



The Biology of Leadership: Self-Regulation, Relational Responsibility, and Sustainable Performance

Antonio Pipio 

“Leonardo da Vinci” University (UNIDAV), Italy

Abstract: Purpose: This article develops a conceptual account of how embodied self-regulation may contribute to responsible and sustainable leadership without reducing social relationships to biological mechanisms. Approach: A theory-driven, non-systematic synthesis connects selected research on stress, sleep, emotion regulation, recovery, and social interaction with relational leadership and organizational work-design perspectives. The source material is an educational lecture, not an empirical dataset. Conceptual contribution: The proposed framework distinguishes regulatory capacities, their behavioral enactment, followers’ relational appraisal, and longer-term collective outcomes. Physical recovery, emotional flexibility, attentional organization, and purpose are treated as interdependent organizing domains rather than a validated hierarchy or biological leadership profile. *Regulatory translation* names the contingent process through which individual capacities become socially consequential through listening, fair procedures, constructive challenge, and support for autonomy. Six untested propositions specify mechanisms, contextual boundaries, reciprocal influences, and evaluation criteria. Implications: Leadership development should combine individual practices with changes to workload, decision processes, and opportunities for recovery. Physiological indicators cannot establish ethical legitimacy, psychological safety, or leadership quality. Originality and limitations: The article offers an integrative process model and a research agenda, not evidence that the complete model is effective. Its contribution lies in making the capacity-enactment distinction explicit while incorporating non-depletion of people into the assessment of sustainable performance. Multilevel, longitudinal, and intervention research is required to examine the proposed relationships.

Keywords: embodied leadership, self-regulation, relational leadership, psychological safety, sustainable performance, organizational responsibility

INTRODUCTION

Leadership requires more than knowing what should be done. A person may understand a strategy, endorse respectful communication, and recognize the importance of listening, yet fail to enact these commitments in a demanding interaction. This discrepancy raises a question that is both practical and theoretical: under what conditions do available competencies become usable capacities for responsible action? The present article approaches this question through the biology of leadership, understood not as a biological classification of leaders but as an inquiry into the embodied conditions of leading and their interaction with social context.

The starting point is an educational argument developed in the author’s lecture on leadership: health and recovery can support a meaningful contribution, including the capacity to guide oneself and others without making exhaustion the normal price of effectiveness. The lecture supplies the problem orientation, not research observations. Its

central intuition is reformulated here as a conceptual question rather than a universal claim that leadership begins in the body before it begins in the mind. Such a chronological separation would reproduce the mind-body dualism the argument seeks to overcome. The relevant unit is a person acting in relationships under particular material and institutional conditions.

Existing research already connects leadership with relational processes, affect, sleep, and occupational stress. Relational leadership theory directs attention to the processes through which leadership and organizing are constituted in interaction (Uhl-Bien, 2006). Diary research has examined associations between leaders' sleep and subsequent supervisory behavior (Barnes et al., 2015), while critical work cautions against replacing organizational explanation with neuroscientific vocabulary (Lindebaum & Zundel, 2013). The task is therefore not to announce that biology has newly become relevant. It is to articulate how embodied conditions can enter an explanation of leadership while preserving the explanatory importance of behavior, interpretation, power, and work design.

The article asks: through which processes, and under which contextual conditions, might embodied self-regulation contribute to relationally responsible and sustainable leadership? It proposes that regulation matters through its translation into conduct that others experience, interpret, and can contest. A leader's capacity to reduce immediate reactivity does not itself establish that a decision is fair or that employees can speak without retaliation. Conversely, visible tension does not demonstrate poor leadership when a person is confronting a genuinely unsafe or unjust situation. Capacity, conduct, and legitimacy therefore require separate analysis.

Three contributions follow. First, the framework specifies a capacity-enactment distinction: a potentially useful regulatory state becomes relevant to leadership only through situated action. Second, it introduces relational appraisal as an intervening social process, rather than assuming that one person's physiological state transfers directly to a team. Third, it defines sustainable performance through the joint consideration of task quality, continuity, and the preservation of people's opportunities to recover and exercise agency. These are proposed analytical contributions, not claims of empirical validation or priority over all existing integrative models.

The scope is deliberately bounded. The primary setting is work leadership involving recurring interactions and some influence over other people's conditions of participation. The framework may inform reflection in education, healthcare, or community settings, but transfer to those settings must be examined rather than presumed. It is not a clinical treatment model, a personnel-selection instrument, or a theory that people with better health are inherently better leaders. The argument concerns conditions that may support responsible action, not physiological prerequisites for dignity, authority, or participation.

CONCEPTUAL APPROACH AND EVIDENTIAL BOUNDARIES

This is a conceptual paper based on a targeted, theory-driven synthesis, not a systematic review, meta-analysis, or empirical evaluation of a training program. Following the methodological distinction between conceptual synthesis and the accumulation of empirical findings, the objective is to connect explanatory elements and formulate propositions that can be challenged (Jaakkola, 2020). The author's lecture identifies the practical problem;

published research provides selected constraints and resources for reconstructing it. Neither the lecture audience nor coaching clients are treated as participants, and no personal case material is analyzed.

Sources were selected for their relevance to one of four questions: how stress and recovery may affect functioning; how individual regulation is expressed in interaction; how relationships and organizational conditions shape opportunities for action; and how these connections could be evaluated without reductionism. The source base includes laboratory and field studies, measurement research, theoretical papers, and critical reviews. Targeted public searches and checks of publisher records, abstracts, and accessible articles were used to establish bibliographic identity and the claims reported here. The selection does not claim exhaustive coverage, and no database-wide screening or formal risk-of-bias assessment was conducted.

Three evidential levels remain distinct throughout. Established or reported findings are attributed to their sources and retained within the relevant study context. Integrative interpretations connect findings across contexts but are identified as conceptual reasoning. The proposed framework and propositions belong to a third level: they organize future inquiry and are not findings of this article. A laboratory result concerning attention, for example, cannot independently establish how a manager will behave, how an employee will interpret that behavior, or how a team will perform months later.

Practitioner models have a narrower role. The drama triangle and The Empowerment Dynamic are discussed as optional educational languages for reflecting on interaction, not as validated neurobiological accounts. Likewise, the lecture's four domains—physical, emotional, mental, and meaning-related—are retained as organizing categories rather than treated as an established factor structure. These boundaries make the synthesis selective and contestable. Its usefulness depends on whether the distinctions improve explanation and research design, not on the persuasive force of neuroscientific terminology.

THEORETICAL FOUNDATIONS: EMBODIED CONDITIONS WITHIN SOCIAL SYSTEMS

Stress, Sleep, and the Availability of Regulatory Capacity

Research reviewed by Arnsten (2009) identifies mechanisms through which stress can impair prefrontal functioning under particular conditions. Controlled sleep-restriction research also demonstrates cumulative decrements in neurobehavioral performance (Van Dongen et al., 2003). These findings support considering the conditions under which a person works; they do not support a simple contrast between a rational cortex and an irrational emotional brain. Nor do they establish a hormonal threshold distinguishing effective from ineffective leaders. Their relevance is enabling and constraining rather than determinative.

A leadership-specific bridge is provided by Barnes et al. (2015), who examined leaders' sleep, daily abusive supervision, and work-unit engagement. Their diary findings supported the proposed indirect pathway for sleep quality rather than sleep quantity. The observational design and the theoretical explanation should not be conflated: evidence of an association does not uniquely demonstrate that a finite self-control resource was depleted. A large preregistered test of ego depletion did not support the predicted effect in its primary analysis (Vohs et al., 2021). Consequently, this article uses capacity as a functional description, not as a literal reservoir of mental energy.

The distinction has practical significance. Reporting tiredness, experiencing cognitive overload, and making a poor decision are not interchangeable observations. A difficult interaction may reflect workload, lack of expertise, conflicting incentives, prior conflict, or deliberate misconduct rather than deficient recovery. A biological account becomes useful only when it adds a specified explanation beyond these alternatives. The proposed framework therefore treats sleep and recovery as potentially relevant antecedents, while requiring evidence about the intervening behavior and its context.

Emotion Regulation is not the Elimination of Emotion

Gross's (1998) experimental comparison of reappraisal and expressive suppression illustrates that regulatory strategies can have different consequences for experience, expression, and physiology. This distinction challenges the assumption that an outwardly composed person is necessarily processing an interaction adaptively. For the present framework, emotional regulation means selecting and revising responses in relation to a situation and its legitimate demands. It does not mean suppressing all disagreement, maintaining a permanently positive mood, or converting distress into an individual failure.

Emotion can also carry relevant information. Anger at mistreatment, concern about a safety risk, or disappointment after an avoidable error may warrant acknowledgment and action. The conceptual issue is whether a leader can use that information without humiliation, impulsive punishment, or the suppression of others' perspectives. Appropriate regulation may therefore involve slowing a response, making a concern explicit, seeking another perspective, or taking decisive protective action. The target is flexibility in responsible conduct, not a universal low-arousal state.

Neurochemical shorthand should be handled with similar restraint. Research on dopamine and reward prediction does not warrant equating dopamine with motivation in all its forms (Schultz et al., 1997). Work on oxytocin emphasizes the importance of person and context rather than a universal prosocial effect (Bartz et al., 2011). Neither chemical provides a sufficient explanation of trust, purpose, or ethical behavior. In leadership education, these terms should clarify the limits of simple explanations rather than provide apparently scientific labels for desirable personality traits.

Leadership Effects are Mediated by Social Interaction

Evidence concerning leaders' mood and group processes supports investigating interpersonal pathways. Sy et al. (2005) experimentally examined how leader mood affected members' mood, group affective tone, and aspects of group functioning. A panel study in a Danish municipality also reported associations between managerial and employee occupational stress (Bonnesen et al., 2022). Such work makes relational influence plausible, but the latter design cannot rule out all shared organizational causes. Neither study licenses an unqualified claim that a leader's nervous system directly regulates everyone else's nervous system.

Psychological safety provides a particularly important distinction. In Edmondson's (1999) formulation, it concerns a shared belief about the safety of interpersonal risk-taking within a team. It is not equivalent to feeling physically relaxed during a meeting. Employees may appear calm because they expect speaking up to be costly; an animated discussion may

occur in a group that tolerates disagreement well. Relational appraisal therefore concerns the anticipated consequences of participation, including whether questions, dissent, and acknowledged mistakes receive a fair response.

Recent field evidence is consistent with examining intermediate social mechanisms. Rus et al. (2025) studied leader coaching behaviors, psychological safety, intra-team learning, and performance in Romanian work teams. Their cross-sectional findings supported indirect relationships, not a causal demonstration of the sequence. The conceptual lesson adopted here is methodological: leadership outcomes should not be inferred from a leader's self-report alone. Observable conduct and the perspectives of those affected must remain distinct parts of the explanation.

Recovery, Organizational Resources, and Meaningful Contribution

The job demands-resources model connects burnout-related processes to characteristics of work rather than locating the entire problem inside the individual (Demerouti et al., 2001). Recovery research further distinguishes experiences such as psychological detachment, relaxation, mastery, and control over off-job time (Sonnentag & Fritz, 2007). These perspectives prevent self-regulation from becoming a prescription to tolerate any workload. An employee or manager cannot always compensate for understaffing, unpredictable schedules, or contradictory responsibilities by adopting a personal practice.

Meaning also belongs in the analysis, but without treating it as a universal protective substance. Grant's (2008) field experiments on task significance show how the experienced significance of work can affect performance through relational processes and under boundary conditions. Work on self-determination in organizations similarly distinguishes autonomy-supportive from controlling managerial orientations (Deci et al., 1989). The present framework consequently treats purpose as an orientation that must be examined alongside discretion, reciprocity, and realistic demands. A compelling mission cannot establish that excessive sacrifice is acceptable.

Taken together, these literatures motivate an integrative model rather than proving it. Physiological research identifies possible constraints; emotion-regulation research differentiates strategies; organizational research supplies relational and structural mechanisms. None of these levels replaces the others. The challenge is to connect them without converting an association at one level into a conclusion at another. The next section makes those connections explicit and specifies where inference remains provisional.

THE PROPOSED REGULATORY TRANSLATION FRAMEWORK

Four Organizing Domains, not a Biological Hierarchy

Regulatory capacity is defined here as the situated availability of resources and skills for attending, interpreting, choosing, and adjusting action. It includes but is not exhausted by physiological conditions. The term availability matters: possessing a skill in principle differs from being able and willing to use it in a particular encounter. Loehr and Schwartz (2001) also distinguish four performance domains. Here, the domains serve as a practical analytic map, not a claim to a novel four-part classification. They overlap, may compensate for one another, and should not be combined into a single score without independent conceptual

and measurement justification. The physical domain concerns conditions relevant to functioning and recovery, including sleep opportunity, experienced fatigue, and accommodation of individual needs. Its significance is not that the strongest or healthiest person is the most capable leader. A person with chronic illness may enact excellent leadership through appropriate support, pacing, and collaborative arrangements. Conversely, physical fitness does not imply fairness or judgment. Within this framework, physical conditions are assessed in relation to actual tasks and resources, never as a ranking of personal worth.

The emotional domain concerns identifying affective responses, tolerating relevant discomfort, and selecting expressions and actions appropriate to the situation. Its behavioral expression may include acknowledging frustration without allocating blame prematurely, or noticing fear without automatically avoiding a necessary conversation. It also includes repair: recognizing that an interaction was mishandled, correcting the decision process, and making the correction visible to those affected. A model that recognizes only prevention would miss the importance of accountable recovery after inevitable errors.

The attentional and cognitive domain concerns organizing attention, distinguishing evidence from interpretation, maintaining priorities, and revising a judgment when new information warrants it. Protected work intervals, explicit decision criteria, and written clarification can be considered candidate supports, not universally effective prescriptions. Capacity in this domain includes recognizing when a decision should be deferred, distributed, or independently checked. Responsible leadership is therefore compatible with acknowledging that one's own current judgment is insufficient.

The purpose-related domain concerns the reasons for action and the values against which choices are evaluated. It corresponds to the lecture's spiritual dimension only in the nonreligious sense of meaning, contribution, identity, and coherence. Purpose can orient a decision but cannot substitute for evidence, expertise, or respect for other people's values. Within the proposed model, it functions as a revisable direction rather than an obligation to persist at any cost. Table 1 summarizes the domains and illustrates how they might be studied without reducing them to biomarkers.

Table 1: Organizing domains and candidate observations

Domain	Functional focus	Illustrative observations
Physical	Availability for the task and opportunities for recovery.	Sleep opportunity, perceived fatigue, workload and access to individual accommodations.
Emotional	Identification of affect and flexible response selection, including repair.	Responses to disagreement; acknowledgment of errors; correction without humiliation.
Attentional and cognitive	Organization of attention, interpretation and decision procedures.	Clarifying questions; explicit criteria; appropriate delegation or independent checking.
Purpose-related	Reasons for contribution and revisable value commitments.	Consistency between stated values and decisions; scope for questioning demands and preserving autonomy.

Note. Original conceptual synthesis developed in this article. The domains are not a validated hierarchy or scale. Examples identify possible observations, not diagnostic criteria.

From Capacity to Enacted Behavior

The first transition in the framework is from available capacity to enacted behavior. This transition is contingent: a well-rested, attentive person may choose to intimidate others, while a fatigued person may use a reliable procedure that protects decision quality. *Regulatory translation* names the process by which embodied capacities become socially consequential through action. It is an integrating label for proposed relationships, not a newly measured psychological trait, proprietary intervention, or established neural pathway.

Relevant behaviors include asking a clarifying question before assigning fault, explaining a decision's criteria, allowing correction without retaliation, challenging a proposal rather than humiliating its author, and supporting another person's capacity to act. The model does not infer such behaviors from a leader's reported serenity. It proposes that they be documented directly, through appropriately consented observation, event-based reports, or independent evaluation of actual decisions. The object of assessment is the interaction, not the persuasive self-description of the leader.

This transition also depends on structural permission. A manager may have the skill to consult employees but lack discretion over an externally imposed deadline. Alternatively, consultation may be technically possible while incentives reward unilateral action and discourage disclosure of uncertainty. In these cases, a purely individual account would misidentify the constraint. Regulatory translation includes the opportunity and authorization to enact a response, as well as the individual resources for doing so.

From Enacted Behavior to Relational Appraisal

The second transition concerns how others interpret and respond to conduct. The same question may be experienced as an invitation, an evaluation, or a threat depending on previous interactions and the consequences of disagreement. Relational appraisal is defined as participants' interpretation of the fairness, reliability, and interpersonal risk associated with the interaction. It is not assumed to be accurate in every instance, nor is it under the leader's unilateral control. Its significance is that leadership is enacted among agents with histories and perspectives of their own.

This formulation separates intention from effect. A leader may intend to help while repeatedly taking over a colleague's work, thereby limiting opportunities for autonomy. A leader may intend to challenge constructively while using language that makes disagreement unsafe. Conversely, an unpopular decision may still be considered procedurally fair when its constraints are explained and affected people retain a meaningful voice. Empirical evaluation must therefore allow disagreement between leader intention, observed behavior, and participant appraisal rather than averaging them into an undifferentiated leadership score.

An illustrative scenario clarifies the distinction. After poor sleep, a supervisor feels unusually defensive when an employee reports a problem. The supervisor notices this response, postpones assigning responsibility, asks for a reconstruction of events, and records the team's concerns. This is a hypothetical example, not a case finding. A breathing exercise or momentary calm would not by itself demonstrate successful leadership. The relevant

questions concern whether the response improved understanding, whether the employee could speak freely, and whether any resulting action addressed the problem fairly.

Collective Outcomes, Sustainability, and Reciprocal Feedback

The third transition concerns collective consequences across repeated interactions. Candidate outcomes include learning behavior, coordination, decision quality, continued willingness to speak, and the development of others' autonomy. Their connection to individual capacities is indirect and context-dependent. A single successful encounter cannot establish a durable organizational climate, just as a single difficult encounter cannot define a person's entire leadership. Repetition, consistency, and the distribution of authority determine whether local experiences become more persistent patterns.

Sustainable performance is proposed as a joint criterion comprising quality, continuity, and non-depletion of people. Quality concerns the appropriateness of decisions and task outcomes. Continuity concerns the ability to maintain or restore functioning over a meaningful period. Non-depletion concerns whether achieving results preserves reasonable opportunities for recovery, participation, and development among those involved. The third criterion does not imply the elimination of all effort or fatigue. It excludes treating foreseeable, avoidable exhaustion or dependency as an unexamined means to organizational success.

These criteria should remain visible rather than be collapsed into a flattering total. High output with deteriorating recovery is not automatically classified as sustainable; neither is subjective comfort without competent performance. Appropriate evaluation may require different time horizons and stakeholder perspectives. The model therefore resists a simple equation in which performance quality is multiplied by duration. That image can be useful in teaching, but it is not a validated measurement model and cannot specify acceptable trade-offs by itself.

Table 2: Proposed translation sequence and distinct evidential requirements

Level	Analytical question	Evidence needed
Regulatory availability	Which capacities are accessible in this situation?	Repeated assessments of recovery, attention and emotional responses, with work conditions recorded.
Enacted behavior	How are capacities expressed in actual conduct?	Independent observation or event-based reports of listening, decision procedures, challenge and support.
Relational appraisal	How do affected people interpret the interaction?	Participants' reports of fairness, reliability and interpersonal risk, separated from leader intentions.
Collective outcomes	What develops across repeated interactions?	Longitudinal evidence on task quality, learning, voice, recovery opportunities and autonomy.
Context and feedback	How does work design enable or constrain each transition?	Demands, resources, authority and prior interactions assessed over time in both directions.

Note: The sequence is a conceptual proposal, not a demonstrated causal chain. Each transition requires independent testing; feedback can be favorable, adverse or mixed.

Finally, the framework is recursive. Work design shapes opportunities for recovery; interactions affect the demands people face; repeated outcomes influence future expectations and behavior. A leader who invites honest reporting may initially encounter more difficult information, not less stress. Over time, better problem visibility could support corrective action, but this requires resources and follow-through. Feedback may therefore be beneficial, harmful, or mixed. No assumption of an inevitable upward cycle is built into the model. Table 2 summarizes the proposed sequence and separates the observations required at each level.

SIX PROPOSITIONS AND A RESEARCH AGENDA

Proposition 1: Recovery and Within-Person Variation

Proposition 1. Within the same leader, poorer-than-usual recovery will be associated with a lower probability of adaptive responses in demanding interactions, with the association weakened by effective decision supports and sufficient discretion to pause or delegate.

The proposition concerns variation around a person's own baseline, not comparison of healthier and less healthy leaders. It extends the relevance of sleep and recovery research without claiming that fatigue causes misconduct in every instance. A useful design would combine repeated recovery reports, event descriptions, and ratings of specific interactional behaviors. Prior conflict, daily demands, expertise, and time pressure should be considered as competing explanations or moderators. The proposition would be challenged if recovery added no explanatory value after these factors were addressed, or if observed associations were confined to common-method self-reports.

Proposition 2: Behavioral Mediation

Proposition 2. Associations between leaders' regulatory capacities and followers' relational appraisals will be mediated primarily through enacted interactional behaviors rather than adequately explained by leader-reported internal states alone.

This is the central translation claim. A longitudinal study could assess capacities before an interaction, independently code behaviors during it, and obtain participant appraisals afterward. Repeated observations would allow the researcher to separate stable reputational differences from episode-specific processes. The design should not assume that mediation estimates establish causality; temporal ordering, measurement quality, and plausible alternative pathways remain necessary considerations. Evidence that behavioral measures add no explanatory contribution, or that appraisals precede rather than follow the proposed conduct, would require revision of the mechanism.

Proposition 3: Procedural and Relational Conditions

Proposition 3. Any positive association between regulated conduct and psychological safety will be stronger where participants experience consistent procedures, meaningful opportunities to contribute, and protection from retaliation; outward composure alone will not reliably predict psychological safety.

The proposition is designed to prevent the equation of calmness with trustworthiness. It can be examined through comparative interaction studies or team-level longitudinal designs that distinguish enacted respect from affective display. A critical comparison would involve composed behavior under controlling conditions versus emotionally engaged behavior under participatory conditions. It is plausible that the latter could support more open participation. If composure predicts favorable impressions but not subsequent willingness to report errors or disagree, the model would treat those outcomes as distinct rather than declaring the interaction successful.

Proposition 4: Reciprocal Organizational Influence

Proposition 4. Organizational demands and resources will predict subsequent regulatory availability, while repeated leadership interactions will contribute to later demands, recovery opportunities, and relational expectations; both directions require separate empirical examination.

This proposition rejects a one-way story in which leaders' bodies generate organizational culture. Longitudinal studies should examine whether structural changes precede changes in recovery and conduct, and whether interaction patterns subsequently affect the organization of work. Fixed-effects analyses, carefully selected time lags, and qualitative reconstruction of critical events may clarify these relationships without eliminating every confound. A finding that shared work demands explain an apparent leader-to-follower association would narrow, rather than invalidate, the broader framework by relocating the relevant mechanism.

Proposition 5: Combined Interventions and Non-Depletion

Proposition 5. Interventions combining individually chosen regulation practices with changes to work design will produce more durable improvements in relational conduct and non-depletion than individual regulation training alone, where remediable structural demands are a substantial source of strain.

This is an untested comparative claim, not a recommendation supported by a trial of the present model. A cluster-randomized study could compare individual training, work-design changes, their combination, and an appropriate comparison condition. Outcomes should include independently assessed conduct, participant appraisals, recovery opportunities, and task quality. Follow-up should extend beyond immediate satisfaction with the course. Null or adverse effects, implementation costs, unequal access, and unintended pressure to perform wellness should be reported. Improvement in a physiological measure without behavioral or relational improvement would not confirm this proposition.

Proposition 6: Purpose with Autonomy And Recovery

Proposition 6. Experienced purpose will support sustainable persistence more consistently when people also have meaningful autonomy and adequate recovery opportunities; purpose invoked alongside chronic, unavoidable overextension will not reliably protect sustainable performance.

The distinction is between reasons that orient contribution and narratives that normalize sacrifice. A study should separate personally endorsed purpose from pressure to identify with an organization's mission. It should examine whether these forms of meaning relate differently to participation, recovery, and the willingness to question unrealistic demands. The proposition would be weakened if purpose consistently predicted durable outcomes independently of autonomy and recovery, or if the specified boundary conditions failed to differentiate patterns. Its value lies in producing discriminating questions, not in assuming that meaning is invariably beneficial.

Measurement, Disconfirmation, and Scope Conditions

Across the six propositions, construct separation is essential. Regulatory capacity, observed conduct, individual appraisal, shared team climate, and organizational outcomes should not be measured by nearly identical items completed at the same time by the same person. Individual perceptions should be aggregated to the team level only where the research design and evidence justify doing so. Clinical or physiological variables should not be introduced merely to make the study appear more scientific; their inclusion requires an explicit incremental question.

Physiological measurement would require particular restraint. Recommendations for heart-rate variability research emphasize the importance of recording conditions, respiration, analysis choices, and transparent reporting (Laborde et al., 2017). Heart-rate variability is not a general-purpose index of moral character, whole-system regulation, or leadership potential. A study could test whether an appropriately measured indicator adds information beyond reported recovery and observed behavior. A null incremental contribution would be informative and should not be reinterpreted as hidden support for the model.

Sampling should include variation in health, disability, gender, organizational status, and working arrangements without treating any category as inherently deficient. Measurement and interpretation also require attention to cultural and occupational differences in the expression of respect, disagreement, and authority. Healthcare emergencies, creative collaboration, and routine administration do not impose identical task demands. The framework predicts context sensitivity rather than a universal preferred emotional display. Its claims would be strengthened by successful replication across settings and narrowed when effects depend on particular tasks or institutions.

IMPLICATIONS FOR LEADERSHIP EDUCATION AND ORGANIZATIONAL PRACTICE

Teach the Transition from Awareness to Action

Leadership education informed by this framework would not end with recognizing one's internal state. The educational sequence would ask participants to identify a demanding situation, distinguish bodily sensations from interpretations, consider alternative responses, and examine the consequences for others. Reflection would then return to whether the response served the task and preserved participation. This is a proposed application of the framework, not a validated curriculum. It should be evaluated through changes in actual interactions, not solely through participants' satisfaction or familiarity with neuroscientific terms.

For example, an exercise could contrast two responses to a missed deadline. One response attributes failure to a colleague's character; another reconstructs the constraints, clarifies responsibility, and agrees on a corrective action. The second is not necessarily softer: it may establish demanding expectations and clear consequences. Its distinguishing feature is that challenge is directed toward the problem and the agreed responsibilities rather than toward personal humiliation. Participants should also consider when consultation is insufficient and a protective or time-critical decision must be made.

Use Relational Models as Reflection, not Diagnosis

Karpman's (1968) drama triangle offers a vocabulary of victim, persecutor, and rescuer roles; David Emerald's The Empowerment Dynamic presents creator, challenger, and coach roles (Center for The Empowerment Dynamic, n.d.). These are distinct attributed frameworks. In the present article, they are optional prompts for discussing dependency, blame, responsibility, and support for agency. They do not identify fixed personality types or demonstrate that adopting a role activates a particular neural circuit.

Their use requires an explicit ethical boundary. Describing a relational position must never invalidate actual victimization, shift responsibility for abuse onto the person harmed, or imply that an employee can simply choose their way out of structural disadvantage. Similarly, coaching should not become an excuse for withholding resources or abandoning a colleague who needs assistance. Supporting autonomy may involve giving practical help, removing an obstacle, or accepting institutional responsibility. Responsibility is distributed according to actual power and obligations, not assigned equally merely because all participants can reflect on their responses.

Keep Self-regulation Practices Proportionate to Evidence

The source lecture includes attention practices, movement, recovery, and breathing as possibilities for individual regulation. These should be presented as options whose acceptability and effects vary, not as mandatory signs of commitment. Balban et al. (2023) reported improvements in mood and respiratory rate for certain brief breathing practices in a randomized study. That evidence does not demonstrate improved leadership, reduced organizational misconduct, or a validated pathway from breathing to team performance. Testing those outcomes would require separate research. No physiological exercise can replace an appropriate response to unsafe working conditions, a clinical problem, or a conflict over responsibilities. Participation should be voluntary, accessible, and adaptable; employees should not be required to disclose health information to justify declining. The present framework makes no recommendation for heat or cold exposure, hormone manipulation, or fixed breathing protocols. Its practical emphasis is on matching a modest individual option to an identified need while examining whether the organization must also change.

Make Work Design and Accountability Visible

At the organizational level, the framework directs attention to controllable sources of unnecessary strain: unclear decision rights, preventable interruptions during critical tasks,

expectations of constant availability, and incentives that reward output while obscuring its human costs. These are candidate targets for local assessment, not a universal checklist of causes. Leaders should identify which constraints they can change, which require collective negotiation, and which must be escalated. Asking people to become more resilient is not an adequate substitute for this analysis.

Accountability also requires information that leaders cannot supply alone. Anonymous or otherwise protected opportunities to report interpersonal consequences, appropriate review of difficult decisions, and visible follow-through can help test whether stated commitments are enacted. The relevant outcome is not that everybody feels positive about every decision. It is whether reasons can be examined, errors corrected, concerns expressed, and responsibilities allocated fairly. In the proposed framework, biological awareness serves those purposes; it does not displace them.

DISCUSSION, LIMITATIONS, AND ETHICAL SAFEGUARDS

The framework contributes a process-level explanation rather than a catalog of desirable traits. Its central claim is conditional: embodied regulatory capacities may matter for leadership through behavior that is interpreted within relationships and constrained by work design. This formulation preserves the lecture's concern for the person while avoiding the inference that physiology supplies the meaning or legitimacy of social action. It also explains why an intervention can improve how a leader feels without improving how others are treated.

Several limitations are substantial. The literature selection is non-systematic and may omit relevant perspectives or contradictory findings. The four domains are not empirically validated, and their boundaries may overlap excessively. The translation sequence may prove too broad unless particular behaviors, temporal intervals, and contexts are specified. Some proposed relationships may be fully accounted for by existing organizational theories. The model's incremental value therefore remains an empirical and conceptual question rather than an accomplished contribution to prediction.

Causal uncertainty is equally important. Much of the relevant organizational evidence is observational, while laboratory studies have limited direct correspondence with workplace leadership. Shared conditions, reverse causation, expectations, and measurement artifacts can generate apparent cross-level links. Even a successful intervention would not establish that its effects were biological rather than attributable to attention, changes in procedure, or participants' expectations. Future studies must compare mechanisms rather than attach a biological explanation to any favorable outcome.

A further risk is the commercialization of regulation as a personal obligation. If employees are encouraged to optimize themselves while avoidable organizational pressures remain untouched, the vocabulary of biology can individualize collective problems. The proposed non-depletion criterion is intended to resist that move, but a criterion alone does not guarantee ethical implementation. People affected by an intervention should be involved in determining acceptable aims, burdens, and outcomes, including the right to question whether the program addresses the actual problem.

Finally, the framework explicitly rejects physiological gatekeeping. Health conditions, autonomic indicators, emotional expressiveness, or participation in wellness

activities must not be treated as evidence of someone's right to lead. Physiological data, when genuinely needed for research, should be collected with meaningful consent, minimized, protected, and separated from employment appraisal. These are proposed ethical safeguards rather than a summary of jurisdiction-specific law. The fundamental distinction remains: capacity may enable action, but it cannot determine the ethical value of that action.

CONCLUSION

The biology of leadership is most defensible as a question about embodied conditions within social relationships, not as a claim that leadership can be read from the brain, hormones, or heart rate. This article has proposed a framework connecting regulatory availability, enacted behavior, relational appraisal, and collective outcomes, with organizational demands and recovery opportunities operating throughout the process. It has also separated sustainable performance from uninterrupted output by incorporating quality, continuity, and non-depletion of people. The framework remains untested. Its six propositions are intended to support research that can identify absent effects, alternative explanations, and boundary conditions as well as favorable relationships. Its practical implication is correspondingly modest but consequential: attention to the leader's state should be accompanied by attention to conduct, the experience of others, and the design of work. Caring for embodied capacities becomes a leadership responsibility when it supports competent action, meaningful participation, and an accountable use of influence—not when it merely produces a more persuasive image of personal optimization.

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