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Catalyzing Success Through Scientific Strategy

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1. ABOUT US

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2. DISCLAIMER

Scientifica Consulting was not involved in the planning, design, or execution of this study, nor in the collection of the original data. The role of Scientifica Consulting was limited to performing statistical analyses of the dataset as it was provided.

The analyses, interpretations, and reported outcomes are exploratory in nature and do not constitute medical advice, treatment recommendations, or diagnostic tools. Individual experiences may vary, and no guarantees of results are implied or should be inferred.

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Align Mat Pilot Study at BrainTap Headquarters

This pilot study was designed to evaluate the acute effects of a single session on the Align Mat, using the P5 program (39.6 Hz). The study was conducted at BrainTap Headquarters. The objective was to measure short-term changes in autonomic nervous system function using NeuralChek assessments performed immediately before and after the intervention.

The study population consisted of fifteen adults, including eight females and seven males, with a mean age of 47.7 years. The design included one pre-session and one post-session assessment. Each participant underwent a 20-minute session on the Align Mat using the P5 program at 39.6 Hz.

All statistical analyses were conducted using GraphPad Prism 8.0. The distribution of each dataset was examined with the Shapiro–Wilk test to assess normality. Outliers were identified and removed when appropriate. Depending on the distribution results, comparisons between pre- and post-session measures were performed using paired or unpaired parametric t-tests or their non-parametric equivalents. Statistical significance was defined as $p < 0.05$. To aid interpretation, percentage changes were calculated relative to baseline values.

Results

Heart Rate, HRV Index, and Stress Index

Pre- and post-session comparisons revealed several significant and non-significant changes across autonomic and heart rate variability parameters. Heart rate decreased by 4% ($p = 0.0164$). Heart rate represents the number of beats per minute calculated from the average R–R interval. A lower resting heart rate is often linked to parasympathetic dominance, better fitness, and recovery, whereas a higher resting rate may indicate sympathetic activation, stress, fatigue, or poor cardiovascular conditioning.

The HRV Index increased by 22% but did not reach statistical significance ($p = 0.0553$). This index is a geometric measure of HRV that reflects overall stability and variability of autonomic regulation. A higher value indicates greater variability and robust regulation, while a lower value suggests reduced variability and possible stress or dysfunction.

The Stress Index decreased by 6% without statistical significance ($p = 0.5325$). This parameter is derived from the distribution of R–R intervals and estimates the tension of regulatory systems and sympathetic activity. It is useful for monitoring acute stress load and recovery capacity. Higher values are associated

with sympathetic dominance and acute stress load, whereas lower values suggest relaxation and parasympathetic predominance.

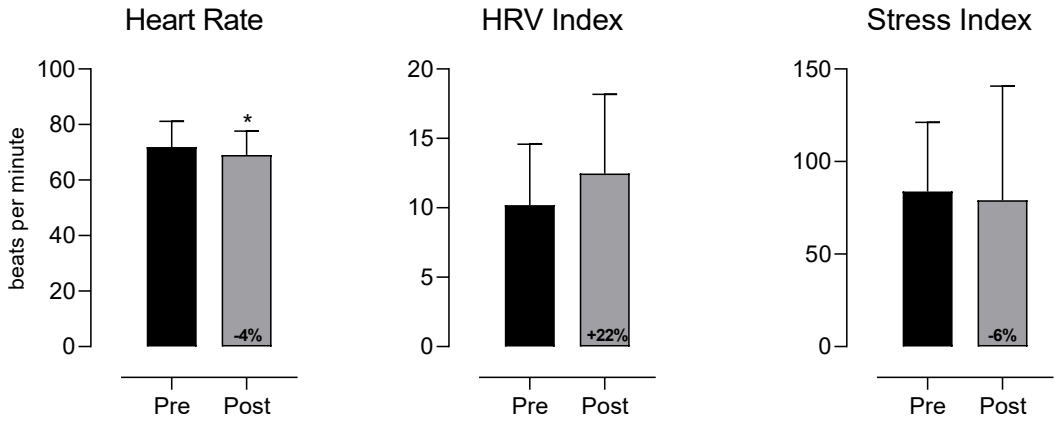

Figure 1. Heart Rate, HRV Index, and Stress Index before and after a single Align Mat P5 session. Bars represent standard deviation, and each column is the group mean. * indicates $p < 0.05$.

RRNN, SDNN, and RMSSD

The mean R–R interval (RRNN) increased by 4% ($p = 0.0191$). RRNN represents the average time between normal heartbeats. Higher RRNN indicate a slower heart rate and greater parasympathetic activity, while lower intervals are associated with faster heart rate, sympathetic predominance, stress or fatigue.

SDNN increased significantly by 19% ($p = 0.0250$). SDNN is the standard deviation of all normal R–R intervals and reflects overall HRV, encompassing both short- and long-term variations. Higher SDNN values denote greater variability and an adaptable autonomic system, whereas lower values are linked to stress or dysfunction.

RMSSD showed a significant 27% increase ($p = 0.0069$). This measure reflects short-term HRV and is primarily associated with parasympathetic (vagal) activity. Higher RMSSD indicates strong vagal tone and recovery capacity, while lower values suggest reduced vagal activity, poor recovery, and possible stress.

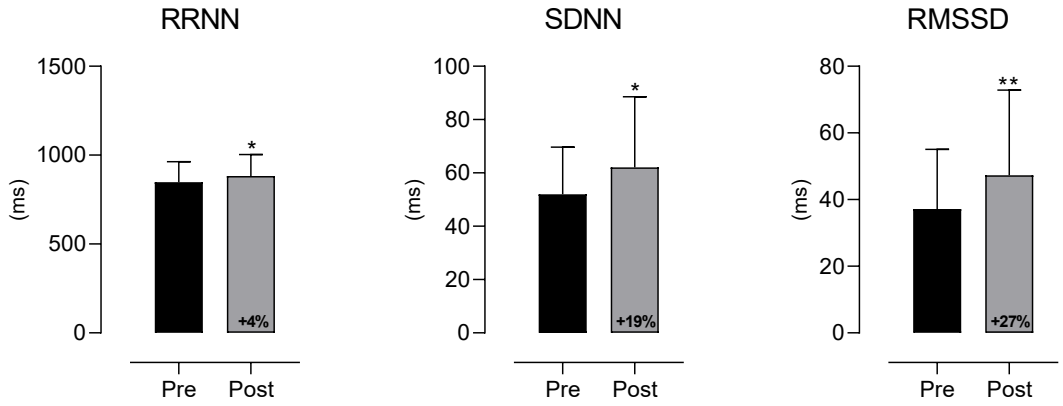

Figure 2. RRNN, SDNN, and RMSSD before and after a single Align Mat P5 session. Bars represent standard deviation, and each column is the group mean. * indicates $p < 0.05$.

NN50, pNN50, and Total Power

NN50 rose by 39% ($p = 0.0107$), and the related pNN50 parameter also increased by 39% ($p = 0.0103$). Both metrics assess beat-to-beat variability, with NN50 counting the number of R–R intervals differing by more than 50 ms and pNN50 expressing this as a percentage of total intervals. Increases in these parameters suggest stronger vagal modulation, while lower values are associated with stress and reduced parasympathetic activity.

Total power (TP) increased by 53% but did not reach statistical significance ($p = 0.3287$). TP represents overall HRV across very low, low, and high frequency bands. Higher TP values are indicative of stronger autonomic flexibility and adaptability, whereas lower values are often associated with stress, illness, or autonomic imbalance.

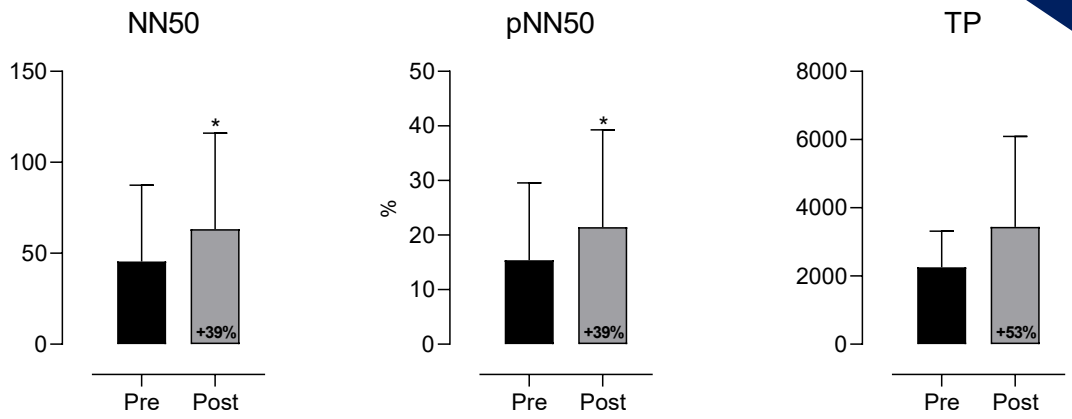

Figure 3. NN50, pNN50, and Total Power before and after a single Align Mat P5 session. Bars represent standard deviation, and each column is the group mean. * indicates $p < 0.05$.

HF (nu), LF (nu), and LF/HF Ratio

High frequency power (HF, normalized units) increased by 10% ($p = 0.4212$), while low frequency power (LF, normalized units) decreased by 5% ($p = 0.4212$). Higher HF is associated with parasympathetic dominance, relaxation, and recovery whereas LF reflects a mix of sympathetic and parasympathetic activity, with higher values suggesting baroreflex activation or sympathetic tilt.

The LF/HF ratio decreased by 17% ($p = 0.4212$). This ratio is traditionally interpreted as an index of sympathovagal balance, with higher values indicating sympathetic dominance and lower values suggesting parasympathetic predominance. However, modern evidence highlights that LF is not a pure sympathetic marker, so this parameter should be interpreted cautiously and in context.

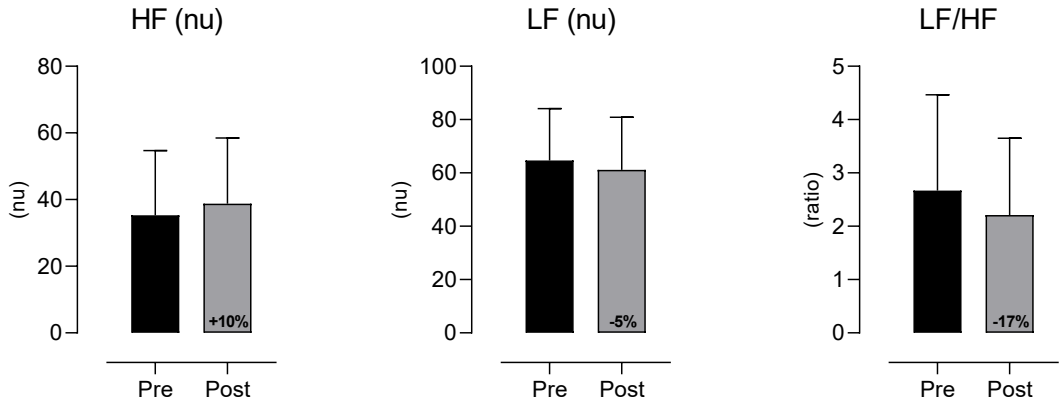

Figure 4. HF (nu), LF (nu), and LF/HF Ratio before and after a single Align Mat P5 session. Bars represent standard deviation, and each column is the group mean. * indicates $p < 0.05$.

Conclusion

The findings from this pilot study demonstrate that a single 20-minute PEMF session with the Align Mat was associated with meaningful shifts in autonomic regulation. Heart rate decreased while RRNN increased, indicating a slower cardiac rhythm and enhanced vagal influence. Global markers of variability, including the HRV Index, SDNN, and total power, all showed clear increases, reflecting improved overall autonomic adaptability.

Short-term variability indices such as RMSSD, NN50, and pNN50 exhibited significant gains, highlighting a strong enhancement of parasympathetic tone. At the same time, the Stress Index declined, suggesting a reduction in sympathetic load and regulatory strain. Frequency-domain parameters further supported these changes, with increases in high-frequency activity, modest changes in low-frequency activity, and a reduction in the LF/HF ratio, collectively pointing toward a redistribution in favor of parasympathetic dominance.

Taken together, the combined results indicate enhanced vagal activity, reduced stress, and greater autonomic flexibility following just one session with the Align Mat. This favorable acute response suggests that the intervention may support relaxation, recovery, and resilience capacity, warranting further investigation in larger and longer-term studies.