

# Does Violent Movie Exposure Affect Aggressive Cognition of Chinese Adolescents? Evidences from a Modified STROOP Task

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## Abstract

The main purpose of the study was to examine the impact of violent movies on aggressive cognition of Chinese adolescents. A modified STROOP word-color naming task was used to examine whether aggressive words could prime Chinese adolescents' aggressive cognition. The result showed no significant differences in aggressively activated score (AAS) for violent movie and non-violent movies, and that no significant differences were found in main affect of movie type (violent movie vs. non-violent movie). However, it did reveal significant Movie Type × Gender interaction, and that aggressive cognition was significantly affected by violent movie for boys, but was not for girls. Additionally, significant Movie Type × Aggressive Level interaction was found, and that aggressive cognition was significantly influenced by violent movie only for high-aggressive level (HL) participants, not for low-aggressive level (LL) and mid-aggressive level (ML) participants, which partly supported General Aggressive Model (GAM). Limitations of the present study were also discussed.

**Keywords:** violent movies, aggressive cognition, Chinese adolescents, modified STROOP task

## 1. Introduction

Aggressive cognition was a type of implicit aggression (e.g., affect, emotion, thought, plan) hidden in human brain, which intended to harm others who were motivated to avoid that harm. Based on this, we attempted to regard aggressive cognition as a cognitive process of aggressive stimuli, which could be explained from perspective of information processing. Although aggressive behavior (e.g., physical assault, murder) provoked was on the premise of aggressive cognition activation, aggressive cognition was not bound to aggressive behavior.

Currently, considerable researches reported that media violence (e.g., TV, movie, video games) affected individuals' aggression (Anderson, Gentile, & Buckley, 2007; Wood et al, 1991; Bushman, 1997; Bushman & Anderson, 2007; Zeng et al, 1997). Furthermore, it confirmed that exposure to violent media could increase aggressive behavior (Wendy et al, 1991; Anderson & Bushman, 2001; Carnagey & Anderson, 2005; Hyde, 1984; Lagerspetz et al, 1988). More importantly, men were reported to be more susceptible to aggression relative to females (Crick & Grotpeter, 1995; Lindeman et al, 1997; Paquette & Underwood, 1999; Estefanía Estevez López, et al, 2008; Anderson, 1997). In particular, it was found that subjects watching violent movies thought more aggressive words by using lexical decision and word association task (Bushman, 1995). Researchers also found that subjects playing violent sports video games have higher aggression than others by using word naming task (Anderson & Carnagey, 2009).

With the rapid advancement of network technology, numerous adolescents had more and more opportunities to view violent movies online, and they were prone to form aggressive cognition, imitate aggressive behavior. Meanwhile, China was undergoing social transition and transformation, which may make adolescents show aggressive behavior when they confronted setbacks. Currently, a great amount of violent movies poured into

Chinese adolescents' daily life, and their aggressive cognition may be affected by short-term or long-term violent movie exposures. It was reported that aggressive kids may be at risk for serious adjustment difficulties (e.g., loneliness, depression, isolation) relative to their non-aggressive peers after viewing violent movies (Huesmann et al, 2003). It seemed that a causal correlation existed between media violence and aggressive cognition, but little empirical research touched in this aspect. In reality, most young offenders who convicted crimes had once watched violent movies, and that approximately 75 percent criminals watched Chinese violent movie GU HUO GUY (see <http://www.news.sina.com.cn>). Adolescents' aggression caused by violent movies, however, did not attract attention from school, family, and society. Therefore, it was of necessity for us to conduct empirical researches on this area, so as to effectively control aggressive behavior. What's more, most previous research only focused on differences between high- and low-aggressive individuals, not touching mid-aggressive ones. In fact, individuals ranking at mid-aggressive level accounted for a great part of our society, whereas few people ranking at high- or low-aggressive level. Thus, mid-aggressive level adolescents should be further explored.

The present study aimed to examine the effects of violent movie exposure on Chinese adolescents' aggressive cognition by employing modified STROOP word-color naming task across different genders and aggressive levels. Thus, two following hypotheses were proposed.

**Hypothesis 1.** Boys may have higher aggressive cognition than girls after watching violent movies.

**Hypothesis 2.** High-aggressive adolescents may have higher aggressive cognition than mid- and low-aggressive adolescents after watching violent movies.

## 2. Method

### 2.1 Participants

74 Chinese adolescents (38 boys, 36 girls) were randomly selected from a high school in China. Participants ranged in age from 15 to 19 years ( $M=16.46$ ,  $SD=1.23$ ), with no color blindness and normal vision correction. 37 participants watching STREET FIGHTER were regarded as the experimental group (violent movie group), and 37 participants watching AIR CRISIS were regarded as the control group (non-violent movie group). 2 participants watching AIR CRISIS were deleted as their accuracy rate below 80 percent in statistics, and thus the final participants involved in statistics were 72 (the control group=35, the experimental group=37), please see table 1.

Table 1. Participants in the study

Movie Type	Gender		Aggressive Level			Overall
	Boys	Girls	HL	ML	LL	
The Experimental Group	19	18	12	12	13	37
The Control Group	19	16	12	12	11	35
Overall	38	34	24	24	24	72

Discription: HL=High-aggressive level; ML= Mid-aggressive level; LL=Low-aggressive level.

### 2.2 Materials

#### 2.1.1 Computer & Earphone

The computer resolution rate was  $1024 \times 576$ , and the refresh rate was 60Hz. The distance between participants and screen was around 60cm, the face of participants was parallel with screen, and the eyes of participants were kept at the same level with the center of the screen.

#### 2.2.2 Street Fighter & Air Crisis

STREET FIGHTER told a former special military officer who sneaked into the most dangerous underground fight clubs to look for avenge the enemy for his brother. His brother was forced to participate in the fighting game because of a gambling debt, so that he was now in a coma situation. Fragment selected was a wrestling scene. AIR CRISIS told a flight travels from Berlin to New York, and the heroine has endured the grief of unexpected death of her husband. She was eager to get back home with a young daughter as soon as possible. The lovely 6-year-old daughter was missing after the airplane shortly takes off and the strong mother began to look for her on the plane. The fragment selected told about the looking process. The time of each movie clip

lasted for 15 minutes. The content of violent movie (STREET FIGHTER) was body-fighting between two males following with language attack, whereas the content of non-violent movie (AIR CRISIS) had no body-fighting and language attack.

### 2.2.3 Goal Words

50 aggressive words and non-aggressive words were randomly matched. Words were presented on a gray background in green and blue color, and they were presented in the center of computer screen. The presented order of words was counterbalanced.

### 2.2.4 Measures. Buss-Perry Aggression Questionnaire (BPAQ)

A 5-point scale, was used to measure aggressive levels (high-aggressive, mid-aggressive and low-aggressive level). BPAQ consists of four dimensions: physical aggression (PA), verbal aggression (VA), anger (A), and hostility (H). Internal consistent reliability (Cronbach-alfa coefficient) for the Scale was 0.94. Test and re-test reliability yielded a correlation coefficient of 0.89. Cronbach-alfa coefficients of physical aggression, verbal aggression, anger, and hostility were 0.85, 0.72, 0.83 and 0.77, respectively. The questionnaire supports the convergent validity as a measure of aggression (Buss & Perry, 1992).

### 2.3 Research Design

The multi-factorial design was used, with movie type, gender and aggressive level as the independent variables and aggression cognition as the dependent variable. 2(Movie Type: Violent vs. Non-violent)  $\times$  2 (Goal Word: Aggressive vs. Non-aggressive)  $\times$  3 (Aggressive Level: High-aggressive, Mid-aggressive, Low-aggressive)  $\times$  2 (Gender: Boy vs. Girl) repeated four measures analysis of variance (ANOVA) was used to examine main effect and interaction of variables. The between-group factors were movie types, aggressive level, and gender, and goal word was the within-group factor. According to related studies (Li et al, 2008), the participants at the top one third of BPAQ were defined as high-aggressive level (HL), the last one third of BPAQ were deemed as low-aggressive level (LL), and others were mid-aggressive level (ML) in terms of score distribution. All participants were treated according to the ethical guidelines of the *American Psychological Association* (American Psychological Association, 1972).

### 2.4 Procedure

First of all, we signed an inform consent with participants to make them know the experiment cautions. After that, they were told to watch a 15-minute movie clip and fill BPAQ, and then finished an experiment task on computer. They could terminate at any time if they felt uncomfortable. Secondly, participants were randomly distributed to watch violent movie clips or non-violent movie clips. Thirdly, each participant finished STROOP color-word naming task. Last, participants were debriefed about their feelings, and participants received a nice gift after experiment.

#### 2.4.1 Practical Session

When an instruction was presented, 5 aggressive and 5 non-aggressive words were presented in two colors (green, blue). There were totally 30 trials in practical session and they will not appear in formal session. The program will return to practical session if the accuracy rate was below 80 percent. The goal of the session was to familiar participants with key pressing, and to exclude the color blindness constantly. The experimenter watched beside the participants, getting ready to answer their questions.

#### 2.4.2 Formal Session

All trials will be divided into 3 blocks, in which 40 trials and totally 120 trials were presented on average. 20 aggressive and 20 non-aggressive words were randomly presented in two kinds of colors (green, blue), and each word appeared only once in each block. Participants had a short rest among blocks, after that the program entered into the next block automatically. When the session was over, concluding remarks appeared on screen and participants were debriefed.

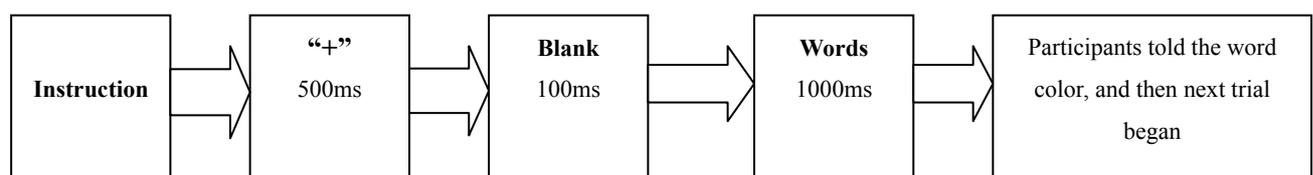


Figure 1. Modified STROOP word-color naming presentation procedure

Description: The procedure was programmed by E-prime psychology software, and it was divided into two stages: practical session and formal session. Instructions were first presented on screen with guidance: "The experiment is to test your speed and accuracy of reading, and the following words will be presented in two colors one by one. If word color is green, press "1" on keyboard, if word color is blue, press "2". You should react as quickly and accurately as possible to determine the word color regardless of its meaning, and then the next trial began." When instructions appeared, a sign "+" emerged on the center of the screen with the time of 500ms, and the blank gray screen lasted for 100ms, then the words appeared in the center of the screen, the time lasted for 1000ms. The target words were used in NO. 48 black italics, each word was presented randomly with two colors (green, blue). After participants reported the word color, the program entered the next trial. Above all, the program would also enter into the next trial automatically if participants did not respond in 1000ms. Meanwhile, accuracy rate and reaction time (RT) were recorded. The inter-stimulus-interval (ISI) was from 200 to 400ms.

### 3. Results

#### 3.1 The Main Effect of Goal Word

Using one-way repeated measure analysis of variance (ANOVA), a significant main effect of goal word was found in reaction time (RT) for aggressive words ( $M=540$ ,  $SD=52.08$ ) and non-aggressive words ( $M=535$ ,  $SD=52.17$ ). The RT of aggressive words was significantly longer than that of non-aggressive words ( $F=4.56$ ,  $p<0.05$ ) (see Table 2).

Table 2. RT differences between aggressive and nonaggressive words

	Goal Words				<i>F</i>
	Aggressive words		Non-aggressive words		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
RT	540	52.08	535	52.17	4.56*

Description: \*  $p<0.05$ ; \*\*  $p<0.01$ ; \*\*\*  $p<0.001$ .

#### 3.2 The Main Effect of Movie Type, Movie Type $\times$ Gender, Movie Type $\times$ Aggressive Level Interaction

STROOP task was based on this assumption: If subjects showed characteristics of delay when naming the color of semantic words, explaining that they consumed lots of cognitive resources, which could infer the existence of cognitive processing. In this study, we thought the time participants named the color of aggressive words after watching violent movie clips was longer than that of nonaggressive words (compared to participants who watched non-violent movie clips). Based on this, we hypothesize every participant had an aggressively activated score (AAS), which meant the RT differences of aggressive words minus non-aggressive words, and examined whether significant differences of AAS were found in violent and non-violent movie groups (see Table 3).

Table 3. Means of RT of word-color naming for aggressive and non-aggressive words

	Goal Words				Means of AAS (ms)
	Aggressive Words		Non-aggressive Words		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Violent movie	542	49.17	536	48.11	+6
Non-violent Movie	537	55.60	534	56.83	+3
Effect of violent movie					+3

Description: AAS= aggressively activated score.

Multi-factor analysis of variance (ANOVA) was used to examine whether significant differences were found in AAS among independent variables. There were no significant differences in each level ( $P>0.05$ ), and the results were comparable (see Table 4).

Table 4. Multi-factor ANOVA for independent variables

Variables	Mean Square	<i>F</i>	<i>P</i>
Movie type	237.07	0.74	0.39
Movie type× <i>Gender</i>	1596.21	5.42**	0.01
Movie type× <i>Aggressive level</i>	1716.68	5.39**	0.01
Movie type× <i>Gender</i> × <i>Aggressive level</i>	21.35	0.07	0.94

Discription: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

### 3.3 The Main Effects of Movie Type

The AAS of the experimental group was significantly higher than that of the control group if aggressive cognition was affected by violent movie clips. As we could see, the average AAS of violent movie was higher than that of non-violent movie (6ms>3ms), but no significant differences were found ( $F=0.74$ ,  $p>0.05$ ). Therefore, no significant differences were found in main effect of movie type on aggressive cognition (see Table 3).

### 3.4 Movie Type × Gender Interaction

There were significant Movie Type × Gender interaction ( $F=5.42$ ,  $P<0.01$ ) (see Table. 4). Further simple effect analysis showed the average AAS of girls watching violent and non-violent movie clips was 4.76 and 11.53, respectively, and no significant differences were found. The average AAS of boys watching violent and non-violent movie clips was 7.48 and -5.43, respectively. The average AAS of boys watching violent movie clips, however, was significantly higher than non-violent movies ( $F=3.82$ ,  $p<0.05$ ). Therefore, aggressive cognition significantly affected by violent movies was only for boys, but not for girls (see Table 5).

Table 5. Comparison of AAS for boys and girls after watching movie clips

Gender	Violent Movie Clips	Non-violent Movie Clips	<i>F</i>
Boys	7.48	-5.43	3.82 *
Girls	4.76	11.53	1.19

Discription: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

### 3.5 Movie Type × Aggressive Level Interaction

There were significant differences in *Movie Type × Aggressive Level interaction* ( $F=5.39$ ,  $p<0.01$ ). Simple effect analysis showed the average AAS of HL subjects watching violent and non-violent movies were 17.89 and -2.99, respectively, and particularly aggressive cognition of HL adolescents was significantly affected by violent movie clips ( $F=9.84$ ,  $p<0.05$ ). The average AAS of ML adolescents watching violent and non-violent movies were 10.61 and 16.51, respectively, and aggressive cognition of ML participants was not significantly affected by violent movies ( $F=2.83$ ,  $p>0.05$ ). The average AAS of LL participants watching violent and non-violent movies were -0.67 and -2.75, respectively, and aggressive cognition of LL participants was not significantly affected by violent movies ( $F=0.06$ ,  $p>0.05$ ). (see Table 6).

Table 6. Comparison of AAS for aggressive levels after watching movie clips

Aggressive Level	Violent Movie Clip	Non-violent Movie Clip	<i>F</i>
HL	17.89	-2.99	9.84*
ML	10.61	16.51	2.83
LL	-0.67	-2.75	0.06

Discription: HL=High-aggressive level; ML= Mid-aggressive level; LL=Low-aggressive level; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

#### 4. Discussion

The primary goal of the study was to examine the impact of violent movie on Chinese adolescents' aggressive cognition. In agreement with our hypothesis, the study demonstrated that violent movie positively activated the aggressive cognition of adolescents. Both situational variables (Movie Types) and individual variables (Aggressive Levels, Gender) affected adolescents' aggressive cognition, partly supporting General Aggressive Model (GAM) and Cognitive-neoassociation Model (CNM). Additionally, we found aggressive cognition of boys was more likely to be affected than that of girls, which was correspondent with hypothesis 2, and also replicated previous researches (Christina & Kaukiainen, 2004; Boutwell, et al, 2011; Lansford et al., 2012). Besides, the aggressive cognition of HL adolescents was positively affected by violent movie clips at significant level, which was in parallel with prior studies (Cross & Campbell, 2012; Bushman, 1996; Khoury, 2012; Wallace et al, 2012). It should be noticed that, however, aggressive cognition of ML and LL adolescents was not significantly influenced by violent movie clips, which supported hypothesis 3. Perhaps HL adolescents have stronger aggressively cognitive association networks than ML and LL adolescents, and thus their aggressive behavior was more likely to appear. Therefore, repeated exposure to violent media will form aggressively cognitive schema for adolescents, and finally led to aggression.

There were some differences in research methods compared with previous research, which used undergraduate psychology students as main participants. In the present study, Chinese adolescents were used as participants, and STROOP word-color naming paradigm was used to explore the impact of situational and individual variables on aggressive cognition, which extended previous researches. Some different results, however, also existed between previous study and this one. For instance, previous studies showed viewers' aggressive cognition was primed by violent movies, and the main effect of movie type was significant. The study, however, demonstrated no significant main effect of movie types, and that no significant differences were found in aggressive cognition between the experimental group and the control group. Perhaps differences among the factors were averaged and offset, making no significant main effect, which was obvious in main effect of movie type and gender  $\times$  aggressive level interaction. Significant movie type  $\times$  aggressive level interaction were also found, simple effect analysis showed aggressive cognition was significantly affected by violent movies for HL adolescents, but not for LL and ML adolescents. It was worth noticing that the gender of perpetrators in violent movies may affect aggressive cognition of participants with different genders. In other words, could aggressive cognition of boys be more easily influenced by violent movies when the perpetrators were males? If the perpetrators of the movies were females, would boys' aggressive cognition be affected at the same level? Perhaps the gender of perpetrators was really a factor associated with aggression, which need us further to be answered in future.

In the present study, we've examined the effects of violent movie on aggressive cognition of Chinese adolescents by employing STROOP word-color naming task. There were no significant differences in AAS for violent movie and non-violent movies, but significant Movie Type  $\times$  Gender interaction was found, and that aggressive cognition was significantly affected by violent movie for boys, but not for girls. Significant interaction was also found between movie type and aggressive level, and that aggressive cognition was significantly influenced by violent movie for high-aggressive adolescents, but not for mid-aggressive and low-aggressive adolescents. Thus, this result should not be interpreted to generalize that watching violent movies surely elicit all adolescents' aggressive cognition.

#### 5. Limitations

The study may be one of the first to explore the effects of violent movies on aggressive cognition of adolescents in China. Also this was one of the first to find the impact of aggressive level and gender on aggressive cognition for Chinese adolescents. The results, nevertheless, should be noticed in light of some limitations. First, the sample selected in the study was a relatively small and homogeneous group at a middle school. As a result, cautions should be made when the conclusions were generalized to another population (e.g., cross-cultures, multi-nation). Second, the data obtained from a cross-sectional design prevented the final determination of casual relationships. Third, all participants were asked to complete BPAQ, which was use to assess aggressive trait in the U.S. Perhaps some items in the scale were not suitable for Chinese adolescents under eastern cultural background. In future study, researchers should consider using a revised edition of BPAQ to survey and obtain data, to scientifically and exactly classify aggressive levels of adolescents. Additionally, longitudinal studies should be developed to provide pronounced evidence on the relationship among variables explored in the study. Last, we should cautiously draw conclusions that watching violent movies surely led to aggressive cognition. Upon this study, it only showed that violent movie exposure may provoke aggressive cognition for high-aggressive adolescents, not on all adolescents who viewed violent movies. Presumably, this was the reason

why so many prior researchers had fierce debates on this issue for a long time.

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