

A Conceptual Framework Linking Meaning-Making, Temporal Experience, and Biological Aging

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Abstract

Contemporary longevity research has emphasized behavioral adherence, genetic predispositions, and biomedical risk factors. While valuable, these approaches provide limited explanatory power across cultures and historical contexts. This article advances a meaning-centered, biocognitive framework for understanding aging through the Centenarian Consciousness Index (CCI). The CCI is proposed as a conceptual framework grounded in the experience of lived duration rather than chronological time (Martinez, 2001; Martinez, 2014), and may relate to how perceptual and emotional orientations interface with stress physiology, inflammatory signaling, and biological aging processes. Emotional factors—including gratitude, generosity, curiosity, and admiration—interact with perceptual orientations such as urgency versus plenitude and decline focus versus healthspan orientation. Rather than asserting direct causal regulation, the framework outlines how these perceptual–emotional patterns may be associated with biological processes through pathways described in psychoneuroimmunology and affective science. We present the

theoretical foundations of duration, describe the biocognitive composition of the CCI, examine mechanisms of perceptual–emotional coupling, and address cultural generalizability. The CCI is presented as a hypothesis-generating construct rather than a validated instrument, with emphasis on its theoretical foundations, cross-cultural considerations, and priorities for future empirical testing. Longevity is reframed not as behavioral compliance but as the sustained inhabitation of meaning across time.

Introduction

Longevity science has made substantial advances in identifying correlates of extended lifespan, including dietary patterns, physical activity, social integration, and access to medical care. However, these factors demonstrate inconsistent predictive value when examined across cultures, cohorts, and historical periods. Moreover, behavioral prescriptions often fail to explain why individuals exposed to similar conditions age along markedly different biological trajectories (Stephoe & Deaton, 2015; Westerhof & Wurm, 2015). An emerging body of evidence suggests that the manner in which individuals experience and interpret time—particularly under conditions of uncertainty, loss, and finitude—plays a critical role in shaping stress physiology and inflammatory regulation (McEwen, 1998, 2007; Slavich, 2020). Prior biocognitive work has proposed that meaning-making enacted through lived duration constitutes a primary pathway through which perception and emotion may influence biological systems over time (Martinez, 2001; Martinez, 2014). This article builds on that foundation by extending duration theory into a structured longevity framework.

The Centenarian Consciousness Index (CCI) is introduced as a theoretically grounded framework designed to characterize perceptual and emotional orientations that may relate to biological stress systems. While the framework draws on ethnographic observations across diverse cultural contexts, claims regarding cross-cultural robustness should be

understood as preliminary and interpretive rather than empirically established. The CCI does not measure personality traits or discrete behaviors; instead, it describes enduring orientations through which individuals inhabit duration and meaning in the process of growing older. These orientations are proposed as potentially cross-cultural patterns of meaning-making; however, their generalizability requires systematic empirical evaluation across populations and settings. By doing so, it may offer a culturally relevant perspective on longevity research while remaining open to refinement through future cross-cultural study.

The Centenarian Consciousness Index (CCI)

Psychometric Rationale

One of the challenges of personality tests and other psychometric assessments is their limited predictive validity for healthy longevity, largely because such measures fail to capture contextual and cultural contributors to healthspan. Mindbody responses are strongly influenced by environmental conditions and culturally mediated interpretations of meaning, which shape physiological regulation (Martinez, 2001). Individuals may display extroversion in family contexts and introversion with strangers; emotional openness may be valued in one culture and discouraged in another; collectivist and individualist orientations further shape perception and emotional expression. These contextual variations limit the explanatory power of trait-based models when applied cross-culturally to aging and longevity (Carstensen et al., 1999).

The Centenarian Consciousness Index (CCI) is presented here as a conceptual framework derived from over 25 years of ethnographic observation of healthy centenarians (100 years or older), including collectivist and individualist Eastern and Western cultures, rather than as a finalized or validated psychometric instrument. In its current presentation, however, the

CCI should be understood as a conceptual model from which such an instrument may be developed, rather than as a fully validated psychometric scale. The ethnographic database underlying the CCI is based on longitudinal qualitative observations and interviews conducted by the author over multiple decades and cultural contexts (unpublished data). These observations inform the structure of the proposed dimensions but do not yet constitute formal psychometric validation (e.g., factor structure, reliability, or predictive validity). Each item is rated on a five-point Likert scale ranging from strongly disagree to strongly agree. Rather than indexing personality or behavior, the CCI assesses mindbody patterns of perceiving and emoting the world that correlate with biological longevity markers and stress physiology. Accordingly, references to biological relevance should be interpreted as theoretically grounded associations consistent with existing literature, rather than as empirically established properties of the instrument itself.

The CCI characterizes four perceptual and four emotional factors commonly observed among centenarians across cultures and life conditions. These factors are expressed during both favorable and adverse circumstances and reflect stable modes of inhabiting inner and outer experience over time (Martinez, 2001, 2014).

(See Figure 1 below)

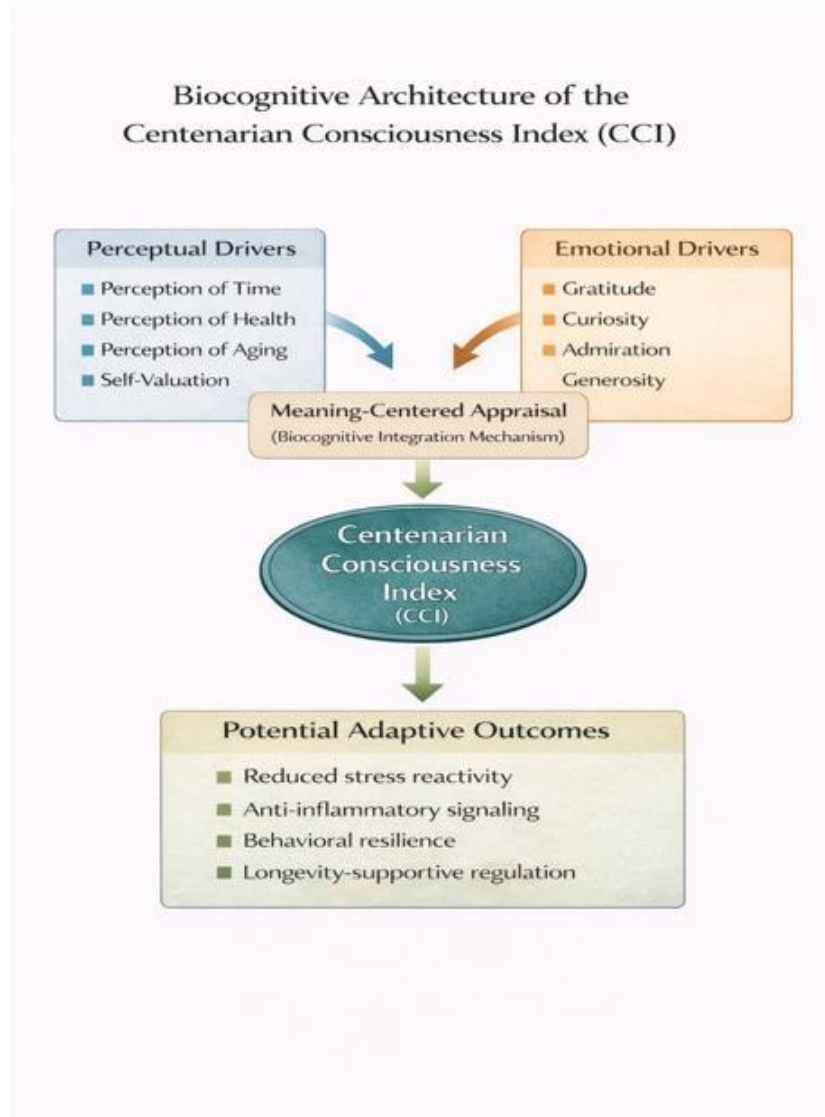


Figure 1. The Centenarian Consciousness Index (CCI) architecture. The model illustrates the coupling between four perceptual dimensions (time orientation, health perception, aging perception, and self-valuation) and four emotional dimensions (gratitude, curiosity, flexibility, and acceptance). These dimensions operate as an integrated system rather than discrete traits, shaping how individuals inhabit experience and maintain continuity across the life course.

Each factor is grounded in empirically identified neuropsychological and psychoneuroimmunological mechanisms relevant to stress regulation and inflammation.

Rather than measuring cognitive appraisals or behavioral tendencies, the CCI focuses on perceptual and emotional orientations with demonstrated neurobiological function. These orientations are

linked to regulatory pathways involving the hypothalamic–pituitary–adrenal (HPA) axis, autonomic nervous system balance, and inflammatory signaling cascades. For instance, sustained emotional states such as gratitude and admiration have been associated with increased parasympathetic activity and vagal tone, which may influence heart rate variability and pro-inflammatory cytokine activity (Thayer & Lane, 2000; Stellar et al., 2015). Conversely, threat-based perceptual orientations have been linked to sympathetic arousal and cortisol release, which may contribute to chronic allostatic load and immune dysregulation (McEwen, 1998, 2007; Slavich, 2020). For example, curiosity—one of the four CCI emotional dimensions—has been associated with dopaminergic pathways involving the ventral tegmental area, which may support adaptive stress modulation and anti-inflammatory processes (Althoff & Sutin, 2016; Sakaki et al., 2018). Dopamine activity has also been linked to modulation of subjective time perception, a core perceptual dimension of the CCI. Observational reports suggest that centenarians often exhibit both curiosity and expanded time perception, consistent with the proposed coupling of these factors (Martinez, 2014).

To clarify the relationship between macro-level perceptual–emotional orientations and micro-level biological markers, the CCI framework conceptualizes physiological indices not as direct inputs into the scale, but as downstream correlates of sustained meaning-enacted regulation. Biological markers—including inflammatory cytokines (e.g., IL-6, CRP), cortisol dynamics, autonomic balance (heart rate variability), and dopaminergic activity—serve as measurable expressions of how perceptual–emotional patterns are embodied over time. For example, curiosity, as an exploratory emotional orientation, has been associated with dopaminergic activation and enhanced stress adaptability, which in turn modulates inflammatory signaling and supports cognitive resilience (Althoff & Sutin, 2016; Sakaki et al., 2018). Similarly, gratitude and admiration are

linked to parasympathetic activation and reduced pro-inflammatory cytokine expression, reflecting improved neurovisceral integration (Thayer & Lane, 2000; Stellar et al., 2015). Within this framework, the CCI operates at the level of patterned experience—assessing how individuals habitually perceive and emote—while biological markers provide convergent validation at the level of physiological regulation. The relationship is therefore not unidirectional but reciprocal over time: sustained perceptual–emotional orientations influence stress physiology and inflammation, while chronic biological states (e.g., elevated allostatic load) may constrain or bias perception toward threat-based interpretations. This bidirectional coupling is consistent with psychoneuroimmunological models of aging, where meaning-mediated appraisal processes shape endocrine and immune responses across the lifespan (McEwen, 1998; Slavich, 2020). Importantly, the CCI does not reduce longevity to biomarker optimization; rather, it situates biological indices within a broader biocognitive system in which meaning, duration, and physiological regulation co-emerge. In this sense, biomarkers function as empirical anchors that make visible the otherwise implicit process by which lived duration becomes biologically instantiated. Objective determinants such as genetic background, nutrition, lifestyle behaviors, and environmental exposures are acknowledged within the CCI framework as boundary conditions and modulators of biological aging rather than as competing explanatory systems. In line with a biocognitive model, these factors provide the material constraints within which meaning-enacted regulation operates. The CCI does not replace behavioral or biomedical assessments; rather, it specifies the interpretive layer through which such factors are physiologically instantiated. For example, identical nutritional or lifestyle profiles may yield divergent inflammatory and endocrine outcomes depending on whether they are enacted within threat-based or continuity-based perceptual orientations, influencing HPA axis reactivity, autonomic balance, and downstream immune signaling (McEwen, 1998, 2007; Slavich, 2020; Thayer & Lane, 2000). In this sense,

objective variables function as inputs to biological systems, while perceptual–emotional patterns is proposed to shape their regulatory expression over time. The CCI therefore enables a closer inquiry from macro-level lived duration to micro-level biological outcomes by clarifying how environmental and behavioral factors are differentially embodied through meaning, without reducing longevity to either domain alone.

Perceptual and Emotional Dimensions of the Centenarian Consciousness Index

The CCI characterizes longevity-supportive consciousness through the coupling of emotional and perceptual dimensions that may influence lived duration. Rather than treating emotions or perceptions as isolated variables, the CCI conceptualizes them as interdependent orientations shaping how time, meaning, and biological stress are inhabited across the lifespan (Martinez, 2001).

Emotional Dimensions

Four emotional orientations form the affective core of the CCI: gratitude, generosity, curiosity, and admiration. These emotions are widely associated with psychological well-being; however, their biological relevance emerges most clearly when situated within a temporal, meaning-centered framework.

Gratitude

Gratitude is defined as a sustained orientation of appreciative awareness toward life, relationships, and existence itself, rather than a momentary response to favorable events. Research demonstrates that gratitude is associated with reduced depressive symptoms, improved sleep quality, lower inflammatory markers, and enhanced cardiovascular functioning (Emmons & McCullough, 2003; Algoe, 2012). Longitudinal studies indicate that gratitude predicts better self-rated health, resilience, and psychological well-being across adulthood and into older age (Hill et al., 2016). From a psychophysiological perspective, gratitude is associated with increased parasympathetic

activity and improved autonomic regulation, buffering chronic stress activation (Thayer & Lane, 2000). Within the CCI, gratitude functions as an emotion of temporal integration, anchoring individuals in lived duration rather than loss-focused appraisal (Martinez, 2014).

Generosity

Generosity is conceptualized as the enacted emotion of outward contribution—giving time, care, attention, or resources beyond instrumental exchange. Epidemiological and longitudinal research shows that prosocial behaviors such as volunteering and caregiving are associated with reduced mortality risk, lower blood pressure, improved immune functioning, and greater longevity, particularly in later life (Brown et al., 2003; Okun et al., 2013). Neurobiological studies further indicate that generous action activates affiliative and reward-related neural circuits, including oxytocin-mediated pathways, reducing stress reactivity and buffering loneliness and social threat (Inagaki & Eisenberger, 2012). Within the CCI, generosity transforms social engagement into a biologically protective emotional orientation that reinforces purpose and relational meaning (Martinez, 2014).

Admiration

Admiration is defined as an emotion of elevation and appreciation toward excellence, beauty, or virtue in others or the world. Research on moral elevation and awe demonstrates that admiration-related emotions broaden attentional and perceptual scope, enhance vagal tone, and promote prosocial motivation (Haidt, 2003; Stellar et al., 2015). In aging populations, experiences of admiration and awe are linked to increased openness, meaning in life, and reduced self-focused rumination—psychological patterns associated with emotional regulation and cognitive flexibility (Keltner & Haidt, 2003; Krause & Hayward, 2015). Within the CCI, admiration counteracts experiential contraction often associated with aging and loss.

Curiosity

Curiosity is conceptualized as an emotion of exploratory engagement with novelty, uncertainty, and learning. Longitudinal research indicates that curiosity predicts better cognitive functioning, greater cognitive reserve, reduced dementia risk, and lower mortality across the lifespan (Althoff & Sutin, 2016; Sakaki et al., 2018). Neurobiological studies link curiosity to dopaminergic regulation, enhanced memory consolidation, and adaptive stress responsiveness. In later life, curiosity sustains engagement with the environment and buffers withdrawal and learned helplessness. Within the CCI, curiosity functions as an emotion of future-directed openness, preserving vitality even as chronological time advances.

Perceptual Dimensions

In the CCI framework, perceptual dimensions are articulated in direct parallel to the emotional dimensions. Perception is treated as a meaning-mediated, duration-sensitive orientation that shapes biological regulation over time.

Time

Time is perceived not as a scarce or diminishing commodity, but as lived duration—a continuous, inhabitable present integrating past, present, and future (Martinez, 2001). This temporal orientation reduces urgency-driven appraisal and supports sustained engagement, curiosity, and emotional regulation. Socioemotional selectivity theory demonstrates that when time is experienced as meaningful rather than threatening, individuals show improved affective balance and reduced stress reactivity (Carstensen et al., 1999). Neuroscientific and psychophysiological studies further indicate that time pressure and future deprivation appraisals are associated with heightened sympathetic activation and cortisol release, whereas expanded temporal perspective supports parasympathetic regulation and resilience (Thayer & Lane, 2000; McEwen, 2007). Longitudinal aging studies show that individuals reporting meaningful present-focused time orientations exhibit

better cognitive aging trajectories and lower mortality risk (Stephoe & Deaton, 2015). Within the CCI, lived duration functions as a foundational perceptual regulator: by inhabiting time rather than racing against it, individuals biologically embody continuity rather than decline.

Aging

Aging is perceived as potentiality transformation rather than inevitable deterioration. Research on aging self-perceptions demonstrates that individuals holding positive, growth-oriented views of aging show better functional health, reduced cardiovascular risk, lower inflammatory markers, and increased longevity compared to those with deficit-based beliefs (Levy, 2003; Westerhof & Wurm, 2015). Negative aging stereotypes internalized across the lifespan exert direct biological effects, including slower recovery from illness and heightened stress responses, whereas adaptive aging narratives support self-efficacy and physiological regulation (Levy et al., 2002). From a meaning-centered

perspective, perceiving aging as coherence-enhancing allows mortality awareness to deepen gratitude rather than provoke fear (Martinez, 2014).

Health

Health is perceived dynamically rather than diagnostically. Rather than equating health with the absence of disease, centenarian consciousness interprets bodily sensations and limitations within a broader context of adaptability and meaning. Self-rated health robustly predicts morbidity and mortality, often outperforming objective clinical indicators (Idler & Benyamini, 1997; DeSalvo et al., 2006). Psychoneuroimmunology research shows that threat-based interpretations of bodily signals amplify allostatic load and inflammation, whereas meaning-based appraisals support resilience (McEwen, 1998; Slavich, 2020). In aging populations, perceiving health as manageable and purposeful is associated with better functional outcomes and longevity (Stephoe & Deaton, 2015).

Self-Valuation

Self-valuation is grounded in intrinsic worth rather than productivity or age roles. Eudaimonic well-being research demonstrates that stable self-acceptance and purpose are associated with reduced allostatic load, lower inflammatory markers, and decreased mortality risk (Ryff, 1989; Alimujiang et al., 2019). Threatened self-worth amplifies cortisol reactivity, whereas secure self-valuation supports adaptive stress responses (Dickerson & Kemeny, 2004). Within the CCI, self-valuation sustains coherence across time, enabling integration of aging and mortality awareness without identity collapse (Martinez, 2014).

Perceptual–Emotional Coupling

At the physiological level, this coupling operates through coordinated regulation of the hypothalamic–pituitary–adrenal (HPA) axis, autonomic nervous system balance, and immune signaling pathways. Perceptual orientations function as pre-reflective filters of threat or safety, shaping whether emotional activation leads to adaptive regulation or sustained stress reactivity. When perceptual frameworks are characterized by urgency, decline focus, or externalized control, even positive emotional states may fail to downregulate cortisol production or inflammatory cytokine activity, resulting in sustained allostatic load (McEwen, 1998, 2007; Slavich, 2020). In contrast, when emotions such as gratitude, curiosity, and admiration are enacted within expanded temporal perception—where continuity replaces scarcity—there is enhanced parasympathetic activation, improved heart rate variability, and reduced pro-inflammatory signaling, reflecting more efficient neurovisceral integration (Thayer & Lane, 2000; Stellar et al., 2015). This interaction can be understood as a regulatory convergence: perceptual dimensions may shape the baseline interpretive stance toward experience, while emotional dimensions may influence the intensity and direction of physiological responses. Their coupling may be associated with patterns of endocrine activity, immune function, and inflammatory tone over time. In this sense, the co- consideration of

perceptual and emotional dimensions within the CCI reflects a proposed biocognitive process through which meaning may relate to biological outcomes. The biological relevance of these dimensions lies in their proposed coupling. Emotional expression alone may not confer consistent biological effects unless considered within broader perceptual orientations. The CCI framework suggests that similar emotional expressions may be associated with different physiological patterns depending on whether they are embedded in compressed or expanded temporal contexts (Martinez, 2001). Together, the perceptual and emotional dimensions described in the CCI outline a biocognitive system through which meaning may relate to physiological processes over time.

Duration as Meaning-Enacted Temporality

Duration refers to the embodied, qualitative experience of time as it is subjectively inhabited, expanded, or compressed through meaning. In the present framework, lived duration is defined as a perceptual–experiential orientation toward time that may be characterized along a continuum from temporal expansion (e.g., continuity, presence, integration of past–present–future) to temporal compression (e.g., urgency, scarcity, fragmentation of experience). Unlike chronological time, which is externally measured, lived duration reflects how individuals interpret and engage with time in relation to meaning, context, and self-relevance (Martinez, 2001). Expanded duration may be operationally reflected in reported experiences of temporal openness, reduced urgency, sustained engagement, and integration of life events, whereas compressed duration may be reflected in perceived time scarcity, heightened urgency, and fragmentation of attention and meaning. These orientations are not treated as fixed traits but as dynamic patterns that may vary across contexts and over time. When duration is compressed, experience tends to be dominated by urgency and scarcity, which have been associated with heightened stress appraisal and activation of physiological stress systems. In contrast, expanded duration may be associated with continuity

of experience, reduced threat reactivity, and more adaptive physiological regulation. These associations are consistent with existing findings in stress research and psychoneuroimmunology, although they are not presented here as direct causal mechanisms specific to the CCI framework. The CCI operationalizes duration indirectly through proposed perceptual and emotional dimensions that may serve as observable indicators of how time is being experienced and enacted. In this sense, duration functions as a central organizing construct within the framework, linking subjective temporal experience with meaning-making and potential biological correlates, while remaining open to empirical specification and measurement in future research.

Discussion

The present article advances the Centenarian Consciousness Index (CCI) as a biocognitive framework that reconceptualizes longevity through lived duration rather than behavioral accumulation. By situating biological aging within meaning-enacted duration, the CCI addresses a central limitation of conventional longevity models: their reliance on behaviors and traits that vary widely across cultures and contexts, yet are treated as universal determinants of health. A central contribution of the CCI is the distinction between emotional expression and emotional efficacy. Gratitude, generosity, curiosity, and admiration are often invoked in health psychology as protective emotional states; however, empirical findings have been inconsistent. The present framework clarifies this inconsistency by demonstrating that emotions exert biological influence only insofar as they are enacted within an expanded temporal duration. When perceptual orientations compress duration—through urgency, decline focus, externalized control, and contingent self-worth—emotional expression may fail to downregulate stress physiology, coexisting with chronic inflammatory activation. In contrast, perceptual orientations that expand duration may support more adaptive regulatory processes associated with reduced allostatic load. These dynamics suggest that perceptual–emotional coupling operates as a biocognitive mechanism

through which lived duration may shape patterns of physiological regulation across the life course (see Figure 2 below)

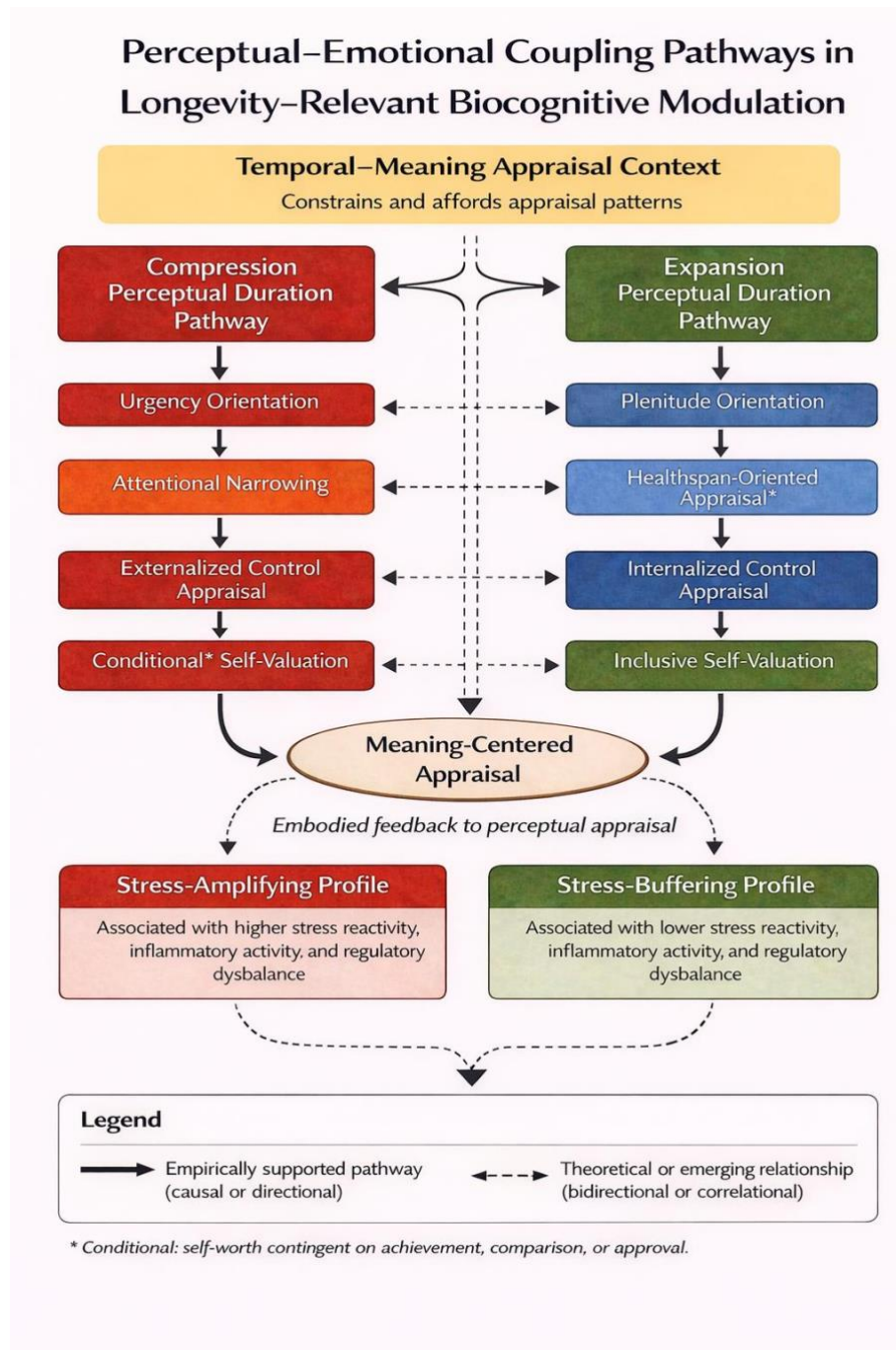


Figure 2. Duration as a biocognitive regulator. The model illustrates how perceptual–emotional coupling influences the compression or expansion of lived duration. Compressed duration—characterized by urgency, decline focus, externalized control, and contingent self-worth—is associated with sustained stress activation and inflammatory processes. Expanded duration is associated with regulatory patterns that may support reduced allostatic load and more adaptive physiological regulation across the life course.

The concept of perceptual–emotional coupling provides an operational bridge between subjective experience and physiological regulation. Perceptual orientations shape stress appraisal at a pre-reflective level, determining whether environmental demands are experienced as threats or challenges. In expanded duration, plenitude replaces urgency and continuity displaces scarcity, allowing emotional engagement to plausibly modulate hypothalamic–pituitary–adrenal (HPA) axis activation consistent with established neuroendocrine models. In compressed duration, persistent vigilance sustains allostatic load regardless of emotional tone. This distinction aligns with neuroendocrine models of stress while extending them into the domain of meaning-making. Importantly, the CCI reframes duration not as a cognitive belief or temporal illusion but as a functional biocognitive process. Duration is enacted through repeated perceptual and emotional orientations that stabilize over time, shaping physiological set points. This view avoids reductionism by neither collapsing biology into psychology nor treating subjective experience as epiphenomenal. Instead, duration functions as an integrative construct linking meaning, emotion, and biological regulation across the life course. The cross-cultural applicability of the CCI further suggests its theoretical relevance. Behavioral prescriptions for longevity are deeply embedded in cultural and socioeconomic contexts, limiting their generalizability. In contrast, perceptual dimensions such as urgency versus plenitude or inclusive versus exclusive self-worth reflect fundamental modes of inhabiting time and meaning that appear across cultures. This may explain why centenarian populations exhibit diverse lifestyles yet share common existential orientations toward time, continuity, and contribution.

Positioning the CCI Within Existing Frameworks of Aging and Meaning

The present framework extends, but is not reducible to, several established models in aging and health psychology. Socioemotional selectivity theory (SST) emphasizes motivational shifts under

perceived time limitation, particularly the prioritization of emotionally meaningful goals. While this accounts for changes in goal selection, it does not specify the structured perceptual and emotional configurations through which individuals interpret duration, health, and aging, nor how such configurations may relate to biological regulation. The CCI advances this line of inquiry by articulating distinct perceptual orientations (e.g., time, aging, self-valuation) and emotional patterns (e.g., gratitude, curiosity, generativity) as an integrated system rather than as isolated motivational tendencies. Similarly, research on subjective aging and self-perceptions of aging demonstrates that beliefs about aging influence health outcomes, including morbidity and longevity. However, these models typically focus on evaluative attitudes (e.g., positive vs. negative aging beliefs) rather than the broader interpretive architecture through which individuals construct duration. The CCI reframes these processes within a biocognitive framework, proposing that health-relevant effects arise from the integration of perception, meaning-making, and emotional engagement across time, rather than from attitudes alone. Eudaimonic well-being models identify purpose, autonomy, and personal growth as central to health and longevity. While these constructs overlap with aspects of the CCI, they are not embedded within an explicit temporal or durational structure. The present framework contributes a temporally grounded model in which meaning is not a static trait but a function of how individuals inhabit and expand lived duration, particularly in the context of aging. Finally, psychoneuroimmunology (PNI) provides a mechanistic account of how psychological processes influence immune and inflammatory pathways. The current framework does not propose new biological mechanisms but instead offers a higher-level interpretive model specifying the types of perceptual-emotional configurations that may plausibly modulate these pathways. In this sense, the CCI functions as an integrative, meaning-centered framework that organizes variables relevant to known biological systems, rather than as a direct mechanistic model. Taken together, the novelty of the CCI lies in its integration of temporality, perception, and emotion into a

structured, meaning-centered framework that bridges phenomenological experience and biological plausibility, while remaining distinct from existing models that treat these domains in relative isolation.

Limitations

The present article is theoretical in purpose. It articulates the biocognitive architecture of the Centenarian Consciousness Index (CCI™) and its relationship to lived duration, meaning-making, and biological aging rather than reporting a comprehensive psychometric validation study. Accordingly, it does not present complete analyses of factor structure, reliability, population-based standardization, or longitudinal predictive validity. This limitation defines the evidentiary scope of the present article; it does not reduce the CCI™ to a conceptual framework or imply that the instrument is not operational. The CCI™ is currently being applied in empirical and clinical investigations.

The relationships proposed between perceptual–emotional configurations and biological processes—including inflammatory signaling, stress physiology, neuroendocrine regulation, and epigenetic aging—are not directly tested within this article and should not be interpreted from the present theoretical analysis alone as established causal mechanisms. These relationships are, however, undergoing direct empirical investigation.

In an ongoing pilot study involving a planned cohort of 50 centenarians, 27 participants have completed assessment with the CCI™ and GlycanAge. Each has shown a GlycanAge at least 20 years younger than chronological age. In addition, the mean CCI™ factor profile of the 27 participants corresponds with the theoretically predicted optimal configuration—the profile representing maximum benefit across the CCI™ factors. These are preliminary, unpublished observations from an ongoing study. Their convergence does not establish that the CCI™

configuration produces the observed difference in biological age, but it provides an empirical basis for investigating the relationship between biocognitive organization and biological aging.

The CCI™ is also being applied in an ongoing series of clinical case studies involving members of the general population. Preliminary follow-up measurements indicate reductions of approximately four to five years in biomarker-derived biological age over eight months following protocols contextualized to individual CCI™ profiles. These observations do not establish causality or population-level effects. They allow longitudinal investigation of whether changes in CCI™ configurations coemerge with measurable changes in biological aging.

The CCI™ originated in long-term ethnographic observation across cultural contexts, but the cross-cultural invariance of its organizational configurations has not yet been systematically examined through comparative or longitudinal designs. Further research will be required to determine which configurations remain consistent across populations and how their expression is coauthored within particular cultural terrains of meaning.

Finally, expanded and compressed duration are not proposed as isolated temporal variables. They describe contextual organizations of meaning, perception, and biological regulation. Their empirical investigation therefore requires methods capable of identifying these organizations consistently without reducing lived duration to a decontextualized measure. Continued research will examine how CCI™ configurations correspond with biological markers across populations, contexts, and longitudinal change.

Conclusion

This article advances the Centenarian Consciousness Index (CCI™) as a structured psychometric instrument grounded in a meaning-centered, biocognitive framework of aging and longevity. Rather than locating longevity in behavioral compliance or trait-based personality models, the

CCI™ situates biological aging within lived duration: the way biological life is organized through meaning and continuity.

Within this framework, emotional orientations do not operate as isolated variables. They coemerge with perceptual terrains that compress or expand lived duration, with implications for physiological regulation across the life course. Duration therefore functions not as another measure of chronological time but as the integrative context within which meaning-making and biological regulation become mutually organized.

The CCI™ introduces the meaning-maker as the unit through which physiological processes and lived experience can be investigated within a shared biocognitive architecture. Preliminary observations from the ongoing centenarian pilot study show convergence between markedly younger GlycanAge measurements and a mean CCI™ profile corresponding with the theoretically predicted optimal configuration. Ongoing clinical case studies further indicate that protocols contextualized to individual CCI™ profiles can be examined longitudinally alongside biomarker-derived changes in biological age. These observations do not establish causal direction, but they demonstrate that the proposed relationship between biocognitive organization and biological aging is empirically accessible.

The emerging research question is therefore not whether meaning can be added to existing models of biological aging, but how the organization of meaning within lived duration participates in the regulation of biological aging itself.

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