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SCIENTIFIC REPORT ON TESTING PROTECTIVE INFLUENCE ON HUMAN ORGANISM AGAINST WIRELESS ROUTER RADIATION AND ENERGY INFLUENCE ON HUMAN ORGANISM

FOR THE PRODUCT

BD PROTECT EMF+ Protection Bracelet

Customer

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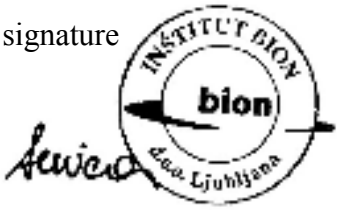

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1 INTRODUCTION

1.1 GENERAL

An essential research area at BION Institute is measuring the effects/influences of physically as yet undefined and unrecognized (subtle) field(s). Conventional measuring devices cannot measure these fields. Even unconventional devices, however, in the majority of cases, are not yet capable of measuring this kind of subtle fields reliably enough, although the technology is constantly improving. Mostly, these fields and their effects cannot be explained by commonly accepted theoretical interpretations, even though some scientists have offered possible explanations that span from quantum vacuum to dark matter.

In many years of research and testing, the BION Institute developed an alternative path that enables us to use a *human organism* as a reliable detector of such weak or subtle influences. We learned how to express these detections via easily measurable general physiological effects monitored through electrophysiological measurements. This is why we can give a valid assessment of the supposed biological influence or non-influence of devices based on a subtle fields' influence. The latter may represent a stimulating factor or a protective shield against negative radiation from the environment. If we find the effects of the supposed emission statistically significant, we issue the appropriate certificate.

1.2 SPECIFIC

The company Life Harmony Energies, ordered testing of a supposed protective influence and energy influence of the BD PROTECT EMF+ Protection Bracelet (Figure 1). The customer claims this bracelet has an energy influence on human organism as well as a protective one against different types of harmful radiation. By using clinical testing methodology, in the first part of testing, we verified the supposed protection against wireless router radiation (Figures 2 and 3, from now on called Wifi) by exposing volunteers to the supposed protective effect of the bracelet when the volunteer is simultaneously exposed to the Wifi radiation. In the second part, we verified the supposed energy effect of the bracelet by exposing volunteers to the supposed energy effect of the bracelet when the volunteer is unexposed to any other specific non-ionizing radiation. In both tests, we monitored various physiological parameters (skin conductance, heart rate, muscle tension, respiration, finger temperature, and some other derivate parameters) by electrophysiological measurements.

Figure 1: BD PROTECT EMF+ Protection Bracelet device used in testing.

In the first part, the volunteers were arranged into **three testing situations**. One situation represented the *absolute control* with neither Wifi radiation applied nor a working BD PROTECT EMF+ Protection Bracelet used. Its purpose was to show normal dynamics in the measured physiological parameters in a usual electromagnetic environment. The second situation represented *exposure to Wifi radiation* with a sham BD PROTECT EMF+ Protection Bracelet, to discern solely the influence of the applied microwave radiation on human physiology. The third situation was the one with both devices, *Wifi and a working BD PROTECT EMF+ Protection Bracelet*, wherefrom the supposed and tested protective effect should disclose itself. With the help of various statistical methods, we compared and evaluated the data of all three situations gained by measuring the enumerated parameters and made conclusions as to the protective influence of the BD PROTECT EMF+ Protection Bracelet.

Figure 2: Test setup during testing the supposed protective influence on the human organism against wireless router radiation of the BD PROTECT EMF+ Protection Bracelet. After all the electrodes were attached to a volunteer, he/she sat for 30 minutes while electrophysiological parameters were measured. During the measurements, the Wifi router was hidden under the cardboard box so that neither the test assistant nor the volunteer knew which situation is being tested at a particular time.

Figure 3: During the measurements, Wifi router was placed 1 m away from the volunteer.

In the second part, the volunteers were arranged into **two testing situations**. The first situation represented the *control* with a sham BD PROTECT EMF+ Protection Bracelet used. Its purpose was to show normal dynamics in the measured physiological parameters. The second situation represented the effect group with a *working BD PROTECT EMF+ Protection Bracelet*. A comparison to the first testing situation should disclose an energy effect of the BD PROTECT EMF+ Protection Bracelet on the human organism. We tested each volunteer in both situations, but neither volunteers nor the test assistant knew whether a working BD PROTECT EMF+ Protection Bracelet or a sham one was used (a double blind test methodology).

Figure 4: Test setup during testing the supposed energy influence on the human organism.

2 MATERIALS AND METHODS

2.1 TEST DESIGN

Manufacturer's claims were verified by scientific tests including 15 volunteers based on principles of clinical testing. This means that the tests were:

- **prospective** (general criteria for the efficiency of the device's tension were determined in advance);
- **with placebo effect ruled out** (volunteers didn't know whether they were exposed to the device's influence of not);
- **double-blind** (even the test assistant didn't know whether the working or sham BD PROTECT EMF+ Protection Bracelet was used and neither if the Wifi was ON or OFF);
- **randomized** (the decisions about the order of different situations were made randomly).

In the first test, we tested the influence of the BD PROTECT EMF+ Protection Bracelet on the electrophysiological parameters of volunteers exposed to Wifi radiation. Volunteers were subject to three different test situations:

- Wifi turned ON with the working BD PROTECT EMF+ Protection Bracelet - subject to a presumed protective influence of the bracelet (**Wifi & Bracelet situation**),
- Wifi turned ON with the sham BD PROTECT EMF+ Protection Bracelet - detecting the influence of Wifi radiation (**Wifi situation**),
- Wifi turned OFF with the sham BD PROTECT EMF+ Protection Bracelet - detecting the influence of background radiation with no active Wifi router in the vicinity and with sham BD PROTECT EMF+ Protection Bracelet (**Control situation**).

In the second test, we tested the energy influence of the BD PROTECT EMF+ Protection Bracelet on the electrophysiological parameters of volunteers. Volunteers were subjected to two different experimental situations in a random order:

- **Bracelet situation**: volunteers were wearing a working BD PROTECT EMF+ Protection Bracelet.
- **Control situation**: volunteers were wearing a sham BD PROTECT EMF+ Protection Bracelet.

Tests were conducted from the 2nd to 21st of July 2020 at the BION Institute with 15 volunteers aged from 31 to 72 (ten women and five men). Before the tests, we instructed the volunteers not to eat a big meal at least one hour before the test and not to drink coffee, alcohol or energy drinks at least three hours before the test. We tested each person four times in four different days, every time at the same time of the day. This ruled out the effects of other factors as much as possible (e.g., the volunteer could be tired after many hours of work, but is expected to be more or less at the same level of fatigue at the same time of day). Random order of all four situations was applied to every volunteer (the principle of randomization).

Volunteers sat for half an hour in a comfortable wooden chair. During this time skin conductance, heart rate, muscle tension, respiration, and finger temperature were measured (Figures 2, 3 and 4). A J&J Engineering I330 C2+12 device was used to measure mentioned physiological parameters. Both, the working BD PROTECT EMF+ Protection Bracelet and the sham one looked the same so that neither volunteers nor the test assistant could tell one from the other. Wifi router was 1 m away from volunteers and hidden under the cardboard box so that neither the test assistant nor the volunteers knew which situation is being tested at a particular time (Figures 2 and 3). Either the working or the sham bracelet was placed on the volunteer's left wrist. Before starting the measurements, the test assistant told every volunteer that Wifi exposure and a tested protection bracelet were being included in different test situations. Many volunteers have long-term testing experiences involving various devices and tend to be quite indifferent regarding different testing situations. When measurements started, the test assistant left volunteers alone in the room.

2.2 MEASUREMENT OF PHYSIOLOGICAL PARAMETERS

Measurements of physiological parameters by electrophysiological methods enable us to monitor dynamical responses to any influencing agent working on the human organism in real-time. We measure the following parameters: heart rate, muscle tension, skin conductance, finger temperature, and respiration.

- **Heart rate** (frequency of heartbeat, HR) is calculated from the electrocardiogram (ECG).
- **Muscle tension** (electromyogram, EMG) is measured on the right forearm. The EMG shows us any artefacts that could appear on the ECG due to arm movements.
- **Skin conductance** (SC) is measured on the fingertips of the right hand, where skin conductance varies the most. Skin conductance measurements are part of lie detectors because both, sweating as well as the blood flow affect skin conductance and are regulated by the parasympathetic nervous system. The latter is a part of the autonomic nervous system that is not controlled by our consciousness, so we cannot regulate it just by simple intention. In general, skin conductance is higher when a person is under stress (more sweating, higher blood flow), but sometimes the response may be much more complex.
- **Finger temperature** (TMP) is measured on the tip of the middle finger of the right hand.
- **Respiration** is monitored with a special extendable elastic belt, measuring the **thorax expansion** (TE), which makes it possible to calculate the **respiration rate** (RR) and **thorax expansion difference** (TED).

3 TESTING PROTECTIVE INFLUENCE ON HUMAN ORGANISM AGAINST WIRELESS ROUTER RADIATION

3.1 DATA ANALYSIS

After the measurements, we exported all data to Excel files with the sampling frequency of one second. The data was graphically presented and statistically analyzed with different software, such as *Gnumeric, R* and *Jamovi*. For every volunteer, we first calculated sixty-second medians and then standardized the data to the median of the first two minutes (quotient between the median of the given time and the median of the first two minutes). Based on these data, we calculated medians with all 15 volunteers for each measured parameter and presented them in graphs. Since physiological parameters may vary with time, we divided the whole 30 min session into two 15 minutes parts and evaluated statistical parameters for each part separately. The first 15 minutes part is named **Part A** and the second one **Part B**.

To check for the difference between all three test situations we used the Friedman test. We conducted post hoc tests (Wilcoxon signed-rank test) to check for the differences between different combinations of test situations. We used the Levene's test for equality of variances to check if the application of BD PROTECT EMF+ Protection Bracelet caused any important changes in data variability. The results of all statistical tests were corrected with the Holm-Bonferroni correction for multiple comparisons.

3.2 RESULTS WITH INTERPRETATION

An overview of the Friedman test results demonstrates that there are statistically significant differences between the three experimental situations for all measured parameters except thorax expansion (Table 1). Muscle tension only demonstrates a significant difference in Part B of the measurement. Additional comparisons between different combinations of situations were made in the post hoc test, which revealed that there was no significant difference between any of three comparisons in Part A of the heart rate measurements, although two of them are quite close to it (Table 2). Results for all other parameters are in line with the Friedman test. With Levene's test, we found that the Part A of the muscle tension measurement was the only statistically significant difference between any combinations of situations for data variability.

Table 1: p-values of the Friedman test based on 60-second medians for each parameter during both parts of measurements. Holm-Bonferroni correction for multiple comparisons is applied to the p-values in the table. Values shaded in green represent statistically significant differences between at least two of the three different experimental situations ($p < 0.05$). Marks: EMG – muscle tension, HR – heart rate, SC – skin conductance, RR – respiration rate, TMP – finger temperature, TED – thorax expansion depth.

	Part A (0-15 min)	Part B (15-30 min)
EMG	0.3442	0.0000
HR	0.0171	0.0000
SC	0.0006	0.0000
RR	0.0030	0.0000
TMP	0.0063	0.0000
TED	0.8585	0.0849

Table 2: Summary of post hoc tests (Wilcoxon signed-rank test) corrected with Holm-Bonferroni correction for multiple comparisons. Values shaded in green represent statistically significant differences between two experimental situations ($p < 0.05$). Values shaded in light green represent almost statistically significant differences between two experimental situations ($0.05 < p < 0.1$). Marks: EMG – muscle tension, HR – heart rate, SC – skin conductance, RR – respiration rate, TMP – finger temperature, TED – thorax expansion depth.

Situation comparison	Part A			Part B		
	Wifi	Wifi & Bracelet	Wifi & Bracelet	Wifi	Wifi & Bracelet	Wifi & Bracelet
	Control	Control	Wifi	Control	Control	Wifi
EMG	0.1151	0.7279	0.5152	0.0087	0.0087	0.5630
HR	0.0689	0.8042	0.0698	0.0087	0.0157	0.1989
SC	0.6038	0.0157	0.0261	0.0166	0.0087	0.0087
RR	0.0689	0.0353	1.0000	0.0087	0.0087	1.0000
TMP	0.0098	0.1659	1.0000	0.0107	0.0087	0.1658
TED	1.0000	0.8042	1.0000	1.0000	0.8042	1.0000

In the following, we represent graphs for each measured parameter, belonging to all three situations and the two measurement's parts. The height of bars represents normalized values (to the first two minutes) so that all parameter measurements can be compared.

Regarding the muscle tension (Figure 5) in Part A, a protective effect is visible since the Wifi & Bracelet situation is closer to the Control situation than the Wifi situation. Since the difference Wifi & Bracelet vs. Wifi situation is not statistically significant, in this case we may speak about a protective trend.

Heart rate demonstrates a protective influence, as values for the Wifi & Bracelet situation are lower when compared to the Wifi situation (Figure 6) with marginal statistical significance in Part A, and in both cases incline towards the Control situation.

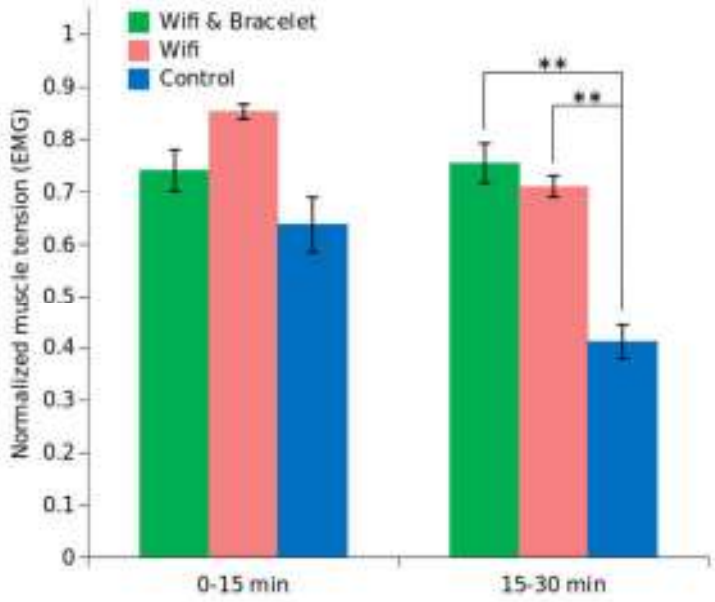

Figure 5: Normalized muscle tension (EMG) from fifteen volunteers during two parts of measurements for all three test situations (*Wifi & Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist with Wifi router turned ON, *Wifi*: sham bracelet with Wifi turned ON, *Control*: sham bracelet with Wifi turned OFF). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two parameters with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

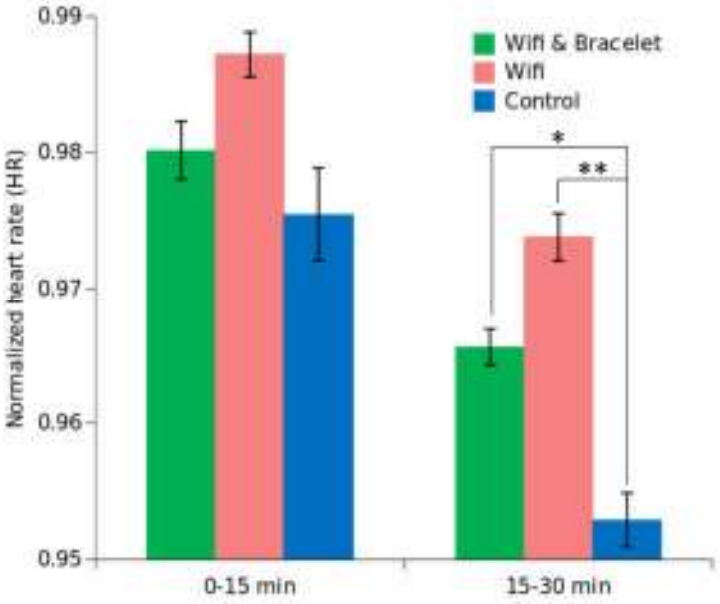

Figure 6: Normalized heart rate (HR) from fifteen volunteers during two parts of measurements for all three test situations (*Wifi & Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist with Wifi router turned ON, *Wifi*: sham bracelet with Wifi turned ON, *Control*: sham bracelet with Wifi turned OFF). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two parameters with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

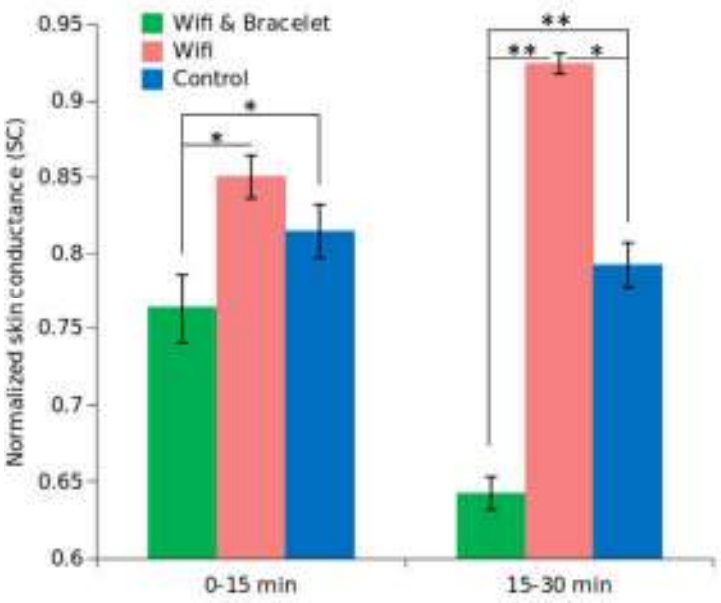

Figure 7: Normalized skin conductance (SC) from fifteen volunteers during two parts of measurements for all three test situations (*Wifi & Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist with Wifi router turned ON, *Wifi*: sham bracelet with Wifi turned ON, *Control*: sham bracelet with Wifi turned OFF). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two parameters with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

Results for the skin conductance (Figure 7) show a great difference between Wifi & Bracelet and Wifi situation in both measurement parts. Both times the difference is even greater than the difference between Wifi and Control situation (which is even not statistically significant in Part A) and goes in the same direction. Both differences in Wifi & Bracelet vs. Wifi situations are statistically significant.

Results for the standardized respiration rate (Figure 8) show a negligible difference between Wifi & Bracelet and Wifi situation, especially if compared to the Control situation. It seems that the respiration rate is unaffected by the bracelet's protective field.

Situation with temperature measurements (Figure 9) is similar to one of respiration rate, however in Part B it assumes a trend that shows its own energy influence in lowering the finger temperature.

Thorax expansion depth (Figure 10) has no statistically significant differences however, we may still speak about trends. While there are no clear trends seen in Part A, in Part B there is an indication of the bracelet's own energy influence during Wifi exposure on the human organism.

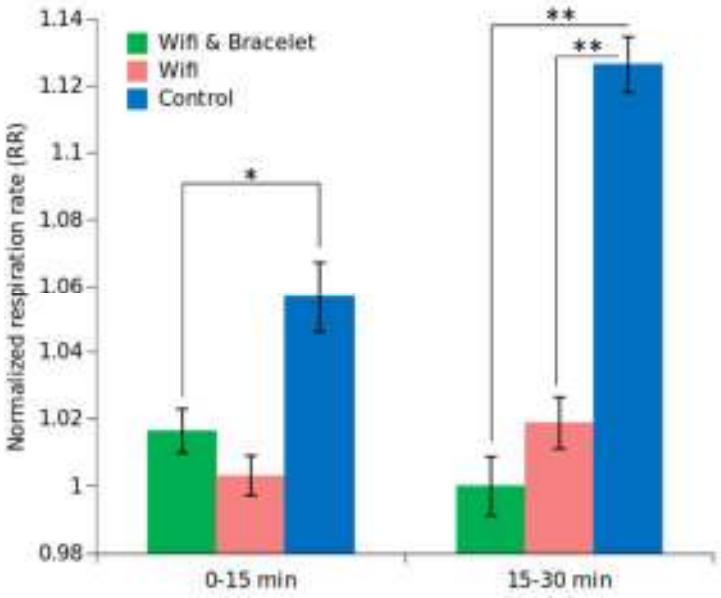

Figure 8: Normalized respiration rate (RR) from fifteen volunteers during two parts of measurements for all three test situations (*Wifi & Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist with Wifi router turned ON, *Wifi*: sham bracelet with Wifi turned ON, *Control*: sham bracelet with Wifi turned OFF). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two parameters with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

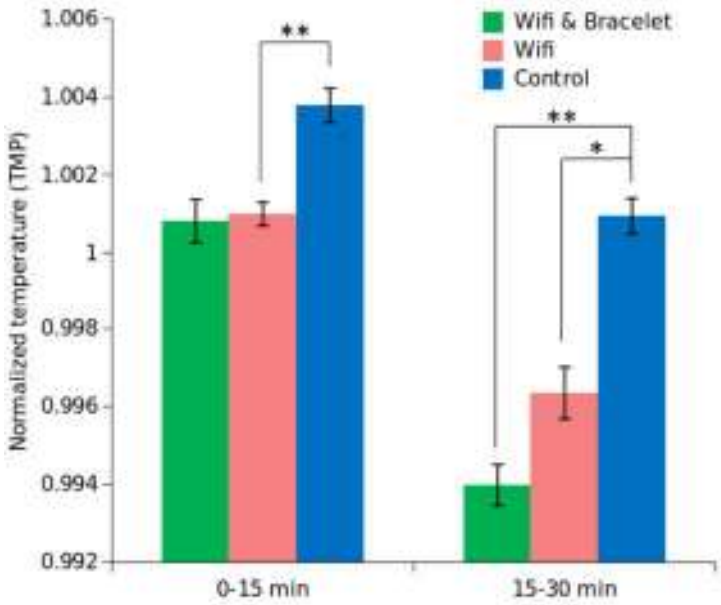

Figure 9: Normalized finger temperature (TMP) from fifteen volunteers during two parts of measurements for all three test situations (*Wifi & Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist with Wifi router turned ON, *Wifi*: sham bracelet with Wifi turned ON, *Control*: sham bracelet with Wifi turned OFF). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two parameters with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

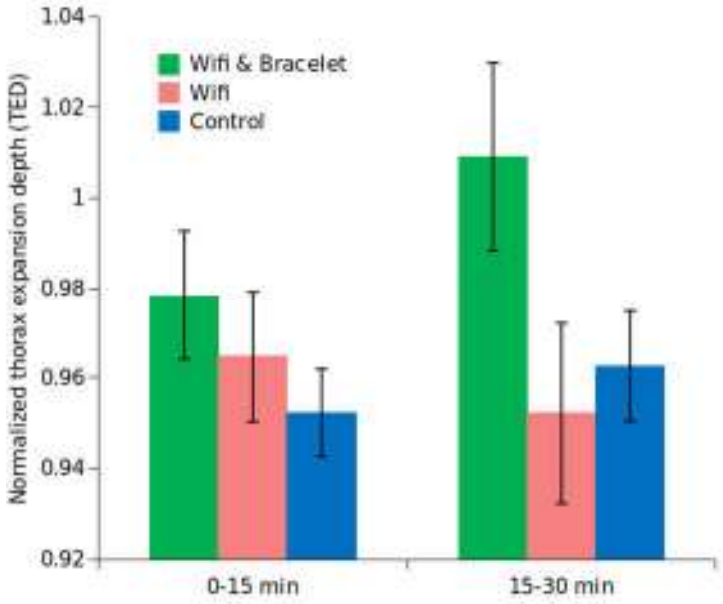

Figure 10: Normalized thorax expansion depth (TED) from fifteen volunteers during two parts of measurements for all three test situations (*Wifi & Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist with Wifi router turned ON, *Wifi*: sham bracelet with Wifi turned ON, *Control*: sham bracelet with Wifi turned OFF). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two parameters with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

Besides statistical differences, we also calculated the standardized effect size, which speaks about the magnitude and the sign (direction) of the influence. To calculate the standardized effect size we used Hedges's g with color-coding for the intensity and the direction of influence. Values are presented in Table 3.

Table 3: Overview of the Hedge's g effect size on different physiological parameters. Three different comparisons between test situations are presented. Negative values (blue color) signify that the first situation decreased the parameter compared to the second situation, while the positive values (red color) signify an increase of the parameter. Values with an underlined black font signify parameters yielding a statistically significant difference between two chosen situations, the values written in grey are not statistically significant, at least after the Holm Bonferroni correction. The intensity of the background color signifies the intensity of change (an absolute value less than 0.2 indicates a *small change*, an absolute value between 0.2 and 0.8 indicates a *medium change*, an absolute value between 0.8 and 2 indicates a *large change* and an absolute value above 2 indicates a *huge change*). Marks: EMG – muscle tension, HR – heart rate, SC – skin conductance, RR – respiration rate, TMP – finger temperature, TED – thorax expansion depth.

Comparison	Time	EMG	HR	SC	RR	TMP	TED
Wifi vs. Control	Part A	0.991	0.795	0.394	−1.122	−1.496	−0.108
	Part B	2.350	2.337	2.074	−2.886	−1.467	0.007
Wifi & Bracelet vs. Control	Part A	0.303	0.174	−0.465	−1.142	−1.142	0.041
	Part B	2.252	1.596	−2.153	−3.283	−2.693	0.491
Wifi & Bracelet vs. Wifi	Part A	−0.769	−0.797	−0.823	0.011	−0.026	0.125
	Part B	0.443	−1.094	−5.819	−0.591	−0.756	0.385

We also made an investigation into the differences between variabilities of the involved three situations as it may also disclose some valuable information about the protective effect. It is independent of the above analyses in statistical differences and effective sizes.

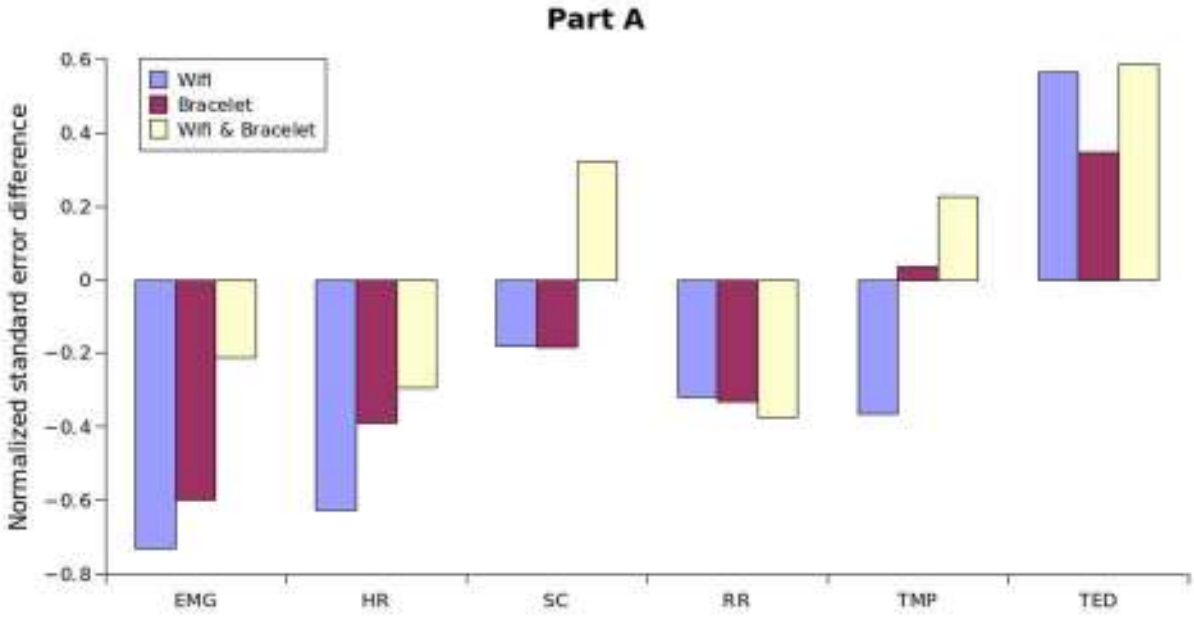

Figure 11: The graph represents the difference between the standard error values of the Control situation (zero value in the graph) against Wifi, Bracelet or Wifi & Bracelet situation for Part A of the measurement. For example, standard error in Part A for muscle tension (EMG) in the Wifi situation is 70% smaller than standard error of the Control situation.

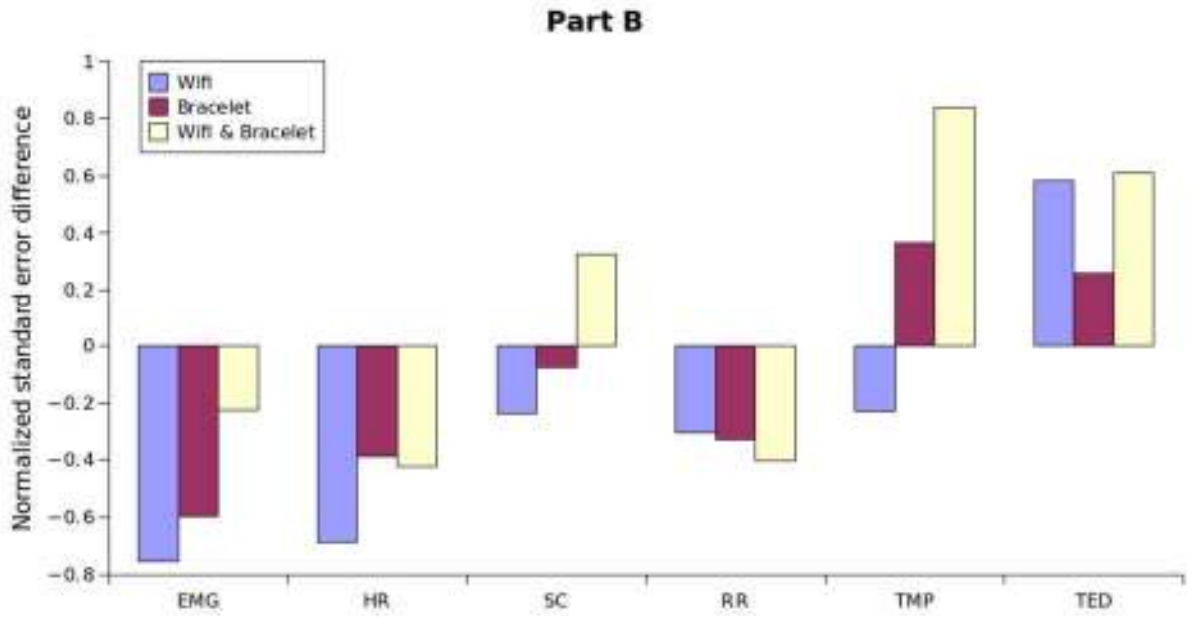

Figure 12: The graph represents the difference between the standard error values of the Control situation (zero value in the graph) against Wifi, Bracelet or Wifi & Bracelet situation for Part B of the measurement. For example, standard error in Part B for muscle tension (EMG) in the Wifi & Bracelet situation is 20% smaller than standard error of the Control situation.

From Figures 11 and 12 we can observe how Wifi situation has a consistently lower variability compared to Control situation for muscle tension, heart rate, skin conductance and finger temperature. When we compare this to the Wifi & Bracelet situation, we can see that it has a consistently greater standard error compared to Wifi situation for most of the parameters, which brings the standard error of the Wifi & Bracelet situation closer, sometimes even much closer, to the Control situation. This consistency of results strongly supports the protective effect of the BD PROTECT EMF+ Protection Bracelet.

3.3 DISCUSSION WITH CONCLUSION

If we look at significant differences (Table 2), the most conspicuous protective effect, i.e. an effect that counteracts the influence of Wifi radiation, is seen with the skin conductance parameter (Figure 7). It also has a huge standardized effective size (Table 3), and this effect exceeds even the difference between Control and Wifi situation (Figure 7). With the heart rate (Figure 6), we see a similar situation with a high effective size in Part B, although statistically non-significant. The protective effect can be seen also from the muscle tension parameter in Part A as a trend with a medium effective size ($g = -0.769$; Table 3). On the other hand, the thorax expansion depth shows an energy influence of the BD PROTECT EMF+ Protection Bracelet (especially in Part B, Figure 10) with concomitant strong Wifi radiation, with a medium effective size (Table 3) and as a trend.

Strong support for a protective effect against Wifi radiation may be inferred also from the comparison of variabilities (Figures 11 and 12). Here, we may see that Wifi situation mostly has a lower variability (except for TED parameter) against Control situation. We interpret this phenomenon as an indication that strong irradiation forces the organism into a more specific physiological state, where it doesn't have that much freedom as if without such a burden. From Figures 11 and 12, we may also see that Bracelet situation shows the same kind of effect, although not so conspicuous (and not observed in TMP and TED parameters). However, regarding the tested protective effect, it is important that Bracelet & Wifi situation (the protective situation) mostly clearly demonstrated a much lower variability (closer to Control situation if negative or even lower than Control situation as seen from SC and TMP in both parts). Only regarding heart rate, this phenomenon is not observed.

From all these results, we may conclude that the BD PROTECT EMF+ Protection Bracelet has an objective protective effect from relatively strong Wifi radiation on the human organism.

4 TESTING ENERGY INFLUENCE ON HUMAN ORGANISM

4.1 DATA ANALYSIS

Data preparation was the same as in the protective influence test. Sampling frequency was one second, data was averaged into sixty-second medians and then data was normalized to the median of the first two minutes. After we calculated medians with all 15 volunteers for each measured parameter and presented them in graphs. The whole 30 min session was divided into two 15 minutes parts and evaluated separately. As in the protection test, the first 15 minutes part is named **Part A** and the second one **Part B**.

To check the difference between the two experimental situations we used the Wilcoxon signed-rank test. We used the Levene's test for equality of variances to check if the BD PROTECT EMF+ Protection Bracelet caused any significant changes in data variability. The statistical outcome of the results for all tests was corrected with Holm-Bonferroni correction for multiple comparisons.

4.2 RESULTS WITH INTERPRETATION

An overview of the results demonstrates that there are statistically significant differences between two experimental situations for all parameters except finger temperature (Table 4, Wilcoxon signed-rank test). Skin conductance and respiration rate are significantly different in only one of two parts, while all other parameters are significantly different in both parts. Only muscle tension shows a statistically significant difference in data variability via Levene's test in Part A only (Table 4, Levene's test).

Table 4: p-values of the Wilcoxon signed-rank test and Levene's test based on one-minute medians for each parameter during both parts of measurements. Holm-Bonferroni correction for multiple comparisons is applied to the p-values in the table. Values shaded in green represent statistically significant differences between the Bracelet and the Control situation ($p < 0.05$). Marks: EMG – muscle tension, HR – heart rate, SC – skin conductance, RR – respiration rate, TMP – finger temperature, TED – thorax expansion depth.

	Wilcoxon signed-rank test		***Levene's test***	
	Part A	**Part B**	**Part A**	**Part B**
EMG	0.0496	0.0087	0.0045	0.2908
HR	0.0345	0.0107	0.9358	1.0000
SC	0.0089	0.0996	1.0000	0.4731
RR	0.2951	0.0089	1.0000	0.4731
TMP	0.0857	0.2951	1.0000	0.5113
TED	0.0496	0.0087	1.0000	1.0000

In the following, we represent graphs for each measured parameter, belonging to both situations and the two measurement's parts. The height of bars represents normalized values (to the first two minutes) so that all parameter measurements can be compared.

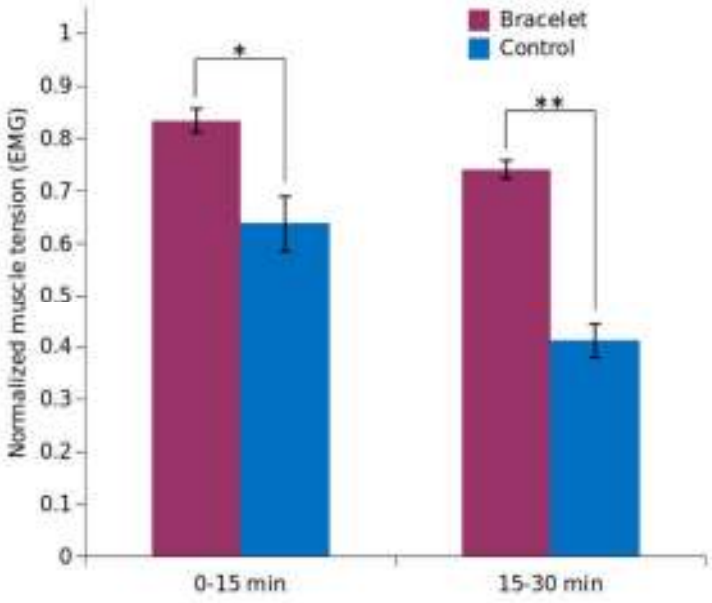

Figure 13: Normalized muscle tension (EMG) from fifteen volunteers during two parts of measurements for both test situations (*Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist, *Control*: sham bracelet). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two situations with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

The comparison of both parts shows a significantly raised muscle tension (Figure 13) during the Bracelet situation, which speaks about a vitalizing (energizing) influence. Since the g-values are very high (0.856 and 2.647, respectively), we may speak about a strong influence.

Similar to the EMG parameter, heart rate (Figure 14) also shows a significant raise in both parts, indicating the same type of influence. The g-values are also similar, which speaks of a strong effect.

Skin conductance (Figure 15) shows a different behavior in different parts of measuring. In the first part, it works in the direction of energizing (more tension, akin to EMG, and HR) in a significant manner and with a relatively high g-value. However, in Part B, it turns to a relaxing influence. The latter effect is non-significant, yet the g-value is very high; therefore, it may be declared as a strong trend.

Contrary to EMG and HR, the respiration rate (Figure 16) shows an appeasing effect, especially in Part B, where the effect is also statistically significant, with a huge effect size (g-value) of -1.86.

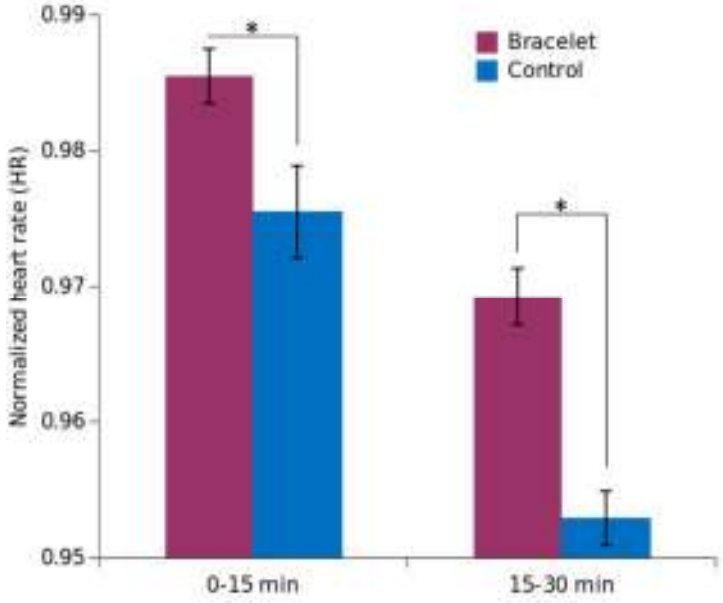

Figure 14: Normalized heart rate (HR) from fifteen volunteers during two parts of measurements for both test situations (*Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist, *Control*: sham bracelet). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two situations with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

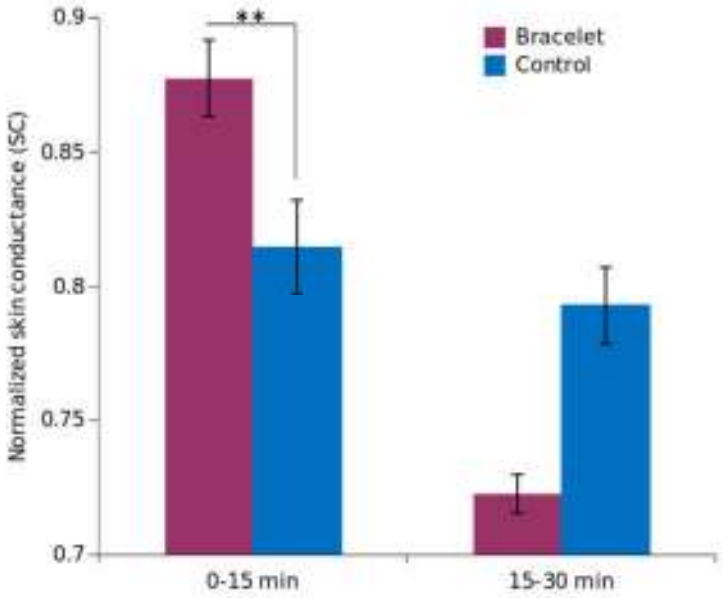

Figure 15: Normalized skin conductance (SC) from fifteen volunteers during two parts of measurements for both test situations (*Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist, *Control*: sham bracelet). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two situations with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

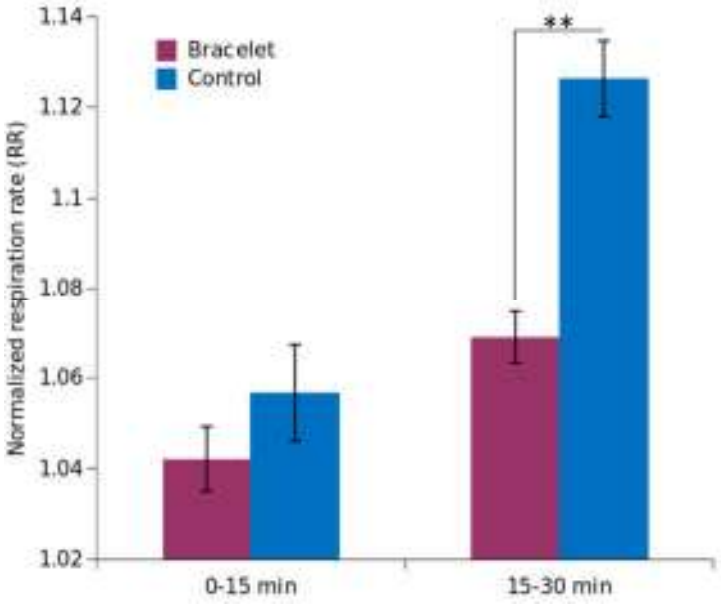

Figure 16: Normalized respiration rate (RR) from fifteen volunteers during two parts of measurements for both test situations (*Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist, *Control*: sham bracelet). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two situations with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

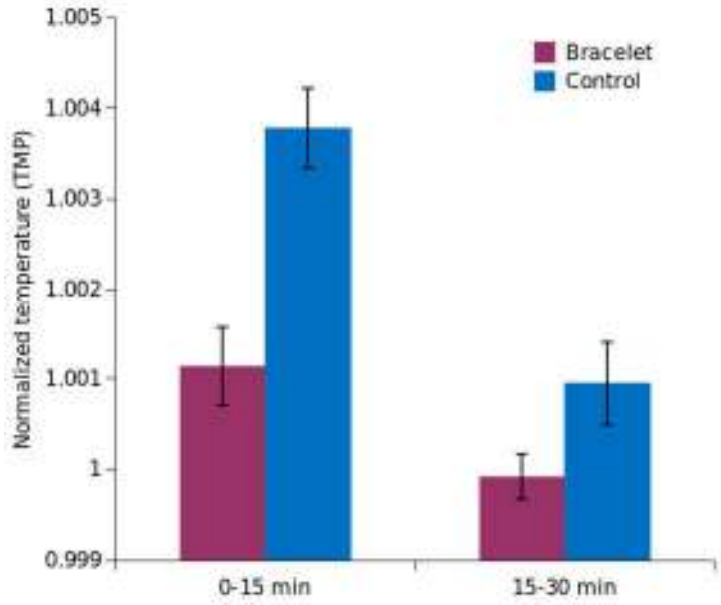

Figure 17: Normalized finger temperature (TMP) from fifteen volunteers during two parts of measurements for both test situations (*Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist, *Control*: sham bracelet). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two situations with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

The finger (peripheral) temperature (Figure 17) shows a consistent and relatively high (g-value) diminution during the Bracelet situation, however, it is not statistically significant and may be treated as a trend.

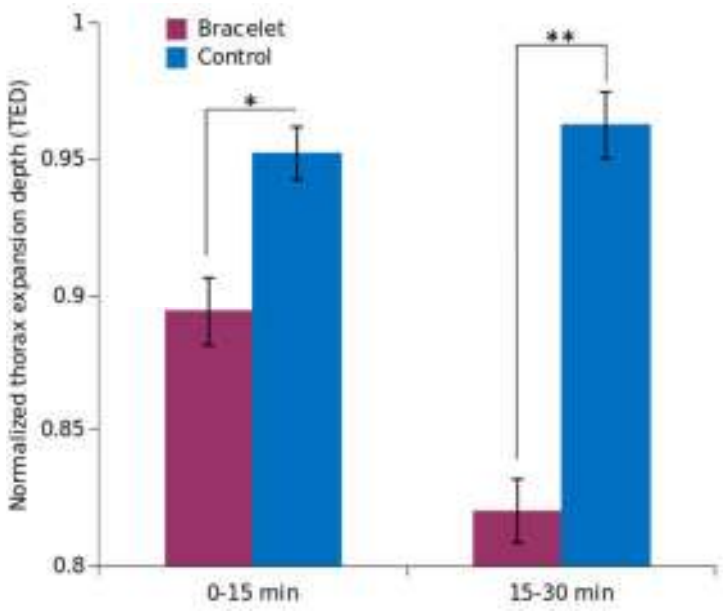

Figure 18: Normalized thorax expansion depth (TED) from fifteen volunteers during two parts of measurements for both test situations (*Bracelet*: BD PROTECT EMF+ Protection Bracelet on the volunteer's wrist, *Control*: sham bracelet). Mean values ± standard error (N = 15) are shown. A single asterisk (*) represents a statistically significant difference between two situations with $p < 0.05$ and a double asterisk (**) represents a statistically significant difference with $p < 0.01$.

Thorax expansion depth (Figure 18) shows a decrease when comparing the Bracelet situation to the Control situation. In both parts, the effect is statistically significant, and with a very high standardized effect size (g-value).

Besides statistical differences, we also calculated the standardized effect size, which speaks about the magnitude and the sign (direction) of the influence. For calculating the standardized effect size, we used Hedges's g with color-coding of the intensity and the direction of the influence. The values are presented in Table 5.

Table 5: Overview of the Hedge's g effect size on different physiological parameters. Negative values (blue color) signify that the Bracelet situation decreased the parameter compared to the Control situation, while the positive values (red color) signify an increase of the parameter. Values with an underlined black font signify parameters yielding a statistically significant difference between two chosen situations, the values written in grey are not statistically significant, at least after the Holm Bonferroni correction. The intensity of the background color signifies the intensity of change (an absolute value less than 0.2 indicates a *small change*, an absolute value between 0.2 and 0.8 indicates a *medium change*, an absolute value between 0.8 and 2 indicates a *large change* and an absolute value above 2 indicates a *huge change*). Marks: EMG – muscle tension, HR – heart rate, SC – skin conductance, RR – respiration rate, TMP – finger temperature, TED – thorax expansion depth.

Comparison	Time	EMG	HR	SC	RR	TMP	TED
Bracelet vs. Control	Part A	0.856	0.620	0.715	−0.454	−1.116	−1.136
	Part B	2.647	1.739	−1.113	−1.860	−0.622	−2.825

4.3 DISCUSSION WITH CONCLUSION

As seen in Table 4, many comparisons are statistically significant, which means that the BD PROTECT EMF+ Protection Bracelet definitely has its own energy influence, even when there is no specific electro-smog in the human organism's surroundings. If we look into the nature of the bracelet's influence, we may say that it works in the sense of vitalizing or energizing the organism (Figures 13 – 18, Table 5). This effect, measured through standardized effective size (g-value), is very strong, even huge (EMG, Part B), with EMG and HR parameters. It may be seen also with the SC parameter in Part A. On breathing parameters (RR and TED), the bracelet works in a calming manner. The same kind of effect may be observed also with the finger temperature (Figure 17), although only as a trend, lacking statistical significance.
As already said, the energy influence of the bracelet may be seen in regards to parameters having different variabilities in different testing (Figures 11 and 12). Here, the bracelet shows its own working on the organism, although not so big as a Wifi router, which is understandable, as the former influence is expected to be subtler, giving more freedom to the bodily physiology.

In conclusion, based on statistical analysis, we may say that the BD PROTECT EMF+ Protection Bracelet has an objective energy effect on the human organism, mostly in a vitalizing (energizing) manner; however, on some parameters it may work soothingly.

5 CONCLUSION

Based on sufficient statistically significant differences between Wifi & Bracelet vs. Wifi situation and Control vs. Bracelet situation demonstrated in the testing of the protective and energy influence of the product *BD PROTECT EMF+ Protection Bracelet*, we acknowledge that the product meets all the criteria required to obtain the *Certificate of Protective Influence on Human Organism against wireless router radiation* No. 0302, and the *Certificate of Energy Influence on Human Organism* No. 0260, which is announced on webpage: http://bion.si/en/testing-certificates.

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