PNEI for Psychology: Psychological Processes, Regulation, and Integrated Health

David Lazzari*

Received 10 November, revised 15 November, accepted 16 November
Online first: 18 November 2026

* Specialist in Psychosomatic Medicine, Psychotherapy, and Health Psychology. Former Director of the Clinical Psychology Unit, Terni Hospital. Past President of the Italian Society of Psychoneuroendocrinoimmunology (SIPNEI) and the Italian National Council of Psychologists (CNOP). President of the Observatory for Psychological Well-Being and Health (BENÈPSYS).
davidlazzari888@gmail.com

Please cite: Lazzari D., PNEI for Psychology: Psychological Processes, Regulation, and Integrated Health. *Pnei Review.*
DOI: 10.3280/pnei2026oa24254

Abstract. *Psychoneuroendocrinoimmunology (PNEI) provides psychology with a scientific basis for understanding psychological processes within the functioning of the whole organism and offers health professionals a shared language for integrated care. This paper examines four transitions: from separate domains to a regulatory perspective; from mind–body interactions to the psyche as a source of biologically relevant information; from stress mechanisms to feedback loops that may sustain disorders; and from symptom treatment to prevention and health promotion. Meanings, expectations, memories and needs shape physiological responses, while biological signals contribute to experience and behaviour. Psychological well-being is considered a structural component of health and a resource for regulation. The author proposes a clinical assessment of demands, resources, recovery and feedback loops that considers personal and social circumstances. PNEI supports a shared knowledge base for collaboration among professions, while respecting their specific expertise and the limits of available evidence.*

Keywords: *psychoneuroendocrinoimmunology; health psychology; regulation; stress; psychological well-being; integrated care.*

Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

Introduction: What Kind of Psychology within PNEI?

When discussing PNEI in relation to psychology, the question is not simply how to demonstrate that the mind influences the body. Such a formulation perpetuates the image of two separate realities that communicate only occasionally. PNEI's most important contribution is to show that psychological processes belong to the functioning of the organism: they help guide action, anticipate demands, allocate resources, modulate the stress response, and shape the conditions of health. At the same time, immune activity, metabolism, sleep, pain, and interoceptive signals participate in psychological life. A person is not merely the sum of a biological system and a subjective history, but a living system that continually shapes its own balance through both.

For psychology, this perspective broadens the field without dissolving its specificity. The psychological dimension encompasses subjective experience, emotions, memories, expectations, representations, needs, a sense of self, relationships, and the capacity to attribute meaning and make decisions. Reducing it to mental disorders means overlooking its ordinary presence in health processes. Conversely, for the biological sciences, considering the person merely as a set of parameters fails to capture how those parameters are organised in everyday life, relationships, and material living conditions. Moving beyond both forms of reductionism requires studying the connections between levels without assuming that any one level exhausts the others.

I return here to the four transitions presented in my address at the Fifth SIPNEI Congress: the organism as a network, stress regulation, the biological significance of psychological information, and the implications for clinical practice and prevention. The connecting thread is regulatory functioning. My aim is to show why PNEI enables psychology to contribute to understanding health and supports shared practice across professions.

From Separate Parts to Regulatory Processes

The health sciences have advanced through essential forms of specialisation. These have made it possible to describe organs, cells, mediators, neural circuits, and clinical conditions with increasing precision. Difficulties arise when the distinctions needed for scientific study become a way of representing the person. In real life, environmental demands, the meaning attributed to events, autonomic, endocrine and immune responses, behaviour, and relationships continually influence one another. Studying each element is necessary; understanding their connections is equally necessary if we wish to explain why a difficulty develops, persists, or resolves.

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

The concept of allostasis helps us make this transition: the organism maintains stability through coordinated changes, anticipating and responding to variable situations. An activation response is often useful: it mobilises attention, energy, and defences. Problems arise when activation recurs without sufficient recovery, continues beyond the situation that required it, or when regulatory systems respond inadequately. McEwen described the cumulative cost of these processes as allostatic load. The relevant question, therefore, is not whether stress is present or absent, but what balance emerges over time between demands, resources, activation, and recovery (McEwen, 1998).

PNEI makes this question concrete. The nervous, endocrine, and immune systems exchange signals and modulate one another. Inflammation can affect motivation, energy, mood, and attention; brain and behavioural processes, in turn, influence autonomic, endocrine, and immune responses. To speak of a network is to identify the connections relevant to a trajectory of life and illness, locating the symptom within the system to which it belongs (Bottaccioli & Bottaccioli, 2017).

The Psyche Does More Than Mediate: It Generates Information

One function of psychological processes is to mediate the relationship between context and organism: an event is not biologically equivalent for someone who experiences it as manageable, someone who interprets it as a threat, and someone who associates it with an earlier experience. Perception, appraisal, memory, perceived control, and social support help shape the response. In brief: event, meaning, physiological response. Yet this sequence alone is incomplete. The psyche does not merely interpret signals from the external world or the body; it also generates information that actively contributes to regulatory processes.

A person can anticipate a difficult conversation, recall a loss, imagine a possibility, fear a worsening condition, or plan for the future without the feared or desired event actually occurring at that moment. These mental activities are psychologically real and can produce measurable physiological effects: changes in attention, autonomic tone, muscle tension, sleep, motivation, and health-related behaviours. Saying that what I think or imagine is "real for the organism" does not mean confusing a representation with an external fact. It means recognising that, once produced, a representation is an internal signal that the organism can use to prepare a response. The psychological dimension is therefore both an interpreter of the world and a primary source of information for the body.

Research on interoception helps explain why the reverse pathway is equally essential. Visceral sensations do not reach a neutral mind that merely registers them;

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

they are integrated with expectations and predictions on the basis of previous history and the present context. Models of interoceptive prediction describe a brain that anticipates bodily needs, compares expectations with signals, and coordinates visceromotor responses (Barrett & Simmons, 2015). The result is a circular dynamic: the body informs experience; experience directs attention towards the body and shapes regulation; the new bodily state changes what the person will feel and think. Many forms of distress, as well as many possibilities for change, arise within this loop.

Pain provides an immediate example. A sensation may take on a different meaning when a person receives an understandable explanation, feels safe, and sees opportunities for action than when they fear that the signal indicates uncontrollable damage. Meaning does not eliminate nociception or replace medical assessment. It forms part of the overall experience of pain and can alter attention, expectation, avoidance, and behaviour. Studies on placebo and nocebo effects have shown particularly clearly that expectations, learning, and the relational context can modify treatment outcomes through identifiable neurobiological pathways (Benedetti, Frisaldi & Shaibani, 2022). This is why the quality of clinical communication is part of care, rather than merely the setting in which care takes place.

There is also a distinctly psychological dimension of time. Physiology responds in the present to information that may come from a remembered past or an anticipated future. Memory, prediction, and imagination connect different times, giving direction to the present moment. Similarly, psychological space does not coincide with physical distance alone: a relationship may continue to provide security in someone's absence, whereas a social threat may be felt before a meeting. This ability to bring past experiences and anticipated future events into the present is a remarkable resource for planning and cooperation; when organised around persistent threats, it can keep defence systems activated beyond the event itself.

Stress, Needs, and Adaptive Balance

Understanding stress requires looking at demands and resources simultaneously. The same demand may be sustainable when someone has time, skills, support, and opportunities for recovery, but burdensome when these conditions are lacking. Demands do not arise only from outside. Expectations, values, needs, conflicts, goals, and self-criticism can constitute persistent internal demands. Resources likewise have two sources: skills, flexibility, and the ability to recognise one's own signals, on the one hand; relationships, working conditions, access to services, material security, and living environments, on the other.

The Stress Balance (Bilancia dello Stress), a framework I have developed for as-

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

sessment and intervention, makes visible the interplay between external and internal demands and external and internal resources (Lazzari, 2017). It is not a moral ranking of an individual's ability to withstand difficulties. Its purpose is to ask where an imbalance arises and which changes are realistic. A person may have effective skills yet live in a context that systematically consumes more resources than it restores. Another may receive support but experience internal demands that prevent them from recognising or using it. A third may have sufficient resources for immediate activation but lack opportunities for recovery over time. Assessment becomes more meaningful when these aspects are considered together.

In practice, observing recovery is just as important as assessing peak activation. Sleep, breaks, relationship quality, appropriate physical activity, room for decision-making, and a predictable environment help bring systems back within a functional range. If the organism remains oriented towards a danger perceived as continuous, the capacity to explore, learn, cooperate, and care for oneself may narrow. The result may be a seemingly stable but costly balance in which the person continues to function at the cost of reduced flexibility. Psychology can identify this trajectory early, before the problem develops into an overt disorder.

The term "adaptive gap" may help describe the growing distance between the demands of contemporary contexts and the actual regulatory capacities of individuals and communities. Accelerated pace, uncertainty, constant connectivity, loneliness, caregiving responsibilities, insecurity, or limited influence over decisions can widen this gap. The term does not designate a diagnosis or attribute every difficulty to modernity. Rather, it describes a question for research and action: when demands increase or change faster than resources and recovery time, which psychobiological circuits are activated, and which social conditions can restore adaptive capacity? The concept is useful insofar as it helps us identify specific situations and develop testable responses.

This interpretation avoids turning the language of regulation into an appeal directed solely at individuals to "manage better" what surrounds them. Personal capacities matter, but effective regulation also requires favourable conditions. When there is insufficient time for sleep, work is unpredictable, or a family lacks support and services, the response cannot be limited to teaching a technique. The Stress Balance points to interventions on both sides: increasing resources, making demands sustainable, strengthening recovery, and changing the context wherever possible. This is where clinical work meets prevention and public health.

The Feedback Loops That Sustain Disorders

Many disorders persist because psychological and biological processes reinforce

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

one another. Describing feedback loops does not imply a single causal chain that applies to everyone; it means identifying, in each person, the steps through which an initially understandable response eventually feeds the very problem against which it protects. The sequence may begin with a biological condition, a relational experience, a loss, a pre-existing vulnerability, or several concurrent factors. Once established, it may become relatively independent of its starting point. This makes it clinically useful to identify the points at which the loop can be interrupted.

Consider a threat experienced as prolonged: negative anticipation heightens vigilance and activation; difficulty disengaging disrupts sleep; fatigue reduces concentration, frustration tolerance, and the ability to draw on relational resources. Even ordinary bodily sensations may then be interpreted as signs of further danger, reinforcing vigilance. The person may restrict activities for protection, lose experiences of mastery, and feel even less capable of coping with the situation. No single step in this loop explains the entire picture. What sustains the disorder is the self-reinforcing interplay between experience, physiological responses, and behaviour.

Another loop may begin with pain or chronic illness. The symptom limits movement and participation; loss of activity and social connections reduces opportunities for pleasure and support; mood and sleep deteriorate; sensitivity to bodily signals increases, and pain occupies an even larger place in experience. If patients encounter fragmented explanations or are left alone to interpret fluctuations and relapses, uncertainty becomes an additional burden. An integrated intervention can act at several points: medical treatment of the underlying pathological process, graded re-engagement in activity, psychological work on fear and avoidance, support for relationships, and consistent communication among professionals.

Feedback loops also connect social experience and biology. Repeated experiences of rejection or insecurity can orient attention and behaviour towards defence, with effects on stress-response systems and inflammation. Social Safety Theory offers a framework for studying these relationships (Slavich, 2020). At the molecular level, social genomics studies have described, under conditions of chronic threat, a pattern of gene expression in immune cells associated with increased activity of pro-inflammatory genes and reduced type I interferon responses, termed the conserved transcriptional response to adversity (Cole, 2019). This does not justify inferring an individual's subjective experience from a genetic test; rather, it shows that social and psychological factors can enter regulatory processes through biological pathways.

Epidemiological findings further support this picture. In a study of three cohorts differing in age and context, social isolation was associated most consistently with suPAR, a marker of chronic systemic inflammation, whereas associations with

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

other markers varied across groups (Matthews *et al.*, 2024). The key implication for practice is that relationships are not simply a source of subjective comfort: they are part of the conditions in which health takes shape. At the same time, a relationship can serve different functions depending on its quality, the support actually provided, and the meaning it has for the person. Counting contacts is not enough to understand experienced social safety.

What Intervention Studies Show

Experimental evidence allows us to move beyond theoretical plausibility. A meta-analysis of 56 randomised studies involving 4,060 participants found that psychosocial interventions were associated with an overall improvement in immune measures compared with controls (g = 0.30), with particularly consistent findings for cognitive-behavioural therapy, combined interventions, and pro-inflammatory markers. The authors reported a mean favourable change in immune functions considered beneficial and a reduction in those considered harmful, with effects also observed in subsequent months (Shields, Spahr & Slavich, 2020). These findings support the argument that psychological interventions can produce measurable changes beyond the domain of subjective symptoms.

A network meta-analysis of 104 randomised studies, involving 7,820 participants in total, found associations between some classes of psychological interventions and reductions in pro-inflammatory markers; effects varied according to the intervention and outcome measure (Ballesio *et al*., 2023). More recently, a review of 25 randomised studies involving 1,641 adults examined positive psychology interventions targeting gratitude, optimism, meaning, and other experiences. It found an overall effect on the biomarkers considered, more pronounced for inflammatory indicators than for cortisol (Eilertsen *et al*., 2025). The diversity of approaches and measures suggests that there is no single psychological pathway to biological effects. Instead, we need to ask which process is actually modified and in what context.

These findings do not mean that every change in a laboratory marker translates into clinical recovery. Their strongest value for the argument developed here is to demonstrate that psychological experiences and interventions belong to the network of observable biological processes. Clinical decisions must also consider outcomes that matter to people: functioning, quality of life, symptoms, participation, and disease course. For example, a Cochrane review of psychological interventions for depression and anxiety in people with heart disease or heart failure found improvements in depressive and anxiety symptoms and mental quality of life, without a demonstrated difference in mortality or major cardiovascular events (Ski *et*

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

al., 2024). This distinction clarifies treatment aims without diminishing the value of psychological outcomes.

Often, the most compelling evidence for integrated care concerns the care pathway as a whole. In a randomised primary-care study involving people with depression and diabetes, heart disease, or both, collaborative, patient-centred management improved both indicators of medical disease control and depressive symptoms at twelve months compared with usual care (Katon *et al.*, 2010). This does not prove that a single psychological intervention caused all the outcomes; it demonstrates the benefit of working on problems that patients experience together but services often separate. Organisational mechanisms matter: shared goals, monitoring, treatment adjustments, and communication between professionals.

Psychotherapy, too, can be understood within this framework. The therapeutic relationship, reworking of meanings, new experiences, learning, and behavioural change are processes that occur within an organism. We can examine how subjective, relational, behavioural, and bodily outcomes unfold together over time (Lazzari, 2013). The more useful question is for whom, under which conditions, and through which pathways a treatment produces lasting benefits.

From Assessment to Collaborative Practice

A shared PNEI knowledge base can bring professional expertise together without blurring roles. Physicians retain responsibility for the investigations and treatments within their remit; psychologists contribute methods for assessing and intervening in psychological and relational processes; nurses, rehabilitation professionals, social workers, and other practitioners bring their own knowledge and practical capabilities. Integration takes shape when the team examines a shared clinical process, works towards goals understood by all, and recognises how an intervention at one point in the loop may alter the work of others.

In a shared assessment, beyond diagnosis and severity, I would propose asking: What external and internal demands is this person facing? What resources are available, which can they actually use, and which are missing? How do they become activated, and how do they recover? Which bodily signals become particularly salient, and what meanings are attached to them? Which behaviours provide short-term protection but maintain the problem in the long term? Who provides safety and support? Which environmental conditions need to change? These questions guide a working hypothesis, to be updated in light of the clinical course, and make visible the contribution of different professions.

For example, in a person with diabetes and persistent stress, simply adding psychological consultation to a prescription is insufficient. We need to understand

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

whether the problem involves an unsustainable burden of self-care, fear of complications, sleep, the financial ability to follow recommendations, family conflicts, or difficulty interpreting bodily signals. The response may include reviewing the treatment plan, psychological support, education, access to social resources, and agreed monitoring. Not everyone needs every component: assessing the loops makes it possible to select what is appropriate for that person at that stage.

Shared knowledge also helps avoid contradictory messages. If one professional encourages a gradual return to activities while another states, without prior discussion, that every symptom necessarily indicates damage, the patient receives incompatible information and may increase avoidance. If a psychologist interprets a symptom requiring medical investigation as mere anxiety, integration fails in the same way. Sharing a language of threat, recovery, inflammation, pain, expectations, and behaviour does not mean everyone uses the same tools; it means developing clinical explanations that are compatible, testable, and understandable to the patient.

This perspective also has implications for training. A common PNEI foundation should include essential knowledge of stress and recovery systems, relationships between immunity and behaviour, the role of expectations and relationships, social determinants, and the limitations of isolated indicators. It should also teach professionals to formulate questions across disciplinary boundaries and discuss cases longitudinally. Collaboration does not arise from organisational proximity alone: it develops when professional competences are mutually recognised and focused on a sufficiently well-defined shared problem to guide decisions and evaluation.

Prevention and Health Promotion: Well-Being as a Structural Condition

If psychological processes contribute to health regulation, waiting until an overt disorder develops before addressing them means missing an important opportunity for healthcare intervention. Prevention is not simply the early identification of a diagnosis. It means reducing prolonged exposure to unsustainable demands, strengthening individual and collective resources, enabling recovery, supporting relational skills, and facilitating access to help. Health promotion also means cultivating the capacity to make choices, reliable social ties, participation, meaning, and opportunities to influence one's environment. These dimensions operate in everyday life, where both vulnerability and protection are formed.

I have proposed viewing psychological well-being as a structural component of the person's overall functioning and therefore of health, quality of life, and social participation (Lazzari, 2026; Lazzari, 2025). "Structural" does not mean a constant-

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

ly pleasant emotional state. It refers to the relatively stable availability of conditions and capacities that enable people to face life's tasks, recover from difficulties, maintain relationships, and realise possibilities. It includes personal factors but also relationships, school, work, housing, services, and shared spaces. Well-being cannot be reduced to an individual characteristic or the mere absence of symptoms; it emerges from the dynamic interplay between individuals and their environments.

Evidence on social determinants supports this approach. The WHO's 2025 report on health equity highlights the effects of the conditions in which people are born, grow, work, and age, as well as the distribution of power, money, and resources (World Health Organization, 2025b). In the same year, the report of the WHO Commission on Social Connection identified isolation and loneliness as health issues requiring public responses (World Health Organization, 2025a). A PNEI perspective helps explain why these conditions are not simply a backdrop external to biology: they can influence exposure to threats, opportunities for recovery, behaviours, and regulatory systems. Social differences become embodied in health trajectories, although they do not determine every individual's fate in the same way.

From this perspective, a health-promotion programme should operate at three interconnected levels. The first concerns the individual: awareness of needs, the ability to recognise signs of overload, tools for coping with difficulties, and timely access to support. The second concerns immediate contexts: relationship quality, practices in schools and workplaces, opportunities for participation, and protection from chronic burdens. The third concerns service organisation and policy: continuity of care, integration of health and social services, attention to inequalities, and outcome evaluation that includes psychological functioning. Rigidly separating these levels makes interventions at each less effective.

This is also what it means to understand health as a common good. People do not regulate their lives in a social vacuum: they depend on environments created together. Investing in the psychological dimension does not mean adding an optional service at the end of a medical care pathway. It means intervening in a component that participates in health processes, in people's ability to use available care, and in the collective conditions that make life sustainable. Prevention and health promotion are not secondary chapters alongside clinical practice; they extend its effectiveness by acting before and after episodes of illness.

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

A Regulatory Perspective for Psychology and the Health Sciences

A regulatory model can be considered here as a general perspective: examining how people modify their balance over time through information, resources, demands, behaviours, and relationships. This question connects the PNEI network, adaptive stress, the psyche as both a source and an interpreter of information, and integrated care extended to prevention. It allows biological explanation, personal experience, and social conditions to be distinguished while keeping them in communication (Lazzari, 2019).

Psychology can contribute to this endeavour if it recognises the breadth of its field. It is relevant not only when a mental disorder appears or when a person needs to adhere to treatment. It is involved in the construction of identity, experiences of safety and threat, expectations, social bonds, everyday choices, relationships with pain and illness, and the ability to envisage the future. PNEI situates these processes within the functioning of the organism; it does not simply reduce them to molecular events. It makes them part of an investigation into health trajectories in which lived experience is essential evidence and biological measures are equally essential.

For the biological sciences, the benefit is complementary. Cellular and molecular mechanisms remain indispensable, but in a real person they are embedded in histories, living conditions, behaviours, and relationships. Inflammation must be studied in terms of its causes and treated with appropriate tools; its relationship with sleep, stress, diet, pain, or isolation may require additional expertise. Moving beyond reductionism means specifying which levels are involved and how they can be addressed in a coordinated way (Bottaccioli & Bottaccioli, 2024).

In my institutional work, I have emphasised the need to make psychology a recognisable presence in public health, primary care, schools, and prevention policies. PNEI offers this perspective a scientific foundation that can be shared with other professions: it shows why the psychological dimension matters to the organism and why its effects intertwine with biological and social conditions. The implication is not to claim universal expertise, but to develop pathways in which psychological contributions are accessible at the right time and can engage with other contributions around a common problem.

Conclusions

PNEI enables psychology to recognise the relevance of its objects of study to health, and medicine to include lived experience in its explanations and practices.

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

The decisive step is to understand interactions as regulatory processes unfolding over time. Context informs the organism through perception and meaning; the psyche also generates information of its own when remembering, anticipating, or imagining; the body continuously informs experience; and behaviours and relationships modify both. These interactions may give rise to loops that sustain disorders or loops that support recovery.

One practical implication is to assess demands, resources, recovery, and feedback alongside diagnoses and clinical parameters. Another is to build teams and services capable of drawing on a shared PNEI knowledge base while respecting each professional's expertise. A third is to recognise psychological well-being as a structural dimension of health, to be supported in treatment, prevention, and promotion. The most tangible promise of PNEI is not to provide a single explanation for everything, but to enable us to understand and address, in an integrated way, processes that people experience as inseparable.

Funding: This research received no external funding. Conflicts of Interest: The author declares no conflict of interest.

References

Ballesio A., Zagaria A., Vacca M., Pariante C.M., & Lombardo C. (2023). Comparative efficacy of psychological interventions on immune biomarkers: a systematic review and network meta-analysis. *Brain*, Behavior, and Immunity, 111, 424–435. https://doi.org/10.1016/j.bbi.2023.05.006

Barrett L.F., & Simmons W.K. (2015). Interoceptive predictions in the brain. *Nature Reviews Neuroscience*, 16, 419–429. https://doi.org/10.1038/nrn3950

Benedetti F., Frisaldi E., & Shaibani A. (2022). Thirty years of neuroscientific investigation of placebo and nocebo: the interesting, the good, and the bad. *Annual Review of Pharmacology and Toxicology*, 62, 323–340. https://doi.org/10.1146/annurev-pharmtox-052120-104536

Bottaccioli F., & Bottaccioli A.G. (2017). *Psiconeuroendocrinoimmunologia e scienza della cura integrata*. Il manuale. Milano: Edra.

Bottaccioli F., & Bottaccioli A.G. (2024). *La rivoluzione in psicologia e psichiatria*. Il tempo del cambiamento. Milano: Edra.

Cole S.W. (2019). The conserved transcriptional response to adversity. *Current Opinion in Behavioral Sciences*, 28, 31–37. https://doi.org/10.1016/j.cobeha.2019.01.008

Eilertsen M., Hansen T., Bidonde J., Reneflot A., Nilsen T.S., Czajkowski N., & Nes R.B. (2025). Effects of positive psychology interventions on inflammatory biomarkers and cortisol: a systematic review and meta-analysis. *International Journal of Applied Positive Psychology*, 10, 64. https://doi.org/10.1007/s41042-025-00258-6

Katon W.J., Lin E.H.B., Von Korff M., Ciechanowski P., Ludman E.J., Young B., Peterson D., Rutter C.M., McGregor M., & McCulloch D. (2010). Collaborative care for patients with depression and chronic illnesses. *New England Journal of Medicine*, 363, 2611–2620. https://doi.org/10.1056/NEJMoa1003955

Lazzari D. (Ed.) (2013). *Psicoterapia: effetti integrati, efficacia e costi-benefici*. Milano: Tecniche Nuove.

Lazzari D. (2017). *Bilancia il tuo stress*. Una guida efficace per gestire al meglio le tue energie e ritrovare l'equilibrio. Firenze: Demetra/Giunti.

Lazzari D. (2019). *La psiche tra salute e malattia*. Evidenze ed epidemiologia. Milano: Edra.

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org

Lazzari D. (2025). *Lo psicologo in tasca*. Benessere equilibrio salute. Milano: Sperling & Kupfer.

Lazzari D. (2026). Salute mentale e benessere psicologico: verso un sistema integrato tra cura, prevenzione e promozione. *Rivista di Psicologia Clinica*, 1, 32–40. https://doi.org/10.3280/rpc1-2026oa23595

Matthews T., Rasmussen L.J.H., Ambler A., Danese A., Eugen-Olsen J., Fancourt D., Fisher H.L., Iversen K.K., Schultz M., Sugden K., Williams B., Caspi A., & Moffitt T.E. (2024). Social isolation, loneliness, and inflammation: a multi-cohort investigation in early and mid-adulthood. *Brain, Behavior, and Immunity*, 115, 727–736. https://doi.org/10.1016/j.bbi.2023.11.022

McEwen B.S. (1998). Protective and damaging effects of stress mediators. *New England Journal of Medicine*, 338, 171–179. https://doi.org/10.1056/NEJM199801153380307

Shields G.S., Spahr C.M., & Slavich G.M. (2020). Psychosocial interventions and immune system function: a systematic review and meta-analysis of randomized clinical trials. *JAMA Psychiatry*, 77, 1031–1043. https://doi.org/10.1001/jamapsychiatry.2020.0431

Ski C.F., Taylor R.S., McGuigan K., Long L., Lambert J.D., Richards S.H., & Thompson D.R. (2024). Psychological interventions for depression and anxiety in patients with coronary heart disease, heart failure or atrial fibrillation. *Cochrane Database of Systematic Reviews*, (4), CD013508. https://doi.org/10.1002/14651858.CD013508.pub3

Slavich G.M. (2020). Social safety theory: a biologically based evolutionary perspective on life stress, health, and behavior. *Annual Review of Clinical Psychology*, 16, 265–295. https://doi.org/10.1146/annurev-clinpsy-032816-045159

World Health Organization (2025a). *From loneliness to social connection: charting a path to healthier societies*. Geneva: WHO.

World Health Organization (2025b). *World report on social determinants of health equity*. Geneva: WHO.

PNEI review – ISSNe 2532-2826 – DOI: 10.3280/pnei2026oa24254
Copyright © FrancoAngeli This work is released under Creative Commons Attribution – Non-Commercial – No Derivatives License. For terms and conditions of usage please see: http://creativecommons.org