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THE EFFECTS OF STRESS FACTORS CIRCUMSTANCES ON ANXIETY AND BIO PHYSIOLOGICAL PARAMETERS

EMIL-RAZVAN, GATEJ [a], STELIANA, RIZEANU [a], ALINA-CRISTINA, SOARE [a]

[a] *Hyperion University, Faculty of Psychology and Educational Sciences Department of Psychology*

Abstract

The aim of the study is to identify the difference between two forms of stress revealed both in a psychological and a physiological way of experiment.

The participants were 100 students tested between December 2019 and February 2020, 15 male and 85 female , age between 20 and 35 years old. The procedure in order to test our hyphotesis were based on two main situations: A situation in which the subject was passanger in a car driven in a reckless way and the other experimental conditions in which the subject was in the vehicle but was asked to be uninhibited and play some loud music.

Statistically significant differences were revealed with the statistical processing using SPSS IBM® program in 4 parameters: anxiety as state, anxiety as trait, pulse and blood pressure.

As the present research shows, the implications of stress perception had significant results both in the psychological sphere at the level of anxiety and in the physiological sphere, determining significantly different results at the level of pulse and blood pressure parameters. Oxygen saturation, as in other similar studies conducted and presented in the literature, did not undergo statistically significant changes.

Keywords: stress, anxiety, Bio-physiological parameter.

1. INTRODUCTION

Oxidative stress is defined as the excess production of reactive oxygen species (ROS) in relation to antioxidant defense. Reactive Oxygen Species are highly reactive oxygen-based chemical intermediates. The balance between reactive

Corresponding author: Emil-Razvan Gatej
E-mail: emilrgatej@gmail.com.

oxygen species production and reactive oxygen species attenuation systems is called the "redox state." Increased reactive oxygen leads to the toxicity of many xenobiotics. Normal physiological levels of oxidative stress are guarded by the body's self-defense mechanisms, while overwhelming oxidative stress can be largely harmful. Increasingly, it is estimated that reactive oxygen species may be an important factor in the dynamic of normal aging process and in the pathogenesis of many dangerous chronical diseases, including cancer, cardiovascular disease, diabetes, athereactive oxygen speciesclereactive oxygen speciesis, Alzheimer's and Parkinson's disease, liver damage and immunity diseases (Storz, 2002).

Numerous studies that are bringing an important amount of knolegde of redox signaling has fueled research on the role of oxidative stress under normal physiological conditions (oxidative stress), as opposed to exposure to supraphysiological oxidative challenges that lead to biomolecular damage and subsequent consequences such as disruption of redox signaling (oxidative distress) (Lesser, 2006).

Numerous knowledge of redox signaling has fueled research on the role of oxidative stress under normal physiological conditions, as opposed to exposure to supraphysiological oxidative challenges that lead to biomolecular damage and consequences such as disruption of redox signaling (oxidative distress) (Lesser, 2006). Stress is both a biological and a psychological response as revealed by Rizeanu and Mihăilă (2015). It occurs when a situation is perceived as challenging or threatening (for example, meeting a deadline or facing a high-speed car) and stress responses are mediated primarily by the human “stress system,” which involves the amygdala, hypothalamus, ANS, glands, and organs (Chrousos and Gold, 1992). The hormone epinephrine is pumped into the bloodstream and accelerates heartbeat and respiration. These reactions are known as the "fight or flight" response, which allows us to react quickly to life-threatening situations and helps us fight threats or flee safely. Acute stress is transient, beneficial and even vital in many cases. When a stressful situation passes, the parasympathetic branch of the ANS is activated, acting as a "brake" to alleviate stress responses and help restore homeostasis. Unfortunately, this "brake" may not work when our body overreacts to certain chronic stressors, such as long-term work pressure. When the brain continually perceives the situation as stressful, the “fight or flight” responses that can always be stretched can lead to ANS imbalance and damage to the stress response. The cumulative effects of chronic stress often degrade work performance (Kemeny, 2003; Rizeanu, 2016).

Physiologically, long-term activation of the adrenal glands can release excess cortisol that disrupts homeostasis (Romero, 2004). Elevated cortisol levels put people with high stress at increased risk for many health problems, including anxiety, depression (Dula et al., 2010), immune disorder (Rubio et. al, 2005), heart disease, hypertension) and diabetes (Vitasari et. al, 2011). The optimal response of the

stress system is essential also for regulating healthy emotions in social interactions and feelings of well-being (Bubulac, Gatej, Rizeanu, 2018). For example, listening to music can reduce cortisol levels and help people recover from periods of stress (El-Sherbiny et al., 2003). Research by Alvarsson and his coleagues (2010) suggest that post-stress recovery will be fas more complete when people are exposed to colors and sound stimuli recorded in natural environments. Teasdale and his coleagues (2000) have documented evidence that the practice of short-term meditation can improve the balance of ANS and that mindfulness practices offer several positive benefits, including low anxiety and increased concentration and improved mood (Gatej, 2013; Rizeanu, 2014). Microelectronics, human-computer interaction and computing platforms, ubiquitous physiological information will potentially transform the role of biofeedback in clinical treatment. This technology will also provide a useful tool for managing stress in everyday life.

2. **OBJECTIVE AND HYPOTHESES**

2.1. OBJECTIVE

The main objective of this study is to reveal a possible difference between the effects of stressful situations perceived by two experimental groups in two different experimental conditions.

2.2. HYPOTHESES

H1. There is a statistically significant difference between levels of anxiety of the two experimental groups.

H2. There is a statistically significant difference between the biophysiological parameters of the two experimental groups.

3. MATERIAL AND METHOD

Participants

The participants were 100 students, 15 male and 85 female. Their age was between 20 and 35 years old. This sample had a similar level of education and cultural provenance.

The Anxiety level was revealed with State-Trait Anxiety Inventory (STAI) that has been developed by Spielberger in 1968. It consists of two self-assessment scales for measuring two distinct concepts regarding anxiety: state anxiety (A-state) and trait anxiety (A-trait) (Spielberger, Gorsuch & Lushene, 1970).

To measure the blood presure there was used Sendo Advance 3 Blood Pressure Monitor. Blood pressure measurement is reported as two numbers, which represent systolic and diastolic blood pressure. (https://en.sendo.info/).

For measuring the level of oxygen saturation or oxygen levels in the blood ”Professional puls oximeter Yonker”. The pulse oximeter is a small, non-invasive, painless medical device that measures the level of oxygen saturation or oxygen levels in the blood. The purpose of using a pulse oximeter is to check how well the heart is pumping oxygenated blood through the body. (https://yonker.cn)

Procedure:

The procedure in order to test our hyphotesis were based on two main situations: A situation in which the subject was passanger in a car driven in a reckless way and the other experimental conditions in which the subject was in the vehicle but was asked to be uninhibited and play some loud music. In order to mantain experimental control a very high level of safety it was used a driving simulator made by one of the authors 10 years ago named ERGASIM, a real vehicle equiped with electronic steering wheel and a LCD screen instead of the windscreen. Both samples were conected to the biophysiologic equipment and after they filled in a psychological test for anxiety. Written informed consent was signed by every participant that was a subject of this study. All the process was voluntary. The motivation of people involved was based on the curiosity for science and motivated by the results. The subjects were informed that they could withdraw from the study anytime, no matter what stage of the study has been achieved also they were ensured of confidentiality.

4. RESULTS

After collecting the data we used IBM SPSS® in order to process the results.

Data below are showing a mean 46.15 for the 1st sample and a mean of 43.52 for the 2nd sample.

Table 1

Differences in anxiety levels (Trait) between the two experimental groups

	Levene's Test - Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper

AT	Equal variances assumed	.067	.852	734872367924390.800	118	.000	2.63000	.00000	2.63000	2.63000
	Equal variances not assumed			734872367924390.800	89.076	.000	2.63000	.00000	2.63000	2.63000

Based on the results shown above, the research hypothesis that assumes significant differences the level of anxiety as Trait is accepted for a sample of 100 subjects. Results on the anxiety scale were significantly different between the two samples. (M1 = 46.15, M2 = 43.52, t = 0.73, $p < 0.05$). Data revealed by the table above accept the existence of significant differences between the two samples.

Data below are showing a mean 48.21 for the 1st sample and a mean of 43.88 for the 2nd sample.

Table 2

Differences in anxiety levels (State) between the two experimental groups

		Levene's Test - Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
AS	Equal variances assumed	.078	.781	865260629915603.600	118	.000	4.33000	.00000	4.33000	4.33000
	Equal variances not assumed			865260629915603.600	93.615	.000	4.33000	.00000	4.33000	4.33000

Based on the results shown above, the research hypothesis that assumes significant differences the level of anxiety as State is accepted for a sample of 100 subjects. Results on the anxiety scale were significantly different between the two samples (M1 = 48.21, M2 = 43.88, t = 0.86, p <0.05). Data revealed by the table above accept the existence of significant differences between the two samples.

Data below are showing a mean 89.47 for the 1st sample and a mean of 63.77 for the 2nd sample.

Table 3

Differences in pulse levels between the two experimental groups

		Levene's Test - Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
PULS	Equal variances assumed	.037	.848	13.057	118	.000	25.69956	1.96821	21.80198	29.59714
	Equal variances not assumed			13.057	114.350	.000	25.69956	1.96821	21.80069	29.59843

Based on the results shown above, the research hypothesis that assumes significant differences between groups regarding the Pulse level is accepted for a sample of 100 subjects. Results collected with the blood pressure monitor were significantly different between the two samples (M1 = 89.47, M2 = 63.77, t = 13.05, p <0.05). Data revealed by the table above accept the existence of significant differences between the two samples.

Data below are showing a mean 89.50 for the 1st sample and a mean of 54.23 for the 2nd sample.

Table 4

Differences in blood pressure levels between the two experimental groups

		Levene's Test - Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
BP	Equal variances assumed	43.916	.000	9.154	118	.000	35.26600	3.85246	27.63708	42.89492
	Equal variances not assumed			9.154	88.990	.000	35.26600	3.85246	27.61123	42.92077

Based on the results shown above, the research hypothesis that assumes significant differences between groups regarding the Blood Pressure level is accepted for a sample of 100 subjects. Results collected with the blood pressure monitor were significantly different between the two samples. (M1 = 89.50, M2 = 54.23, t = 9.15, p <0.05). Data revealed by the table above accept the existence of significant differences between the two samples.

Data below are showing a mean 97.01 for the 1st sample and a mean of 97.56 for the 2nd sample.

Table 5

Differences in oxygen saturation *levels between the two experimental groups*

		Levene's Test - Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
OX	Equal variances assumed	.204	.652	-1.775	118	.078	-.55000	.30978	-1.16345	.06345
	Equal variances not assumed			-1.775	117.960	.078	-.55000	.30978	-1.16346	.06346

Based on the results shown above, the research hypothesis that assumes significant differences between groups regarding the Oxygen Saturation level is not accepted for a sample of 100 subjects. Results were not significantly different between the two samples. ($M1 = 97.01$, $M2 = 97.56$, $t = 1.77$, $p < 0.05$). Data revealed by the table above accept the existence of significant differences between the two samples.

Discussions

As the above results show, there is a significant difference between the two experimental samples in the sense that the experimental sample subjected to stressful situations has higher values in psychological parameters of anxiety as well as physiological parameters of pulse and blood pressure. The experimental sample that causes and controls the stressful situation seems to register lower values at these parameters, which strengthens our belief that a proper attitude towards stress can lead to the improvement of symptoms in the physiological sphere. These differences exclude oxygen saturation which does not show statistically significant differences. Given these findings we can discuss the complexity of the stress phenomenon. As this research has shown, stress can be seen both from a biological perspective and from the perspective of the psychological response. In both cases the effects of this

phenomenon so present in our lives can be controlled by the perspective that the subject has on reality (Dula et al., 2010). The multitude of researches that indicate a significant effect of stress on the human body has led this study to try to reveal significant results depending on the psychological perspective on the stressful situation. Possible explanations for the results of the present study may be related to the neuropsychology and psychosocial perspective. From this perspective, although different reactions to different stressors can be caused in the laboratory but the fundamental difference is one that comes from the social environment: the involvement of the ego. From this perspective, the situation of passive stress from the first experimental sample determined a response to stress based on the possibility of injury both psychologically and physically. In the second case, the catalytic effect of the induced self-stress determined a better control over the situation and even a manifestation of one's own ego (Zuckerman-Levin et. al, 2001).

5. CONCLUSIONS

The study involving the effect of physical stressors showed statistically significant results in terms of both physiological parameters such as pulse or blood pressure and significant differences in blood tests performed. Psychological intervention in the case of such studies could make the difference between stress compensation and the determination of harmful reactions of the body to this phenomenon (Zuckerman-Levin et. al, 2001). However, the approach to stress and how to get involved in different human activities is what can make the difference. As the present research shows, the implications of stress perception had significant results both in the psychological sphere at the level of anxiety and in the physiological sphere, determining significantly different results at the level of pulse and blood pressure parameters. Oxygen saturation, as in other similar studies conducted and presented in the literature, did not undergo statistically significant changes (Vitasari, 2011). Studies identified that there is a certain level of damage to the individual that can be controlled through learned mechanisms of coping with stress and through a trained control of thoughts and emotions. As future directions of our research team, we aim to analyze the most advanced psychological factors that can cause physiological changes in the field of stress. The Mindfulness perspective seems to be a psychological approach that can significantly reduce the harmful effects of stress whether it is situations from outside the individual or self-generated stress.

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