

Investigating Magic's Potential To Reduce Stress

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Abstract

Stress significantly influences brain health by affecting emotional regulation, cognitive performance, and autonomic nervous system functioning. While existing stress-reduction strategies such as breathing exercises and mindfulness are well studied, attention-based and visually engaging methods have received less attention. Live magic performances may reduce stress by capturing attention, create positive emotional responses, and promoting present-moment awareness. This pilot study examined whether watching a short, standardized magic routine produces measurable changes in stress using both psychological and physiological indicators. Twelve participants (ages 11–57) completed the State form of the State–Trait Anxiety Inventory (STAI-S) and underwent measurements of heart rate variability (HRV; RMSSD), blood pressure, and blood oxygen saturation (SpO₂) before and after viewing a three-minute card magic routine. Results showed a mean decrease in STAI-S scores from 38.9 to 35.9 (mean change –3.0) and a mean increase in RMSSD from 48.6 ms to 50.0 ms (mean change +1.4 ms). Diastolic blood pressure showed a small average decrease, while systolic blood pressure and SpO₂ showed minimal or inconsistent changes. Although physiological outcomes varied across participants, reductions in self-reported anxiety were observed in most individuals. These preliminary findings suggest that watching magic may reduce perceived stress and support further investigation with larger samples and control conditions.

Introduction

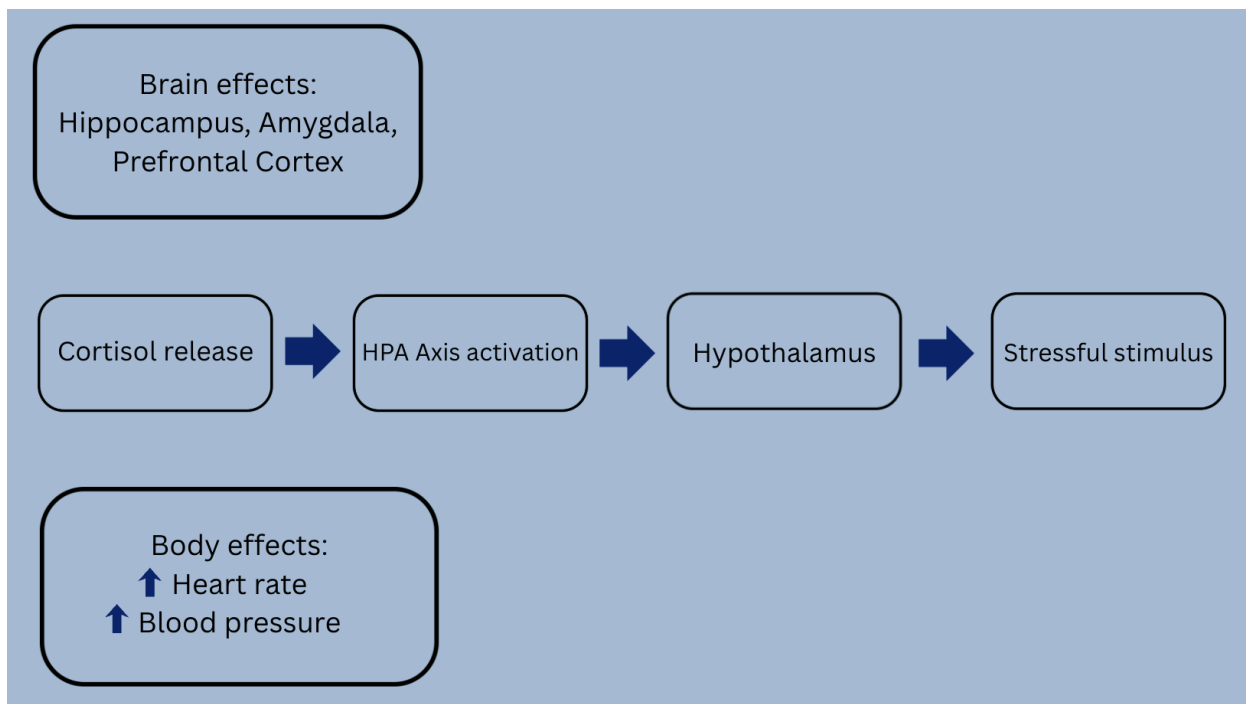
Brain health plays a critical role in overall well-being, shaping how individuals think, feel, and respond to their environment. It includes cognitive processes such as memory and decision-making, emotional regulation, and higher-order thinking. Factors including physical activity, nutrition, sleep quality, mental stimulation, stress management, and social interaction contribute to brain health, and disruption in any one of these areas can negatively affect overall functioning.

Stress is a major factor influencing brain health. It is a natural physiological response to perceived challenges and activates survival-related systems within the body, including the sympathetic nervous system and the release of stress hormones such as cortisol. While acute stress can temporarily improve focus and alertness, prolonged or repeated stress responses can be detrimental. Chronic stress has been associated with structural and functional changes in the brain, including reduced hippocampal and prefrontal cortex volume and intense amygdala reactivity, which may contribute to impaired memory, emotional dysregulation, and increased

anxiety. Stress also influences the gut-brain axis, a communication system between the brain and the gastrointestinal microbiome, potentially affecting inflammation, neurotransmitter signaling, and mood.

Stress can take multiple forms. Acute stress stems from short-term challenges such as public speaking or exams. Episodic acute stress involves repeated exposure to these short-term stressors, while chronic stress persists over extended periods due to ongoing pressures such as financial strain or personal conflict. Although these forms share common biological pathways, they differ in duration, intensity, and long-term impact on the nervous system. Additionally, individuals vary significantly in how they perceive and respond to stress. This component, known as perceived stress, involves the use of both self-report and physiological measures when evaluating stress-related outcomes.

Figure 1. Biological mechanisms underlying stress responses



Given the negative effects of stress on brain health, effective stress-reduction strategies are essential. Traditional approaches include breathing exercises, physical activity, and mindfulness practices, which all promote parasympathetic nervous system activation. More recently, visually engaging and attention-focused methods such as ASMR videos, hypnosis, and calming visuals have gained popularity. These techniques often engage attention and the emotional networks associated with relaxation and reward.

Live magic is an understudied potential stress-reduction method. Watching magic requires focused attention, engages cognitive prediction processes, and often brings out emotions such as curiosity, surprise, and delight. These responses may interrupt stress-related thought patterns and promote a present, mindful state. Research on the neuroscience of magic suggests that magic experiences strongly engage brain systems involved in attention, expectation, and prediction error, creating immersive experiences that may overlap with strategies similar to other calming visual experiments. This study investigates whether watching a short, live magic performance produces measurable reductions in stress using both psychological and physiological indicators.

Materials and Methods

Participants

The target recruitment goal for this study was 32 participants aged 5–60 with a balanced distribution of males and females. At the time of analysis, 12 participants (6 male, 6 female; ages 11–57) completed the full experiment. Participants reported no history of major cardiovascular or neurological setbacks. The eligibility criteria included at least seven hours of sleep the night before testing, no consumption of caffeine, stimulants, or medications on the day of participation, and no strenuous physical activity immediately prior to the experiment. Participants with limited prior exposure to magic performances were preferred to minimize familiarity and expectation effects.

Ethical Considerations

This study was reviewed and approved by an Institutional Review Board (IRB) prior to data collection. All procedures were classified as minimal risk and involved only non-invasive physiological measurements. Informed consent was obtained from all adult participants, and parental consent was obtained for participants under the age of 18. Participants were informed of the study procedures, the right to withdraw at any time, and the confidentiality of their data.

Study Environment

All sessions were conducted in a quiet room in a private house to minimize external stressors. The room contained a table with two chairs positioned across from each other for the researcher and participant. A black velvet mat and a deck of playing cards were used during the magic performance. The lighting was dim, and soft background music was played to promote relaxation.

Heart rate variability (HRV) was measured using the EMAY ECG mobile application, paired with a handheld ECG sensor, which outputs HRV as RMSSD (milliseconds). Blood pressure was

measured using a wrist-based monitor, providing systolic and diastolic values in mmHg. Blood oxygen saturation (SpO₂) was measured using a fingertip pulse oximeter.

Procedure

Participants were seated and provided with verbal instructions for the experimental procedure. They were asked to remain still and relaxed during the physiological measurements. Participants also acted as observers and did not physically interact with the cards.

For the procedure, participants first completed the State form of the State–Trait Anxiety Inventory (STAI-S). Baseline physiological measurements were then recorded in the following order: heart rate variability, blood pressure, and blood oxygen saturation. Participants then viewed a standardized three-minute card magic routine consisting of a visual color change, a two-phase ambitious card sequence, and a final prediction reveal. Immediately after the performance, physiological measurements were repeated using the same devices and order. Participants then completed the STAI-S a second time.

Data Analysis

Pre- and post-performance values were compared for STAI-S scores, RMSSD, systolic blood pressure, diastolic blood pressure, and SpO₂. Differences were calculated as post-performance minus baseline values. Basic statistical summaries were used to examine overall changes across participants. Because this study was a small pilot investigation, the statistical analyses were considered exploratory, meaning that the focus was on identifying patterns and directions of change rather than drawing firm conclusions about statistical significance.

Results

Across the 12 participants, reductions in perceived stress were observed in most individuals after the magic performance. Mean STAI-S scores decreased from 38.9 ± 7.93 before the performance to 35.9 ± 5.81 afterward, representing an average reduction of 3.0 points. The 95% confidence interval for baseline STAI-S scores ranged from 33.9 to 44.0, while post-performance scores ranged from 32.2 to 39.6, indicating a consistent downward trend in perceived anxiety for most participants. Nine participants demonstrated a decrease in STAI-S, while three showed slight increases.

Physiological measures showed greater variability. Mean RMSSD increased from 48.6 ± 12.35 ms at baseline to 50.0 ± 13.65 ms after the performance, indicating a small average increase in parasympathetic activity. The 95% confidence interval for baseline RMSSD values ranged from 40.7 to 56.4 ms, while post-performance values ranged from 41.3 to 58.7 ms. Although variability was significant across participants, the group mean showed a slight upward trend.

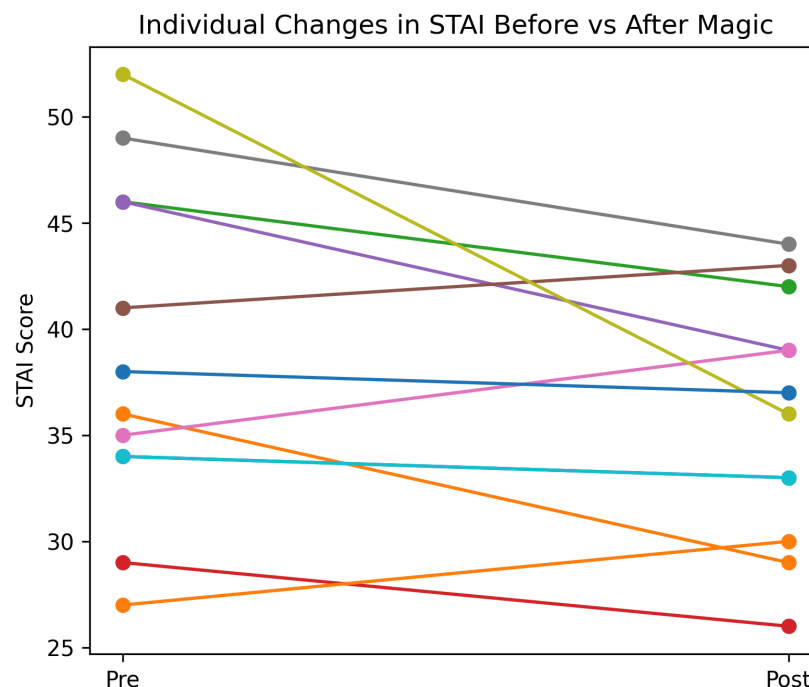
Seven participants showed increased RMSSD following the performance, while others showed minimal change or decreases. Diastolic blood pressure showed a slight average decrease, whereas systolic blood pressure revealed inconsistent changes across participants. SpO₂ values remained mostly stable.

Table 1. Pre–Post Changes in Psychological and Physiological Measures (n = 12)

Measure	Pre (Mean)	Post (Mean)	Mean Change	95% CI (Pre)	95% CI (Post)
STAI-S (score)	38.9	35.9	-3.0	33.9 - 44.0	32.2 - 39.6
HRV RMSSD (ms)	48.6	50.0	+1.4	40.7 - 56.4	41.3 - 58.7
Systolic BP (mmHg)	111.2	113.3	+2.1	-	-
Diastolic BP (mmHg)	73.8	70.9	-2.9	-	-
SpO ₂ (%)	96.3	96.2	-0.1	-	-

(Blood pressure and SpO₂ variability were not included in the CI calculations because individual raw distributions were not analyzed for those measures.)

Figure 2. Individual STAI score changes before and after the magic performance



Additional paired comparisons were performed to examine possible patterns of change. STAI-S scores showed a general decrease (paired $p \approx 0.084$), while RMSSD showed a slight increase (paired $p \approx 0.36$). These findings suggest directional trends, though they should be interpreted cautiously due to the limited sample size. Blood pressure and SpO₂ did not show consistent statistical trends. These analyses are preliminary and intended to guide future research rather than establish conclusions.

Standard errors were also calculated to estimate the precision of the sample means. For STAI-S scores, the standard error was 2.29 at baseline and 1.68 after the performance. For RMSSD, the standard error was 3.56 ms at baseline and 3.94 ms post-performance. These values reflect the variability expected in a small pilot sample and support the conclusion that the observed changes represent trends rather than definitive effects.

Discussion

This pilot study examined whether watching a short, live magic performance could reduce stress using both psychological and physiological measures. The most consistent finding was a reduction in self-reported anxiety, as measured by the STAI-S, observed in the majority of participants. This supports the hypothesis that magic may function as an attention-based intervention capable of improving immediate emotional state.

Physiological responses were less consistent, which is not unexpected. HRV and blood pressure are sensitive to numerous factors, including posture, breathing patterns, movement, and measurement duration. Although RMSSD is a well-established indicator of parasympathetic activity, short recordings may be more fluctuating than longer, standardized HRV assessments.

There are several explanations for the observed reduction in perceived stress. Magic requires constant attention, which may interrupt stress-related thought patterns. The emotional responses created by magic, such as curiosity and surprise, may counteract negative thoughts and promote positive emotional outcomes. Additionally, magic engages predictive processing systems in the brain, which require present-moment focus. These methods overlap with explanations for the calming effects of ASMR and other visual stimuli.

The study methods were refined throughout the research process. Early planning used a single card trick, but observations from practice trials showed that a multi-step routine sustained better engagement. Participants were also kept as passive observers to eliminate performance-related anxiety as an additional variable. These refinements likely strengthened the validity of the findings.

However, there were several limitations. The sample size was small and represented a convenience sample, limiting generalization. Physiological measurements were collected using



consumer-grade devices, which might be less precise than clinical devices. Additionally, the wide age range increased variability in baseline stress.

Future research should intend to complete the planned recruitment, add control conditions such as quiet sitting or non-magic visuals, standardize breathing during HRV measurements, and consider longer HRV recording durations. Despite these limitations, the present findings provide preliminary evidence that magic may serve as a simple, accessible tool for stress reduction.

Conclusion

This pilot study explored the effects of watching live magic on stress using both psychological and physiological indicators. A brief magic performance was associated with reduced self-reported anxiety in most participants, while physiological measures showed mixed but suggestive patterns. These results support further investigation into magic as a stress-reduction method and highlight the importance of combining subjective and objective measures when studying stress.

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