results show indeed a significant relation between the two personality dimensions honesty-humility and agreeableness and the intention to aggress. Self-reported victimization reinforced the relationship between a high honesty-humility and intention to aggress. In addition, there were significant differences between the two conditions in terms of stronger feelings towards presence. To combine the aspects of this study, presence negatively moderated between participants’ personality traits and their intention to aggress. Finally, practical implications and suggestions for further research are discussed.

Criminal and illegal acts happen on a daily basis. In 2016, the Central Bureau for Statistics registered more than 200.000 cases of violence and aggressive sexual behaviour in the Netherlands (CBS, 2017). The estimated number although, is a lot higher because not every victim reports an attack to the police. Criminal behaviour can be defined as any behaviour that can be prosecuted legally. How do people decide to engage in criminal behaviour, especially in an aggressive and violent manner? Which factors are important to make this decision? Research in criminology and especially, research in criminal decision making, aims to answer these types of questions. That gives society a sharpened idea of what makes people behave antisocially, how to guard from that harm, how to prevent recidivism and how to support victims of crime.

The focus of this paper is on determining the effects of specific personality traits as one factor of deciding to engage in aggressive behaviour. Furthermore, the prediction of violence by criminal behaviour and victimization in the past is discussed, as well as the usefulness of Virtual Reality (VR) in hypothetical scenarios.

Since the 1980s rational choice theories have been prevalent to give explanations for the engagement in crime. These theories include weighing against each other the costs and benefits of committing a crime, arguing that offenders are rational actors. There has been only little attention for the personality of offenders by these theories, or in other words, the personality of the criminals seemed to be irrelevant (Nagin & Paternoster, 1993). However, it can be asked if that explanation is enough to fully understand criminal decision making.

Adding a factor to the rational choice theories, Gottfredson and Hirschi focus in *A General Theory of Crime* (1990) on the individual differences of the offender. According to this theory, especially poor self-control is responsible for engaging in a criminal event. A poor ability of controlling the self includes a lack of empathy, a preference for risk-taking, little interest in long-term planning, a low tolerance for frustration, a lack of persistence and preferring physical rather than mental activity (Schreck, 1999). Still, it is stated that the individuals are “rational decisionmakers” (Nagin & Paternoster, 1993, p. 470). Research by Van Gelder and De Vries (2012) shows that criminal behaviour seems to be influenced by the costs that are perceived. In addition to that, their research makes clear why personality traits in crime are to be considered important. It is argued that rational choice theories and individual differences do not exclude each other and given that personality traits are thought of to be key factors nowadays, it is necessary to integrate them with the rational accounts to better understand criminal decision making.

### Aggression and personality

Aggressive behaviour as a criminal act includes physical (e.g. hitting, pushing, kicking) and verbal (e.g. threatening, insulting, cursing) behaviour with the goal to injure someone (Johnson & Johnson, 2014). Aggression can also be defined in terms of impulsive vs. non-impulsive behaviour. Impulsivity is characterized as a “tendency to act on the spur of the moment, neither thinking, nor planning, nor considering potential risks and alternative modes of action” (Plutchik & Van Praag, 1995, p. 12). According to this definition, again, poor self-control plays an important role in aggression as a criminal act.

In addition to the lack of self-control, personality traits seem to determine the willingness to engage in violent behaviour as well and therefore committing a crime. Models can be used to specify those personality traits: The HEXACO model covers the human personality with the help of six different dimensions: Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness and Openness to Experience (Lee & Ashton, 2004).

Criminal behaviour is related to three out of these six dimensions of the HEXACO, namely a low agreeableness, low emotionality and low honesty-humility (Van Gelder & De Vries, 2012). According to lexical studies about personality structures, poor agreeableness is characterized by being “ill-tempered, quarrelsome, stubborn and choleric” (Ashton & Lee, 2007, p. 156). Just by the pure meaning of the word, it is assumed that a person with poor agreeableness shows a tendency to aggress due to a lack of patience, thereby displaying hostile behaviour. Low emotionality is associated with a lack of fearfulness, a lack of empathy and being “brave, tough, independent, self-assured, stable” (Ashton & Lee, 2007, p. 156). This makes the individual more likely to engage in risk-taking behaviour. The honesty-humility dimension is considered as most important in criminal decision making (Van Gelder & De Vries, 2012). A person who shows a poor honesty-humility is characterized by being less “fair-minded” and less “faithful” (Ashton & Lee, 2007, p. 156). In addition, lower moral standards and caring less about the well-being of others correlate with a poor honesty-humility.

Indeed, prior studies have provided evidence for the relationship between personality traits and aggression throughout the years. From this research, it seems clear that the three HEXACO dimensions agreeableness, emotionality and honesty-humility relate to aggressive behaviour. It is less clear whether these effects are reinforced by other factors.

According to Gendreau, Little and Goggin (1996), a strong predictor of offender recidivism is a “criminal history/history of antisocial behaviour” (p. 575). This gives an

indication that the past criminal behaviour of the offender contains valuable information. In addition, there is one particular aspect that victims of crime and offenders have in common. As stated above, criminal and aggressive behaviour is associated with a lack of self-control. However, a low self-control increases the vulnerability to crime, in terms of a lack of safety or guardianship (Gottfredson & Hirschi, 1990). Especially the role of frustration tolerance is important in becoming a victim of crime. The victim does not need to be solely passive, but “losing” a fight often results in frustration for people with a low tolerance on this account, which in turn leads to a higher risk of hostility which can provoke an attack (Schreck, 1999). This vicious circle makes the victim an offender. Being a victim in the past could therefore provide new insights on aggressive behaviour. Important to say is that not all victims of a crime have a poor self-control, but the theory makes clear that offenders and victims often share the same characteristics which eventually results in both sides behaving aggressively (Schreck, 1999). Therefore, criminal behaviour in the past and past victimization might have a reinforcing effect on the relation between specific personality traits and engaging in aggression.

#### The hypothetical scenario method

To examine and measure individual tendencies, hypothetical scenarios have been used in the past. Also known as vignettes, these scenarios include reading a short descriptive text and answering several questions. The participants are asked to take the criminal’s perspective during the reading and the questionnaire. The scenario method is considered to simulate a more realistic situation, in contrast to surveys (Van Gelder, Otte & Luciano, 2014). In addition to that the scenarios provide a more detailed context, compared to surveys which help to gain more valid responses from the participants (Klepper & Nagin, 1989). Still, it is questionable to what extent written scenarios predict real-world behaviour. Also, participants have to be able to imagine themselves in the situation (Van Gelder et al., 2014).

Due to the technical development in the past years, other tools besides written scenarios in criminal decision making are available. Using scenarios in VR is one example. A video which has been recorded with multiple cameras to produce a 360° view, is one way of creating VR. While watching the video with VR-glasses, the viewer can look around freely. This results in a more dynamic situation than in a written scenario. By integrating a visual representation with audible stimuli, this method exposes the viewer to even more detail and that is important to increase the sense of subjectively “being there” in the situation, also known as spatial presence (Hartmann et al., 2015, p. 1). Research shows that greater presence

can lead to higher ecological validity of experiments, in terms of participants' behavioural intentions (Van Gelder et al., 2017). In other words, results of studies which make use of VR are thought to predict more real-life behaviour when the participants feel more present in the situation than when they do not.

In addition, research shows that humans have a limited cognitive capacity (Mayer, 2008). While reading a scenario, the cognitive capacity is divided into 1) reading the text, 2) understanding the text, 3) imagining the situation and 4) taking perspective. All these factors include moderate to high involvements of mental capacity. Therefore, only little capacity is left to, for instance, explore and reflect on the emotions that are present at the time. In VR, the participant still has to understand the scenario and take a different perspective, but less effort is necessary because the scenario is being visually presented. The participant can use the cognitive capacity left to focus on the present internal states while observing the situation.

The present study

This study aims to integrate two different aspects of criminological research. On the one hand, it can be asked whether the individual's past as an offender or victim has an influence on the relation between personality traits and displaying aggressive behaviour. On the other hand, it can be interesting to look into VR as a useful simulation tool in criminal decision making. Therefore, this study tries to gain insight into the characteristics and history of people who tend to aggress easier than others, the advantages of using VR in hypothetical scenarios and the relation between these aspects.

One question that results is, is there a relation between specific personality traits and the intention to aggress? And how does the criminal past and victimhood of people influence this relation? Based on the previously discussed research, the following hypotheses are stated:

*Hypothesis 1: Participants who score low on the personality dimensions agreeableness, emotionality and honesty-humility, show a significantly higher intention to aggress in a hypothetical scenario.*

*Hypothesis 2: A criminal past and victimization in the past have a reinforcing effect on the relation between the personality dimensions and the intention to aggress.*

Another question that needs to be asked is, how beneficial is the VR method in criminological research? It is expected that in comparison to a written scenario, the participants in the VR-Condition feel more present in the situation. Therefore, the following hypothesis is developed:

Hypothesis 3: *Participants in the VR-Condition show significantly higher perceptions of presence, compared to participants in the written-scenario Condition.*

## **Method**

### **Participants**

In total, 151 participants volunteered for the study. All the participants were male, in order to allow perspective taking of the male figure in the presented scenario. Their ages ranged from 18 to 59 years of age, with 22.33 years as mean value. The participants were recruited with the help of convenience sampling. The first 97 participants were recruited at the VU University Amsterdam in 2015, where they could walk into the lab to participate. The other 54 participants were recruited with the help of the SONA-system of the University of Twente in 2018. 74 participants have been randomly assigned to Condition 1 (scenario in VR) and 77 to Condition 2 (written scenario). They received 1 SONA-Credit at the University of Twente and 7.50€ at the VU University Amsterdam after participating.

### **Materials**

#### **Scenario**

The VR scenario that was shown in Condition 1 of the experiment, has been recorded in a pub in Amsterdam by using six GoPro cameras to produce the 360° angle. The cameras were attached to a helmet with the lenses faced outwards, which was worn by an actor who simulated the participants' actions out of the first-person perspective. This method creates a situation where the viewer can look around and watch the video from different angles. A narrator introduced the context and the setting to the viewer. The spoken language was Dutch. The scenario was presented to the participants with VR-glasses and the corresponding smartphone. Over-ear, noise cancelling headphones were used to minimize the possible influence of distracting audible stimuli.

In the written condition, Condition 2, the scenario was presented to the participants in a written form. The scenario is the same as in the first condition. The text is in Dutch, but it is translated to English for this report:

**An evening in Molly Malone's**

*Imagine the following situation:* It's Friday night and you are out with your girlfriend Lisa in the Irish Pub "Molly-Malone's" in the center of Amsterdam. You and Lisa, with whom you have been dating for two years now, went to Molly's for food. The food was great and you enjoyed a nice glass of wine with it. After the main course you decide against taking desert or coffee but to head home instead. You walk to the bar to pay. The bartender asks you whether you enjoyed the food while presenting you the bill of €47,- You tell him the food was great while paying him with a €50,- note and tell him to keep the change. While returning to your table you see a guy in his early 20s that you don't know standing close to and talking with Lisa. Walking back to your table you hear him ask for Lisa's phone number. The following dialogue unfolds:

YOU: "What's going on? Are you hitting on my girlfriend?"

GUY: (keeps looking at Lisa) "I don't see a ring on her finger so she can talk to whoever she wants to."

YOU: "Lisa, let's go."

GUY: (to you): "Maybe you should go."

YOU: (louder) "I am not talking to you!"

GUY: (turning towards you): "But I am talking to you."

YOU: (raised voice) "Fuck off!"

GUY: (raised voice) "You fuck off!"

YOU: (raised voice and threatening) "And now stop it!"

GUY: (provocative) "Or what...?"

*Figure 1.* The hypothetical scenario.

Immediately following the presentation of the scenario in either VR or written form, the participants were asked to fill in an online questionnaire. The questionnaire measured the HEXACO, self-reported victimization, self-reported delinquency, State Anger, Perceived Risk, Anticipated Guilt/Shame, State Anxiety and Perceived Realism of the scenario and as dependent variables Intention to Aggress, Presence and a number of demographic variables.

#### Independent variables

At first, 21 questions about the scenario were asked. These questions contain four different subscales which measure factors that are generally viewed to have an influence on engaging in an aggressive act: Anger, guilt/shame, perceived risk and anxiety (Stuewig, Tangney, Heigel, Harty & McCloskey, 2010).

*Anger.* Anger was measured by 5 items using 7-point scales. This scale was developed by Van Gelder et al. (2018) and its internal consistency was .93. The items are: "Would you be angry in this situation?", "Would you be annoyed?", "Would you be irritated?", "Would you be furious?" and "Would you feel frustrated?" ranging from "not at all" to "very much".

*Anticipated Guilt/Shame.* To measure Anticipated Guilt/Shame, two questions have been asked on a 7-point Likert-scale. The Pearson correlation coefficient was  $r = .82$  and the



items are: “Would you later feel guilty if you were to use violence?” and “Would you later feel shame if you were to use violence?”.

*Perceived Risk.* To measure Perceived Risk, scales measuring sanction probability and punishment severity were used. This scale was developed by Van Gelder and De Vries (2012). Two items measured sanction probability: “How likely is it that there will be negative consequences for you if you use violence?” ranging from “very unlikely” to “very likely” and “How big do you think the chance is that things will end badly for you, should you use violence?” ranging from “very small” to “very large”, using 7-point scales. In addition, two items on a 7-point scale were used to measure punishment severity: “How serious are the possible consequences for you if you use violence?” ranging from “not at all” to “very serious” and “How severe are the potential negative consequences if things end badly for you?” ranging from “not at all severe” to “very severe”. The Perceived Risk scale that contained both sanction probability and punishment severity was created multiplying the mean scores of both subscales (Probability x Severity). The alpha reliability was .70.

*State Anxiety.* Anxiety was measured by five items using a 7-point scale ranging from “not at all” to “very much”. This scale was developed by Van Gelder and De Vries (2012) and its internal consistency was .84. Examples are: “Would you be anxious in this situation?” or “Would you be nervous?”.

*Perceived Realism.* To measure the perceived realism of the situation, participants had to answer 6 statements on a 5-point Likert-scale from “strongly disagree” to “strongly agree”. One statement as an example was “The scenario was realistic”. This realism scale was developed by Van Gelder et al. (2017). The alpha reliability was .82.

*Self-reported Victimization.* The subscale about self-reported victimization contained 14 items to be answered on a 5-point scale (Never, 1-2 times, 3-5 times, 6-10 times, more than 10 times). This scale was developed on the basis of the annual report about security, quality of life and victimization in the Netherlands in 2014 (CBS, 2015). The internal consistency was .84. Examples are: “How often in the past 2 years did someone break into your house or tried to do so?” or “How often in the past 2 years did someone give you the feeling to be discriminated (for example at home, in the street, at work or at university, in a café, in a club or in public space, etc.)?”.

*Self-reported Offending.* Self-reported delinquency was measured by 24 statements using a 5-point scale (Never, 1-2 times, 3-5 times, 6-10 times, more than 10 times). The alpha reliability was .78. Examples are: “How often in the past 2 years have you used a knife or another weapon?” or “How often in the past 2 years have you set something on fire?”.

*Personality dimensions.* Participants had to answer 41 questions about their personality on the basis of the HEXACO questionnaire. It was decided to use less items than in the original HEXACO, to keep the entire survey shorter. 10 items of the honesty-humility dimension ( $\alpha = .53$ ), 15 items of the emotionality dimension ( $\alpha = .57$ ) and 16 items of the agreeableness dimension ( $\alpha = .77$ ) were used. As it is in the HEXACO, answers had to be given on a 5-point Likert-scale from “strongly disagree” to “strongly agree”. Examples are “I rarely hold a grudge, even against people who have badly wronged me” or “People sometimes tell me that I am too critical of others”.

#### Dependent variables

*Intention to aggress.* The outcome variable Intention to Aggress was measured by two questions on a 7-point Likert-scale, for example “How likely is it that you would use violence against this person by pushing, kicking or hitting him?” (1 very unlikely–7 very likely). In addition, the participants were asked to estimate the percentage of the likelihood to aggress in that situation “Can you give a percentage estimate of the probability that you would use violence (that is, push, kick or hit the other person)?”. The latter was recoded to a 7-point scale to create an Intention to Aggress scale ( $r = .70$ ). Here, also the perceived attractiveness of Lisa has been measured on a 7-point Likert-scale.

*Presence.* Presence was measured using 13 items on a 5-point Likert-scale from “strongly disagree” to “strongly agree”. The items were based on the Igroup Presence Questionnaire (IPQ) by Schubert, Friedmann and Regenbrecht (2001) ( $\alpha = .91$ ) and were adjusted to fit both conditions. One example is “I had the feeling that I was part of the scenario”.

Finally, demographic variables were asked. These include the age, sex, education and relationship status of the participants.

#### **Procedure**

The study was advertised in the SONA-system as “Going to the pub in VR”. Participants could sign up for a specific timeslot and go to the location at that time. All the experiments took place in the same room. After being thanked for their interest in the study, the informed consent showed up on the computer. The participants were asked to read it and to agree with it, they had to click on an arrow to go to the next page. After that, participants in Condition 1 received explanations about how to use the Samsung Gear VR glasses and they were fitted with the equipment. After watching the scenario, the participants took the VR

glasses off and the questionnaires were presented on the computer. Participants in Condition 2 saw the written scenario on the screen and were asked to fill in the questionnaires after that. After completing the survey, they had the chance to experience the scenario in VR. Everyone was thanked at the end of the experiment for the participation. All in all, the experiment took around 30 minutes.

### Results

Inclusion criteria of this study were that the participants had to be students, male and they had to be fluent in Dutch. From the 151 participants, 8 of them failed to fill in the complete questionnaire and 1 participant stated to be a woman. These participants were excluded from the study, therefore the data of 142 participants was analysed.

#### Direct effects

To answer the first hypothesis “Participants who score low on the personality dimensions agreeableness, emotionality and honesty-humility, show a significantly higher intention to aggress in a hypothetical scenario”, at first Pearson correlation analyses were executed.

Table 1  
Summary of Intercorrelations for Mean Scores Between Different Variables

Variables	1	2	3	4	5	6	7
Honesty- Humility	-						
Emotionality	.07	-					
Agreeableness	.31**	.27**	-				
Self-reported Offending	.08	-.08	-.07	-			
Self-reported Victimization	-.18*	.12	-.16	.37**	-		
Presence	-.02	-.05	-.42**	.02	.16	-	
Intention to Aggress	-.31**	-.07	-.49**	.15	.17	.59**	-

Note. N = 142.

\* $p < .05$ . \*\* $p < .01$ .

Table 1 shows the Pearson correlations of all relevant variables with each other. This analysis identifies a moderate positive correlation between intention to aggress and presence ( $r = 0.59, p < .01$ ). Results of the Pearson correlation analysis also indicate a moderate negative association between intention to aggress and agreeableness ( $r = -.49, p < .01$ ). Furthermore, intention to aggress weakly to moderately correlates with a poor honesty-humility ( $r = -.31, p < .01$ ).

Secondly, regression analyses were executed to show if the three dimensions of the HEXACO worked as predictors of the intention to aggress.

Table 2  
Predictors of Intention to Aggress

Variable	Step 1		Step 2		Step 3	
	<i>B</i> ( <i>SE</i> )	$\beta$	<i>B</i> ( <i>SE</i> )	$\beta$	<i>B</i> ( <i>SE</i> )	$\beta$
Constant	27.53(7.22)		69.24(11.51)		28.04(13.02)	
Age	-.17(.23)	-.06	-.34(.20)	-.12	-.31(.18)	-.11
Condition (VR = 0, Written = 1)	-9.64(2.60)	-.31	-6.01(2.38)	-.19*	-1.26(.29)	-.04
Attractiveness	2.03(.91)	.18	2.18(.80)	.20**	.86(.78)	-.08
Lisa						
Honesty-Humility			-6.36(2.36)	-.20**	-6.45(2.19)	-.20**
Emotionality			3.38(2.66)	.09	2.60(2.40)	.07
Agreeableness			-11.40(2.33)	-.40**	-6.69(2.25)	-.24**
Presence					8.16(2.18)	.42**
$R^2$		.12		.35		.47
$\Delta R^2$		.09		.32**		.43**

Note.  $N = 142$ .

\* $p < .05$ . \*\* $p < .01$ .

As shown in Table 2, together, these predictors explained a significant amount of variance in the dependent variable intention to aggress,  $F(1, 130) = 13.58, p < .01$ , with a  $R^2$  change of .47. As the individual predictors were examined further, it became clear that only a low score on the honesty-humility dimension ( $t = -2.95, p < .01$ ) and the agreeableness

dimension ( $t = -2.97, p < .01$ ) statistically predicted a high intention to aggress, but not the emotionality dimension. This was also indicated by the correlation values (Table 1).

In other words, having a lack of honesty-humility or agreeableness corresponds to a higher intention to aggress. Thus, the first hypothesis “Participants who score low on the personality dimensions agreeableness, emotionality and honesty-humility, show a significantly higher intention to aggress in a hypothetical scenario” was partially supported, because of the predicting effect of only two of the three dimensions on the dependent variable: honesty-humility and agreeableness.

Furthermore, the influence of various variables on intention to aggress was measured. On the one hand, the attractiveness of Lisa, the condition and the age of the participants were included as control variables. None of these variables seemed to have an influence on the participants’ intention to aggress (Table 2), but when added in Step 2, the condition ( $t = -2.52, p < .05$ ) and the attractiveness of Lisa ( $t = 2.72, p < .01$ ) had an influence on the participants’ intention to aggress. In other words, participants in Condition 1 and participants who ranked Lisa as more attractive showed a higher intention to aggress. On the other hand, presence had a significant predicting effect on the intention to aggress ( $t = 3.73, p < .01$ ) when added in Step 3, while the condition and the perceived attractiveness of Lisa did not have an influence in this model anymore.

### Indirect Effects

To answer the second hypothesis, moderation analyses were executed. It was decided that the analyses are executed by using the three dimensions honesty-humility, emotionality and agreeableness as independent variables, the intention to aggress as dependent variable and self-reported offending and self-reported victimization as moderator variables. Furthermore, it was decided to explore the effect of presence on these relationships.

Table 3  
Summary of Moderation Analyses for Participants’ Intention to Aggress

Variable	Intention to Aggress		
	<i>B</i> (SE)	$\beta$	95% CI
Honesty-Humility x Self-reported Offending	-2.21(5.44)	-.04	[-12.98, 8.55]

Honesty-Humility x Self-reported Victimization	11.66(5.19)	.30**	[1.39, 21.93]
Honesty-Humility x Presence	-9.82(3.02)	-.26**	[-15.80, -3.83]
Emotionality x Self-reported Offending	-3.71(6.42)	-.06	[-16.4, 8.99]
Emotionality x Self-reported Victimization	1.77(6.28)	.03	[-10.65, 14.20]
Emotionality x Presence	2.16(3.24)	.06	[-4.23, 8.59]
Agreeableness x Self-reported Offending	8.49(4.75)	.15	[-.91, 17.89]
Agreeableness x Self-reported Victimization	13.29(4.19)	.31**	[5.00, 21.59]
Agreeableness x Presence	-2.42(2.12)	-.08	[-6.61, 1.77]

Note.  $N = 142$ .

\*\* $p < .01$ .

As stated above, the honesty-humility and agreeableness main effects were significant. As seen in Table 3, the moderation analyses revealed that the interaction effect was significant between honesty-humility and self-reported victimization,  $B = 11.66$ ,  $SE = 5.19$ ,  $CI [1.39, 21.93]$ ,  $t(129) = 2.24$ ,  $p = .02$ . In addition, the interaction effect was significant between agreeableness and self-reported victimization,  $B = 13.29$ ,  $SE = 4.19$ ,  $CI [5.00, 21.59]$ ,  $t(129) = 3.17$ ,  $p < .01$ .

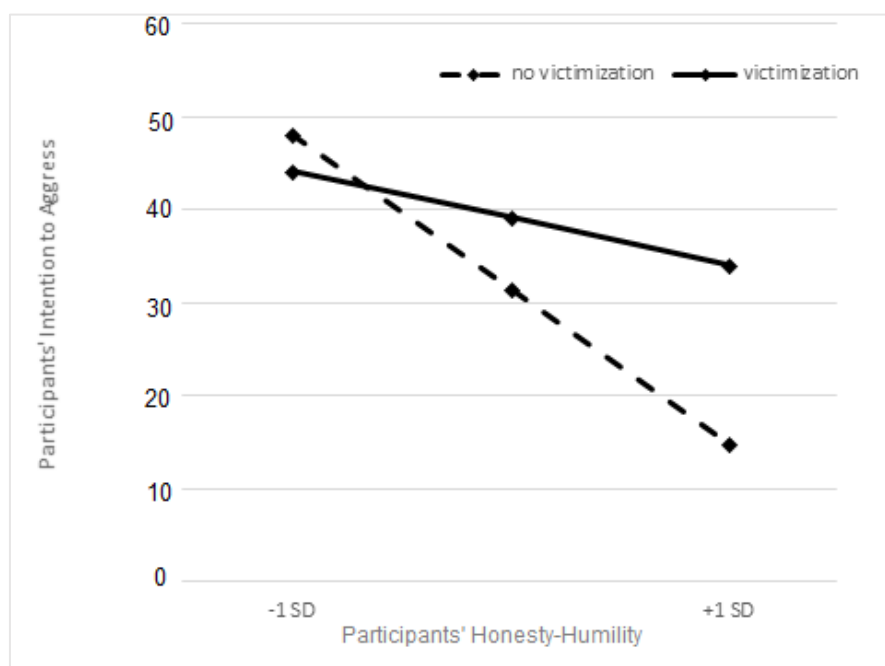


Figure 2. Participants' honesty-humility as a predictor of intention to aggress as a function of self-reported victimization (victimization or no victimization in the past).

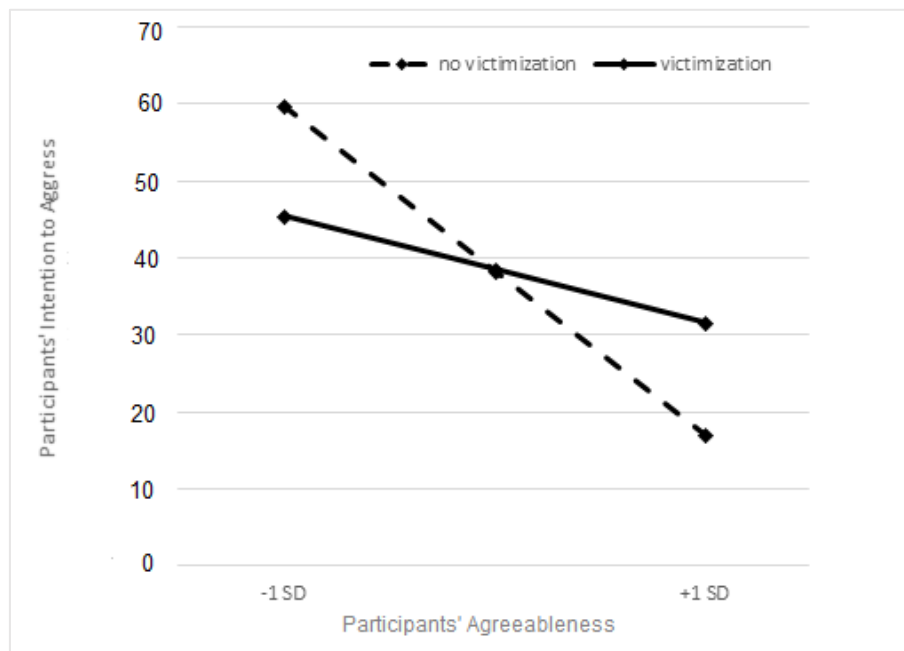


Figure 3. Participants' agreeableness as a predictor of intention to aggress as a function of self-reported victimization (victimization or no victimization in the past).

Conducting simple slope analyses revealed that honesty-humility and agreeableness were not significant predictors of intention to aggress, when the participants were a victim of a crime before, both  $Bs < -3.26$ ,  $ts(129) < -.85$ ,  $ps > .10$ , CIs [-13.20, 4.33]. Contrary to the expectations, a low honesty-humility was a predictor of intention to aggress when the participants reported no victimization in the past,  $B = -10.59$ ,  $SE = 3.84$ ,  $CI [-16.63, -4.56]$ ,  $t(129) = -3.47$ ,  $p < .01$ , as well as a low agreeableness,  $B = -15.46$ ,  $SE = 2.42$ ,  $CI [-20.26, -10.673]$ ,  $t(129) = -6.38$ ,  $p < .01$ . In Figure 2 and 3, the simple slopes were plotted at low levels of honesty-humility and agreeableness (1 *SD* below the mean) and high levels (1 *SD* above the mean). It can be seen, when participants displayed a higher score on the two personality dimensions (moving from -1 *SD* to +1 *SD* in the figure) they showed in total, a lower intention to aggress. Important to notice is that in this case their intention to aggress was higher when they were a victim of a crime before. In other words, the interaction reflects the fact that being a victim of a crime in the last two years reinforces the relationship between a high honesty-humility and agreeableness and the intention to aggress. Thus, the second hypothesis: “A criminal past and victimization in the past have a reinforcing effect on the relation between the personality dimensions and the intention to aggress” is partially

supported, because of only the victimization having an effect on the relations instead of also a criminal past.

As it was shown in Table 1 and 2, there were indications of an effect by the presence in the scenario on the intention to aggress. Exploratory moderation analyses revealed that there was a significant negative interaction between the honesty-humility dimension and presence,  $B = -9.82$ ,  $SE = 3.02$ ,  $CI [-15.80, -3.83]$ ,  $t(128) = -3.24$ ,  $p < .01$ . In other words, if participants felt more present in the hypothetical scenario, this had a weakened effect on the relation of the honesty-humility personality dimensions and the intention to aggress.

### Group Effects

The third hypothesis deals with differences in the conditions on the dependent variable presence. To reveal these differences, at first the means and standard deviations were compared.

Table 4  
Contrast of Presence in the Two Conditions

Variable	Condition 1		Condition 2	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Presence	3.4	.61	2.77	.81

*Note.*  $N = 142$ .

As shown in Table 4, there are moderate differences between Condition 1 and Condition 2, while comparing the means. This is supported by the results of the t-tests for independent groups. Participants felt significantly more present in the situation as they experienced the scenario in VR than in written form,  $t(139) = 5.21$ ,  $p < .01$ . Thus, the third hypothesis “Participants in the VR-Condition show significantly higher perceptions of presence, compared to participants in the written-scenario Condition” is accepted. In addition, the interaction between presence and the attractiveness of Lisa were not significant. In other words, the attractiveness of Lisa did not have an influence on the differences of feeling present in the two conditions.

## Discussion

This study was set up to contribute to existing research in three ways. First, the present study focussed on the characteristics and personality traits of people who behave antisocial,



rather than on rational choice factors. In addition to that, the prior criminal behaviour and victimization was taken into account. And third, the study aimed to show advantages of using VR and therefore supporting the evidence which was stated beforehand. Based on that, the hypothetical scenario method in criminological research can be optimised to gain better insight and validity.

The results of this study show that there is a relation between different personality dimensions and the intention to aggress. It was hypothesized that a low score on the HEXACO-dimensions honesty-humility, emotionality and agreeableness is a predictor of the intention to aggress. In this study, not all dimensions were related to aggressive behaviour, which is not in keeping with the hypothesis. Surprisingly, the dimension emotionality was not related to the intention to aggress, which is also not in keeping with existing literature. Because, as stated in the introduction, the emotionality dimension is associated with various aspects of displaying aggressive behaviour, for example being “brave and independent” (Ashton & Lee, 2007, p. 156). In this scenario however, a poor emotionality was not related to the intention to aggress. This may be due to the choice of the scenario. The scenario displays a situation where the participants were not alone. They got highly provoked by a guy who was coming too close to the participants’ in-the-situation-girlfriend, Lisa. This may have had the effect of wanting to protect Lisa, which results in not being independent anymore. Therefore, the participants were bound to the scenario’s conditions, which may explain the missing effect of poor emotionality in relation to the intention to aggress.

Another goal of this study was to find out what reinforces the relation between the personality dimensions and showing aggressive behaviour. The results show that self-reported victimization did so. The self-reported victimization was intensifying the relationship between a high agreeableness and the intention to aggress as well as a high honesty-humility and the intention to aggress. However, it was expected that being a victim of a crime relates to a poor agreeableness and honesty-humility. That means that people who show a lack of patience or moral standards, meaning a low agreeableness or a low honesty-humility, are not at a higher risk of displaying aggressive behaviour if they were a victim of criminal behaviour in the past, maybe because they do not know what it is like to be a victim and how to react. Instead, people whose personalities are characterized by being faithful, loyal and gentle, meaning a high honesty-humility and agreeableness, were at a higher risk of behaving aggressively in this situation if they were victims of a crime before. This may be due to the fact that a poor frustration tolerance is associated with becoming a victim as well as being an offender (Schreck, 1999). However, in this experiment the frustration tolerance of the participants was

not measured. Contrary to previous expectations, participants who displayed criminal behaviour before were not at higher risk of behaving aggressively in this scenario. This result could be explained by a variety of reasons. On the one hand, it might be that in this sample, participants who report criminal actions in the past do not show a lack of self-control with the associated lack of patience or empathy. On the other hand, it might be that offenders may have had difficulties to accept the situation as real, because in the past years they were the ones who started acting out and, in this situation, it was the other way around. But as a conclusion, participants of this study with a criminal past were not at a higher risk of recidivism. In addition, the results show that feeling more present in the situation had weakening effects on the relation between honesty-humility and the intention to aggress. This is surprising, but it might be that the decision to aggress of participants who show a lack of honesty-humility was more related to other factors than their feeling of being present in the situation.

In recent years, research in criminal decision making relied mostly on those hypothetical scenarios where participants had to imagine themselves in a written situation. Written scenarios have been a beneficial tool in the study of criminal behaviour as they provide context and situation specific information to the reader (Van Gelder, De Vries, Demetriou & Sintemaartensdijk, 2018). However, it is argued that the written scenario method has limitations in terms of reflecting emotional aspects that are present at the time of the criminal decision. The limitations have an influence on how realistic the scenario is experienced. VR tries to overcome these obstacles by providing a visual representation of the situation, which eventually leads to more realistic reactions (Van Gelder et al., 2014). In this study, the written scenario method was compared to a scenario presented in VR. It was expected that participants experience higher presence in the VR- than in the written condition. The findings agree with this hypothesis, the participants reported to feel more present in the situation when they were exposed to the visual and audible stimuli in VR. This shows, that hypothetical scenarios in VR are indeed beneficial for research in criminal decision making, as they allow more valid conclusions about the results than written scenarios.

This study had some limitations that further research can try to overcome. For example, the HEXACO was placed to the end of the questionnaire. The participants had to report their feelings beforehand which could have primed them to fill in the HEXACO in a more emotional way. Nevertheless, the dimensions of the HEXACO are factors which are proven to be stable. Therefore, it did not matter at what time this subscale was filled in. In addition, self-reports are always depending on the honesty of the participants and exposed to a

phenomenon called social desirability bias – that people answer in a way to avoid embarrassment (Fisher, 1993). Especially the subscale of self-reported victimization and offending were expected to fall victim to this bias. It could be interesting to replicate this study with people who officially reported being a victim of a crime. Then the social desirability bias would not have an influence anymore. It could even lead to developing a programme for victims with a high agreeableness and/or high honesty-humility, in order to respond appropriately in situations where they are provoked by someone else, because they are at a higher risk of displaying aggressive behaviour. In addition, the programme could help to engage in a conversation with their own offenders. In that way the victims can see the negative effects on the other side and enhance their empathy and self-control. Furthermore, research following this study should also measure the frustration tolerance of the participants, because it creates a link between the personality traits of offenders and victims. In addition, future research in this area can investigate in other signs of distress that the participants display and not solely depending on self-reported feelings like anger, anxiety or frustration. It could combine questionnaires with measurements of for instance the heart rate or skin conduction.

The study gains more insight in the characteristics of people who tend to aggress easier than others. This type of research in criminal decision making is needed to decrease recidivism of criminals and the criminal behaviour of former victims and to prevent offenders to aggress in the first place. In this study, especially very balanced people who were victims of a crime before were at a higher risk of displaying aggressive behaviour. In addition, this study shows that VR is a useful tool and certainly beneficial to improve the research in this area as it elicits stronger feelings towards presence than other tools.

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