

Do members of shooting associations display higher levels of aggression?

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According to public opinion, members of shooting organizations (i.e. shooters) are thought to be more aggressive than other groups in society. Also, guns are generally seen as stimuli that elicit aggressive behaviour. The present study examined whether shooters are really more aggressive than non-shooters. Shooters and non-shooters were compared on measures of aggressive behaviour, aggressive fantasies, impulsivity, and main personality dimensions (i.e. neuroticism, psychoticism, and extraversion). The results showed that members of shooting associations were less aggressive and impulsive than non-members, even when controlling for their tendency to present themselves in a more favourable manner. These findings suggest that there is no reason to consider hobby shooters *a priori* as more aggressive. A possible explanation could be that for shooters, their positively coloured experiences with guns have changed the aggression-eliciting effect that normally occurs when interacting with guns (i.e. the weapons effect). These findings are discussed in light of the cognitive script theory of aggression by Huesmann.

Keywords: aggression; aggressive behaviour; cognitive; individual differences; personality characteristics

Introduction

In April 2004, people in The Netherlands were shocked when they learned that a man, who was later found to be a member of a shooting association, shot and killed three people and then committed suicide (Derksen & Haighton, 2004; *Doden bij* [People killed], 2004). Immediately, a public debate arose in which some argued that shooting association membership should be discouraged or even forbidden (Scharroo, 2004). Several politicians proposed stricter rules for (members of) shooting associations, for instance that they should not be allowed to store their guns in the house (Eerdmans, 2004; Scharroo, 2004; *Strengere regels* [Stricter rules]). The incident fuelled the idea that individuals who are aggressive tend to choose 'aggressive' leisure time activities such as hobby shooting (*Schietclubs woedend* [Shooting associations furious]). In another line of reasoning, shooting, or even the presence of firearms, may cause people to become aggressive (see also Berkowitz & LePage, 1967), however, to our knowledge, no empirical evidence indicates that members of shooting associations are more aggressive than the average individual,

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although a vast amount of literature exists on the relation between guns and aggressive behaviour.

One famous study on the relation between guns and aggressive behaviour that attracted many follow-up studies is the now classic experiment by Berkowitz and LePage (1967). They found that angered participants administered more electric shocks in the presence of a gun (i.e. when a gun was lying on the table) than when no object or a neutral object was present. This effect became known as the 'weapons effect': the mere presence of guns as aggression-eliciting stimuli. The study by Berkowitz and LePage (1967) inspired a body of research with regard to the weapons effect. Generally, these studies compare behaviour of participants in the weapon condition with behaviour of participants in the non-weapon condition. In the weapon condition, participants handle a gun or a gun is present in the room. In the non-weapon condition, an unrelated object like a football is handled or is present in the room. The outcome measures that are used usually involve one or more measures of aggressive behaviour. It has been found that participants in the weapon condition assigned longer prison sentences to perpetrators in a hypothetical scenario depicting a crime (Dienstbier et al., 1998), that the presence of a weapon during the course of a crime reduces the validity of eyewitness testimony (Mehrkens Steblay, 1992), that participants in the weapon condition add more hot sauce to a glass of water they believed that another subject would have to drink and that they showed a greater increase in testosterone levels (Klinesmith, Kasser, & McAndrew, 2006). Testosterone has consistently been associated with aggressive behaviour in animals (for instance, see Brain & Haug, 1992), although results regarding the relation between testosterone and human aggressive behaviour have been mixed (see Archer, 2006). Recently, it was shown that cortisol moderates the relation between testosterone and overt aggressive behaviour in delinquent male adolescents (Popma et al., 2007). Overall, these findings indicate a robust effect of weapons as aggression-eliciting stimuli, a result that was also found in a meta-analysis by Carlson, Marcus-Newhall, and Miller (1990).

Huesmann (1988, 1998) proposed an information processing model to explain the development of aggressive behaviour in early childhood and the maintenance of aggressive behaviour in later life. He proposes that persistent aggressive behaviour can be explained as the result of hyper-activated clusters of information (i.e. scripts, schemata). In short, memories about experiences in the past are stored and clustered in a number of different scripts. These scripts are used to guide behaviour as they make it easier to respond adequately and rapidly to environmental cues. Huesmann (1988, 1998) assumes that persistently violent people have acquired hyperactive aggression schemata, and that these scripts are used as the main template of response. In this way, aggressive behaviour will be triggered easily in numerous situations. According to Huesmann (1988, 1998), several steps are involved in the strengthening of aggression-related scripts. After the initial encoding of the experiences in memory has taken place, rehearsal is one of the key variables through which these scripts are formed and strengthened. Through rehearsal, for instance by means of recollection, rumination or fantasizing, the number and strength of the connections to the initial encoded memory are increased and the script becomes more strongly embedded in memory. Huesmann's (1988, 1998) theoretical framework would predict that interacting with weapons on a regular basis increases the chance of behaving aggressively due to rehearsal and subsequent activation of a

hyperactive aggressive script. In the present study, this hypothesis was tested by comparing individuals who join shooting associations to individuals who are not a member of such an association in their aggression proneness.

Two groups of participants (shooters and non-shooters) not only completed a scale for measuring aggressive behaviour, but also various other questionnaires. These pertain to aggressive fantasies, impulsivity and basic personality dimensions (e.g. neuroticism). The latter variables were included in the study as they have consistently been associated with aggression in previous research by Nagtegaal and colleagues (Nagtegaal & Rassin, 2004; Nagtegaal, Rassin, & Muris, 2006; Nagtegaal, Rassin, & Muris, under revision) and thus appear to be robust correlates of aggression. Shooters and non-shooters were compared with respect to aggressive behaviour, personality dimensions, impulsivity and aggressive fantasies. Furthermore, within each group, correlations between these factors and aggressive behaviour were computed, and the unique contribution of each variable to total aggression scores was examined.

Method

Participants

Participants were 59 members of shooting associations and 67 community controls (all males). For the shooters, the mean age was 41.93 years ($SD = 13.49$, range = 15–82), while in the control group, the mean age was 38.82 years ($SD = 14.59$, range = 12–75). The difference in age was not significant [$t(124) < 1.0$]. In both groups, most participants were from Dutch origin (i.e. both parents were Dutch). In the shooting sample, one participant was from a non-Dutch origin, while there were three non-Dutch participants in the control group.

Procedure

Members of shooting associations throughout the Netherlands were invited to participate in an online questionnaire study. A community control group was recruited by means of an advertisement on the Internet. All participants received a small financial compensation for taking part in this study.

Measures

The *Aggression Questionnaire* (AQ; Buss & Perry, 1992; see also Meesters, Muris, Bosma, Schouten, & Beuving, 1996) has 29 items that are answered on a five-point scale (1 = *strongly disagree*, 5 = *strongly agree*). There are four subscales: physical aggression (e.g. 'Once in a while I can't control the urge to strike another person'), verbal aggression (e.g. 'I tell my friends openly when I disagree with them'), anger (e.g. 'I flare up quickly but get over it quickly'), and hostility (e.g. 'I am sometimes eaten up with jealousy'). For each subscale, a total score can be computed by summing up relevant items. All items are also combined in a total aggression score, which ranges from 29 to 125.

A modified version of the *Schedule of Imagined Violence* (SIV; Grisso, Davis, Vesselinov, Appelbaum, & Monahan, 2000) was used (for an overview of the

modifications, see Nagtegaal et al., 2006). The original SIV contains nine questions on aggressive fantasies, whereas the SIV-NL consists of 13 questions. The first question of the SIV-NL is 'How often do you have daydreams or thoughts about doing damage to or injuring other people?' (frequency). Questions 2–9 each inquire about different characteristics of the aggressive fantasies: recency, chronicity, theme, type of harm, target, familiarity, severity, and proximity (see Table 2). These items have fixed answering categories. Questions about gender, age, nationality and ethnic background are also included, following the recommendations by Grisso et al. (2000). SIV status (SIV+ or SIV-) can be determined by combining the variables frequency and recency. Participants who report aggressive thoughts (ranging from 'several times a day' to 'several times a year') and who had experienced these thoughts within the past 2 months (ranging from 'today' to 'in the past 2 months') are labelled as SIV+. Participants who reported to have never experienced aggressive thoughts, or those who did not know the last time they had such thoughts, or participants who reported to have experienced aggressive thoughts 'more than 2 months ago', are classified as SIV-.

The *Urgency, lack of Premeditation, lack of Perseverance, Sensation seeking impulsive behaviour scale* (UPPS; Whiteside & Lynam, 2001) is a 45-item self-report questionnaire measuring four different psychological processes leading to impulsive behaviour: Urgency (a tendency to commit rash or regrettable actions as a result of intense negative affect, e.g. 'I have trouble controlling my impulses'), (lack of) Premeditation (a tendency to react without careful thinking and planning, e.g. 'I have a reserved and cautious attitude toward life'), (lack of) Perseverance (a tendency to stop completing a task due to easy boredom, e.g. 'I tend to give up easily'), and Sensation seeking (the tendency to seek excitement and adventure, e.g. 'I generally seek new and exciting experiences and sensations'). All items are scored on a four-point scale: 1 = *strongly disagree*, 4 = *strongly agree*. A higher score indicates a tendency to be impulsive in the specified domain.

The *Eysenck Personality Questionnaire* (EPQ; Eysenck & Eysenck, 1991; see also Sanderman, Arrindell, Ranchor, Eysenck, & Eysenck, 1995) was used as a measure of basic personality traits. The questionnaire contains 48 dichotomous items (yes or no) that can be allocated to four subscales: Neuroticism (emotional instability, e.g. 'Does your mood often go up and down?'), Extraversion (sociability, assertiveness and focus on the outside world, e.g. 'Do you enjoy meeting new people?'), Psychoticism (an individualistic, cold and insensitive attitude, e.g. 'Do you prefer to go your own way rather than act by the rules?'), and Social desirability (a willingness to present oneself in a socially desirable manner, e.g. 'Are *all* your habits good and desirable ones?').

A final question was asked regarding the reasons for being a member of the shooting association. The answering categories were: 'for relaxation', 'to socialize', 'losing extra energy/frustration' or 'different, namely ...'.

Statistical analyses

Data were first examined for normality of scores by calculating Kolmogorov–Smirnov's *Z* scores. Results indicated that for the shooters, the distributions of AQ verbal aggression scores and the EPQ neuroticism and psychoticism scores were slightly non-normal ($Z_s > 1.00$, $p_s < 0.05$). In the control group, AQ verbal

aggression and anger, and EPQ neuroticism and psychoticism were distributed non-normally ($Z_s > 1.00$, $p_s < 0.05$). Despite the fact that a small departure from normality was found for these subscales, most scores were distributed normally and parametric tests were employed.

Results

First, the reliability of scores on the AQ, UPPS, and EPQ scales were examined by means of Cronbach's alpha. Besides AQ verbal aggression and EPQ psychoticism (in both groups), all alphas indicated moderate to high levels of internal consistency ($\alpha_s > 0.65$, see Table 1). Second, the influence of social desirability was examined. For the shooters, a mean score of 7.20 ($SD = 2.41$) was found, which was significantly higher than the mean score of 5.93 ($SD = 3.17$) in the control group [$t(124) = 2.52$, $p < 0.05$].

In addition, correlations between social desirability and AQ subscales, SIV status, UPPS factors, and scores on other EPQ-scales were computed. For the shooters, social desirability was significantly negatively related to all AQ subscale scores, SIV status, UPPS urgency and lack of perseverance, and EPQ neuroticism (r_s between -0.30 and -0.52 , $p_s < 0.05$). For the control group, social desirability was significantly negatively related to AQ physical aggression, anger and total aggression scores, SIV status, UPPS urgency and sensation seeking, and EPQ extraversion and neuroticism (r_s between -0.27 and -0.40 , $p_s < 0.05$). In sum, the influence of social desirability was twofold: shooters scored significantly higher on social desirability than controls and several negative correlations (i.e. a decrease in scores on the other measures) between social desirability and other

Table 1. Mean scores (standard deviations) for shooters ($n = 59$) and controls ($n = 67$) on measures of aggression, impulsivity and personality.

	Shooters		Controls	
	Adj. <i>M</i> (SD)	α	Adj. <i>M</i> (SD)	α
AQ physical	17.66 (5.12)	0.65**	23.21 (7.93)	0.79
AQ verbal	12.12 (2.72)	0.60*	13.48 (3.03)	0.44
AQ anger	13.07 (4.81)	0.73**	17.08 (5.70)	0.75
AQ hostility	16.92 (5.52)	0.76**	20.58 (7.16)	0.82
AQ total	59.76 (14.30)	0.87**	74.35 (18.55)	0.89
UPPS urgency	20.58 (5.62)	0.84**	27.88 (6.07)	0.82
UPPS lack of premeditation	19.08 (4.51)	0.81**	23.08 (5.66)	0.86
UPPS lack of perseverance	16.31 (4.49)	0.80**	19.88 (5.33)	0.82
UPPS sensation seeking	30.02 (7.52)	0.84	31.15 (7.55)	0.83
EPQ psychoticism	2.25 (1.49)	0.48**	3.64 (1.63)	0.30
EPQ extraversion	8.02 (2.28)	0.88*	7.06 (2.81)	0.82
EPQ neuroticism	2.20 (2.06)	0.72**	4.88 (3.37)	0.85

Note. α , Cronbach's Alpha; Adj *M*, estimated marginal means when correcting for social desirability; SD, standard deviation; AQ, Aggression Questionnaire; UPPS, Urgency, lack of Perseverance, lack of Premeditation, Sensation seeking impulsive behaviour scale; EPQ, Eysenck Personality Questionnaire. * $p < 0.05$, ** $p < 0.01$.

measures were found in both groups. Therefore, subsequent analyses were conducted while correcting for social desirability.

Group differences

The descriptive statistics for the AQ, UPPS, and EPQ scores are presented in Table 1. The differences between scores on these scales for the shooters and the controls were examined by means of a multivariate analysis of variance, with social desirability as the covariate (MANCOVA). A significant main effect for group was found [$F(12,111) = 8.43, p < 0.01$]. Follow-up ANCOVAs showed that, compared to controls, shooters scored significantly higher on EPQ extraversion [$F(1,122) = 6.16, p < 0.01$] and significantly lower on all AQ subscale scores, UPPS lack of premeditation, urgency and lack of perseverance, and EPQ psychoticism and neuroticism [$F_s(1,122)$ between 5.02 and 39.88, $p_s < 0.05$].

Thirty members of a shooting association (51%) and 30 controls (55%) reported aggressive thoughts, with a frequency ranging from 'several times a year' to 'several times a day' (see Table 2). Only 14 shooters (24%) were classified as SIV+, these participants reported aggressive thoughts that occurred within the past 2 months. In the control group, 29 participants (43%) were identified as SIV+. In chi-square analyses, the difference in SIV+ status between shooters and controls was significant [$\chi^2(1) = 20.12, p < 0.05$]. However, when carrying out logistic regression analysis in order to control for social desirability in SIV status, the difference was no longer significant [Wald $\chi^2(1) = 1.40, p > 0.05$].

In line with Grisso et al. (2000), differences in the content of aggressive thoughts between shooters and controls were also examined. The variables 'theme, physical hurt', 'type, same each time', 'familiarity, known person' were significantly different between the two groups [$\chi^2(1)$ s between 4.24 and 4.66, $p_s < 0.05$]. However, these differences became non-significant when controlling for social desirability. There were no differences on the other variables, that is 'target, same person', 'severity, escalation in seriousness', or 'proximity, near person' [$\chi^2(1)$ s between 0.17 and 1.87, $p_s > 0.05$].

Correlates of aggression in both groups

Shooters

Partial correlations (correcting for social desirability) between aggressive thoughts, impulsivity factors, and personality dimensions on the one hand and aggression on the other were computed (see Table 3). A number of significant correlations were found. Most importantly, SIV status, UPPS urgency and sensation seeking, and EPQ neuroticism were significantly positively related to various types of aggression.

Stepwise linear regression analyses were carried out to examine the relative contributions of personality dimensions, impulsivity factors and aggressive thoughts to total aggression scores. In these analyses, social desirability was entered on step 1, SIV status, UPPS and EPQ subscales were entered on step 2, whereas the AQ total aggression score was the dependent variable. For step 1, the regression model explained 27% of the total variance [$F(1,58) = 20.93, p < 0.01$], more precisely, social

Table 2. Descriptive characteristics of aggressive thoughts (in percentages) for shooters and controls as measured with the Schedule of Imagined Violence (SIV).

SIV characteristics	Response categories	Shooters	Controls
Frequency	never	49	45
	several times a year	31	15
	several times a month	9	8
	once a week	2	9
	several times a week	3	12
	once a day	5	3
Recency	several times a day	2	9
	today	5	15
	past 2 days	3	8
	past 3–7 days	5	12
	during past month	5	5
	during past 2 months	5	6
Chronicity	more than 2 months ago	5	3
	don't know	22	9
	as long as remember	36	45
	since several years	29	21
	since several months	0	3
	since specific event	21	14
Theme	don't know	14	14
	different	0	3
	physical hurt	36	31
	verbal aggression	43	48
Type	sexual aggression	0	3
	other	21	17
	same	29	48
Target	different	64	35
	don't know	7	17
	same person	36	17
Familiarity	different people	64	79
	don't know	0	3
	known people	50	59
	sometimes known/unknown	29	31
Severity	unknown people	21	10
	don't know	21	0
	less severe	29	21
	more severe	21	10
Proximity	not changed	36	41
	don't know	14	28
	near	50	59
	not near	50	38
	don't know	0	3

Note. For the SIV characteristics 'frequency' and 'recency', the number of respondents was $n = 59$ shooters and $n = 67$ controls. For the remaining SIV characteristics, only those respondents who were SIV+ were included (i.e. 14 shooters and 29 controls).

Table 3. Correlations between aggressive thoughts, personality characteristics and aggression scores in members of a shooting association ($n = 59$).

	AQ total	AQ physical	AQ verbal	AQ anger	AQ hostility
SIV status ¹	0.54**	0.48**	0.31*	0.42**	0.36**
UPPS urgency	0.66**	0.34**	0.19	0.64**	0.64**
UPPS lack of premeditation	0.03	0.12	-0.05	-0.00	-0.01
UPPS lack of perseverance	0.09	-0.01	-0.15	0.05	0.26*
UPPS sensation seeking	0.19	0.39**	0.30*	0.05	-0.09
EPQ neuroticism	0.47**	0.19	0.10	0.53**	0.45**
EPQ psychoticism	0.08	0.26*	0.05	-0.12	0.05
EPQ extraversion	0.08	0.11	0.14	-0.05	0.07

Note. ¹All correlations were partial r s, corrected for social desirability. The partial r between SIV status and AQ scores was obtained by means of an ANCOVA (because the former variable was dichotomous). AQ, Aggression Questionnaire; SIV, Schedule of Imagined Violence; UPPS, Urgency, lack of Perseverance, lack of Premeditation, Sensation seeking impulsive behaviour scale; EPQ, Eysenck Personality Questionnaire. * $p < 0.05$, ** $p < 0.01$.

desirability made a significant (negative) contribution to total aggression scores ($\beta = -0.52$, $t = 4.58$, $p < 0.01$). The variables entered on step 2 accounted for an additional 37% of the variance [$F(9,58) = 9.71$, $p < 0.01$]. The only variable that made a significant positive unique contribution to aggression scores was UPPS urgency ($\beta = 0.58$, $t = 4.78$, $p < 0.01$).

Controls

For the control group, SIV status, UPPS urgency and EPQ neuroticism were positively correlated to various subscale scores of aggression. Lack of premeditation and sensation seeking correlated negatively with most aggression scores (see Table 4). Stepwise linear regression analyses were performed (see above). On step 1, the model accounted for 11% of the variance [$F(1,65) = 8.21$, $p < 0.01$], indicating that social desirability had a significant negative influence on aggression scores ($\beta = -0.34$,

Table 4. Correlations between aggressive thoughts, personality characteristics and aggression scores in controls ($n = 67$).

	AQ total	AQ physical	AQ verbal	AQ anger	AQ hostility
SIV status ¹	0.38**	0.46**	0.17	0.33*	0.14
UPPS urgency	0.43**	0.23	0.17	0.49**	0.37**
UPPS lack of premeditation	-0.31**	-0.22	-0.19	-0.26*	-0.26*
UPPS lack of perseverance	-0.08	0.01	-0.22	-0.00	-0.10
UPPS sensation seeking	-0.17	0.06	0.05	-0.31*	-0.26*
EPQ neuroticism	0.61**	0.21	0.29*	0.60**	0.70**
EPQ psychoticism	0.16	0.35**	0.14	0.02	-0.04
EPQ extraversion	-0.15	-0.08	-0.01	-0.20	-0.15

Note. ¹All correlations were partial r s, corrected for social desirability. The partial r between SIV status and AQ scores was obtained by means of an ANCOVA (because the former variable was dichotomous). AQ, Aggression Questionnaire; SIV, Schedule of Imagined Violence; UPPS, Urgency, lack of Perseverance, lack of Premeditation, Sensation seeking impulsive behaviour scale; EPQ, Eysenck Personality Questionnaire. * $p < 0.05$, ** $p < 0.01$.

$t=2.87, p<0.01$). On step 2, an additional 45% of the variance was explained [$F(9,65)=7.89, p<0.01$]. In this case, EPQ neuroticism ($\beta=0.50, t=4.31, p<0.01$) and psychoticism ($\beta=0.25, t=2.50, p<0.01$) appeared as unique and significant positive predictors of aggression.

Discussion

The results of the present study demonstrate that members of shooting associations scored differently on aggression and aggression-related variables as compared to controls. However, shooters did not score higher on these measures, on the contrary, members of shooting associations scored lower on aggression, personality dimensions, impulsivity, and aggressive thoughts. Although these decreased scores were partly due to a socially desirable response style, even when correcting for social desirability in subsequent analyses, shooters scored significantly lower than controls on most subscales. More specifically, members of shooting associations were less characterized by an individualistic, cold and insensitive attitude (psychoticism), were less emotionally unstable (neuroticism), showed less impulsive behaviour in several different domains, reported less aggressive thoughts, and exhibited less aggressive behaviour than participants in the control group. The finding that members of shooting associations scored significantly higher on extraversion, a measure of a sociable and assertive attitude and a focus on the outside world, corroborates these results.

The idea that aggressive individuals choose 'aggressive' leisure time activities such as shooting was also not substantiated by the results of the present study. Indeed, when the shooters were asked to indicate why they became a member of a shooting association, 64% answered 'for relaxation', 52% indicated that they visited the club 'to socialize', 59% reported viewing shooting as a hobby, whereas only 6% indicated 'losing extra energy/frustration' as one of the reasons for their membership (giving more than one answer was permitted, therefore the total does not add up to 100%).

It should be noted that, in The Netherlands, possession of guns is generally not allowed and it is a rather complicated and lengthy procedure to become a full member of a shooting association. A background check and safety procedure is carried out, which involves a search through criminal records, an examination by the police, a registered candidate membership of a shooting association for at least a year and regular shooting practice at the association (Koninklijke Nederlandse Schutters Associatie, 2006). In addition, members have to abide by several Dutch laws pertaining to gun ownership and it is regularly checked whether these rules are followed. Only after this rather extensive procedure a candidate member becomes a full member and is given a permit to carry a gun. It is possible that with these safety procedures, aggressive individuals among potential members are correctly kept from becoming a full member. However, the screening that occurs does not involve measures of aggression, personality or impulsivity, but mostly looks at criminal behaviour. Also, if the screening procedure really had the effect of selecting out all individuals who could become aggressive, there may not have been any shooting incidents with members of shooting associations.

The results of the present study fit nicely with the findings of Bartholow, Anderson, Carnagey, and Benjamin Jr (2005). Although Huesmann's (1988, 1998) theoretical framework would predict that interacting with weapons increases the chance of behaving aggressively due to rehearsal and subsequent activation of a hyperactive aggressive script, Bartholow and colleagues (2005) hypothesized that this may not be the case for people who do not see guns as aggressive stimuli. According to these authors, the explanation on the association between weapons and aggressive behaviour by Huesmann (1988, 1998) depends upon the assumption that weapons are seen as instruments designed to kill – objects that hurt others. If a weapon is not associated with violence, it would not activate related aggressive concepts in memory and one would not expect a relation between weapons and aggressive behaviour. Following this line of reasoning, Bartholow and colleagues (2005) hypothesized that certain groups in society like hunters, would not associate guns with aggression but with objects that are used in sports and recreation. Indeed, they found that for hunters, weapons (hunting guns) generated different – less aggressive – thoughts, feelings and behaviours. The authors suggested that pre-existing individual differences in knowledge structures (cognitive scripts) between hunters and non-hunters influenced the interpretation of aggressive stimuli in their experiments (Bartholow et al., 2005). Translating these results to the current study, it can be hypothesized that shooters, like hunters, do not associate guns with aggression but with the fun they experience while being at the shooting association. Likewise, the continued interaction with the guns at the shooting association will not result in more aggressive behaviour. Indeed, it was found that shooters scored lower on aggression, which provides further evidence for the suggestion that individual differences in knowledge structures change the impact that aggressive stimuli have on actual behaviour (cf. Bartholow et al., 2005).

In order to explore the relations between personality dimensions, impulsivity factors and aggressive thoughts on the one hand, and aggression scores on the other, correlations were computed. Multiple significant correlations appeared in both groups. For instance, neuroticism, urgency and SIV status were generally correlated with various types of aggressive behaviour, in both shooters and non-shooters. In addition, some correlations were found that were characteristic for either the shooters or the controls. In the additional regression analyses, different factors emerged as unique contributors of total aggression scores. For the shooters, urgency was the only significant (positive) predictor and for the controls neuroticism and psychoticism were independent (positive) predictors of total aggression scores. It seems that for members of a shooting association, impulsive behaviour due to negative affect is associated with aggressive behaviour.

The connection between neuroticism and psychoticism and aggression has been previously found (e.g. Gleason, Jensen-Campbell, & South Richardson, 2004; Tremblay & Ewart, 2005; Walker & Gudjonsson, 2006), and suggests that people who are characterized by a hostile and individualistic attitude (psychoticism) or emotional instability (neuroticism) behave more aggressively. The finding that the independent predictors of total aggression scores varied somewhat across both groups provides another indication that there may be differences in underlying knowledge structures, or cognitive scripts, between the two samples (cf. Bartholow et al., 2005).

Some limitations of the current study need to be addressed. First, all variables were measured by means of self-report scales and this implies that reporter bias cannot be ruled out. Indeed, social desirability appeared to have a significant impact on the data. However, as social desirability was explicitly measured in this study, it was possible to correct for its influence in the statistical analyses. Nevertheless, future research may benefit from including concurrent measures, such as peer reports or behavioural observations.

Second, in order to provide a straightforward empirical test of the hypothesis as put forward by Huesmann (1988, 1998), it is preferable to directly test differences in underlying knowledge structures by means of an experimental task, such as a priming task (see, e.g. Anderson, Anderson, & Deuser, 1996; Anderson, Benjamin, & Bartholow, 1998). Another task that appears promising as an empirical test of Huesmann's model is the binocular rivalry task. In binocular rivalry, two distinctly different images are presented, one to each eye. These images provide such different retinal information that binocular predominance occurs: observers report seeing only one image, instead of fusing them into one (Fox, 1991). Following the assumption that cognitive schemata form the template of response in any given situation, violent men should be more prone to see violent cues as opposed to non-violent cues. Indeed, it has been demonstrated that the frequency of violent perceptions correlated significantly with assault convictions and psychopathy (Seager, 2005). Although such an experimental task was not included in the present study the measures that were used may contribute to identifying which characteristics may be involved in differences in aggressive responding of various groups in society. Nevertheless, future research may be directed at more directly examining differences in knowledge structures, for instance the priming task or the binocular rivalry task.

Third, the obtained data was cross-sectional in nature, which does not permit drawing conclusions about causality. In other words, it is not possible to conclude whether certain personality traits, impulsivity factors and aggressive thoughts are causing aggressive behaviour or whether these are merely by-products of people who are aggressive in nature.

As a final note, as mentioned before, political proposals as a reaction to a shooting incident in the Netherlands included discouraging membership of shooting associations and forbidding storage of hobby guns in the house. Although members of shooting associations were not more aggressive in the present study and these results suggest that stricter rules for shooting associations may not be necessary, there are some indications that the limitation of the storage of hobby guns may be wise nevertheless. For instance, Hepburn and Hemenway (2004) found that people in countries with more firearms are more at risk of being murdered. They also found that the risk of being killed increased linearly with the number of firearms that were available in the house. The authors suggested that the fact that guns are physically more lethal than other weapons, such as knives, may account for this higher prevalence rate of homicide. In case of an argument or fight, the chance of a fatal outcome increases when a gun (instead of another weapon) is readily available (Hepburn & Hemenway, 2004). Therefore, it may be wise to further limit storage of guns in the household and not to allow possession of guns at home for anybody, including hobby shooters.

References

- Anderson, C.A., Anderson, K.B., & Deuser, W.E. (1996). Examining an affective aggression framework: Weapon and temperature effects on aggressive thoughts, affect, and attitudes. *Personality and Social Psychology Bulletin*, *22*, 366–376.
- Anderson, C.A., Benjamin, A.J., & Bartholow, B.D. (1998). Does the gun pull the trigger? Automatic priming effects of weapon pictures and weapon names. *Psychological Science*, *9*, 308–314.
- Archer, J. (2006). Testosterone and human aggression: An evaluation of the challenge hypothesis. *Neuroscience and Biobehavioral Reviews*, *30*, 319–345.
- Bartholow, B.D., Anderson, C.A., Carnagey, N.L., & Benjamin, Jr, A.J. (2005). Interactive effects of life experience and situational cues on aggression: The weapons priming effect in hunters and nonhunters. *Journal of Experimental Social Psychology*, *41*, 48–60.
- Berkowitz, L., & LePage, A. (1967). Weapons as aggression-eliciting stimuli. *Journal of Personality and Social Psychology*, *7*, 202–207.
- Brain, P.F., & Haug, M. (1992). Hormonal and neurochemical correlates of various forms of animal 'aggression'. *Psychoneuroendocrinology*, *17*, 537–551.
- Buss, A.H., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology*, *63*, 452–459.
- Carlson, M., Marcus-Newhall, A., & Miller, N. (1990). Effects of situational aggression cues: A quantitative review. *Journal of Personality and Social Psychology*, *58*, 622–633.
- Derksen, D., & Haighton, M. (2004). Onafscheidelijk waren ze, tot Sandra vertrok [They were inseparable – until Sandra left]. *De Volkskrant*, 17 April 2004.
- Dienstbier, R.A., Roesch, S.C., Mizumoto, A., Hemenover, S.H., Lott, R.C., & Carlo, G. (1998). Effects of weapons on guilt judgements and sentencing recommendations for criminals. *Basic and Applied Social Psychology*, *20*, 93–102.
- Doden bij schietpartij in Tiel [People killed at shooting incident in Tiel. April 21, 2004.] <http://www.nu.nl>
- Eerdmans, J. (2004). Aanvalsplan tegen wapengeweld [Plan of attack against violence. with weapons]. *Weblog Joost Eerdmans*, 9 December 2004, retrieved 13 May 2007.
- Eysenck, H.J., & Eysenck, S.B.G. (1991). *Manual of the Eysenck Personality Scales (EPS Adult)*. London: Hodder & Stoughton.
- Fox, R. (1991). Binocular rivalry. In D. Regan (Ed.), *Binocular vision* (pp. 93–110). Boca Raton, FL: CRC.
- Gleason, K.A., Jensen-Campbell, L.A., & South Richardson, D. (2004). Agreeableness as a predictor of aggression in adolescence. *Aggressive Behavior*, *30*, 43–61.
- Grisso, T., Davis, J., Vesselinov, R., Appelbaum, P.S., & Monahan, J. (2000). Violent thoughts and violent behavior following hospitalization for mental disorder. *Journal of Consulting and Clinical Psychology*, *68*, 388–398.
- Hepburn, L.M., & Hemenway, D. (2004). Firearm availability and homicide: A review of the literature. *Aggression and Violent Behaviour*, *9*, 417–440.
- Huesmann, L.R. (1988). An information processing model for the development of aggression. *Aggressive Behavior*, *14*, 13–24.
- Huesmann, L.R. (1998). The role of social information processing and cognitive schema in the acquisition and maintenance of habitual aggressive behavior. In R.G. Geen (Ed.), *Human aggression: Theories, research, and implications for social policy* (pp. 73–109). San Diego, CA: Academic Press.
- Klinesmith, J., Kasser, T., & McAndrew, F.T. (2006). Guns, testosterone, and aggression. *Psychological Science*, *17*, 568–571.
- Koninklijke Nederlandse Schutters Associatie [Royal Dutch Association of Shooters]. (2006). *Statuten Koninklijke Nederlandse Schutters Associatie [Statutes of the Royal Dutch Association of Shooters]*. Amersfoort: KNSA.
- Meesters, C., Muris, P., Bosma, H., Schouten, E., & Beuving, S. (1996). Psychometric evaluation of the Dutch version of the aggression questionnaire. *Behaviour Research and Therapy*, *34*, 839–843.
- Mehrkens Steblay, N. (1992). A meta-analytic review of the weapon focus effect. *Law and Human Behavior*, *16*, 413–424.

- Nagtegaal, M.H., & Rassin, E. (2004). The usefulness of the thought suppression paradigm in explaining impulsivity and aggression. *Personality and Individual Differences*, *37*, 1233–1244.
- Nagtegaal, M.H., Rassin, E., & Muris, P. (2006). Aggressive fantasies, thought control strategies and their connection to aggressive behaviour. *Personality and Individual Differences*, *41*, 1397–1407.
- Nagtegaal, M.H., Rassin, E., & Muris, P. (under revision). Aggression-related cognition in incarcerated male offenders: A comparison with community controls. *Criminal Behaviour and Mental Health*.
- Popma, A., Vermeiren, R., Geluk, C., Rinne, T., Van den Brink, W., Knol, D.L. et al. (2007). Cortisol moderates the relationship between testosterone and aggression in delinquent male adolescents. *Biological Psychiatry*, *61*, 405–411.
- Sanderman, R., Arrindell, W.A., Ranchor, A.V., Eysenck, H.J., & Eysenck, S.B.G. (1995). *Eysenck Personality Questionnaire (EPQ)*. Een handleiding [A manual]. Groningen: Regenboog.
- Scharroo, J. (2004). Voetbal, dat is pas een gevaarlijke sport. Strengere regels lossen volgens schietclubs niets op: Mafkezen houd je altijd [Soccer, now that's a dangerous sport. Stricter rules will not solve the problem according to shooting associations: There will always be lunatics]. *De Volkskrant*, 21 April 2004.
- Schietclubs woedend om strengere aanpak [Shooting associations furious about stricter rules. April 21, 2004.] *De Telegraaf*.
- Seager, J.A. (2005). The importance of impulsivity and cognitive schema. *Criminal Justice and Behavior*, *32*, 26–49.
- Strengere regels voor schietclubs [Stricter rules for shooting associations. April 21, 2004.] *Algemeen Dagblad*.
- Tremblay, R.E., & Ewart, L.A. (2005). The Buss and Perry Aggression Questionnaire and its relations to values, the Big Five, provoking hypothetical situations, alcohol consumption patterns, and alcohol expectancies. *Personality and Individual Differences*, *38*, 337–346.
- Walker, J.S., & Gudjonsson, G.H. (2006). The Maudsley Violence Questionnaire: Relationship to personality and self-reported offending. *Personality and Individual Differences*, *40*, 795–806.
- Whiteside, S.P., & Lynam, D.R. (2001). The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences*, *30*, 669–689.