


Perspective Piece

Mental health and the environment – evolutionary perspectives

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Abstract

This paper provides an overview of key concepts in evolutionary psychiatry, summarising major evolutionary explanations for mental illness and highlighting the potential of these perspectives to enhance assessment, diagnosis, explanation to the patient, treatment and prevention strategies. Expanding beyond conventional evolutionary approaches, we explore environmental influences on mental health and illness, emphasising the significant areas of convergence between evolutionary and environmental viewpoints. We then propose an integrated framework that combines insights from both perspectives, offering general principles for improving mental health outcomes at both individual and population levels. The discussion includes implications for general practice, public health and broader societal considerations, with particular reference to concepts such as biophilia and the emerging role of 'green care' in psychiatric practice.

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Introduction

Evolutionary Psychiatry involves the application of evolutionary principles to the study of mental health and illness and has been defined by Nesse & Stein (2019) as 'the subfield of evolutionary medicine that uses the basic science of evolutionary biology to better understand and treat mental disorders'.

Evolution is a fundamental bedrock of biology, providing the ultimate meta theory for life. However, in contrast with the widely quoted statement of Theodosius Dobzhansky (1973): 'nothing in biology makes sense except in the light of evolution', evolution is largely neglected in mainstream psychiatry and in medical education.

That said, recent years have seen the emergence of increased interest in the field, with two national special interest groups on evolutionary psychiatry, in the United Kingdom (Abed & John-Smith, 2016) and in Ireland (Brar & O'Connell, 2024), increased prominence of the World Psychiatric Association Section of Evolutionary Psychiatry (2024) at key international symposia and the publication of landmark papers (Nesse, 2023), best-selling books (Nesse, 2019a), edited volumes (Abed & St John-Smith, 2022) and textbooks (Brüne, 2016; Del Giudice, 2018; McGuire & Troisi, 1998).

In this paper, we will begin with an outline of key concepts within evolutionary psychiatry. We will summarise the main evolutionary explanations for mental illness and allude briefly to the vast potential for evolutionary perspectives in enhancing the assessment, diagnosis, treatment and prevention of mental illness.

We will then extend beyond the usual scope of papers on evolutionary psychiatry to explore environmental perspectives on mental health and illness and the many areas of overlap between evolutionary and environmental perspectives.

Finally, we will attempt to integrate key concepts from evolutionary and environmental perspectives and outline general principles relating to the treatment and prevention of mental illness at individual and population levels, with corresponding implications for clinical practice, public health and some wider societal implications. In doing so, we will also refer to concepts such as biophilia and 'green care' in psychiatry.

Evolutionary psychiatry – A brief overview

The standard approach employed in psychiatry is proximate in nature, focused on what has 'gone wrong'. The evolutionary perspective provides an additional 'ultimate' perspective, asking questions about evolved systems (Mayr, 1961; Tinbergen, 1963). For example, a proximate approach to mood disorders might focus on neurotransmitter dysfunction whereas an ultimate perspective asks questions about why affective and motivational systems have evolved, why they exist in the form they do and why they can go awry under certain conditions. This extended perspective also questions as to what underlying systems may be at play, how they develop over the lifetime of an individual (ontogeny), how they develop from ancestral species (phylogeny) and what, if any, is their adaptive significance (function). When stated explicitly as questions, Tinbergen's approach can be summarised as follows:

1. How does the trait/characteristic/system work in an individual?
2. How does it develop in an individual over the course of a lifetime? (ontogeny)

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3. Why does it develop in a species in a given form? (phylogeny)
4. Why does it exist (What is its adaptive significance)?

The first two questions come from a proximate perspective and account for most of the types of questions on aetiology in mainstream medicine and psychiatry. The second two questions complement but extend the formulation to an evolutionary or 'ultimate' perspective.

For example, a proximate approach to mood disorders may focus on neurotransmitter dysfunction whereas evolutionary psychiatry encourages broader perspectives on underlying affective and motivational systems that can go awry in these conditions.

The evobiopsychosocial model enriches Engel's (1977) original by offering an evolutionary framework that unifies biological, psychological and social explanations and highlights their developmental interdependence (Abed *et al.* 2024; Hunt *et al.* 2023; Hunt *et al.* 2022).

Randolph Nesse (2019a) outlines six main evolutionary reasons for why we may become unwell, spanning both medical and psychiatric domains. First, mismatch refers to the problems that arise when our slowly evolved bodies and minds – adapted over millennia to ancestral environments (sometimes referred to as environments of evolutionary adaptedness or 'EEAs') – struggle in modern environments. A classic example is that of obesity, whereby 'adaptive' tastes for scarce sugar and fat in ancestral environments drive us to excess consumption in modern environments where such foods are plentiful, especially in so-called WEIRD (Western, Educated, Industrialised, Rich and Democratic) societies (Henrich *et al.* 2010). Second, infection highlights our ongoing evolutionary arms race with rapidly reproducing microorganisms, starkly exemplified by the recent COVID-19 pandemic. Third, constraints result from the incremental nature of evolution, which proceeds through small steps rather than large leaps, limiting what adaptations are possible. A classic example is the recurrent laryngeal nerve, which takes a circuitous, inefficient route around the aorta in humans – not because this path is optimal, but because evolutionary changes must build on existing structures and cannot easily reroute major anatomical pathways from scratch. Fourth, trade-offs arise when traits beneficial in one context are harmful in another, as with sickle disease, which offers malaria protection in heterozygotes but causes serious illness in homozygotes. Fifth, reproduction at the cost of health acknowledges that natural selection prioritises gene propagation over individual well-being. Lastly, defensive responses such as fever, low mood or anxiety may be adaptive reactions to threats. They are sometimes regarded as pathological, even though they may be important signals to the individuals experiencing them, which can lead to inappropriate treatment or misinterpretation. An example might be treating a victim of domestic violence with tranquiliser rather than dealing with the abuse. Understanding the context is all important.

These six evolutionary pathways for the persistence of disease and disorder are generic evolutionary processes that apply to all species. The question remains therefore, as to whether there are additional human, species-specific causes for the existence and persistence of mental disorders in *Homo sapiens*, especially given the claim of the absence of convincing evidence for the existence of a range of mental disorders in other species (e.g. schizophrenia, autism spectrum disorder (ASD) and Alzheimer's Dementia) (Konopka & Caglayan, 2024). There are, of course, other evolutionary explanations for illness and these relate to issues such as life history factors, sexual selection and its consequences,

balancing selection, demographic history and its consequences and extremes of adaptation.

Nesse (2019a) has also developed a useful system for taking a more comprehensive, evolution-informed view of the individual and their health, known as the SOCIAL system. The letters indicate the individual's Social situation, Occupational status, Children and family, Income, Abilities and Love and Sex.

Another evolutionary informed approach to assessment to psychiatric assessment is the GOAL system developed by Alfonso Troisi (2011). GOAL stands for: Give less weight to symptoms; Observe actual behaviour; Assess functional capacities; Leave your office to observe patients' behaviour in their natural environment. This approach owes much to ethology principles, whereby animal behaviours are observed, in contrast to the primarily subjective appraisals by patients that we gather in clinical psychiatry.

Troisi's framework challenges the current over-reliance on verbal narratives and symptom checklists, arguing instead for an approach that views behaviour as an evolved communication system. However, while conceptually compelling, the GOAL model has yet to be widely validated in empirical studies or integrated into mainstream psychiatric curricula. Its real strength lies in encouraging clinicians to think like evolutionary biologist – asking what behaviours evolved to do, and under what environmental conditions they make sense.

Along with clinical aspects, in areas such as assessment, diagnosis, psychoeducation, direct clinical applications such as the 'smoke detector' principle in anxiety disorders (Nesse, 2019b) and prevention strategies (e.g. limiting access to potent alcohol and synthetic drugs, use of which may 'hijack' primitive reward systems), the evolutionary perspective also has much to offer in how we interpret findings in psychiatric genetics. Clinical research questions are likely to be better framed when grounded in evolutionary theory, provided such perspectives are underpinned by empirically testable hypotheses. This is crucial to avoid the risk of generating 'just so' stories, which arise from the selective use of supportive evidence and the construction of unfalsifiable narratives (Hunt & Jaeggi, 2025).

It is essential to avoid two key conceptual errors in evolutionary thinking: viewing symptoms as diseases and viewing diseases as adaptations (Nesse, 2023). The former risks misinterpreting protective responses (such as anxiety or low mood) as inherently pathological, while the latter mistakenly frames clearly harmful conditions (such as schizophrenia or Alzheimer's disease) as being somehow evolutionarily beneficial. These errors can mislead both clinical understanding and research framing, reinforcing the importance of careful evolutionary reasoning grounded in empirical data.

Perhaps, most importantly, evolutionary perspectives in psychiatry help illustrate the universality of human suffering and mental illness, with resultant destigmatising effects (Schroder *et al.* 2023). The vulnerabilities we see in mental illness stem from systems that evolved to serve vital functions – systems we all possess, regardless of diagnosis. Finally, it can be argued that a psychiatrist with a broad, evolution-informed perspective on humanity and on mental illness is likely to be more persuasive in their therapeutic interactions and in providing explanations for mental illness and in the rationale for treatment. Such questions are currently being empirically investigated through the survey of clinicians' experience and impressions (Nesse, 2019a)

Regarding the ubiquitous placebo effect, it has been proposed that placebo responses (healing processes which have been naturally selected) permit mammals to modify internal processes and behaviours and that adaptive advantages may result from

evolution of abilities 'to modify our internal environment in the light of positive evaluations of our external environments, social interactions and appraisals of the future' (McQueen *et al.* 2013). Placebo effects may also be mediated as a manifestation of evolved attachment systems, whereby proximity and support from caregivers is sought in times of illness or danger and trusted professional carers may come to be seen as key attachment figures. The importance of this being that care professionals need to understand that a significant proportion of efficacy of many treatments may be related to the therapeutic relationship. Consequently, health service planners and managers need to appreciate the importance of continuity of care continuity of care when designing care pathways.

The environment

Understanding that modern environmental changes contribute to psychiatric conditions allows for a more nuanced understanding of evolutionary psychiatry's applicability to contemporary mental health issues. It is therefore necessary to define the term 'environment', acknowledging that the term is potentially very broad in scope. While 'environment' can refer to physical, biological, social or cultural conditions, in this paper we adopt a broad definition encompassing both natural ecosystems and human-made settings that shape psychological function.

Environmental influences on mental health extend well beyond the natural world. The 'evo' and 'social' in the evobiopsychosocial model acknowledge that mental illness is influenced by multiple aspects of the social and environmental conditions. Classic work, such as that by Michael Marmot (2015), highlights how social disadvantage functions as a kind of pollutant, limiting early cognitive and emotional development and shaping lifelong mental health outcomes. His research draws attention to the social gradient in child development: children from higher socioeconomic backgrounds consistently score better across developmental measures, not simply due to poverty alone but due to broader inequalities in social context. These social conditions affect parenting, access to opportunities and ultimately an individual's ability to flourish.

From an evolutionary perspective, environments can be conceptualised in both global 'macro' and individualised 'micro' terms, incorporating physical, biological, social and cultural aspects. This lens also introduces the concept termed 'environments of evolutionary adaptedness' (EEAs) – ancestral settings in which human psychological traits evolved, which often stand in stark contrast to modern environments. These notable differences between ancestral and contemporary environments illustrate the principle of environmental mismatch, already introduced above and help explain the rise of conditions such as anxiety, depression and addictions in modern contexts.

Thinking environmentally also opens up a wide array of research and therapeutic possibilities. These can be broadly grouped under the term 'biophilia' – the idea that humans have an innate tendency to seek connection with nature' (Wilson, 1984; Kellert & Wilson, 1993). Incorporating environmental considerations, both social and ecological, into mental health frameworks may therefore offer new avenues for understanding and intervention.

How are evolutionary psychiatry and the environment related?

Current everyday environments, especially for those of us living in so-called WEIRD societies (Henrich *et al.* 2010), are vastly different from any potential EEA that we can imagine. A major part of our success as a species is our adaptability and ingenuity, enabling us to live in practically every geographical and climatic environment on earth, from the freezing poles to deserts, jungles and, increasingly, modern cities. The extra-ordinary and unique human success in adapting to such a wide array of environments is down to the distinctive human characteristic of cumulative cultural evolution (Henrich, 2015). However, while humans have engaged in niche-construction (Odling-Smee *et al.* 2003) based on cumulative cultural evolution thus rendering their environment increasingly more conducive to survival and reproductive success, there are a range of potentially harmful effects the greater the differences are between EEAs and modern environments. We need to investigate and better understand the nature of the trade-offs involved.

As mentioned earlier, these harmful by-products of novel environments are referred to in the evolutionary psychiatry literature as 'evolutionary mismatch' and is one of the main reasons for mental and physical illness in the modern environment, showing how our adaptability as a species comes with multiple associated costs. On the other hand, life in historic EEAs or modern hunter-gatherer societies was far from comfortable or ideal and we are, therefore, not advocating an idealised 'return to nature'.

In various historic EEAs (and in present-day hunter-gatherer societies), people lived in closely bonded, cooperative groups of related individuals, in harsh and dangerous environments and contact with strangers were unusual. In contrast, in modern social environments there is often much less contact with family members and kin generally. Our domestic environments are generally more comfortable but potentially more isolating. Modern social conditions can, therefore, give rise to the novel phenomenon of involuntary social isolation and loneliness which are known to be associated with poor outcomes for physical, mental and cognitive health (O'Luanaigh *et al.* 2012).

In the EEA setting, individuals of all age groups tended to live together and there appears to be more egalitarianism in modern hunter-gatherer societies. In contrast, humans in modern environments tend to spend more of their time with people of a similar age, with similar interests and similar social backgrounds, a phenomenon known as 'horizontalism' (Hewlett *et al.* 2024). For example, mixed age play and experiential learning is the norm in modern hunter-gatherer societies, in contrast to the highly structured educational and workplace environments. This has implications for how we conceptualise and manage conditions such as attention deficit hyperactivity disorder (ADHD) and learning and behavioural difficulties in modern classroom settings (Chaudhary & Swanepoel, 2023).

For conditions such as schizophrenia, we know that prevalence rates are higher in urban settings and that increasing exposure to green space can lead to improvements in symptoms (Marcham & Ellett, 2024). While 'urban drift' and other phenomena may be at play here, the stressful nature of modern urban environments often combining poverty, crime, cramped living spaces and widespread drug use needs to be emphasised. In addition, living in urban neighbourhoods with low levels of same ethnic group (termed the

ethnic density effect) has been reliably shown to increase the risk of psychosis (Barker *et al.* 2021; Das-Munshi *et al.* 2012). The beneficial effects of green spaces are proposed to be mediated by factors such as attention restoration, with 'soft fascination' with the complex stimulus of the natural world reducing 'attention fatigue' (Cuthbert *et al.* 2021a).

In addition, access to cheap and plentiful calorific foods taps into 'primitive' tastes that would have been 'adaptive' in EEA settings, but in the modern environment, can lead to conditions such as obesity, diabetes, cardiovascular disease and certain cancers. Likewise, access to high potency alcohol and synthetic psycho-active drugs represents a novel challenge to which our reward systems are poorly adapted (Hunt *et al.* 2024). These substances, along with behavioural addictions such as gambling, social media and gaming, may act to 'hijack' evolved mechanisms for reward and motivation in ways that were not possible in ancestral environments (Nesse & Berridge, 1997).

Finally, exploration is warranted into a range of modern factors that diverge from ancestral conditions, including reduced physical activity, the mismatch between adaptive fears in ancestral environments and modern phobias (such as our relative indifference to cars or electrical hazards), the rigid structuring of daily life and evolving social responses to psychological distress. In particular, the ways in which mental illness is expressed – and the degree to which individuals who differ from social norms are tolerated or supported – may differ significantly from patterns in ancestral environments.

Implications for prevention and treatment of mental illness

Combining evolutionary psychiatry perspectives with the environment should help guide multiple levels of research and intervention, aimed at addressing problems in both modern 'micro' social environments and broader 'macro' environmental areas (Polemiti *et al.* 2024; Haase, 2024).

More thoughtful urban planning with an increased emphasis on access to green spaces and more community orientated 'communal' living, considering evidence, could generally enhance health and well-being (Pasanen *et al.* 2023). Likewise, practical measures to address loneliness and enhance social connectedness, especially in older people (such as befriending, daycare facilities and so on) could help address multiple conditions such as depression, anxiety disorders, dementia and various physical health conditions (O'Rourke *et al.* 2018). Improving levels of intergenerational living and cohesion is likely to have benefits for all involved.

Optimising school and other educational environments is likely to lead to benefits for students, teachers and families and help move away from inappropriate 'medicalizing' of certain issues. Addressing the pricing, advertising and access to alcohol and drugs is also likely to yield significant mental and physical health benefits at the individual and population level. Evidence has shown that initiatives such as 'prescribing' physical exercise and 'social prescribing' generally are highly beneficial for individuals and for population health generally, with limited associated costs.

The emerging concept of 'green care' in psychiatry is a very welcome development that should help to draw together many of these areas, incorporating 'psychoevolutionary' concepts (Cuthbert *et al.* 2021b).

Diet is another important aspect of modern living with potentially negative consequences both for physical as well as mental health. The potential benefits of dietary reviews (especially

the reduction of intake of ultra-processed foods) in mental health patients can yield distinct benefits to mental and physical health and well-being and is currently an underappreciated and under-utilised intervention in mental health services (Burrows *et al.* 2022). This is particularly significant in psychiatric cohorts who take psychotropic medications, with studies showing that the second-generation antipsychotics in particular are associated with weight gain and an increase in cardiometabolic vulnerability (McCloughen *et al.* 2015).

Many of the measures outlined here can, in evolutionary terms, be seen to reduce 'mismatch' between EEAs and modern social environments and the whole idea of 'mismatch reduction therapy' is an area worthy of increased research attention. At the secondary level of treatment for established illness, evolutionary and environmental insights are likely to help inform better design of hospital environments with an emphasis on biophilic principles, and more involvement of families in care planning are also likely to lead to better care. Given the ultra-social nature of humans and what we know about the positive effect of social bonds (Tunçgenç *et al.* 2023), the principle of continuity of care (for mental health patients to have contact with familiar individuals as far as practicable) should become a central principle in the design of mental health services.

Although beyond the scope of this paper, the effects of social media and the digital world in causing stress due to excessive social comparisons that can lead to dissatisfaction with life, career and relationships is potentially important (Conte *et al.* 2024), as a further example of evolutionary mismatch. Therefore, assessing consumption of digital/social media could become a standard part of psychiatric assessment, leading to discussion around their potential negative effects.

Finally, the evolutionary perspective has much to offer at 'macro' environmental levels. Climate change is an active threat to current and future generations, with disproportionate effects in specific regions. It is a growing source of anxiety, particularly among younger individuals who may feel a sense of helplessness in the face of an uncertain future (Hickman *et al.* 2021). This anxiety is not, unfortunately, a 'false alarm' signal but rather a rational response rooted in our evolutionary wiring to detect existential threats. As a species, humans are hardwired to respond to existential threats, and climate change represents a tangible and immediate threat to that survival.

While climate-related anxiety may be considered a form of anticipatory grief, it is important to recognise that the existential concerns triggered by climate change are rooted in deeply ingrained psychological mechanisms. These include the fear of impending doom and the uncertainty of the future, which are evolutionary adaptations designed to protect us from life-threatening situations. The increased awareness of climate change risks and the growing predicted prevalence of climate anxiety (Ogunbode *et al.* 2022; Whitmarsh *et al.* 2022) align with the concept of 'eco-anxiety' (Hickman, 2020).

Addressing this type of anxiety requires clear and direct communication about the reality of climate change, the importance of proactive measures to mitigate its effects and the implementation of effective policy changes at global and national levels. Mental health interventions should focus on building resilience, providing emotional support and addressing the psychological impact of climate change, while also advocating for societal actions to lessen its most damaging impacts.

Globalisation is another reality of our times and this is associated with movements of people between countries for

economic reasons. Migration also occurs due to diverse reasons such as wars, persecution, famine and climate change. These related phenomena of globalisation and migration lead to opportunities but also problems that are unique to modern human societies. Those who move may find themselves in stressful and alien environments that impact on their mental health and well-being. 'Native' populations experiencing high levels of inward migration may feel threatened by perceived changes in their societies.

Adopting an evolutionary perspective can again be helpful here, at population and individual levels. Along with deep rooted fears of existential threat, we also have deep rooted fears and suspicions of those who are 'other' to us. This manifests in 'ingroup-outgroup' thinking and behaviour and potential for mental illness, such as paranoia and psychosis (Abed & Abbas, 2011; Abed & Abbas, 2014) and overt and systemic racism.

In our increasingly globalised world, this extended evolutionary perspective (an evobiopsychosocial model) has much to offer us, primarily in highlighting how our shared evolutionary history means that we as a species have so much in common. We consider evolution is the bridge between the biological, the psychological, the social and the environmental (Swanepoel *et al.* 2025).

Conclusion

The integration of evolutionary psychiatry with environmental perspectives offers a powerful framework for understanding, treating and preventing mental illness. By exploring the misalignment between our evolved psychological mechanisms and contemporary environments, we gain insight into why humans are vulnerable to psychiatric disorders in modern contexts. This evolutionary lens allows us to reframe many psychiatric symptoms as once-adaptive responses that have become maladaptive in today's world.

We have illustrated how evolutionary theory enhances the traditional biopsychosocial model by establishing meaningful connections between biological mechanisms, psychological processes and social contexts within an evolutionary framework.

The environmental dimension of mental health extends beyond natural settings to encompass social, cultural and built environments. Modern phenomena such as social isolation, horizontalism in age structures, urban living with limited green spaces and easy access to addictive substances represent significant departures from the conditions in which human psychology evolved. These environmental mismatches contribute substantially to the prevalence of conditions ranging from depression and anxiety to substance use disorders and psychosis.

At the individual level, interventions that reduce evolutionary mismatch – such as enhancing social connectedness, increasing exposure to natural environments, promoting physical activity and optimising diet – can complement traditional psychiatric treatments. The emerging concept of 'green care' represents a promising approach that incorporates biophilic principles into therapeutic frameworks. At the population level, evolutionary insights can inform urban planning, educational design and public health initiatives to create environments more conducive to mental well-being.

Beyond clinical application, evolutionary psychiatry offers a destigmatizing narrative by highlighting the universal aspects of human suffering.

Ultimately, evolutionary perspectives turn conventional medicine on its head by considering why people are vulnerable to illness

and why the genes that enable this persist. This can only be understood when the environments in which humans evolved are considered. As we face global challenges like climate change and migration that impact mental health, evolutionary perspectives remind us of our shared humanity and common psychological heritage. While our evolved responses may sometimes be maladaptive in contemporary contexts, they also provide the foundation for human resilience, adaptability and capacity for positive change. By integrating evolutionary theory with environmental considerations, we can develop more effective approaches to mental health care that address both proximate mechanisms and ultimate causes, improving outcomes for individuals and populations alike. Understanding these deep evolutionary causes can augment the search for solutions.

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References

- Abed R, Hunt A, St John-Smith P (2024). Evolutionary theory can advance and revitalize the biopsychosocial model. *The British Journal of Psychiatry* 225, 424–426. doi:10.1192/bjp.2024.87.
- Abed R, St John-Smith P (2022). *Evolutionary Psychiatry: Current Perspectives on Evolution and Mental Health*, 1st edn., Cambridge: Cambridge University Press.
- Abed R, John-Smith PS (2016). Evolutionary psychiatry: a new college special interest group. *BJPsych Bulletin* 40, 233–236. doi:10.1192/pb.bp.115.052407.
- Abed RT, Abbas MJ (2011). A reformulation of the social brain theory for schizophrenia: the case for out-group intolerance. *Perspectives in Biology and Medicine* 54, 132–151. doi:10.1353/pbm.2011.0020.
- Abed RT, Abbas MJ (2014). Can the new epidemiology of Schizophrenia help elucidate its causation? *Irish Journal of Psychological Medicine* 31, 1–5. doi:10.1017/ipm.2014.2.
- Brar G, O'Connell H (2024). Evolution and psychiatry: the formation of a special interest group. *Irish Journal of Psychological Medicine* 41, 1–3. doi:10.1017/ipm.2023.30.
- Brüne M (2016). *Textbook of Evolutionary Psychiatry and Psychosomatic Medicine: The Origins of Psychopathology*, 2 edn., Oxford: Oxford University Press.
- Burrows T, Teasdale S, Rocks T, Whatnall M, Schindlmayr J, Plain J, Latimer G, Robertson M, Harris D, Forsyth A (2022). Effectiveness of dietary interventions in mental health treatment: a rapid review of reviews. *Nutrition & Dietetics* 79, 279–290. doi:10.1111/1747-0080.12754.
- Chaudhary N, Swanepoel A (2023). Editorial perspective: what can we learn from hunter-gatherers about children's mental health? An evolutionary perspective. *Journal of Child Psychology and Psychiatry* 64, 1522–1525. doi:10.1111/jcpp.13773.
- Conte G, Iorio GD, Esposito D, Romano S, Panvino F, Maggi S, Altomonte B, Casini MP, Ferrara M, Terrinoni A (2024). Scrolling through adolescence: a systematic review of the impact of TikTok on adolescent mental health. *European Child & Adolescent Psychiatry* 34, 1511–1527. doi:10.1007/s00787-024-02581-w.
- Cuthbert S, Kellas A, Page LA (2021a). Green care in psychiatry. *The British Journal of Psychiatry* 218, 73–74. doi:10.1192/bjp.2020.166.
- Cuthbert S, Sharp H, Berry C (2021b). Green care in first-episode psychosis: short report of a mixed-methods evaluation of a "woodland group" in an early intervention service. *British Journal of Psychiatry Bulletin* 45, 235–237. doi:10.1192/bjb.2021.54.

- Das-Munshi J, Bécaries L, Boydell JE, Dewey ME, Morgan C, Stansfeld SA, Prince MJ (2012). Ethnic density as a buffer for psychotic experiences: findings from a national survey (EMPIRIC). *British Journal of Psychiatry* **201**, 282–290. doi:10.1192/bjp.bp.111.102376.
- Del Giudice M (2018). *Evolutionary Psychopathology: A Unified Approach*. New York: Oxford Academic.
- Dobzhansky T (1973). Nothing in biology makes sense except in the light of evolution. *The American Biology Teacher* **35**, 125–129. doi:10.2307/4444260.
- Engel GL (1977). The need for a new medical model: a challenge for biomedicine. *Science* **196**, 129–136. doi:10.1126/science.847460.
- Haase E (2024). Exploring the connections between mental health and our environment. *The Psychiatric times* **41**, 11.
- Henrich J (2015). *The Secret of Our Success: How Culture Is Driving Human Evolution, Domesticating Our Species, and Making Us Smarter*, 1st edn., Princeton, NJ: Princeton University Press.
- Henrich J, Heine SJ, Norenzayan A (2010). The weirdest people in the world? *Behavioral and Brain Sciences* **33**, 61–83. doi:10.1017/S0140525X0999152X.
- Hewlett B, Boyette A, Lew-Levy S, Gallois S, Dira S (2024). Cultural transmission among hunter-gatherers. *Proceedings of the National Academy of Sciences - PNAS* **121**, e2322883121. doi:10.1073/pnas.2322883121.
- Hickman C (2020). We need to (find a way to) talk about ... Eco-anxiety. *Journal of Social Work Practice* **34**, 411–424. doi:10.1080/02650533.2020.1844166.
- Hickman C, Marks E, Pihkala P, Clayton S, Lewandowski R, Mayall E, Wray B, Mellor C, van Susteren L (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. *The Lancet Planetary Health* **5**, e863–e873. doi:10.1016/S2542-5196(21)00278-3.
- Hunt A, Jaeggi A (2025). The DCIDE framework: systematic investigation of evolutionary hypotheses, exemplified with autism. *Biological Reviews* **100**, 1484–1511. doi:10.1111/bvr.70010.
- Hunt A, Merola G, Carpenter T, Robbins T, Jaeggi A (2024). Evolutionary perspectives on substance and behavioural addictions: distinct and shared pathways to understanding, prediction and prevention. *Neuroscience & Biobehavioral Reviews* **159**, 105603. doi:10.1016/j.neubiorev.2024.105603.
- Hunt A, St John-Smith P, Abed R (2022). *The Biopsychosocial Model Advanced by Evolutionary Theory*. Cambridge University Press. doi:10.5167/uzh-224636.
- Hunt AD, St John-Smith P, Abed R (2023). Evobiopsychosocial medicine. *Evolution, Medicine, and Public Health* **11**, 67–77. doi:10.1093/emph/eoac041.
- Kellert SR, Wilson EO (1993). *The Biophilia Hypothesis*. Washington, DC: Island Press.
- Konopka G, Caglayan E (2024). Human and nonhuman primates. In *The Evolutionary Roots of Human Brain Diseases*, 105–130. NY: Oxford University Press.
- Marcham L, Ellett L (2024). Exposure to green spaces and schizophrenia: a systematic review. *Psychological Medicine* **54**, 1–12. doi:10.1017/S0033291724001533.
- Marmot M (2015). The health gap: the challenge of an unequal world. *The Lancet* **386**, 2442–2444. doi:10.1016/S0140-6736(15)00150-6.
- Mayr E (1961). Cause and effect in biology: kinds of causes, predictability, and teleology are viewed by a practicing biologist. *Science* **134**, 1501–1506. doi:10.1126/science.134.3489.1501.
- McCloughen A, Foster K, Marabong N, Miu D, Fethney J (2015). Physical health risk behaviours in young people with mental illness. *Issues in Mental Health Nursing* **36**, 781–790. doi:10.3109/01612840.2015.1036480.
- McGuire MT, Troisi A (1998). *Darwinian psychiatry*. 1st edn. New York: Oxford University Press.
- McQueen D, Cohen S, St John-Smith P, Rampes H (2013). Rethinking placebo in psychiatry: the range of placebo effects. *Advances in Psychiatric Treatment* **19**, 162–170. doi:10.1192/apt.bp.112.010397.
- Nesse RM (2019a). *Good Reasons for Bad Feelings: Insights from the Frontier of Evolutionary Psychiatry*. New York: Dutton.
- Nesse RM (2019b). The smoke detector principle: signal detection and optimal defense regulation. *Evolution, Medicine, and Public Health* **1**, 1–1. doi:10.1093/emph/eoy034.
- Nesse RM (2023). Evolutionary psychiatry: foundations, progress and challenges. *World Psychiatry* **22**, 177–202. doi:10.1002/wps.21072.
- Nesse RM, Berridge KC (1997). Psychoactive drug use in evolutionary perspective. *Science* **278**, 63–66. doi:10.1126/science.278.5335.63.
- Nesse RM, Stein DJ (2019). How evolutionary psychiatry can advance psychopharmacology. *Dialogues in Clinical Neuroscience* **21**, 167–175. doi:10.31887/DCNS.2019.21.2/rnesse.
- Odling-Smee FJ, Laland KN, Feldman MW (2003). *Niche Construction: The Neglected Process in Evolution*. Princeton University Press: Princeton, NJ.
- Ogunbode CA, Doran R, Hanss D et al. (2022). Climate anxiety, wellbeing and pro-environmental action: correlates of negative emotional responses to climate change in 32 countries. *Journal of Environmental Psychology* **84**, 101887. doi:10.1016/j.jenvp.2022.101887.
- O'Lunaigh C, O'Connell H, Chin A-V, Hamilton F, Coen R, Walsh C, Walsh JB, Caokley D, Cunningham C, Lawlor BA (2012). Loneliness and cognition in older people: the Dublin healthy ageing study. *Aging & Mental Health* **16**, 347–352. doi:10.1080/13607863.2011.628977.
- O'Rourke H, Collins L, Sidani S (2018). Interventions to address social connectedness and loneliness for older adults: a scoping review. *BioMed Central Geriatrics* **18**, 214–214. doi:10.1186/s12877-018-0897-x.
- Pasanen P, White M, Elliott L, van den Bosch M, Bratman G, Ojala A, Korpela K, Fleming L (2023). Urban green space and mental health among people living alone: the mediating roles of relational and collective restoration in an 18-country sample. *Environmental Research* **232**, 116324–116324. doi:10.1016/j.envres.2023.116324.
- Polemiti E, Hese S, Schepanski K, Yuan J, Schumann G (2024). How does the macroenvironment influence brain and behaviour—a review of current status and future perspectives. *Molecular Psychiatry* **29**, 3268–3286. doi:10.1038/s41380-024-02557-x.
- Schroder H, Devendorf A, Zikmund-Fisher B (2023). Framing depression as a functional signal, not a disease: rationale and initial randomized controlled trial. *Social Science & Medicine* **328**, 115995. doi:10.1016/j.socscimed.2023.115995.
- Swanepoel A, Abed R, Brar G, St John-Smith P, O'Connell H (2025). Evolution: the bridge between 'biological' and 'social' psychiatry. *Irish Journal of Psychological Medicine* **42**, 3–5. doi:10.1017/ipm.2024.31.
- Tinbergen N (1963). On aims and methods of ethology. *Zeitschrift für Tierpsychologie* **20**, 410–433. doi:10.1111/j.1439-0310.1963.tb01161.x.
- Troisi A (2011). Mental health and well-being: Clinical applications of Darwinian psychiatry. In *Applied Evolutionary Psychology*, 276–289. Oxford: Oxford University Press.
- Tunçgenç B, van Mulukom V, Newson M (2023). Social bonds are related to health behaviors and positive well-being globally. *Science Advances* **9**, eadd3715–eadd3715. doi:10.1126/sciadv.add3715.
- Whitmarsh L, Player L, Jiongco A, James M, Williams M, Marks E, Kennedy-Williams P (2022). Climate anxiety: what predicts it and how is it related to climate action? *Journal of Environmental Psychology* **83**, 101866. doi:10.1016/j.jenvp.2022.101866.
- Wilson EO (1984). *Biophilia*. Cambridge (MA): Harvard University Press.
- World Psychiatric Association Section of Evolutionary Psychiatry (2024). *Evolutionary Psychiatry*. WPA. <https://www.wpanet.org/evolutionary-psychiatry> (Accessed 2 Nov 2024).