

## Research Paper

## The Effects of Cognitive Appraisal and Emotional Suppression on Autonomic Nervous Reactions on the Basis of Sensory Processing Sensitivity

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**ABSTRACT**

**Objectives** The aim of this study was to evaluate the effect of emotion regulation strategies of cognitive appraisal and emotional suppression on autonomic nervous reactions based on high and low sensory processing sensitivity among students.

**Methods** For this purpose, 500 students of Bu Ali Sina University of Hamadan were selected through a stratified sampling approach. Based on final score distribution (Z Standard) in sensory processing sensitivity scale, 45 of the subjects were chosen for testing the study hypothesis. The participants were studied for autonomic nervous reactions under normal viewing conditions, cognitive appraisal and emotional suppression. To evaluate the results of the study, the collected data were analyzed by using multivariate analysis of covariance, univariate covariance and post hoc tests.

**Results** The results showed significant differences between three groups in the autonomic nervous reactions based on emotion regulation and sensory processing sensitivity. The group with high sensory processing sensitivity gained higher heart rate and systolic blood pressure. In normal viewing, suppression and cognitive appraisal, the diastolic pressure was lower compared to the baseline.

**Conclusion** The suppression and cognitive appraisal compared to normal viewing was followed by decreased diastolic pressure that represents low levels of heart rate in normal viewing mode compared to the baseline. The use of cognitive appraisal and suppression compared to normal viewing led to increased heart rate. Therefore, cognitive appraisal and suppression as emotion regulation strategies can interact with personality traits associated with sensory processing sensitivity that influences the physiological reactions.

**Key words:**

Emotions, Autonomic nervous system, Sensitivity

**Extended Abstract****1. Introduction**

**P**ositive excitement regulation is associated with a number of health, social, and physiological outcomes [17, 18]. But, it is assumed that failure to regulate excitement is an un-

derlying mechanism of mood and anxiety disorders [19]. Another important factor is individual differences in this connection. Sensory processing sensitivity is a personality mood feature, which is characterized by sensitivity to internal and external stimuli such as emotional and social stimuli that are the causes of its emergence. The purpose of this study was to investigate the effect of emotion regulation strategies, cognitive assessment and emotional sup-

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pression on auto nerve reactions based on high sensory processing sensitivity and low sensory processing sensitivity in the students.

## 2. Method

Given the type of variables and their manipulation, the current study belongs to empirical design method. Statistical population comprised all college students at the Bu-Ali Sina University in the academic year of 2015-16. Among them, 500 students were selected according to the Cohen table and in form of stratified sampling and with obtaining informed consent in order to study the research objectives. Given the widespread of the population, ease of conducting research, and controlling gender variable, it is necessary to mention that only female gender was selected. After determining initial sample, sensory processing sensitivity scale was distributed among them. After analyzing the initial scores in the sensory processing sensitivity scale, 45 samples were randomly selected from the initial sample based on the distribution scores (Standard Z).

After obtaining informed consent, the final sample was categorized into three groups of High Sensory Processing sensitivity (HSP), Low Sensitivity Processing sensitivity (LSP), and control group. Then, activation and inhibition behavior scale, list of positive and negative emotions, emotional expression and the cognitive order of excitement were given to the participants to respond. Then in the presence of each subject in the psychology lab that had psychometric properties and after removing disturbing triggers, the following steps were followed: 1) At the beginning of work, the participants were informed of the general process of research and were justified. In the next step, after eliminating the tension created in the participants, systolic and diastolic blood pressure, and heart rate were measured three times in order to measure the base line; 2) The participants were then exposed to negative emotions and given the instruction of "normal observation"; 3) In the next stage, the participants were subjected to negative emotions and were given the instruction of "cognitive assessment"; 4) Then, the participants were exposed to the influence of negative excitement and were given the instruction of "emotional suppression" before showing the emotional movie piece. After running each of the steps 2, 3 and 4, heart rate and systolic and diastolic blood pressure were recorded three times. The obtained data was entered into the SPSS-22 computer software for analysis. In the analysis of information, multivariate covariance analysis, Ben Porney's pursuit test, and dependent t test were used in addition to the descriptive statistics indicators. According to this, baseline scores on systolic and diastolic blood pressure, and heart rate, activation and inhibition behavior scale, list of positive

and negative emotions, emotional expressing and the cognitive order of excitement were used as auxiliary variables.

## 3. Results

In normal observation mode, the group with HSP has a higher heart rate than LSP group and also the control group. Also, in systolic blood pressure in suppressed mode, the group with HSP had a higher status, compared to the LSP group. The LSP group had a lower status in this component compared to the control group. In normal observation mode, suppression and cognitive assessment of negative excitement-inducing films, diastolic blood pressure was lower than the baseline mode with a significant difference in normal observation mode. It was also shown that suppression and cognitive assessment had lower diastolic blood pressure compared to normal observation mode. The comparison of heart rates in different modes of excitement regulation indicated a higher heart rate in baseline mode compared to the usual observation of the negative emotional film. In addition, the use of cognitive assessment and suppression increased heart rate compared to the normal observation mode; the increase was significant in cognitive assessment.

## 4. Discussion and Conclusion

Given that patients with HSP have higher sensitivity towards stimuli provided, it seems that they are the most affected by negative emotions resulting in a higher physiological response in auto nerve reactions. Studies have shown that inducing stress as a negative excitement significantly increased systolic and diastolic blood pressure of subjects. Stressors send signals to Central Nervous System (CNS) and create a quick response through the auto nerve system. Therefore, sympatric-adrenal-modulus axis affects organs through direct and quick stimulation of sympatric nerve (such as widening of blood vessels, increasing artery blood pressure).

Using cognitive assessment and suppression, compared to normal observation mode, causes an increase in the heart rate. The present study showed that suppression and cognitive assessment, compared to normal observation mode, reduced diastolic blood pressure. This finding is in line with studies that have shown that cognitive regulation neutralized negative emotional experiences and reduced physiological arousal [17]. Relevance of this characteristic is close to heartbeat, and the influence of these two indicators is from the activity of a similar autonomous machine. Similar to our findings, Augustine et al. [64] also showed that people who experienced more negative emotions in life got infected sooner if they were prone to illness. Overall, the findings of this study showed that automatic nerve response

can be affected by the type of emotional regulation strategy and biological traits. To improve the understanding of functional organization of ANS activity in excitement, future research should be taken into consideration, and if possible, the type of excitement and also the individual differences should be examined.

The limitations of the present study were that sampling was carried out voluntarily and in form of convenient sampling. This study has been carried out only on female subjects, and from this point of view, care should be taken while generalizing the results to other demographic groups. Selecting people for the final stage was based on self-reporting tool, though this tool has been confirmed to be valid to measure the desired variable. It is suggested that other tools like interviewing, reporting by others and physiological evaluation need to be used in future studies. Through the examination of other psychological and physiological variables, the pattern of relationship between personality, excitement regulation and the automated nervous system should be expanded.

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### **Conflict of Interest**

The authors declared no conflicts of interest.