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# Autonomic Changes and Stress Responses in Psychopathology

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## Abstract

**Background.** Various studies have supported identifying specific physiological patterns that are indicative of psychopathological syndromes.

**Aims.** The aim of this study is to verify the presence of different, consistent patterns in ANS arousal shown by five psychopathological groups (GAD, MDE, PAD, OCD, AN) and a control group.

**Method.** Ninety outpatient subjects underwent a simultaneous registration of physiological parameters: skin conductance response (SCR), heart rate (HR), peripheral temperature (PT) and electromyography (EMG); registered in three consecutive phases: baseline, stress presentation, and recovery.

**Results.** Results shows that SCR mean values are higher in GAD and PAD patients than in MDE and OCD patients. HR response is also higher in GAD than in the other groups, whereas OCD and MDE patients show a reduced profile of all four parameters.

**Conclusions.** These results confirm the relevance of the psycho-physiological evaluation in a multidimensional diagnosis and support its use as a new differential diagnosis tool for certain psychopathological syndromes.

**Key words:** psychophysiology, autonomic arousal, differential diagnosis, psychopathology



## INTRODUCTION

The multidimensional approach to a clinical psychopathic diagnosis usually consists of data collection stemming from different areas, such as behavioral, cognitive-emotional, and psycho-physiological spheres, which are important in order to better identify and describe the pathological phenomenon. Evaluation criteria such as the DSM IV-TR, (1) or the ICD-10 are useful guides, but they are not the only supported methods for clinical diagnosis. With respect to psycho-physiological evaluation, the Psycho-physiological Profile (PPP) is characterized by the simultaneous detection, storage, and evaluation of several physiological indexes connected with Autonomic Nervous System (ANS) arousal and the complex system of stress response. Some of the most commonly utilized indexes are Peripheral Temperature (PT), Galvanic Skin Response (GSR) and, in particular, Skin Conductance Level (SCL) and Response (SCR), Heart Rate (HR), Inter Bit Interval (IBI), and the evaluation of the muscle tension by mean of the Surface Electromyography (EMG). Much scientific evidence comes from experimental and clinical studies, regarding the relevance of these types of indexes in pathological manifestation. In the past few years, the works of Gray (2) and Fowels (3, 4) have shown increases in HR and SCR to be the physiological correlates of the Behavioral Activation System (BAS). The BAS, constituted of dopamine pathways in the brain (which include the ventral tegmental area and the nucleus accumbens), is activated by discriminative stimuli principally associated with the positive and negative reinforcements. Both types of reinforcement are associated with positive and agreeable situations and events that are able to regulate appetitive behaviors and are part of the fight or flight reactions. Conversely, the Behavioral Inhibition System (BIS) is characterized by a decrease in HR and SCR. It is constituted of a reticular neuronal structure that includes the amygdala and the hippocampal septum system, which receive serotonergic afferents from the locus ceruleus with projection to the frontal lobe of the brain. BIS is usually activated by negative events like punishment or the sudden suspension of the positive reinforcement. In addition, BIS is able to mediate conflicts according to one's approach to problematic situations; blocking the active response



behaviors and the development of defense reactions exemplifies a passive avoidance behavior.

In the clinical field, various studies have shown the possibility of identifying specific physiological patterns that are indicative of psychopathological syndromes: for example Stegagno & Palomba (11), have found several typical patterns in clinical syndromes such as depression and anxiety, that confirm data of Lader (12, 13). These clinical pictures could be summarized as follow: syndromes characterized by anxiety are often connected to high levels of HR, SCL, EMG, and low values in PT. On the other hand, clinical pictures characterized by depression show low or irregular HR and EMG, and low level of SCR both at rest and during the stress session. Low level of SCR at rest in depressed patients, in comparison to controls, is described in numerous studies (15, 16, 17, 18, 19). The low level or the complete absence of a response during the stress presentation is also verified in depressed patients through imaginative exposition techniques (17). An exaggerated activation picture was also found in patients with Panic Attack Disorders (PAD; 9), similar to the Lader (12, 13) description. More recently, Wilhem, Trabert & Roth (19), reported that patients affected by PAD are characterized by a psycho-physiological pattern that is similar, but not identical to, that of General Anxiety Disorder (GAD), and in fact, both differ from a control group of healthy people. Therefore, many studies have found atypically high values in SCR at rest in PAD patients (20, 21, 22, 23, 24, 25). With respect to the SCR parameter in PAD patients, a low level of habituation to neutral stimuli and a difficulty in obtaining a minimal level of relaxation were demonstrated in past studies (20, 21, 26). In addition, patients with Obsessive Compulsive Disorder (OCD) have shown a pattern characterized by a low and cyclic level of autonomic arousal at rest, with reduced SCR, EMG and HR (27, 28, 29). Finally, SCR values were found to predict the reduction of the symptoms in clinical trials (30, 31). Therefore, the principal aim of the present study is to verify the differences in the ANS arousal patterns shown by five groups of clinical subjects and a control group of healthy people through certain PPP parameters, including EMG, SCR, HR and PT.



## METHODS

### Subjects

A group of 90 people, 42 male and 48 female, from 21 to 51 years of age (mean age  $38.4 \pm 9.7$ ) were recruited from a Clinical Psychology Center with the following diagnosis according to the DSM-IV-TR (1):

- General Anxiety Disorder (GAD, #35);
- Major Depression Episode (MDE #13);
- Panic Attack Disorder (PAD #19);
- Obsessive Compulsive Disorder (OCD #13);
- Anorexia Nervosa Restrictive - type (AN #10).

Sample characteristics are summarized in Table 1. Furthermore, a group of 34 graduate and doctoral students of psychology, 20 female and 14 male, ages 21 to 34 (mean age  $23.27 \pm 3.22$ ), were recruited as a control group.

### Materials

The control group of psychology students was required to provide information about their psychological and medical history. The fourth sheet of the CBA (Cognitive Behavioral Assessment; Zotti et al., 1985; 1987; 1996; 2000) was administered in order to collect data regarding personal and medical history and to eliminate all subjects that were undergoing or that had previously undergone psychological or pharmacological treatments. Patients from all the selected psychopathological groups were required to not take any psychiatric drugs at the time of recruitment and for three months prior to the recruitment. That is, they had to be free from any treatment at the time of the consultation. Furthermore, potential subjects that were affected by other physical illnesses related to the Central Nervous System, concomitant organic syndromes, or co-morbidity with other Axis I disorders of the DSM-IV-TR (1) were excluded.

The PPP registration was, which was first described by Fuller (5), was used to verify if, when, and how one's psycho-physiological balance, connected to the homeostasis processes, is adaptive or not. It is usually made in three different and subsequent phases: rest (to obtain a baseline), administration of a stressful stimulus (to provoke an activation or an ANS arousal), and recovery (waiting for a possible return to the pre stress values; 6, 7, 8, 9). There are a number of stress tests, like the Mental Arithmetic Task (MAT), or problem



solving tasks like the CPM 47 (which is available in a computerized version), as well as stressful situations like public speaking which are able to activate stress reactions in the majority of people (6, 10). The following criteria are used to determine the type of stress response by means of the PPP:

- The prematurely high value of some parameters at the rest phase as a sign of an improper autonomic activation.
- A slow, inconstant, or absent pattern for one or more parameters during the rest phase.
- Abnormal amplitude of the stress induced during the activation in one or more parameters.
- Slow, inconstant, or absent modification of one or more values during the stress presentation
- Slow, inconstant, or failure to return to the values obtained at the initial rest in phase during the recovery phase.

### Procedure

All subjects underwent a continuous physiological registration of 4 parameters as follow (however, the variable groups also underwent other tests):

*Adaptation phase*, in which all participants entered a temperature and humidity controlled room (between 18 to 22 C° and below 55% humidity). A couple of researchers (clinical psychologists) then gave an explanation regarding the apparatus, the electrodes, and the other devices used in the non-painful registration procedure. The participants were asked to sit in a very comfortable, reclining armchair. While setting up the electrodes, the operator asked the subjects for any other questions they had regarding the procedure and the test. The goal was to help subjects relax as much as possible before they began, so as to avoid anticipatory anxiety.

*Registration at rest phase (6min)*, in which subjects were asked to close their eyes and to be quiet. They were told to raise the index finger of their non-dominant hand to indicate any problems to the psychologist (e.g. cough, respiratory problems, etc.).

*Stress session (4 min)*, the Mental Arithmetic Task (MAT) was administered to the subjects. The MAT requires the participant to subtract the number 13 from 1007 continuing until the end of the stress session.

*Recovery session (6 min)*, at the end of the MAT, each subject was requested to stop the exercise, relax, and rest.



The employed technology device was the “Modulab 800” by SATEM, Rome, Italy. The Modulab was connected by means of an infrared cable with a PC. All the data was detected and processed by the PANDA Works program software (by SATEM, Rome, Italy). The following parameters were continuously monitored and registered:

*Frontal electromyography (EMG):* The electrical potential was detected by two active electrodes placed 1 cm above each eyebrow, on the same line as the pupil, and one reference electrode placed at the centre of the forehead (2 cm of distance between each pole).

*Heart Rate (HR) and Inter Bit Interval (IBI):* Measurement involved detection of the electrical potential of cardiac muscle by the classic bipolar shunt for the electrocardiogram (EKG), and calculation of transit time of the “R wave” (ventricular contraction) to evaluate the IBI. Both EMG and HR parameters were detected by means of surface disposable electrodes with 5 mm of active surface.

*Peripheral temperature (THE):* For the THE, a very sensitive electronic thermometer (for evaluating fluctuations in temperature of less than 1 °C) was utilized, with a device placed on the tenar eminence of the non dominant hand.

*Skin Conductance Level & Response (SCL & SCR):* These parameters were measured by a low-intensity electrical current from two electrodes placed on the first and second finger of the non dominant hand. For the SCR two gold plated electrodes were employed.

### Statistical analysis

For all the physiological parameters the time mean (M) and standard deviation (SD) were calculated for:

- The last minute of the rest as a baseline;
- The first minute of the stress phase, to evaluate the best possible activation during the MAT presentation, and to exclude possible habituation due to the adaptation to the situation;
- The last minute of the recovery, as an evaluation of the best possible recovery after the stress presentation (32).

The Shapiro-Wilks statistical test was utilized to evaluate the normal distribution of the values. Because the values were not normally distributed and there were differences in the number of participants in the samples (from 9 to 35, see Table 1) a non-parametric statistical



analysis was utilized. A comparison between groups was made on the basis of the mean value calculated for the three times in every phase of the registration. Each mean value was considered as a unique index. The Mann-Whitney statistical test was utilized to verify the significance of the possible differences between groups.

With the aim to better describe the performance of the registered values in the three phases on the basis of Arena & Blanchard (32) the following indexes were also calculated:

- *Stress response*: an index of the autonomic activation response amplitude, found by subtracting the mean value of the last minute of the rest (baseline) session from the mean value of the first minute of the stress phase.
- *Recovery after stress*: to evaluate the recovery amplitude after the best activation, subtracting the mean value of the last minute of the recovery phase from the mean value of the entire stress session.

## RESULTS

Table 2 shows arithmetic mean (M) and Standard Deviation (SD) of all the physiological parameters registered in the three phases: “rest” or “baseline” (B), “stress” (S) and “recovery” (R). EMG data comparison at rest and during the stress session showed a significant statistical difference between the student control group and the experimental groups. Patients with PAD, GAD, OCD, MDE and AN seem to be characterized by higher level of muscle tension than healthy subjects (Tab.3 and Fig.1).

In the SCR/SCL data comparison, however, some statistical discrepancies were found in all the phases, (Tab. 3 and Fig. 1). Furthermore, GAD and PAD are characterized by higher values in SCR, in all the three phases, compared to MDE, OCD, AN, and control subjects. MDE and AN showed a typical pattern of very low SCR values in all three phases.

The comparison between groups, with respect to the HR parameter, showed high values in all the phases in GAD patients, in comparison to the other psychopathological groups and to the control group (Tab. 3 and Fig. 2).

AN showed a low level of muscle activation compared to the others. The MAT response was significantly lower than in PAD, OCD, and MDE. Furthermore, GAD, OCD and PAD seem to be similar to one another (while all being different from MDE and AN), in



particular for the SCR parameter (Fig.1), with the most significant difference among AN and GAD groups.

## DISCUSSION

The results obtained partially confirm some data already presented in the literature, but do so with more specific indications for every psychopathological profile (30, 31). A condition of autonomic hyper-activation is typically connected to high level of tension and anxiety and vice versa, while a low level of autonomic activation and the impossibility to react to the stimuli is typically connected to depression and OCD. As hypothesized by Fowles and Gray (2, 3, 4), the most important physiological indexes are the SCL and the HR. Furthermore, the HR at rest has a greater effect on GAD than PAD patients and seems to become a differential index among syndrome manifestations, a role that is currently played only by the respiratory indexes. These respiratory indexes were cohesive with the literature data from the SCL parameters of PAD and OCD patients (19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29).

The GSR trend seen in the GAD, PAD and MDE groups, seems to confirm the BAS and BIS theory of Gray and Fowles (2, 3, 4). The high values in the baseline, the peak values during the stress presentation, and the incomplete recovery of the galvanic response could be connected to the BIS due to internal or external danger or threat signals. Based on this data, Roth, Wilhem and Trabert (26) suggest that the low level of PAD relaxation capability, the excessive spontaneous fluctuation, and the absence of recovery in the SCL parameter seem to be connected to the continuous high level of attention. The patient addresses the body and mental sensation by trying to control anxiety and tension. Analogously, the SCL profile in GAD patients could reflect the BIS activation from external stimuli including anticipatory anxiety, performance anxiety, and fear of making mistakes (e.g. during the MAT administration). In the GAD patients, the high HR level at rest could represent BAS activation attributed to worry and apprehension, which even at rest is typical of anxiety manifestations. On the contrary, MDE patients experience a sort of malfunctioning of BIS with low and steady levels of the SCL. This could be a helpless physiological correlation or rather, the loss of the ability to discriminate between stimuli associated to punishment or negative reinforcement and the consequent development of avoidance and fall-back behaviors (33). As



a maladaptive loop MDE subjects' lifestyles become worsened based on feedback from the autonomic system

The results obtained in the present work are encouraging; they better describe the clinical picture through subjective integrate therapies, both pharmacological and psychological. A multidimensional diagnosis by means of different and objective parameters could surely help to avoid over-treatment, to diminish the risk of relapse, and to increase the possibilities of compliant treatments.

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**Tables and Figures****Table 1****Sample characteristics**

<b>Diagnosis (DSM IV – TR)</b>	<b>#</b>	<b>M</b>	<b>F</b>
<b>GAD</b>	35	14	21
<b>MDE</b>	13	7	6
<b>PAD</b>	19	12	7
<b>OCD</b>	13	8	5
<b>AN</b>	10	1	9



**Table 2****Descriptive statistics of all physiological indexes.**

**Legend: M: mean, SD = Standard Deviation, (B), (S), (R) = Baseline, Stress, Recovery phases**

	<i>PAD</i>		<i>GAD</i>		<i>OCD</i>		<i>HEALTHY</i>		<i>MDE</i>		<i>AN</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>EMG (B)</i>	3.8	1.6	4.1	2.0	3.4	1.3	2.8	1.0	3.8	1.7	4.9	1.6
<i>EMG (S)</i>	6.3	2.3	6.6	3.6	6.5	3.3	4.1	1.0	6.6	3.3	5.7	1.7
<i>EMG (R)</i>	3.9	2.0	3.9	1.7	3.7	1.3	3.1	1.2	4.9	2.8	5.2	1.8
<i>GSR (B)</i>	8.7	5.3	8.4	4.9	2.8	1.7	5.7	4.8	2.3	2.4	2.9	2.0
<i>GSR (S)</i>	14.6	10.5	13.4	7.0	4.3	2.7	7.9	5.3	3.6	4.1	3.9	2.7
<i>GSR (R)</i>	12.1	7.9	9.9	5.2	3.8	2.1	6.7	4.7	3.7	3.5	3.2	2.0
<i>THE (B)</i>	31.9	2.9	31.0	2.9	32.5	2.0	30.2	2.8	32.5	2.1	32.1	2.9
<i>THE (S)</i>	32.0	3.1	31.1	2.6	32.7	2.1	30.0	2.8	32.5	2.1	32.1	2.9
<i>THE (R)</i>	31.8	3.2	31.0	2.4	32.4	2.3	29.8	2.9	32.4	2.3	32.1	2.8
<i>HR (B)</i>	69.5	8.2	80.7	9.3	67.7	14.2	73.8	13.9	70.6	13.0	72.2	13.9
<i>HR (S)</i>	79.9	11.2	88.2	13.2	76.9	9.6	87.5	18.1	77.6	12.3	75.5	15.3
<i>HR (R)</i>	70.2	9.2	80.0	10.7	69.8	7.9	71.0	11.9	72.5	14.2	72.8	13.8



**Table 3**

“U” of Mann-Whitney statistical test, and “p” values in the comparison between psychopathological groups and control subjects.

	<i>EMG</i>	<i>EMG</i>	<i>EMG</i>	<i>GSR</i>	<i>GSR</i>	<i>GSR</i>	<i>THE</i>	<i>THE</i>	<i>THE</i>	<i>HR</i>	<i>HR</i>	<i>HR</i>
	( <i>B</i> )	( <i>S</i> )	( <i>R</i> )	( <i>B</i> )	( <i>S</i> )	( <i>R</i> )	( <i>B</i> )	( <i>S</i> )	( <i>R</i> )	( <i>B</i> )	( <i>S</i> )	( <i>R</i> )
<i>PAD/GAD</i>	324.50	320.50	324.00	319.00	322.00	300.00	259.00	254.0	267.00	126.0	196.0	155.0
	(.89)	(.83)	(.88)	(.81)	(.85)	(.56)	(.18)	(.16)	(.24)	(.00)	(.01)	(.00)
<i>PAD/OCD</i>	99.00	119.00	117.00	21.00	31.00	29.00	114.00	110.0	114.00	109.0	105.0	106.0
	(.36)	(.88)	(.82)	(.00)	(.00)	(.00)	(.73)	(.62)	(.73)	(.60)	(.50)	(.52)
<i>PAD/HEALTHY</i>	168.00	96.00	201.00	166.00	167.00	159.00	184.00	173.0	185.00	254.0	219.0	272.0
	(.02)	(.00)	(.09)	(.02)	(.02)	(.01)	(.04)	(.02)	(.04)	(.53)	(.18)	(.79)
<i>PAD/MDE</i>	110.00	118.00	93.00	18.00	26.00	32.00	114.00	118.0	116.0	114.0	105.0	118.
	(.62)	(.85)	(.25)	(.00)	(.00)	(.00)	(.73)	(.85)	(.79)	(.73)	(.50)	(.85)
<i>PAD/AN</i>	61.50	69.00	60.00	16.00	18.00	15.00	84.00	82.00	82.50	84.00	63.00	81.00
	(.24)	(.44)	(.22)	(.00)	(.00)	(.00)	(.96)	(.89)	(.89)	(.96)	(.29)	(.85)
<i>GAD/OCD</i>	180.00	225.00	217.00	51.00	52.00	55.50	152.00	145.0	155.00	79.00	94.50	83.00
	(.27)	(.95)	(.81)	(.00)	(.00)	(.00)	(.08)	(.06)	(.09)	(.00)	(.00)	(.00)
<i>GAD/HEALTHY</i>	302.00	255.00	361.00	335.00	278.00	327.00	425.00	404.0	386.00	326.0	498.0	272.0
	(.00)	(.00)	(.03)	(.01)	(.00)	(.01)	(.19)	(.11)	(.07)	(.01)	(.72)	(.00)
<i>GAD/MDE</i>	208.00	221.00	179.00	40.00	47.00	58.00	152.00	154.0	151.00	85.00	110.0	115.0
	(.65)	(.88)	(.26)	(.00)	(.00)	(.00)	(.08)	(.09)	(.08)	(.00)	(.01)	.01
<i>GAD/AN</i>	113.00	149.00	90.50	41.00	35.00	32.00	135.00	127.5	118.00	82.00	80.50	82.00
	(.20)	(.82)	(.05)	(.00)	(.00)	(.00)	(.53)	(.39)	(.26)	(.03)	(.02)	(.03)
<i>OCD/HEALTHY</i>	136.00	61.00	135.00	113.00	111.00	116.00	103.00	87.00	97.00	163.0	124.0	190.0
	(.12)	(.00)	(.12)	(.03)	(.03)	(.04)	(.01)	(.00)	(.01)	(.41)	(.06)	(.91)
<i>OCD/MDE</i>	73.00	84.00	64.00	53.00	54.00	64.00	81.00	80.00	83.00	78.00	77.00	77.00
	(.58)	(1.00)	(.31)	(.11)	(.13)	(.31)	(.88)	(.84)	(.96)	(.76)	(.72)	(.72)
<i>OCD/AN</i>	26.50	54.00	27.00	57.00	52.00	50.00	57.00	52.00	56.00	54.00	46.00	56.00
	(.03)	(.79)	(.04)	(.95)	(.70)	(.60)	(.95)	(.70)	(.90)	(.79)	(.43)	(.90)
<i>HEALTHY/MDE</i>	120.00	100.00	119.00	86.00	84.00	94.00	100.00	99.00	96.00	163.0	128.0	189.0
	(.05)	(.01)	(.05)	(.00)	(.00)	(.01)	(.01)	(.01)	(.01)	(.41)	(.08)	(.89)
<i>HEALTHY/AN</i>	28.00	47.00	37.00	79.00	64.00	65.00	87.00	83.00	76.00	120.0	78.00	129.0
	(.00)	(.00)	(.00)	(.06)	(.02)	(.02)	(.11)	(.09)	(.05)	(.64)	(.06)	(.86)
<i>MD/AN</i>	38.00	51.00	51.00	39.00	44.00	56.00	55.00	53.00	55.00	56.00	47.00	57.00
	(.19)	(.65)	(.65)	(.21)	(.36)	(.90)	(.85)	(.74)	(.85)	(.90)	(.47)	(.95)



**Table 4**

**Descriptive statistics, Mean (M) and Standard Deviation (SD) of calculated indexes “response” and stress”**

	<i>PAD</i>		<i>GAD</i>		<i>OCD</i>		<i>HEALTHY</i>		<i>MDE</i>		<i>AN</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>response(EMG)</i>	96.7	136.4	84.6	108.3	115.4	119.7	56.3	54.1	82.4	69.0	20.7	22.62
<i>response (GSR)</i>	67.6	90.64	81.5	112.3	79.09	132.8	54.7	53.74	50.4	74.7	40.0	69.93
<i>response (THE)</i>	-.31	1.70	-.34	2.58	-.71	2.07	.57	1.09	.06	.35	.10	.79
<i>response (HR)</i>	15.2	11.03	9.31	9.25	16.91	21.89	18.7	14.2	10.7	10.8	4.40	4.71
<i>stress (EMG)</i>	.36	17.53	6.27	47.29	30.98	100.8	9.30	23.9	27.4	46.7	8.16	16.41
<i>stress (GSR)</i>	37.0	46.02	36.3	72.20	49.07	62.33	35.0	48.6	69.5	71.4	17.2	37.20
<i>stress (THE)</i>	.57	3.00	-.38	8.13	.34	1.98	1.28	1.96	.30	1.59	.07	1.65
<i>stress (HR)</i>	1.01	4.91	-.92	5.88	6.47	22.83	-3.38	5.98	2.90	8.26	.95	3.43



**Table 5**

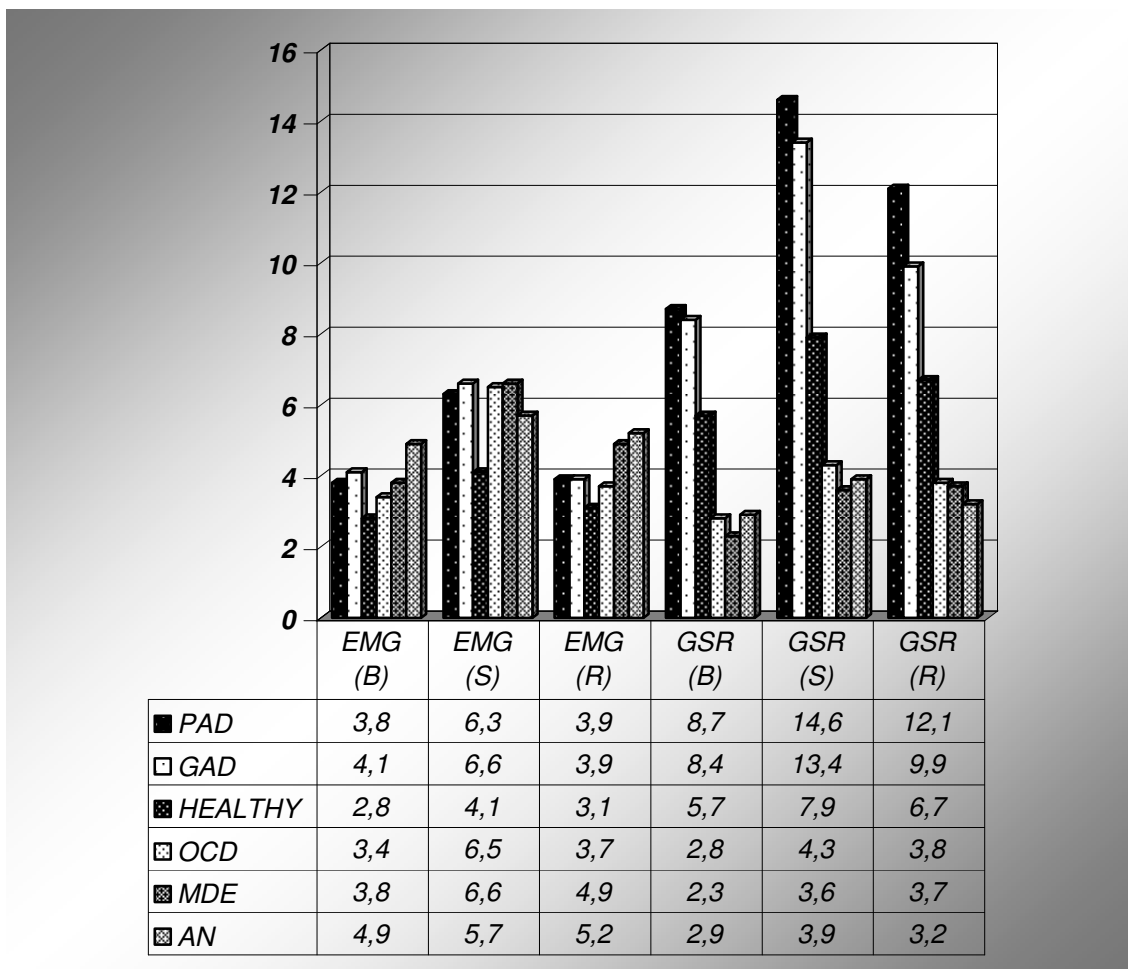
“U” of Mann-Withney statistical test, and “p” values in the comparison between all psychopathological groups on calculated indexes “response” and stress” and on all four psycho physiological parameters.

		<i>Res</i>	<i>Res</i>	<i>Res</i>	<i>Res</i>	<i>Str</i>	<i>Str</i>	<i>Str</i>	<i>Str</i>
		<i>EMG</i>	<i>GSR</i>	<i>THE</i>	<i>HR</i>	<i>EMG</i>	<i>GSR</i>	<i>THE</i>	<i>HR</i>
<i>GAD/PAD</i>	U	300	315	311	215	322	298	332	242
	p	.56	.75	.70	.03	.85	.53	.99	.10
<i>PAD/OCD</i>	U	112	114	120	102,00	112	113	117	114
	p	.68	.73	.91	.43	.68	.71	.82	.73
<i>PAD/HEALTHY</i>	U	266	284	173	262	234	277	257	167
	p	.70	.98	.02	.64	.30	.87	.57	.02
<i>PAD/MDE</i>	U	104	93	100	83	75	96	107	116
	P	.47	.25	.38	.13	.07	.31	.55	.79
<i>PAD/AN</i>	U	47	53	76	32	74	58	67	800
	p	.06	.12	.66	.01	.60	.19	.38	.81
<i>GAD/OCD</i>	U	188	204	227	174	224	190	214	164
	P	.36	.59	.99	.22	.95	.38	.75	.14
<i>GAD/HEALTHY</i>	U	511	498	285	302	428	495	459	443
	P	.85	.72	.00	.00	.20	.69	.39	.28
<i>GAD/MDE</i>	U	201	163	199	218	160	159	204	152
	P	.54	.14	.51	.83	.12	.11	.59	.08
<i>GAD/AN</i>	U	107	95	138	108	118	133	130	99
	P	.15	.07	.59	.16	.26	.49	.44	.09
<i>OCD/HEALTHY</i>	U	159	179	120	155	150	179	158	114
	P	.35	.69	.05	.30	.24	.69	.34	.03
<i>OCD/MDE</i>	U	81	78	84	69	62	71	79	84
	P	.88	.76	1.00	.45	.26	.51	.80	1.00
<i>OCD/AN</i>	U	31	42	56	28	40	41	47	54
	P	.07	.29	.90	.04	.24	.26	.47	.79
<i>HEALTHY/MDE</i>	U	144	143	107	126	150	141	139	107
	P	.18	.18	.02	.07	.24	.16	.14	.02
<i>HEALTHY/AN</i>	U	76	88	86	35	134	92	75	68
	P	.05	.12	.11	0.00	.99	.16	.05	.03
<i>MDE/AN</i>	U	15	52	58	33	49	27	49	57
	P	.00	.70	.00	.10	.56	.04	.56	.95



**Figure 1**

Mean values at rest (baseline, B), and in the stress (S) and recovery (R) phases

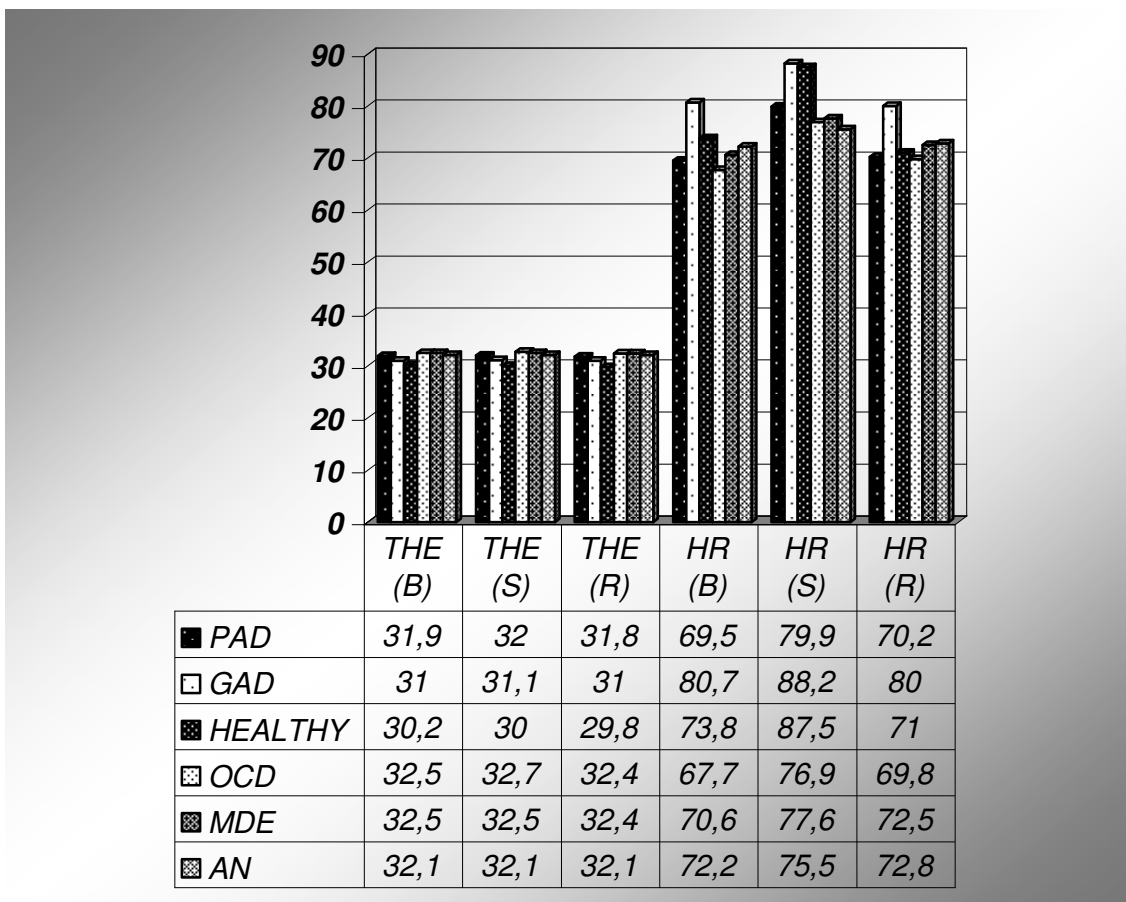


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**Figure 2**

**Mean values at rest (baseline, B), and in the stress (S) and recovery (R) phases**



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