Evolutionary Psychiatry Special Interest Group (EPSIG)

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1. Notes from the Editor

I can hardly believe the last newsletter was sent just two months ago – so much has happened since then. With the new Omicron variant showing us mutation and natural selection in action, I am sure I am not the only one who has wished that this viral evolution would come to a swift end!

On a more positive note, many of our readers joined our 4th International Symposium on 29th October 2021, which was well worth attending (and for those who missed it, we are unfortunately are not able to upload to our YouTube channel as per current RCPsych rules, which we hope will be relaxed in future).

In this special newsletter, I am delighted to include the winning and runner-up essays for our Charles Darwin essay competition in the core trainee category. Many congratulations to Dr Tom Carpenter and Dr Ailsa Bruce respectively! The judges were impressed by the standard, as I am sure you will agree. Make a hot drink, sit back and enjoy.

Wishing you all a happy Christmas and healthy new year!

2. CORE TRAINEE WINNER: Dr Tom Carpenter

Why should I care about evolution? A thought exercise for mental health professionals

'What the patient wants' a consultant physician once said to me, 'is a diagnosis and a management plan'. I am not sure whether this doctor had asked the patient, but in any case, what the patient got was a diagnosis of a lower respiratory tract infection and a course of antibiotics. In a busy psychiatry clinic it is possible to think the same way. Diagnosis: generalised anxiety disorder. Management plan: start SSRI and refer for CBT. Diagnosis: recurrent depressive disorder. Management plan: switch to 2nd line antidepressant therapy. Diagnosis: emotionally unstable personality disorder. Management plan: refer for group therapy. This approach has rhythm. For me, it is the same rhythm as the swing, impact, swing of a pickaxe breaking rough ground. Stooped, you squint against bright light as you raise your head and wipe your brow, dust mixing with sweat to form a thick paste. Giving patients what they want is hard work.

In this essay I will illustrate how taking an evolutionary perspective can enhance the depth and speed of understanding of patients' situations. Thinking about evolution can feel like hard work, but it gives you an understanding of the deeper reasons people may behave like they do and, ultimately, makes understanding people easier. To do this I will discuss ways in which we approach our patients and illustrate how this can be enhanced by an evolutionary perspective.

A different approach to straightforward diagnosis is 'formulation'. This approach is more circumspect, taking into account relevant predisposing, precipitating, perpetuating and protective factors; The Royal College of Psychiatrists expects psychiatric trainees in the UK to be able to do this and to include appropriate differential diagnoses (Royal College of Psychiatrists, 2013). Baird et al. (2017) argue that that the preparation of a formulation need not be overly time consuming. They concede, however, that factors such as lack of time and professional rivalries, e.g. between psychiatry and psychology as reported in Mohtashemi et al. (2016), are perceived to stand in the way of this. And indeed, the idea of preparing and discussing a multifactorial account of the patient's presentation can be daunting given that as soon as you are done, more patients are waiting.

However, there are approaches that help. The biopsychosocial model, originally proposed by Engel (1977), is a toolkit with three different compartments; using it allows a holistic approach that may be particularly useful in psychiatry as it allows us to delineate a patient's medical, nursing, psychological and social needs.

My father's watch – a beautiful piece of mechanical engineering from the 1950s – did not keep good time, except for the two weeks of the year we took a summer holiday in the Mediterranean. The watch had first been given to my grandfather by a wealthy man from the Middle East. We spoke to the manufacturer. The explanation came – the watch had been designed to keep time, but due to the nature of the materials and the constraints of the mechanism, it would only keep time acceptably within a temperature range not found in the UK. Models of this watch sold to the European market would keep time, this one would not. This spring, here, may be replaced; otherwise you can adjust the time more frequently. Knowledge of the process by which the watch came about enabled understanding the current problem and gave two solutions – one to do with the change, the other to do with acceptance of and an appreciation for the watch's history. My father did not change the spring, but took pleasure in adjusting the time.

But what does a story of a mis-ticking watch have to do with psychiatry and the business of mental health care? On hearing about the problem with the watch, the manufacturer knew – and knew instantly and wholly – what was wrong. The spring was at the wrong tension because the ambient temperature was too low; this possibility had been present in the watch since manufacture, this had been the case in this line of watches since a self-winding mechanism had been introduced; watches with springs with different thermal expansion properties had not sold well in the Middle East because they kept poor time, whereas watches with this design amendment had.

Just as the manufacturer's understanding of the design history of the watch allowed a complete and rapid understanding of the issue plus a practical solution and a new and liberating perspective, understanding human evolution can give solutions and solace when people 'mistick'.

The manufacturer's explanation of the reason why the watch could have this problem keeping time contains the same elements needed for a full explanation of a trait shown by a biological organism. These elements were described by Tinbergen (1963) and have since been known as "Tinbergen's Four Questions"; they describe the kinds of questions that can be asked about traits in organisms. Two describe the trait at a point in time: how does it work mechanistically, and how has this influenced fitness? Two describe the trait across a change in time: how does the trait develop in the individual organism, and what is the history of development of the forms of this trait across generations? The questions can be organised into a grid, the below adapted from Nesse (2013).

	Proximate	Evolutionary
Point in time	How does it work? *(Mechanism)*	How has it influenced fitness? *(Adaptive significance)*
Change across time	How does it develop in an individual organism? *(Ontogeny)*	How has its form changed over evolutionary time? *(Phylogeny)*

It helps to think about the questions with a trait in mind. Humans possess the 'mammalian dive reflex'. An adult human, on holding their breath and submerging their head in water will experience bradycardia, apnoea and increased peripheral vascular resistance. It works by complex physiological means including trigeminal nerve afferents and vagus nerve efferents (Foster & Sheel, 2005). It is likely to have influenced fitness by minimising oxygen use and carbon dioxide production in a diving organism, enabling longer dives to engage in fitness-promoting behaviours; it may reduce risk of death from drowning, although its significance in humans is uncertain *(Adaptive significance).* In humans the reflex is present in infants and is triggered simply by wetting the face; it becomes harder to trigger and less intense as humans age (Campbell et al., 1969) *(Ontogeny).* The response is present in all vertebrates studied, suggesting that a common ancestor for all vertebrates possessed the reflex *(Phylogeny).*

How is this relevant to psychiatry? Any trait can be given this treatment and traits underpin the development of mental disorder. For example, exploring the ability to experience low mood and high mood can give us insights into disorders of depression and mania. Most of our research energies go into answering the proximate questions: what neurotransmitter is in excess or deficiency, which brain regions are working differently? *(Mechanism)*. How do these traits develop over the person's life course?*(Ontogeny).* But it is also possible to ask: how has the ability to

experience low mood influenced fitness? *(Adaptive significance)* What is the evolutionary history of the propensity to experience low mood? *(Evolutionary history)* Many things have been given this treatment; it is not my aim to review these here comprehensively but to show that by considering evolutionary approaches within existing models of patient formulation we can come to a more rapid and complete understanding of a patient's issues.

Below is a case outline from my own clinical experience, adapted and with recognisable details changed.

> *A 45-year-old man was brought for out of hours for mental health assessment by police after being found on a bridge reporting suicidal thoughts. He reported that he had been experiencing low mood for two years. His mood had worsened in the last two months and a recent major stressor was being served with an eviction notice from his privately rented property for rent arrears that he had no means to pay. He reported low mood, reduced energy, reduced enjoyment with disrupted sleep and reduced appetite. He felt that his neighbours were talking about him, but this belief was not held with delusional intensity. He had a plan and intent for suicide. Although he felt like he could not be helped, he was willing to come into hospital.*
>
> *He lived alone with no friends, no family, no dependents. His father had suffered with depression and took his own life at a similar age. His retail business had failed a number of years before and he had worked in insecure employment since then. His mother left the family home when he was a small child and his father had been physically abusive towards him throughout his childhood.*

Thinking diagnostically, we could make a provisional diagnosis of "ICD-10 F32.1 Major depressive disorder, single episode, moderate" High risk of completed suicide. Plan: admit to inpatient psychiatry for period of further assessment and for risk mitigation.

Using the biopsychosocial model, we might be able to formulate an understanding along the lines of the following. *Biological*: The patient is likely to have a genetic predisposition to low mood. The patient is likely to have an imbalance in neurotransmitters. *Psychological:* the patient is likely to have poor emotional coping skills secondary to disordered childhood attachment; he is likely to have negative thinking styles. *Social:* The patient is under increased stress due to the prospect of eviction; he has no social support network.

These can also be formulated using a 'four Ps' approach. The episode is predisposed by the genetic personality contribution, disordered attachment, precipitated by the increased social stress of the threat of eviction. It may be perpetuated by his thinking styles and lack of social supports. There are no clear protective factors, however he has felt able to ask for help. His needs might be described as the following. Medical – initiation of SSRI; Nursing – provision of supervision in an inpatient facility and observation of mental state; Psychological – consideration of cognitive behavioural psychotherapies; Social – help to access advice about ways to approach his housing problems, referral to social engagement service once in community.

Using Tinbergen's four questions we can see that the approaches to formulation above address the 'proximate' half of Tinbergen's questions. The patient has a constellation of symptoms consistent with a depressive mental disorder. The mechanism includes neurotransmitter signalling systems, differential activation of brain regions, altered functioning of regulatory systems due to changed inputs regarding the environment. The ontogeny includes the development of his personality and thinking styles to the interaction of his genetics with a relatively hostile developmental environment and overarching cultural norms.

The 'evolutionary' half of the explanations are not addressed. This may be entirely appropriate – it is easy to get muddled in thinking about why evolution has led to a specific person thinking in a particular way in a particular concrete circumstance. However, the patient has a range of traits that are amenable to an evolutionary approach and evolutionary thinking can gain insights. We can take a phenomenon such as "depression", use a formulation approach to break it into a series of proximate causes and can then be very clear about evolutionary concepts that lie behind them. This approach is enhanced by taking a single presentation. Psychiatric diagnoses can have a sense of arbitrariness about them, but this approach allows any concept, no matter how arbitrary, to be broken down into component parts that can be made sense of. Considering evolutionary explanations for the why the components have the forms that they do can help us to recognise patterns and significance across the lives of different people.

It is possible to use this approach in relation to the case above. To illustrate this, I have chosen two formulation elements from each level of the biopsychosocial approach. Each point has been turned into a question relating to a trait that is likely to underlie the element of the formulation to ask: "how is that a person could have a trait that gives them the capacity to do X?". For each trait inferred it is then possible to discuss Tinbergen's two evolutionary questions – what is the adaptive significance, and what is the evolutionary history? For the question of adaptive significance, it is important to remember that not all traits are adaptive – due to evolutionary trade-offs, mismatches and constraints we also have to ask – why has evolution left us vulnerable to this (Nesse et al., 1996)? The table below illustrates this process in relation to the case above and the question of 'adaptive significance'.

By organising the information like this it is possible to see patterns emerge and to better understand the deeper reasons behind why people behave the way they do. By knowing the patterns, we can understand a case more wholly and rapidly. We can see this by looking again at the '4 Ps'. The patient is predisposed to the episode because of the genetic basis of their personality [which is the way it is because of evolution making us sensitive to unfavourable circumstances, plus the stochastic nature of traits in populations], and his disordered attachment [putting him on a developmental path to a more avoidant behavioural mode, for good or bad reasons]. The episode is precipitated the fact he cannot pay his rent bill [which is interpreted as an impossible situation and has resulted in a behavioural pattern being activated]. It is perpetuated by his negative thinking styles [i.e. a skewed appraisal of the risks and benefits of action, learned through experience] and lack of social supports [a highly unfavourable circumstance, evolutionarily]. This tells us why he has the vulnerabilities he does and why his situation is so bad for him. Any patient showing a similar presentation is likely to have similar factors underpinning their behaviour; knowing the deeper reasons behind them will help us recognise patterns.

Biopsychosocial level	**Formulation point**	**Underlying trait**	**Adaptive significance**
BIOLOGICAL	"genetic predisposition to depression"	Possessing genes that give the capacity for low mood	*This might be adaptive because…* Genes are necessary for the development of phenotype traits such as a mood regulation system. It is important to be able to have to have a mood regulation system able to cope with unfavourable circumstances (Nesse, 2000); it may be beneficial to have a mood regulation systems that are biased towards the development of low mood compared to high mood. *This might not be adaptive because…* For any given individual, multiple genes of small effect size contribute to personality dimensions; with the nature of population genetics this has the effect that in populations of interbreeding individuals, most individuals have traits 'somewhere in the middle' but a few will necessarily have traits at one end or other of the normal distribution, which may not be well-suited to the current environment.
	"an imbalance in neuro-transmitters"	Possessing a regulatory system to alter behaviour based on environmental adversity	*This might be adaptive because….* This answer to this question is logically the same as the one to the answer above, as genes underpin the development of the regulatory system. *This might not be adaptive because…* Any regulatory system is liable to failures in certain circumstances
PSYCHOLOGICAL	"disordered attachment"	The capacity to alter attachment styles based on early life experience	*This might be adaptive because…* In early life an insecure attachment style in adverse circumstances may help elicit appropriate parental care and maximise chances of survival (Bowlby, 1980) *This might not be adaptive because…*

			In later life these learned behavioural approaches may not maximise survival and reproduction
	"negative patterns of cognition"	The capacity to make cognitive biases more negative	<u>*This might be adaptive because…*</u> In adverse life circumstances it may help predict future circumstances more accurately if one's expectations are changed, allowing more appropriate behaviour based on predicted bad outcomes (Trimmer et al., 2015) <u>*This might not be adaptive because…*</u> Any such behavioural regulatory system will be prone to failure in certain circumstances.
SOCIAL	"a bill he cannot pay"	The capacity to alter behaviour based on being in a seemingly impossible situation	<u>*This might be adaptive because…*</u> In an impossible situation, disengagement may be the best long-term strategy. <u>*This might not be adaptive because…*</u> A situation may be interpreted as impossible but in fact it may not be and goal-pursuit behaviour may be able to resolve the situation; there may be an evolutionary 'mismatch' between this mechanism and modern environments with the concept of money and with rock-bottom social supports.
	"poor social support"	The capacity to alter behaviour based on not having valuable social relationships	<u>*This might be adaptive because…*</u> Throughout human evolution, exile from a social network was essentially an evolutionary death sentence and would demand robust strategies to avoid this and to dramatically change behaviour were it to happen <u>*This might not be adaptive because…*</u> Just as in the point above, there is access to rock-bottom social support, so the situation may not be as grave as the patient interprets it.

Although this essay discusses only one presentation of mental disorder, the principles used here could be used for any given trait. Although it constitutes a relatively narrow narrative review of selected literature, it shows how exploration of the interaction between the biopsychosocial model and Tinbergen's Four Questions is valuable.

To quote Dobzhansky (1973) – 'nothing in biology makes sense except in the light of evolution'. As a biological organism, no person makes sense except in the light of evolution. As mental health professionals, our job is to make sense of people in order to understand their presentation and come to some understanding of their medical, psychological, nursing and social needs. We 'formulate' our patients, often using the biopsychosocial model and 'four Ps' approach, and use this formulation to guide our management plan. We can use evolutionary thinking to gain insights within the biopsychosocial model and 'four Ps' approach. We can also understand patients more completely and wholly if we appreciate the evolutionary processes that have led to their existence. If we care about understanding our patients, we need to care about evolution.

This essay contains two hypotheses, which I believe to be testable. 1) That an understanding of evolution will increase the speed of attaining a full understanding of a patient's problems and 2) that the sense of perspective afforded by the act of telling a complete, evolutionary story will be beneficial to clinicians and to patients. For now, I hope, the story of my father's watch, and the discussion of our patient, will help to convince you: to understand your patients fully and efficiently, you need to care about evolution.

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3. CORE TRAINEE RUNNER UP: Dr Ailsa Bruce

Darwinian Messages and Dynamic Evolution

Why evolutionary psychiatry is relevant today and how can it be used to understand the implications of our ever-changing environment on the dynamic process of evolution for the future

Background:

The natural selection of evolution explains our existence as we know it. It has shaped each cell, each organ and each physiological and pathological system we are comprised of. Most basically, the meaning of life, as explained by Darwinism, is genetic survival succeeded by carrying an advantage that ensures successful reproduction. With genetic survival as the law of evolution, evolution is notably not influenced by quality of life.

We do not commonly perceive ourselves as 'partially evolved', however evolution is dynamic and we are only on part of this timeline. Evolution also does not exist in isolation and is predominately driven by the environment. Modern humans exert much control over their environments. Nevertheless, almost as a consequence of this, our environment is evolving faster than our biology. One of the clearest examples of this is the dramatic rise in obesity. Humans evolved to survive periods of famine by craving high-calorie food and storing ingested food efficiently. Now that food is generally plentiful these traits lead to widespread obesity and metabolic diseases.

The Function of Evolutionary Psychiatry:

Evolutionary science is readily applied to our understanding of biological physiology but is not, as yet, universally taught as a similar framework to underpin our understanding of psychiatry. Psychiatry remains a field with no accepted unifying framework and therefore allows for multiple, and often significantly opposing, causative interpretations and treatment models. There is tolerance of ambiguity with a broadly accepted interpretation that mental ill health reflects biological dysfunction, disturbed psychology and response to social adversity. The significance attributed to each varies significantly between practitioners and also has a geographical bias. For example, in America prescribing for a biological model is much more widely practised than in the United Kingdom (Parkin, L., et al., 2011). Evolutionary theory provides a causative platform to understand why psychological variation and pathology exist and persist. This understanding can help to explain the development of mental disorders in an integrated manner to account for multiple contributing factors.

Without a unifying framework diagnostic criteria are open to interpretation and are not scientifically defined. In 'Good Reasons for Bad Feelings: Insights from the Frontier of Evolutionary Psychiatry', Randolph Nesse describes the danger of 'viewing symptoms as diseases' in labelling protective defences as disease (Nesse, R., 2020). For example internal medicine does not 'confuse protective defences such as cough and pain with diseases such as pneumonia and cancer.' Without an understanding of evolutionary psychiatry to explain the role of mood, stress and anxiety, there is no physiological framework for the basis of psychiatric diagnosis.

Furthermore, an objective framework is required to prevent the labelling of socially undesirable mental states (as currently interpreted) as psychiatric disorders. Psychiatric manuals such as the

DSM-5 and ICD 10 classify mental disorders by criteria of dysfunction that interferes with an individual's social functioning as defined by the current expert consensus. This method has unfortunately allowed for the historic labelling of homosexuality and female masturbation as 'disorders'. Alternatively, evolutionary principles allow function and dysfunction to be determined objectively to provide the foundation for a scientific diagnostic system. Evolutionary psychiatry proposes that 'mental disorder must be both harmful, in a value-defined sense, and dysfunctional, in an evolutionary sense' (Wakefield, J., 2007).

Some Theoretical Principles - evolutionary models to explain psychopathology

'Nothing in biology makes sense except in the light of evolution' – Theodosius Dobzhansky (Dobzhansky, T. 1973).

The application of evolutionary theory recognises several principles to explain the 'evolution' of disorders focussing on why adaptive traits, reproductive success and interaction with the environment allow for the development and persistence of psychiatric disorders. Three of the main theories expanded in this essay are that psychopathology can be explained by the overexpression of adaptive processes, the selection of reproductive success over wellbeing and also by understanding the evolutionary mismatch between the environment in which we have been evolving and the current environment.

Overexpression of Adaptive Processes

Darwinian messages: 'Pain or suffering of any kind, if long continued, causes depression and lessens power of action: yet it is well adapted to make a creature guard itself against any great or sudden evil.' (Darwin, C. 1859)

A poignant recent example was highlighted by Dr Riadh Abed at the Royal College of Psychiatry Mental Health Awareness Week (Tracy, D., & Abed, R., 2020). This example was the fatal damage caused by over activation of our immune system, itself a vital biological defence, in Covid-19 infection. Likewise, over activation of vital psychological mechanisms can also cause great suffering. For example, anxiety is an important psychological response to danger. In the same vein, high and low moods are important as a driving force in goal pursuit. Allowing for over-expression and false positives is also adaptively important. For example, smoke detectors are designed on the side of caution, accepting frequent false positives, because of the cost of failure.

Reproductive success over fitness and wellbeing

Evolution centres on reproductive success rather than longevity or health. Any trait that improves survival to reproductive age and reproductive success will be positively selected for regardless of its effect on life expectancy or wellbeing. An example was illustrated by a study on rats which found that early life stress led to an initial adaptive advantage with improved performance under stress but by middle age this effect was reversed to produce a detrimental effect (Suir, D., et al., 2013).

Evolutionary Mismatch

Evolutionary mismatch is the discord between adaptably evolved traits and the current environment. For example, adaptations producing reproductive advantage in Pleistocene

environments (known as the Environment of Evolutionary Adaptation) may prove problematic in modern times. The nomadic lifestyle of hunter gathering, which contrasts significantly with modern lifestyles, was the norm for 8 million years of evolution going back to our earliest ancestors.

However, it is important to recognise that the Environment of Evolutionary Adaptation (EEA) is not a set place or time. The EEA represents the environment in which there were pressures that led to certain genetic changes being advantageous and selected for. This environment is 'the statistical composite of selective pressures that caused the genes underlying the adaptation to increase in frequency' (Tooby, J., & Cosmides, L., 1990). Illustrating that selective success cumulatively changed what would be considered 'normal' or species-typical. The EEA is not purely historic but is existent throughout time, as is evolution, meaning that we also currently exist within an environment of evolutionary adaptation.

This concept relies on research and understanding of past environments. Typically, comparisons are drawn from the very distant past but changes can be considered between any time period or geographical location which can be more accessible target areas for research. For example, several tribal communities, whose lives are more in keeping with those of our hunter-gathering ancestors, have been shown to have extremely low rates of depression (Schieffelin, L., 1985), (Douglas, H., & Jane, W., 1994). A study, found that indigenous people in artic areas that changed to modern lifestyles experienced a threefold increase in suicide rates over ten years (Shepard, 1996). Traumatic life events such as grief are not eliminated in less westernized cultures but a mismatch is implicated.

Current application of Evolutionary Psychiatry – An example

Attention-deficit hyperactivity disorder (ADHD) exemplifies the current controversy in psychiatric diagnoses. The discordance is demonstrated by the wide variation in recognition, diagnosis and treatment. For example, in 2012, 9% of school-aged children in America had a diagnosis of ADHD in comparison to less than 0.5% in France (Sinzig, J., et al., 2008). Diagnostic rates also varied significantly between American states (Fulton, D., et al., 2015).

An understanding of why ADHD exists can be drawn from evolutionary principles (Swanepoel, A., et al., 2017). There is evidence of multiple persisting genes associated with ADHD including variants of DRD4, DRD5, Dopamine transporter, dopamine beta-hydroxylase, SNAP-25, 5HT transporter and 5HT receptor-1B (Coghill, R., & Hogg, M., 2012). Considering evolution, for genetic survival ADHD traits must have been, at least historically, adaptively advantageous.

In a hunter-gatherer environment high levels of physical activity and novelty seeking could have provided individual as well as group advantage. A 2008 study compared a nomadic community with a settled community in Kenya. Around 14% of all tribe members had the version of the DRD4 gene, DRD4 7R, which is associated with novelty-seeking and ADHD (Matthews, L., & Butler, P., 2011). The study found that men with DRD4 7R living the nomadic lifestyle and still having to hunt for food were better nourished when compared to those without it (Eisenberg, T., et al., 2008).

The study also suggested evidence for evolutionary mismatch. As well as finding that genes linked to

ADHD were also linked to better nourishment when living a nomadic lifestyle, they found that, in contrast, men with DRD4 7R living a settled lifestyle were on average less well nourished. Furthermore, those with DRD4 7R living in the settled community were found to struggle more with classroom learning (Eisenberg, T., et al., 2008). In combination genes associated with ADHD were found to be advantageous in a hunter-gatherer lifestyle and detrimental in a settled lifestyle. This evolutionary optimisation in some environments carries the cost of poorer outcomes in other environments.

ADHD is also associated with childhood trauma (Brown, M., et al. 2017). The development of ADHD traits may have short-term adaptive advantage with less relaxation, a faster metabolism, less trust and increased risk-taking in abusive or violent environments. This short-term advantage over longer-term gain is perpetuated by evolution with the rule that survival to reproductive success is selected for over fitness and wellbeing. Historically, our ancestors may also have required the development of these protective traits in times of stress to survive. The response to the environment, developing neurobiological patterns that have significant long-term consequences and suffering can still be interpreted as evolutionarily adaptive in this context (Belsky, M., 2012).

Considering the implications of Evolutionary Mismatch

The rates of diagnosis of ADHD have increased considerably in many countries over recent years, including the UK (Holden, S., et al., 2013). Explanations for this rise are as controversial as they are numerous including differences in societal, political and media perception, definition, data collection as well as a rise in prevalence. Regardless, ADHD is linked to serious consequences including poor educational attainment, substance misuse, criminality and premature mortality in adult life (Barbaresi, W., et al., 2013).

Considering ADHD in terms of evolutionary mismatch can provide an alternative platform for a scientific approach to management. This alternative avoids becoming embroiled in how much ADHD is biogenetic or environmental and whether it is under-diagnosed or over-diagnosed and what implications those arguments would have for medication or therapy. Lessening the evolutionary mismatch could be achieved by providing medication, modifying a patient's environment or a combination of both. This raises several ethical questions but the goal to reduce mismatch is important and can be considered on a public health as well as an individual level.

In evolutionary terms, agriculture was adopted relatively recently around 10,000 years ago. Prior to this over millions of years humans had adapted to a hunter-gatherer lifestyle. They lived in small social circles with the primary pressure of survival being the hunt for food. The discrepancy between modern-life is striking and this essay's approach would not advocate a return to cave dwelling but would advocate research and intervention into aspects of disparity.

For example, considering the modern structure of education in terms of evolutionary mismatch would provide a potential for intervention. Historically hunter-gatherers required a broad general knowledge with flexibility and adaptability for which genes associated with ADHD appear to carry an advantage. Modern schooling requires children to sit in classrooms for several hours a day and

concentrate academically. Environmental adaptations such as increased novelty and physical activity could both increase individual success and reduce classroom stress.

Our environment continues to change significantly faster than our biology, which will continue to produce mismatch, in itself a driving force for evolution. The Internet was not made public until 1993. 'Screen time' was coined as a phrase in 1991 and has since increased dramatically. Content is designed to be instantly attention-grabbing and the concentration span required has sequentially reduced from films, TV shows, YouTube videos and, most recently, TikTock where the average length of the most successful clips is 16seconds. Children have earlier access to this instant distraction seemingly designed for short attention spans. Hypothetically, perhaps our attention spans are not being challenged and developed. Perhaps this could contribute to lower the threshold for ADHD traits to become problematic and diagnostic.

Further driven by Covid-19, the average social circle has decreased in physical contact and expanded online. The term 'hikikomori' has been coined to describe the 'acute social withdrawal' of 'modern-day hermits' in Japan. A study published in 2010 estimated a population prevalence of 1.2% of hikikomori in Japan (Koyama, A., et al., 2010).

Humans have extended their lifespan, intervened in reproduction, altered their diet and changed their social structure. The implications of this are on-going and further research is required to develop statistical models to understand what the implications might be for the present and future. Evolutionary medicine is basic science. Understanding gained through the model of evolution will provide a scientific foundation from which to target treatments both on an individual and public health level.

Evolution is as old as life as we know it but its formal application within psychiatry is just beginning. A recent development for this was the formation of the Evolutionary Psychiatry Special Interest Group set up within the Royal College of Psychiatrists in 2016. Evolutionary psychiatry is an area for further research and discussion and will continue to evolve, as will we. There is scope for research not only into our ancestors, but also into the recent past and current periods of environmental change. Evolutionary frameworks can be applied to answer scientifically the fundamental reasons for mental ill health, which in turn may highlight potential areas for treatment.

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4. **WPA, Section of Evolutionary Psychiatry Free Webinar Program.**
   The next free WPA evolutionary psychiatry webinar will be on 27 January 2022 at 4pm where Professor Robin Dunbar will be speaking about the evolutionary psychology of friendship. You will find the registration link for this and the other 2 webinars by Professors Henry O'Connell and Randolph Nesse in March and May respectively on:

https://www.wpanet.org/evolutionary-psychiatry

Many thanks for reading the Newsletter and please don't hesitate to get in touch with any contributions or suggestions.