

## Characteristics of Impulsive Prisoners in Acquisition and Extinction of Conditioned Fear Emotion

Chen Rongfeng, Wu Tong, Hu Zongyang, Lu Wanying, Dai Jiacy, Liao Suqun\*

Shaoguan University, Shaoguan, China

\*Corresponding author

**Keywords:** Impulsive prisoners; Conditioned fear; Acquisition; Extinction; Aggressive behavior

**Abstract:** The discrimination of conditions of fear paradigm were used to study the characteristics of impulsive prisoners in acquisition and extinction of conditioned fear emotion. On the first day, the task of acquiring and resolving conditioned fear was completed, and the task of resolving conditioned fear was accomplished during the next day. The results showed that: (1) Impulsive prisoners acquired conditioned fears and dissipated. (2) The US expectancy analysis showed that in the process of acquisition and extinction of conditioned fear, impulsive prisoners need more trials than normal people, which showed that although they had acquired conditioned fear, they can't identified danger signals and safety signals clearly. The results suggest that impulsive prisoners may have obstacles to discern danger signals and safety signals, which may be linked to their improper reactive behavior in certain situations.

### 1. Introduction

Fear is an unconditional emotional response to an aversive situation or stimulus. It is only an emotional experience that is stimulated by an aversive event [1]. When the aversive stimulus that causes fear is combined with the neutral conditional stimulus multiple time, this kind of neutral stimulus can also cause an individual's fear response, which is called conditioned fear [2-3]. The impulsiveness and tension of fear are higher, and the degree of happiness and confidence are lower than other emotions. Because its highly intense and positive impulsive mode makes individuals in a state of fear emotionally produce aggressive behaviors to protect themselves.

High aggression and irritability are the remarkable characteristics of impulsive prisoners. Highly aggressive individual's negative emotion is more easily be aroused, and they cannot regulate the aroused negative emotion well. Some studies have found that applying a fearful stimulus to an individual in a state of anger will significantly increase their anger level [4]. Davidson pointed out that people with higher levels of attack, especially high-impulsive attackers, have defects of emotional regulation. This aspect was not studied seriously in the past, and how it affects the emotions regulation of highly aggressive individuals is unclear.

Most impulsive prisoners were imprisoned for violent crimes such as intentional injury. Blindness, emotionality, abruptness, impulsiveness were the characteristics of these cases. Many impulsive violent crime cases are caused by the difficulty of controlling the great changes in their emotion. They had no preconceived intentions for their crime and infringements. These features bring serious difficulties to the prevention of this kind of crime. Data show that emotional crime in China has accounted for 70% -80% of injuries and homicide cases. Emotional violent crime has a serious negative impact on the harmonious and stable development of society. Cai Dunming thinks that strong emotions which have criminal psychological significance such as fear, anger, or jealousy have a motivating effect on violent criminal behavior. Some investigations [4-5] indicate impulse criminal prisoners with a high level of risk of violence have to disorder on identify fear emotions. The prisoners have higher level of risk of violence will have higher error rate of fear emotion recognition. Therefore, the relationship between fear emotion and the characteristics of prisoners such as irritability and high aggressiveness has practical research value.

Conditioned fear is an ideal pattern for studying fear [2, 6]. Using the discriminative conditioned

fear paradigm to study the characteristics of conditioned fear acquisition and extinction of impulsive prisoners, and to explore whether there gets some difference between the acquisition and extinction of fear emotion of impulsive prisoners and normal people. To provide a reference for the administration of justice, risk behavior assessment, and psychological corrections by the judicial department and prison management agencies.

## **2. Methods**

### **2.1 Subjects and groups**

The study object is adult. They will divide into an experimental group and control group. Using the “impulsiveness questionnaire” questionnaire, 27 inmates with strong impulsively were selected as the experimental group, and 20 normal adults were selected as the control group. 27 impulsive prisoners (type of crime: intentional injury, robbery) are  $26 \pm 8.55$  years old. And the control group' age are  $19.7 \pm 1.52$  years old. None of the subjects had severe physical or mental illness, no severe brain damage, no color blindness and weak colour. Informed consent was signed before the experiment.

There were 20 valid data of the prisoners and 7 invalid data were excluded. The invalid data is excluded because: the participants' cognitive level is too low, so that their understanding ability is poor, and the experimental requirements cannot be understood; some participants' own emotional fluctuations are too large, affecting the experiment, unable to complete the experiment.

### **2.2 Experimental materials**

All the stimulation and pictures are presented on the computer screen. All the experimental procedure is compiled and all the stimulation is presented by Eprime software. Conditioned stimulation consists of a pizza picture and a tomato picture which selected from the international affective picture system (Albert, López-Martín, & Carretié, 2010): 17285 and 7283. Unconditioned stimulation consists of 5 traumatic emotional pictures, the numbers are 12352.2, 29433, 36550, 43130, 69253. During the practice phase, a picture of a clock was presented to the participants. After the presentation, 27 participants were requested to rate the degree of pleasure of the conditioned stimulation within the range of 0-100, 0 expressed very unpleasantness and 100 expressed very pleasure. The scoring result was  $58.89 \pm 24.65$ .

### **2.3 Experimental design**

This study is adopting a within-subject design. Within-subject factor was the stimulation type (CS+/CS-), and the dependent variables were the pleasantness score and the US (unconditioned stimulus, US) expected value. This experiment consists of three phases: the acquisition phase, the regressing phase, and the regressing again phase.

Conditioned fear tasks use discrimination of conditions of fear paradigm. This paradigm contains two CS (conditioned stimulus, CS), one of which is the fear signal (CS+) and the other is the safety signal CS-. At the acquisition stage, CS+ (tomato picture) matches the US presentation (5 trials match the US and 1 trial presents a black screen), and CS- (pizza picture) does not match the US presentation (a black screen appears); during the receding phase, neither CS+/CS- appears to match US (black screen appears). The order in which CS appeal is arranged divided randomly, so that each CS does not repeat itself more than twice in a row. The conditioned fear task is divided into two days. On the first day, the conditioned fear is acquired, and after the acquisition, it enters the phase of extinction; on the second day (after 24 h), the conditioned fear is regressed again. Based on prior investigation and the experimental results in this experiment, the degree of happiness of the subjects decreased with the acquisition of conditioned fear, and increased with the regress. The US expectancy value of subjects for CS- will improve gradually during the acquisition phase, while for CS+ will gradually decrease.

In the conditioned fear task, all the stimulation and pictures are presented by Eprime software, using Block design. CS appears on the screen in sequence, the presentation time is 6000 ms, the US

or black screen presentation time is 5000 ms, and the trial interval (ITI) is 16~20 s.

Before the start of the formal experiment on the first day, subjects at first performed habitual exercises on the experimental process. The habituation stage showed a clock picture. And showed some neutral pictures after subjects rated their degree of pleasure. This stage helps subjects to master the rule of pre-judgement. After that, picture of the clock was presented again and rated. After the practice, the subjects entered the acquisition phase. During the acquisition phase, CS+ and CS- both experienced 8 trials, for a total of 16 trials. During the extinction phase, CS+ and CS- both appeared 8 trials, a total of 16 trials. After 24 h, the relapse phase is the same as the extinction phase. After each CS appears for 6 s, subjects were required to give the expectancy value of US, that is, to predict the possibility of a negative picture US behind CS, and choose between keyboard numbers 1-9: 1 represents extremely unlikely, 9 represents most likely, you can proceed to the next trial after completing it. The evaluation method of emotion valence is as follows: before acquisition (after habituation), after acquisition (before extinction), after extinction, before regress again and after regress gain, Eprime presents CS pictures, required subjects to watch the CS pictures and report the degree of pleasure to CS within the range of 0-100. 0 means very unpleasant and 100 means very happy. After the report is finished, press any key on the keyboard to enter the next stage of the task.

## **2.4 Data analysis**

Using SPSS to analyze the emotion valence score of CS and US expectancy value. It's a significant difference while  $P < 0.05$ , and a very significant difference while  $P < 0.01$ . Analyzing the degree of pleasure by ANOVA in the five time periods: before acquisition (after habituation), after acquisition, after extinction, before extinction on the next day (after 24 h) and after extinction again.

Analysis of the US expectancy value of acquisition, extinction and extinction again (24h after acquisition). Analysis of variance was performed using the stimulus type (CS+ / CS-) as the internal factors of the subjects.

## **3. Results analysis of results**

### **3.1 The subjects scores of pleasure**

Before the acquisition, the experimental group scored slightly higher on the degree of pleasure of CS+, which may be linked to the factors of the subjects themselves. The group effect was not significant,  $F(1,39)=2.05$ ,  $P > 0.05$ . The main effect of stimulation type was not significant (Figure 1).

After the acquisition, the experimental group rated on the degree of pleasure of CS+ decreased. The main effect of the type of stimulation was significant,  $t(19)=2.56$ ,  $P < 0.05$ . The main effect of the group was very significant,  $F(1,39)=9.21$ ,  $P < 0.01$ . The above results indicates that subjects had to fear emotion during the acquisition phase, showed they had learned conditioned fear. However, the experimental group's acquisition of conditioned fear is far worse than the normal group.

There was no significant difference between the degree of pleasure in the experimental group after extinction and before remission (after acquisition),  $t(19)=0.13$ ,  $P > 0.05$ , the main effect of the group was extremely significant,  $F(1, 39)=8.37$ ,  $P < 0.01$ . The above results shows that there is no significant difference between the experimental group rated on the degree of pleasure of CS+ after acquisition and after extinction. The extinction effect is not good. The conditioned fear has not been successfully resolved. Compared with the normal group, it is almost unaffected by the extinction phase.

After the second day (24h), the score of the degree of pleasure of CS+ in the experimental group was not significantly different from that after the extinction.  $F(1,39)=10.11$ ,  $P < 0.01$ . The above results showed that the experimental group has a poor extinction effect during the extinction phase. The acquisition of conditioned fear has been maintained for more than 24 hours and regardless of time.

After the second day (24h), the difference of the CS+ group's score of the degree of pleasure

between after the extinction again and before the extinction again was obvious at edge. The above results indicating that the remission of the conditioned fear in the experimental group was not complete. They need more trials will complete extinction.

### 3.2 Us expectancy

During the acquisition phase, the US expectancy value of experimental group for CS+ ( $5.88 \pm 2.93$ ) and for CS- ( $4.55 \pm 3.02$ ) were significantly different,  $t(19)=4.07$ ,  $P<0.05$ . The US expectancy value of CS+ in experimental group ( $5.88 \pm 2.93$ ) is significantly different from the expectancy value of CS+ in normal group ( $8.26 \pm 0.84$ ),  $t(19)=12.84$ ,  $P<0.01$ . The above result indicating that the subjects have acquired conditioned fear, but they have different with normal group. And both the experimental group and the normal group can acquire conditioned fear, but the experimental group has a poor acquisition effect, and they need more trials to acquire (Figure 1).

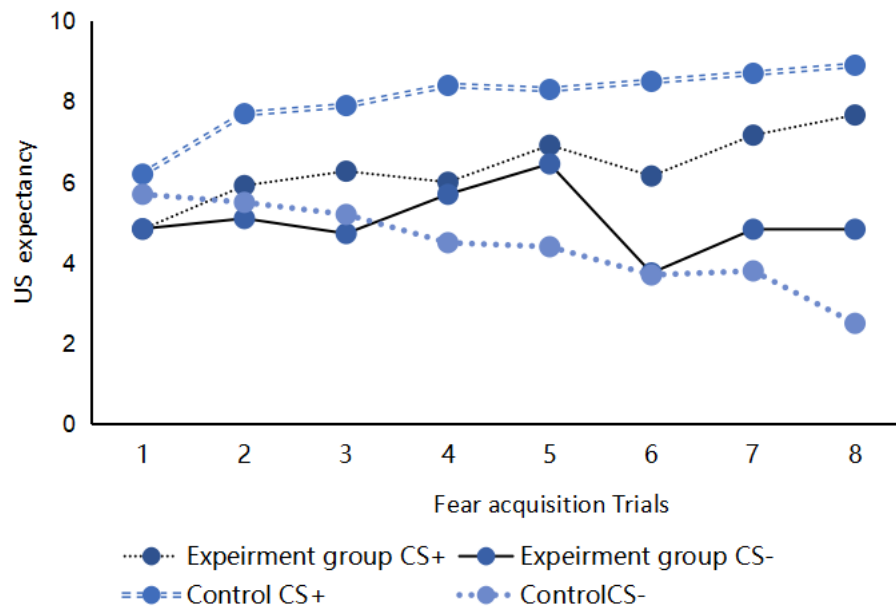


Figure 1 Us Expectancy Values of Acquisition Phase

During the extinction phase, the US expectancy value in anaphase of extinction phase was not significantly different from prophase of extinction phase. But all US expectancy value generally tended to a safe level. The US expectancy value of experiment for CS+ ( $4.44 \pm 2.97$ ) and for CS- ( $4.1 \pm 2.79$ ) were no significant difference,  $t(19)=1.68$ ,  $P>0.05$ . The US expectancy value of CS+ in the experimental group ( $4.44 \pm 2.97$ ) and the US expectancy value of CS+ in the normal group ( $5.35 \pm 2.15$ ) was significantly different,  $t(19)=2.70$ ,  $P<0.05$ . The above results shows that the conditioned fear of the experimental group has successfully extinction in the US expectancy value (Figure 2).

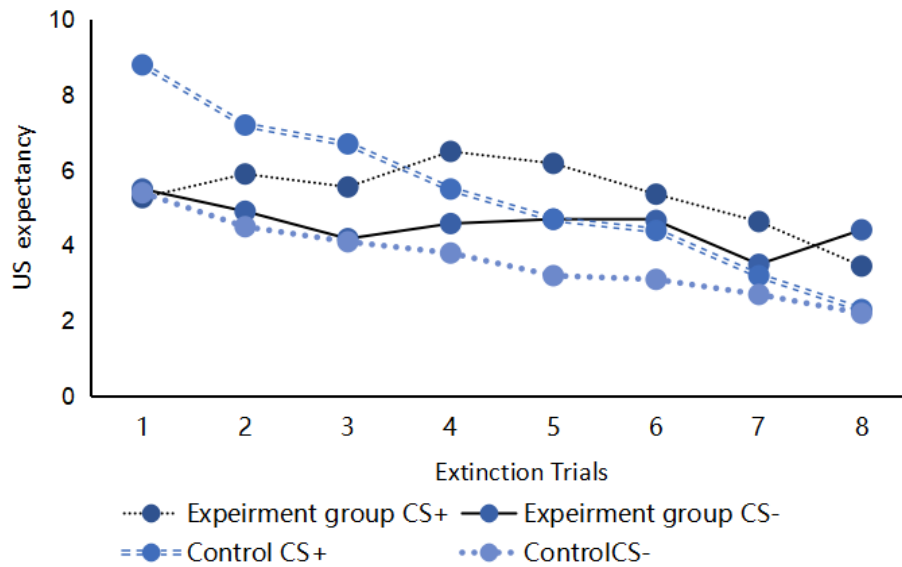


Figure 2 Us Expectancy Values of Extinction Phase

During the extinction again phase, there was no significant difference between the expectancy value of US for CS+ ( $3.17 \pm 2.70$ ) and for CS- ( $3.28 \pm 2.77$ ),  $t(19) = 0.84$ ,  $P > 0.05$ . The US expectancy value of experimental group for CS+ ( $3.17 \pm 2.70$ ) was significantly different from the US expectancy value of CS+ in the normal group ( $4.48 \pm$ ),  $t(19) = 2.64$ ,  $P < 0.05$  (Figure 3). This indicates that the conditioned fear of the experimental group did not return on US expectancy value, and has completely regressed, but the scores of CS+ and CS- are still indistinguishable and are significantly different from the normal group.

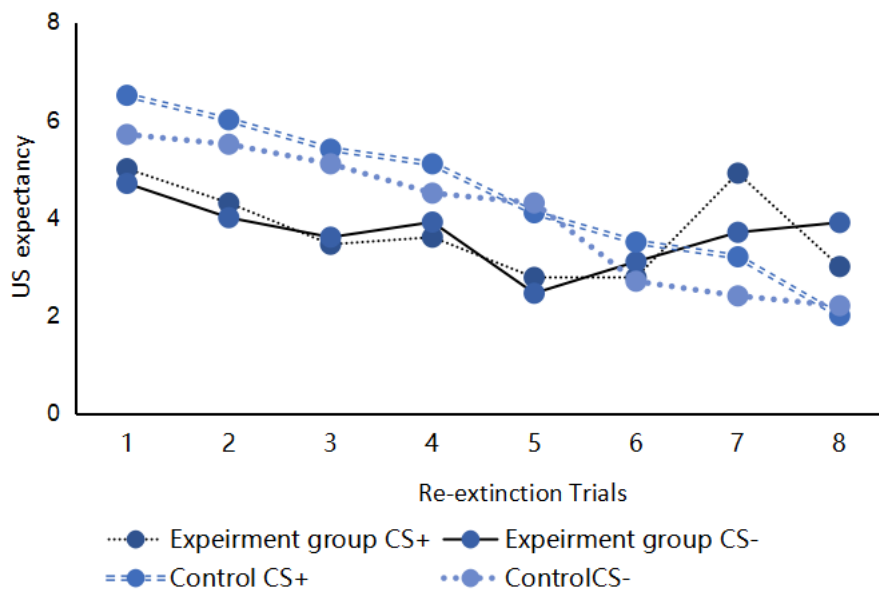


Figure 3 Us Expectancy Values of Re-Extinction Phase

### 3.3 Analysis of signal discrimination

The normal group had significantly different on the US expectancy values of CS+ and CS- in the first trial of the extinction phase. It is indicating that the normal group could clearly distinguish between danger signals and safety signals. But the experimental group rated no significant difference between CS+ and CS-. In the last trial of the extinction again phase, there was a significant difference in the US expectancy values of CS+ and CS- in the experimental group. And there was no significant difference in the US expectancy values of CS+ and CS- in the normal group. The above results showed that the normal group can acquire conditioned fears normally and

can completely regress. But the experimental group has a significantly lower degree of discrimination of two types of signals, as showed in Figure 4.

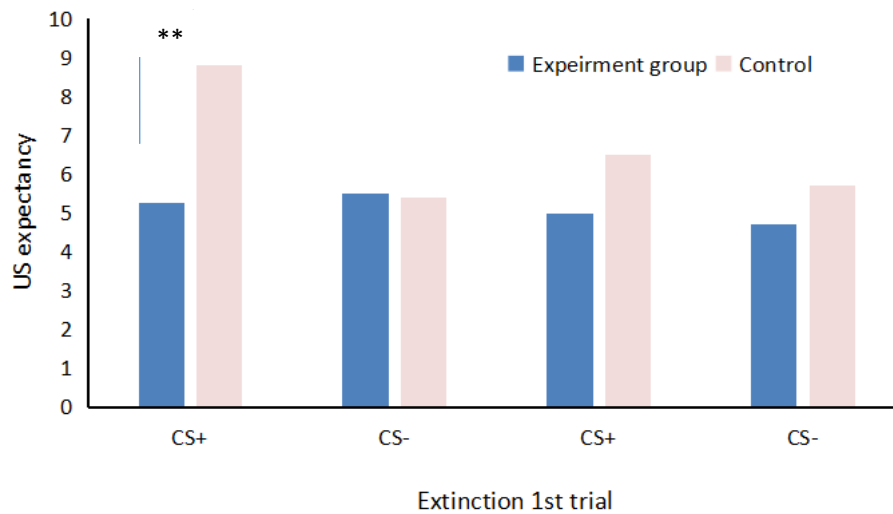


Figure 4 Us Expectancy Values of 1st Trial of Extinction Phase. \*\* means very significant difference

During the extinction on the second day, two groups were no significant difference between the US expectancy values of CS+ and CS-, but the US expectancy values of the experimental group were generally higher than the normal group, and the extinction effect of the normal group was significantly higher than the experimental group (See Figure 5).

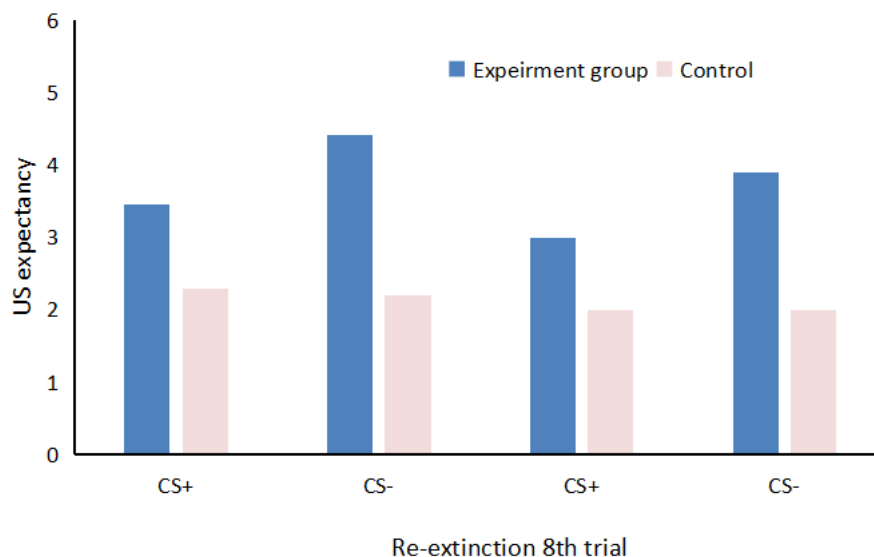


Figure 5 Us Expectancy Values of 8th Trial of Re-Extinction Phase

#### 4. Discussion

Research on imprisonment criminals mainly focused on their impulsive emotions, aggression, and aggressive behaviors, but their emotional discrimination ability was rarely discussed. This study finds that impulsive prisoners have a poor acquisition of conditioned fears and cannot discriminate between safety signals and fear signals. But they have no abnormal score on their own degree of pleasure. Therefore, the cause of impulsive prisoners emotional disorder may be related to their defects of signal discrimination.

During the acquisition of conditioned fear phase, the difference between the US expectancy values of CS+ and CS- for impulse criminal prisoners gradually increased, and the degree of pleasure after acquisition was significantly different from the degree of pleasure before acquisition. It is indicating that they had learned conditioned fear. Impulsive prisoners have learned the conditioned fear after the acquisition phase, but it is not reflected in the identification of safety signal and fear signal. This showed that they may be can perceive their emotional changes, but fails to make a difference between their behavioral response.

In the stage of remission and remission again, it has little difference between the US expectancy values of CS+ and CS- for impulse criminal prisoners. But the score of both CS+ and CS- tends to be in the middle, neither in the area of not regress, nor in the area of normal extinction. It can be said that the scoring level of impulsive prisoners is at an intermediary level that is neither safe nor fearful, and explain they cannot distinguish CS+ and CS- well. Their cognition of conditional stimulus is ambiguous. It shows that impulsive prisoners have defects of discrimination, recognition and cognition on certain emotional stimuli. Impulsive prisoners may already know subconsciously that certain stimuli or certain conditions will cause them to be afraid, and can aware of their own emotional changes. Nevertheless, they are not aware of it at the consciousness, and may not be aware of some of the emotions they have generated. Populations of impulsive prisoners have impulsive personality traits, such as highly aggressive, has strong emotional aggressive behavior and easier to have aggressive behavior with a higher emotional response [7]. Therefore, impulsive prisoners cannot identify and control their emotions well during the impulsive criminal process, and they cannot rationally treat their emotions on the consciousness, resulting in impulsive and emotional criminal offence in an almost out of control state.

This study lies in two aspects. First, there are differences in the experimental scenarios between the two groups. The prisoners are under close supervision of the prison, which may affect their emotions. Such as excessive anxiety may affect their conditioned fear of acquisition and extinction. Second, CS+ and CS- were not scored simultaneously in the subjective rating of pleasure. This data could not be compared with the US expectancy value in parallel to further show that impulsive prisoners have obstacles to distinguish safety signals and danger signals.

The next study will research the effect of experimental scenarios to the acquisition and extinction of conditioned fears of prisoners, and make further explorations of whether the closely monitored context of prison guards has a significant effect on the acquisition and extinction of conditioned fears of prisoners. Existing deficiencies further verify whether the impulsive prisoners have obstacles to distinguish safety signals and danger signals.

## 5. Conclusion

All in all, this study confirms that impulsive prisoners are more specific than normal people. They show deficiencies of distinguishing fear emotion, especially at the obstacles to identifying fear signals. Their degree of pleasure decreased after the acquisition phase, but they were not reflected in the score of fear signals and safety signals. This indicating that they were affected by the unconditioned fear stimulation in the experiment, but they cannot recognize the connection between unconditioned fear stimulation and fear signals at the conscious level. It may imply impulsive prisoners have an obstacle on the ability of cognitive regulation and information processing.

The reason for this obstacle may be linked to their inability to distinguish various signals accurately. This means that impulsive prisoners may be cannot correctly handle some stimulation on normal life, so that they cannot control their emotional behavior and cause crime. Further research can explore the effect of the obstacle of fear emotion discrimination ability on their aggressive behavior, and find out whether there is an internal mechanism between them, and the formation mechanism of the obstacle of fear emotion discrimination ability.

In addition, this study can serve as a theoretical basis for the psychological management of imprisoned prisoners by the prison management department. Impulsive prisoners have emotional obstacles and poor cognitive ability of emotions. Therefore, the management and correction methods of impulsive prisoners should have certain particularity. Through cognitive intervention to

cognitively appraisal of information by impulsive prisoners to reduce the fear of impulsive prisoners in the face of signals, which may improve their ability to control impulsive behaviors and help them build social adaptation and return to society.

## References

- [1] Feng Biao, Xu Liang, Zhang Weixing, et al. The Inhibitive Effect of Positive Emotions on Fear Generalization. *Acta Psychologica Sinica*, 2017, 49(3): 317-328.
- [2] Liao Suqun, Zheng Xifu. Inhibition of Cognitive Reappraisal on the Negative Valence Facilitates Extinction in Conditioned Fear. *Acta Psychologica Sinica*, 2016, 48(4): 352-361.
- [3] Sun Nan, Wei Yiming, Li Qian, et al. Sex Differences in Extinction Return of Conditioned Fear Memory. *Acta Psychologica Sinica*, 2012, 44(03): 314-321.
- [4] Zhan Jun. Experimental Evidence for Chinese Medicine's Hypoththesis on Mutual Restriction of Emotion-"Fear Promotes Anger" and "Sadness Counteracts Anger", Education College of Zhe Jiang normal University, 2013, 39.
- [5] Guo Xiao, Yang Bo, Zhang Zhuo, et al. Mediating Effect of Callous-Unemotional Traits on the Relationship between Violent offenders. *China Journal of Health Psychology*, 2017, 25(9): 1363-1368.
- [6] Glass S J, Newman J P. Recognition of facial affect in psychopathic offenders. *Journal of Abnormal Psychology*, 2016, 115(4): 809-815.
- [7] Zhao Shengzhong, Gao Feng, Lu Yuezhong. Investigation and Analysis of Impulsive Personality of Violence Prisoners. *Crime and Reconstruction*, 2012, 12: 61-63.