

Decision Quality Under Load: The Case for Training Control Rather Than Calm

Oct 2, 2026 · Charles B. Morris III, Ph.D. (ORCID <https://orcid.org/0009-0008-8507-9235>) · White paper, not peer reviewed

Abstract

The decisions that matter most to an organization tend to be made under its highest pressure. This white paper examines what published research says about cognition under acute stress, and argues that the practical target for leaders and operators is trained state control rather than relaxation. Meta-analytic evidence indicates that acute stress reduces working memory performance, with the impairment concentrated under high cognitive load (g equals -0.30) and not distinguishable from zero under low load (g equals -0.05), and reduces cognitive flexibility, while dissociating within inhibition: control over actions improves while control over attention to salient information worsens. Mechanistic reviews describe this as a shift from reflective toward reflexive control. The effects are reliable but small to moderate, not catastrophic, and their direction depends on the task. The paper then separates two claims that are often merged. That stress reshapes cognition is well supported. That brief self-regulation techniques restore decision quality under pressure is not: the cleanest direct test of a single breathing-based session on attentional control returned a null main effect, and no systematic review establishing cognitive benefit has yet been completed. What the evidence does support is training under pressure. Meta-analyses of pressure training in sport and law enforcement report medium effects, and in marksmanship, training under contextually relevant pressure partly offsets the performance loss that pressure otherwise causes. The implication is that state control is built in conditions that resemble performance, not in quiet rooms.

Keywords

decision making under stress, executive function, prefrontal cortex, pressure training, state regulation, human performance, leadership under pressure, cognitive flexibility, working memory, stress exposure training

Introduction

Senior decisions cluster inside high pressure moments. The negotiation, the crisis call, the hard conversation, the decision that cannot wait: these are not distributed evenly across the calendar. They concentrate precisely where the physiological conditions for careful judgment are least favorable.

The usual explanations for poor decisions under pressure are characterological. The person was not ready, not experienced enough, not temperamentally suited to the moment. The research literature points somewhere less flattering to the explanation and more useful to the person: under acute stress, the cognitive functions that support deliberate judgment measurably change. A meta-analysis of 51 studies with 2,486 participants found that acute stress reduced working memory performance, and that the effect was roughly six times larger when cognitive load was high than when it was not (Shields, Sazma and Yonelinas, 2016). Mechanistic reviews describe high catecholamine release under uncontrollable stress as weakening prefrontal networks while strengthening sensory, amygdala and striatal circuits, which the author of one such review characterizes as flipping the brain from reflective to reflexive control of behavior (Arnsten, 2015).

This paper does two things. First, it sets out what the evidence supports about cognition under pressure, with effect sizes stated rather than implied, because the honest numbers are modest and the modest version is the one that survives scrutiny. Second, it separates two claims that popular wellness discussion tends to merge: that stress reshapes decision making, and that relaxation restores it. The first is well supported. The second is not.

What the evidence does support is less convenient and more interesting. Capacity to perform under pressure appears to be built by training under pressure. A meta-analysis of pressure training studies in sport and law enforcement reported a medium effect across 14 studies and 394 participants (Low et al., 2021). In marksmanship specifically, a meta-analysis of 17 studies with 960 participants found that accuracy dropped by nearly 15 percent under high pressure, that years of experience offset only about 1 percent of that per year of service, and that training which included contextually relevant pressure improved performance by around 10 percent relative to control training (Cooper et al., 2024).

That is the practical core of this paper. The target is not calm. Calm is a state that depends on conditions. The target is control, meaning the trained ability to change one's own state while the demand is still present, and the evidence suggests that capacity is built where it will be used.

The framework presented here draws on the author's applied methodology with executives, athletes and military personnel, and on the argument developed in the author's book *Stress: Our Human Superpower*. Claims sourced to that practice are labeled as practitioner observation and distinguished from published findings.

The Problem With the Current View

Three responses to degraded decision making under pressure are common, and each misallocates effort.

Apply more cognitive effort. The instruction to think harder asks for more output from the functions that acute stress has altered. Working memory under high cognitive load is the specific capacity most reduced in meta-analytic estimates (Shields, Sazma and Yonelinas, 2016), and the prefrontal networks that support deliberate control are described as weakened rather than merely busy under high catecholamine conditions (Arnsten, 2009; Arnsten, 2015). Additional effort directed at an altered system is not a correction for the alteration.

Trust the feeling of urgency. The subjective experience of being sharp under pressure is not a reliable index of decision quality. A meta-analysis of 32 datasets with 1,829 participants found that stress was associated with more disadvantageous, reward-seeking and risk-taking choices under uncertainty, though the pooled effect was small at $d = 0.17$ (Starcke and Brand, 2016). The size of that effect matters in both directions. It is too small to support the claim that stressed decisions are generally bad. It is large enough, and consistent enough in direction, to make urgency a poor proxy for judgment.

It should also be said plainly that stress does not degrade everything. In the same meta-analysis of executive functions, response inhibition actually improved under acute stress while cognitive inhibition worsened (Shields, Sazma and Yonelinas, 2016). A selective review of decision making under stress concluded that whether stress confers advantage or disadvantage depends on the specific task and situation (Starcke and Brand, 2012). The accurate claim is that stress reallocates cognitive resources, favoring fast action over flexible deliberation, rather than simply reducing capability.

Reach for relaxation. This is the response that most deserves scrutiny, because it is the most widely recommended and the least supported for this purpose. Workplace recovery research distinguishes psychological detachment and relaxation from mastery and control as separate dimensions of recovery experience (Sonnentag and Fritz, 2007), and later review work notes that high job demands themselves impair recovery experiences (Sonnentag, Venz and Casper, 2017). A recovery strategy that requires the demand to be absent is unavailable at the moment the demand is present.

The intervention evidence compounds the problem. A meta-analysis of 42 independent samples across 37 studies found workplace resilience-building programs produced a small overall effect, $d = 0.21$, with proximal effects of $d = 0.26$ decaying to $d = 0.07$ beyond roughly a month (Vanhove et al., 2016). A systematic review and meta-analysis of 25 randomized trials, judged at moderate to high risk of bias, found modest resilience gains with a pooled standardized mean difference of 0.37, 95 percent confidence interval 0.18 to 0.57, and I^2 of 41 percent (Leppin et al., 2014). These are not null findings, but they describe small and partly transient effects from education-style programming rather than durable trained capacity.

The deeper issue is conditional. A state entered only in quiet conditions is practiced only in quiet conditions. The transfer question is empirical, and the evidence on it is addressed in the Supporting Evidence section below.

The Framework: Control Rather Than Calm

1. Pressure reallocates cognition rather than simply reducing it

The useful mental model is not a dimmer switch on intelligence. It is a change in what the system is optimized for. Under acute stress, deliberate, flexible, load-dependent processing is reduced while fast action control is maintained or improved (Shields, Sazma and Yonelinas, 2016). Mechanistic accounts describe a corresponding shift in the balance between prefrontal networks and sensory, amygdala and striatal circuits (Arnsten, 2015).

This reallocation is appropriate for a physical emergency and poorly matched to a negotiation, a complex judgment, or a decision that requires holding several futures in mind at once. The problem is not that the system malfunctions. It is that it optimizes for a situation that is not the one the person is in.

2. Calm and control are different targets

The distinction matters because it determines what gets trained.

	Calm	Control
Definition	Low arousal	Ability to change state deliberately
Requires	Reduced demand, favorable conditions	No particular conditions
Where it is practised	Quiet settings	Under load
Available mid-demand	Often not	By design
Compatible with high activation	No, by definition	Yes

Heart rate variability research supports treating flexibility rather than low arousal as the construct of interest. The standards document that established measurement conventions is explicit that the measure reflects fluctuation in autonomic input rather than mean autonomic level (Task Force of the ESC and NASPE, 1996). Higher variability has been associated with better self-regulation across 123 studies and 14,347 participants, though the pooled association is weak, r equals 0.09, and was stronger in published studies, which the authors read as a publication bias signal (Holzman and Bridgett, 2017). That weak correlation is worth stating plainly: variability is a tentative population-level marker, not a dial that reliably predicts an individual's judgment.

3. State precedes decision

The operational principle in the author's methodology is that the state is addressed before the decision, not the decision after the fact. In applied practice this means a deliberate regulation step in the minutes before a consequential conversation or choice, rather than an attempt to reason more carefully once already activated.

The mechanistic rationale is reasonable and the direct evidence is weak. This is stated at length in the Supporting Evidence and Limitations sections, because it is the claim a knowledgeable reader will test first.

4. Capacity under pressure is built under pressure

This is the component with the strongest empirical support, and it is the one most at odds with how state regulation is usually taught. Pressure training, meaning deliberate practice conducted with stressors present, has been meta-analyzed with a medium pooled effect of g equals 0.67 across 14 studies and 394 participants in sport and law enforcement, holding for both novice and experienced performers and across open and closed skills (Low et al., 2021). In tactical marksmanship, training that included contextually relevant threat produced roughly a 10 percent performance improvement relative to control training, against a baseline accuracy loss of nearly 15 percent under pressure (Cooper et al., 2024). An earlier laboratory experiment reported that benefits of stress exposure training were retained when participants faced both a novel stressor and a novel task (Driskell, Johnston and Salas, 2001).

The framework therefore inverts the standard practice sequence. If the capacity is to be available under pressure, pressure belongs in the training, not only in the test.

Supporting Evidence

Acute stress changes executive function, with measured and modest effects

The strongest quantitative support comes from a meta-analysis of 51 studies and 2,486 participants examining acute stress effects on core executive functions (Shields, Sazma and Yonelinas, 2016). Working memory performance was reduced, g equals minus 0.197, and the effect was substantially larger under high cognitive load, g equals minus 0.303, than when load was not high, g equals minus 0.049. Cognitive flexibility was reduced, g equals minus 0.300. Inhibition showed no overall effect, g equals minus 0.076, but that null masked opposing directions: response inhibition improved, g equals 0.296, while cognitive inhibition worsened, g equals minus 0.208. The authors characterize the pattern as more reactive processing of salient stimuli alongside greater control over actions.

Two caveats belong with those numbers. The cognitive flexibility estimate rests on only 6 studies and 280 participants, so it should be treated as the most fragile of the set. Several effects were moderated by sex. It would be inaccurate to say that stress impairs inhibition; the finding is that inhibition dissociates.

On decisions specifically, a meta-analysis of 32 datasets and 1,829 participants found stress associated with more disadvantageous, reward-seeking and risk-taking choices under uncertainty, with a small pooled effect of d equals 0.17 (Starcke and Brand, 2016). The effect was d equals 0.26 in contexts where increased reward-seeking is disadvantageous, and was essentially absent elsewhere, d equals 0.01. Processive stressors produced larger effects, d equals 0.19, than systemic stressors, d equals 0.09, which was not statistically significant. A correction notice was subsequently published for this article, and the corrected record should be cited.

In applied settings, a review of acute stress and clinical performance in health professions concluded that elevated stress can impede tasks requiring divided attention, working memory, retrieval and decision making, with effects shaped by appraisal of demands against resources (LeBlanc, 2009). This is a representative rather than systematic review with a literature search ending in 2008, so it is useful for framing applied stakes and weak as evidence.

The shift toward habitual responding is plausible but contested

An influential experimental study reported that stressed participants continued responding habitually rather than adjusting to changed outcome value, with 67 participants analyzed (Schwabe and Wolf, 2009), and a later review synthesized evidence for a stress-related shift from declarative toward procedural memory systems (Schwabe and Wolf, 2013). This line of work is frequently cited in support of the reflexive-shift account.

It requires a caveat that is often omitted. Two preregistered exact replications, with 80 and 95 participants, did not reproduce the original result: stress induction and devaluation both worked, but neither the stressed nor the unstressed group responded differently to valued and devalued outcomes, so the comparison the original study rested on could not be made (Smeets et al., 2023). A separate study across two experiments with 129 participants found no evidence that acute stress increased habitual control or reduced goal-directed control, a null that held after accounting for cortisol reactivity (Zwosta et al., 2025). The honest position is that the broader reallocation pattern is supported by the executive function meta-analysis above, while the specific habit-over-goals mechanism is contested and has not replicated.

Autonomic measures correlate with regulation, weakly

A meta-analysis of neuroimaging studies found cross-study associations between heart rate variability and regions including the amygdala and ventromedial prefrontal cortex, supporting the measure as a marker of top-down appraisal influence on autonomic output (Thayer et al., 2012). A meta-analytic review across 123 studies and 14,347 participants found greater variability associated

with better self-regulation, at r equals 0.09, with stronger associations in published studies and in older samples, leading its authors to describe the measure as a tentative biomarker (Holzman and Bridgett, 2017). An earlier study of 53 male naval personnel found that those above the median on resting variability performed better on working memory and sustained attention tasks (Hansen, Johnsen and Thayer, 2003).

The interpretive limit is important. These are correlational findings about people who differ in resting variability. They do not establish that raising an individual's variability improves their cognition.

Brief regulation techniques: the evidence does not yet support a cognitive claim

This section states a negative result because the paper's credibility depends on it.

Slow breathing and heart rate variability biofeedback have measurable effects on self-reported stress. A meta-analysis of 24 studies with 484 participants reported Hedges g of 0.81 pre-post and 0.83 against controls (Goessl, Curtiss and Hofmann, 2017). A meta-analysis of 12 randomized trials with 785 adults found breathwork reduced self-reported stress, g equals minus 0.35, with the authors explicitly urging caution given that no included trial was rated at low overall risk of bias (Fincham et al., 2023). Every one of these outcomes is self-reported stress or affect. None is cognition or decision quality.

Where cognition has been tested directly, results are largely null. A within-subjects randomized study of 56 participants comparing a single biofeedback session against paced breathing found that the intervention reliably raised variability during the session, that higher resting variability predicted better attentional control, and that the session itself produced no significant main effect on attentional control (Blaser, Weymar and Wendt, 2023). A small randomized trial of 38 participants reported a large working memory improvement after a single session, but the effect size was implausibly large for the sample, there was no pressure manipulation, and the proposed autonomic mechanism was not supported by the mediation analysis (Bahameish and Stockman, 2024). A systematic review protocol published in 2025 states directly that research on slow-paced breathing and cognition has not yet been consolidated and that many questions remain open (Ramquar et al., 2025).

No systematic review or adequately powered trial establishing that brief regulation techniques improve decision quality under pressure was located in preparing this paper.

Reappraisal: real but small, and not physiological

A meta-analysis of 44 effect sizes from 35 randomized trials with 5,638 participants found that arousal reappraisal and stress mindset interventions produced a small performance benefit, d equals 0.23, falling to d equals 0.14 after adjustment for publication bias (Bosshard and Gomez, 2024). Decomposed, arousal reappraisal alone gave d equals 0.22, mixed interventions d equals

0.45, and stress-is-enhancing mindset messaging alone equals 0.18 and not statistically significant. A separate meta-analysis found reappraisal reduced subjective stress responsivity but did not outperform controls on physiological stress measures (Liu et al., 2019).

Two conclusions follow. Cognitive reframing produces a small genuine performance effect, and mindset messaging on its own is the weakest component. Claims that reframing changes physiology under load are not supported by pooled evidence.

Training under pressure: the strongest support in this paper

A meta-analysis of pressure training found a medium effect, g equals 0.67 with a 95 percent confidence interval of 0.43 to 1.12 and low heterogeneity at I^2 equals 17.1 percent, across 14 studies and 394 participants spanning sport and law enforcement, novice through elite (Low et al., 2021). The authors note the literature rarely includes retention testing or measurement in actual competition, so transfer to real-world stakes is inferred.

A systematic review and meta-analysis in tactical populations, 17 studies and 960 participants, found that high pressure reduced marksmanship accuracy by 14.8 percent and reduced decision accuracy, with years of service offsetting only about 1.1 percent per year. Training that included contextually relevant threat improved performance by 10.6 percent relative to control training, with a wide confidence interval of 1.7 to 19.5 percent (Cooper et al., 2024). An earlier laboratory experiment found stress exposure training benefits were retained against both a novel stressor and a novel task (Driskell, Johnston and Salas, 2001), though it is a single small study.

Taken together: experience alone compensates very little for pressure, and deliberate practice under matched pressure compensates measurably more.

Practical Implications

Four implications follow, ordered by how well the evidence supports them.

Put pressure in the training, not only in the test. This is the best supported recommendation in the paper (Low et al., 2021; Cooper et al., 2024). For an executive team, the applied form is rehearsing the actual hard conversation or decision under conditions that resemble the real one: time constraint, an unsympathetic counterpart, incomplete information, observation. For operators and athletes it is already standard practice in the better programs. The evidence suggests the mechanism is contextual relevance of the pressure, not pressure in general.

Expect degradation where load is highest, and design around it. The working memory impairment was concentrated under high cognitive load, g equals -0.30, against g equals -0.05, not statistically significant, under low load (Shields, Sazma and Yonelinas, 2016). The practical response is to reduce load at the moment of decision rather than to attempt more effort inside it:

decide fewer things at once, write the options down before entering the room, pre-commit to criteria while unstressed, and separate information gathering from the decision itself. None of this requires any physiological intervention.

Treat the pre-decision regulation step as a reasonable practice with unproven cognitive benefit. In the author's methodology, a short deliberate regulation step precedes consequential decisions. It is low cost, carries little risk for healthy adults, and has a reasonable mechanistic rationale. It is not supported by evidence of improved decision quality, and the cleanest direct test of a single session on attentional control was null (Blaser, Weymar and Wendt, 2023). The honest recommendation is to use it as a routine that marks a transition and reduces load, while making no cognitive performance claim for it.

Use reframing, and do not oversell it. Arousal reappraisal produces a small genuine performance benefit, larger when combined with other components, while mindset messaging alone does not reliably move performance (Bosshard and Gomez, 2024). Teaching people that activation can be read as readiness is worth doing. Telling them that a change of attitude will change their physiology under load is not supported by pooled evidence (Liu et al., 2019).

For organizations, one structural implication follows from the resilience training literature. Education-style programs produce small effects that decay substantially beyond about a month (Vanhove et al., 2016), and one-on-one delivery outperformed classroom, which outperformed train-the-trainer and computer-based delivery. A single workshop is therefore the format least likely to produce durable change. If an organization is going to invest in this area, the evidence points toward sustained individual practice under realistic conditions rather than annual group sessions.

Limitations

This is a white paper. It has not been peer reviewed and reports no original empirical research.

The remedy half of the argument is a hypothesis, not an established finding. That acute stress reallocates cognition is supported by meta-analytic evidence. That trained state control improves decision quality under pressure is not established by any source cited here. No systematic review, and no adequately powered randomized trial, was located that tests it. The best designed direct test of a single breathing-based session on attentional control found no main effect (Blaser, Weymar and Wendt, 2023). Readers should treat the recommendation as mechanistically plausible and explicitly under-tested.

The contrast between control and relaxation is this paper's framing, not a distinction the literature makes. The available intervention research studies slow-paced breathing, biofeedback and reappraisal, which most reviewers would classify as relaxation-adjacent rather

than as a separate category of trained control. The conceptual distinction is argued here; it is not sourced.

Effect sizes are small to moderate throughout. Working memory g equals minus 0.197 overall (Shields, Sazma and Yonelinas, 2016), decisions under uncertainty d equals 0.17 (Starcke and Brand, 2016), autonomic correlation with self-regulation r equals 0.09 (Holzman and Bridgett, 2017), reappraisal performance d equals 0.23 falling to 0.14 after publication bias adjustment (Bosshard and Gomez, 2024). Nothing here supports dramatic language about stress destroying judgment.

Publication bias is documented in these literatures. The autonomic self-regulation association was stronger in published studies (Holzman and Bridgett, 2017), and the reappraisal performance effect was reduced by roughly 40 percent after trim-and-fill adjustment (Bosshard and Gomez, 2024). Within-participant designs also produced inflated effects relative to between-participant designs in the resilience literature (Vanhove et al., 2016).

One frequently cited mechanism is contested. The finding that stress shifts behavior toward habit (Schwabe and Wolf, 2009) has not replicated: two preregistered exact replications failed to reproduce it (Smeets et al., 2023), and an independent two-experiment study found no effect (Zwosta et al., 2025). It is reported in this paper with that caveat rather than omitted, because readers may expect to see it cited.

The pressure training evidence has domain limits. The marksmanship meta-analysis draws on a narrow task domain with overwhelmingly male samples, and its intervention estimate rests on a subset of studies with a confidence interval approaching zero (Cooper et al., 2024). The broader pressure training meta-analysis covers only 14 studies and 394 participants, with little retention testing or measurement in genuine competition (Low et al., 2021). Generalizing from marksmanship and sport to boardroom judgment is an extrapolation, not a finding.

Autonomic findings are correlational. Studies associating higher resting variability with better cognitive performance compare people who differ at baseline (Hansen, Johnsen and Thayer, 2003; Holzman and Bridgett, 2017). They do not show that raising an individual's variability improves that individual's performance.

Practitioner observation is not evidence. Patterns the author has observed in applied work with executives, athletes and military personnel come from an uncontrolled setting with a self-selected population and no comparison group.

Scope. This paper concerns performance in generally healthy adults. It does not address clinical populations and provides no guidance for any diagnosed condition.

Conclusion

Under pressure, the system does not get worse at everything. It gets faster at acting and worse at holding complexity, and the second of those is what most consequential decisions require. That is a measured finding, with modest effect sizes, and it is enough to retire the characterological explanation for poor decisions made under load.

The standard remedy does not follow from the finding. Calm requires conditions that consequential moments do not provide, and the intervention literature on relaxation-adjacent techniques measures self-reported stress rather than judgment. Where cognition has been tested directly, the results have been largely null. A paper that claimed otherwise would be easy to dismiss.

What the evidence does support is less convenient. Experience alone compensates very little for the performance cost of pressure, around one percent per year of service in the one domain where this has been quantified. Deliberate practice conducted under contextually relevant pressure compensates measurably more. Capacity under pressure appears to be built where pressure is present.

For leaders, the practical reading is twofold. Reduce cognitive load at the moment of decision, which requires no physiology at all. And rehearse the hard thing under conditions that resemble the hard thing, rather than preparing in calm and hoping the preparation survives contact.

The research gap is specific and worth naming. No adequately powered study has tested whether trained state regulation improves decision quality under pressure in high demand populations. That question is answerable, and the framework set out here is offered as a basis for asking it properly.

Disclosure and Notice

Competing interests. The author founded and operates Fulcrum Performance Lab, LLC, a human performance business, and is the creator of the Morris Method, a commercial methodology. The author is also the author of the book *Stress: Our Human Superpower* and has a commercial interest in Nova Breath, an application that delivers breathing protocols and tracks heart rate variability. The paper recommends practices related to those commercial interests, and readers should weigh that when assessing its arguments. Where the evidence does not support a recommendation, the paper says so.

Status of this document. This is a white paper. It has not been peer reviewed and does not report original empirical research. Nothing in it should be represented as a peer-reviewed finding.

Not medical advice. This paper is educational and addresses wellness and human performance in generally healthy adults. It is not medical advice, does not diagnose or treat any condition, and is not a substitute for care from a qualified professional.

References

Bibliographic details below were checked against publisher pages, Crossref, OpenAlex or Semantic Scholar records during preparation. The verification column records what was confirmed and notes anything that could not be checked.

Reference	Type and scope	Link	Verification
Arnsten AFT. Stress signalling pathways that impair prefrontal cortex structure and function. <i>Nat Rev Neurosci.</i> 2009;10(6):410-422.	Narrative review	doi 10.1038/nrn2648, PMID 19455173	Confirmed on the publisher page. Largely animal-model based; cited for mechanism only.
Arnsten AFT. Stress weakens prefrontal networks: molecular insults to higher cognition. <i>Nat Neurosci.</i> 2015;18(10):1376-1385.	Narrative review	doi 10.1038/nn.4087, PMID 26404712	Confirmed on the publisher page. Mechanistic and molecular evidence.
Bahameish M, Stockman T. Short-term effects of heart rate variability biofeedback on working memory. <i>Appl Psychophysiol Biofeedback.</i> 2024;49(2):219-231.	Randomized trial, n = 38	doi 10.1007/s10484-024-09624-7	PMID 38366274, confirmed. Effect size implausibly large for the sample, no pressure manipulation, and the proposed autonomic mechanism was not supported by the mediation analysis. Cited only as a contrary single study.
Blaser BL, Weymar M, Wendt J. The effect of a single-session heart rate variability biofeedback on attentional control: does stress matter? <i>Front Psychol.</i> 2023;14:1292983.	Within-subjects randomized study, n = 56	doi 10.3389/fpsyg.2023.1292983, PMID 38034309	Confirmed on the publisher page, including the null main effect on attentional control.
Bosshard M, Gomez P. Effectiveness of stress arousal reappraisal and stress-is-enhancing mindset interventions on task performance outcomes: a meta-analysis of randomized controlled trials. <i>Sci Rep.</i> 2024;14:7923.	Meta-analysis, 44 effects from 35 RCTs, n = 5,638	doi 10.1038/s41598-024-58408-w	PMID 38575696, confirmed. All effect sizes confirmed on the publisher page, with I squared of 52.6 percent and trim-and-fill reducing the pooled effect to d equals 0.14, 95 percent confidence interval 0.04 to 0.24.

Cooper D, Fuller JT, Wiggins MW, Wills JA, Main LC, Doyle TLA. Negative consequences of pressure on marksmanship may be offset by early training exposure to contextually relevant threat training: a systematic review and meta-analysis. <i>Hum Factors</i> . 2024;66(1):294-311.	Systematic review and meta-analysis, 17 studies, n = 960	doi 10.1177/00187208211065907, PMID 35387527	Confirmed, including the percentage effects. Online first 2022, print 2024.
Driskell JE, Johnston JH, Salas E. Does stress training generalize to novel settings? <i>Hum Factors</i> . 2001;43(1):99-110.	Laboratory experiment	doi 10.1518/001872001775992471, PMID 11474766	Details confirmed. Sample size is not reported in the abstract and no replication was located; cited as a single small study.
Fincham GW, Strauss C, Montero-Marín J, Cavanagh K. Effect of breathwork on stress and mental health: a meta-analysis of randomised-controlled trials. <i>Sci Rep</i> . 2023;13:432.	Meta-analysis, 12 RCTs for stress, n = 785	doi 10.1038/s41598-022-27247-y, PMID 36624160	Confirmed, including effect sizes, heterogeneity and risk-of-bias ratings.
Goessl VC, Curtiss JE, Hofmann SG. The effect of heart rate variability biofeedback training on stress and anxiety: a meta-analysis. <i>Psychol Med</i> . 2017;47(15):2578-2586.	Meta-analysis, 24 studies, n = 484	doi 10.1017/S0033291717001003, PMID 28478782	Confirmed on the Cambridge University Press page, including both effect sizes. Outcomes are self-reported stress and anxiety only, not cognition.
Hansen AL, Johnsen BH, Thayer JF. Vagal influence on working memory and attention. <i>Int J Psychophysiol</i> . 2003;48(3):263-274.	Cross-sectional study, 53 male naval personnel	doi 10.1016/S0167-8760(03)00073-4, PMID 12798986	Confirmed. Median split on resting HRV; correlational and male-only.
Holzman JB, Bridgett DJ. Heart rate variability indices as bio-markers of top-down self-regulatory mechanisms: a meta-analytic review. <i>Neurosci Biobehav Rev</i> . 2017;74:233-255.	Meta-analysis, 123 studies, n = 14,347	doi 10.1016/j.neubiorev.2016.12.032, PMID 28057463	Confirmed, including r equals 0.09 and the publication bias signal.
LeBlanc VR. The effects of acute stress on performance: implications for health professions education. <i>Acad Med</i> . 2009;84(10 Suppl):S25-S33.	Representative review, literature to 2008	doi 10.1097/ACM.0b013e3181b37b8f, PMID 19907380	Confirmed. Not systematic; no pooled effects.

Lehrer P, Kaur K, Sharma A, Shah K, Huseby R, Bhavsar J, Sgobba P, Zhang Y. Heart rate variability biofeedback improves emotional and physical health and performance: a systematic review and meta analysis. <i>Appl Psychophysiol Biofeedback</i> . 2020;45(3):109-129.	Systematic review and meta-analysis, 58 studies from 1,868 records identified	doi 10.1007/s10484-020-09466-z, PMID 32385728	Confirmed on the publisher page. The abstract reports no numeric pooled effect size and no confidence interval, only a significant small to moderate effect, so no figure is quoted from it. Per-domain study counts sit behind the paywall.
Leppin AL, Bora PR, Tilburt JC, Gionfriddo MR, Zeballos-Palacios C, Dulohery MM, Sood A, Erwin PJ, Brito JP, Boehmer KR, Montori VM. The efficacy of resiliency training programs: a systematic review and meta-analysis of randomized trials. <i>PLoS One</i> . 2014;9(10):e111420.	Systematic review and meta-analysis, 25 RCTs	doi 10.1371/journal.pone.0111420, PMID 25347713	Confirmed, including the pooled SMD of 0.37 and I squared of 41 percent. The paper reports no total participant count across all 25 trials; 782 participants contributed to the pooled resilience estimate from 13 trials.
Liu JJW, Ein N, Gervasio J, Vickers K. The efficacy of stress reappraisal interventions on stress responsivity: a meta-analysis and systematic review of existing evidence. <i>PLoS One</i> . 2019;14(2):e0212854.	Meta-analysis, 14 articles, 36 samples	doi 10.1371/journal.pone.0212854, PMID 30811484	Confirmed, including the subjective effect of 0.429, 95 percent confidence interval 0.067 to 0.791, and the null physiological effect of minus 0.084, confidence interval minus 0.349 to 0.180.
Low WR, Sandercock GRH, Freeman P, Winter ME, Butt J, Maynard I. Pressure training for performance domains: a meta-analysis. <i>Sport Exerc Perform Psychol</i> . 2021;10(1):149-163.	Meta-analysis, 14 studies, n = 394	doi 10.1037/spy0000202	Confirmed via two institutional repository records. Not indexed in PubMed. The headline effect is a trimmed estimate after one outlier exclusion.
Ramquar SD, Tyagi C, Sharma B, Chui C, Wasti A, Green RE. A systematic review protocol for slow-paced breathing in healthy populations: impacts on cognition and insights into mechanisms of action. <i>Syst Rev</i> . 2025;15:6.	Review protocol, not a completed review	doi 10.1186/s13643-025-03004-w, PMID 41354819	Confirmed on the publisher page. Cited for its statement of the evidence gap.
Schwabe L, Wolf OT. Stress prompts habit behavior in humans. <i>J Neurosci</i> . 2009;29(22):7191-7198.	Experimental study, 67 analysed	doi 10.1523/JNEUROSCI.0979-09.2009, PMID 19494141	Confirmed. Has not replicated; always cite alongside Smeets et al. 2023 and Zwosta et al. 2025 below.

Schwabe L, Wolf OT. Stress and multiple memory systems: from thinking to doing. Trends Cogn Sci. 2013;17(2):60-68.	Narrative review	doi 10.1016/j.tics.2012.12.001, PMID 23290054	Confirmed. Subject to the same replication caveat.
Shields GS, Sazma MA, Yonelinas AP. The effects of acute stress on core executive functions: a meta-analysis and comparison with cortisol. Neurosci Biobehav Rev. 2016;68:651-668.	Meta-analysis, 51 studies, n = 2,486	doi 10.1016/j.neubiorev.2016.06.038, PMID 27371161	Fully confirmed from the full text, including all pooled effect sizes. Cognitive flexibility rests on 6 studies and n = 280.
Smeets T, Ashton SM, Roelands SJAA, Quaedflieg CWEM. Does stress consistently favor habits over goal-directed behaviors? Data from two preregistered exact replication studies. Neurobiol Stress. 2023;23:100528.	Two preregistered exact replications, n = 80 and n = 95	doi 10.1016/j.ynstr.2023.100528, PMID 36861028	Confirmed on the publisher page. Note the precise result: the unstressed control groups themselves failed to show goal-directed control, so this is a failure to reproduce the original pattern rather than positive evidence that stress has no effect.
Sonnentag S, Fritz C. The Recovery Experience Questionnaire: development and validation of a measure for assessing recuperation and unwinding from work. J Occup Health Psychol. 2007;12(3):204-221.	Scale development and validation	doi 10.1037/1076-8998.12.3.204, PMID 17638488	Confirmed. All self-report and cross-sectional.
Sonnentag S, Venz L, Casper A. Advances in recovery research: what have we learned? What should be done next? J Occup Health Psychol. 2017;22(3):365-380.	Narrative review	doi 10.1037/ocp0000079, PMID 28358572	Confirmed. Non-systematic; no pooled effects.
Starcke K, Brand M. Decision making under stress: a selective review. Neurosci Biobehav Rev. 2012;36(4):1228-1248.	Selective narrative review	doi 10.1016/j.neubiorev.2012.02.003, PMID 22342781	Confirmed. Explicitly selective rather than systematic, and does not support a blanket degradation claim.
Starcke K, Brand M. Effects of stress on decisions under uncertainty: a meta-analysis. Psychol Bull. 2016;142(9):909-933.	Meta-analysis, 32 datasets, n = 1,829	doi 10.1037/bul0000060, PMID 27213236	Confirmed, including d equals 0.17 and the subgroup effects. Cite together with the correction notice below.

Effects of stress on decisions under uncertainty: a meta-analysis: correction to Starcke and Brand (2016). Psychol Bull. 2016;142(9):933.	Correction notice	doi 10.1037/bul0000068, PMID 27732004	Confirmed as a correction to the article above via the Crossref relation record. The body text of the notice could not be opened, so what it corrects is unknown.
Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology. Heart rate variability: standards of measurement, physiological interpretation, and clinical use. Circulation. 1996;93(5):1043-1065.	Consensus standards document	doi 10.1161/01.CIR.93.5.1043, PMID 8598068	Confirmed.
Thayer JF, Ahs F, Fredrikson M, Sollers JJ, Wager TD. A meta-analysis of heart rate variability and neuroimaging studies: implications for heart rate variability as a marker of stress and health. Neurosci Biobehav Rev. 2012;36(2):747-756.	Meta-analysis of neuroimaging studies	doi 10.1016/j.neubiorev.2011.11.009, PMID 22178086	Confirmed. The second author is spelled Ahs with a ring above the A in the original. The number of included studies is not stated in the abstract, so no study count is given in the text.
Vanhove AJ, Herian MN, Perez ALU, Harms PD, Lester PB. Can resilience be developed at work? A meta-analytic review of resilience-building programme effectiveness. J Occup Organ Psychol. 2016;89(2):278-307.	Meta-analysis, 42 samples from 37 studies	doi 10.1111/joop.12123	Confirmed, including proximal and distal effects. Not indexed in PubMed.
Zwosta K, Karcz T, Moschl M, Walser M, Goschke T, Ruge H, Wolfensteller U. No evidence for increased habitual or decreased goal-directed action control after acute stress. PLoS One. 2025;20(9):e0327807.	Two experiments, n = 129	doi 10.1371/journal.pone.0327807, PMID 40920670	Confirmed via the Crossref and OpenAlex records. The third author is spelled Moschl with an umlaut on the o in the original.