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Evolutionary psychology and social work

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ABSTRACT

Evolutionary psychology (EP) has become an important metatheory over the past three decades. EP is centered upon Darwin's theory of natural selection and how this process has played an important role in the development of the human brain and behavior. Evolutionary psychology attempts to explain biological phenomena in terms of evolutionary forces, in this case brain structure and function, which directly impacts human behavior. There has been a remarkable increase in empirical evidence in regards to the merits of this theory and it has been able to partially explain certain features of aggression, sexual behavior, anxiety, depression, and numerous other aspects of cognition, emotions, and psychopathology. This literature review examines the origins, actors, principles, and evidence in the development of this theory and how evolutionary psychology can be applied to the social work profession.

KEYWORDS

Evolutionary psychology; evolution; natural selection; proximal and ultimate causation; functionalism; ethology; sociobiology; eusociality; neuroscience

Introduction

Since its inception in 1992, evolutionary psychology has become an increasingly important metatheory in providing an explanation for human psychosocial behavior (Buss, 2005, 2020; Cosmides & Tooby, 1997; Nesse, 2019). Evolutionary psychology is centered upon Darwin's theory of natural selection and how this process of evolutionary change has played a role in the development of the human brain and body during the Pleistocene Epoch (a geological period which lasted from 2.54 million years ago to 11,500 BC) (Barton et al., 2007; Tooby & Cosmides, 2005). Evolutionary psychology explains psychosocial phenomena in terms of ultimate causation, which is to say that the existence of something occurring in human cognition/behavior is the result of evolutionary forces, in this case those which have led to the development of the modern human brain and its processing (Austad & Nesse, 2020; Barkow et al., 1992; McGuire et al., 1992; Park, 2013).

To that end, evolutionary psychology has gained a growing acceptance in a number of fields, including medicine, the social sciences, and beyond (Cosmides, 2004; Roberts et al., 2012; Van Vugt, 2017). Evolutionary psychology has had an increasing influence upon psychiatry, psychology, and of course, social work—the latter of which has generally had a more limited reception and applicability up until now (Durisko et al., 2016; McGuire et al., 1992; Sayre & Walker, 2014; Yorke & Begère, 2018). Therefore, the purpose of this paper is to (1) provide a framework for the understanding of evolutionary psychology in the context of social work education and practice and to (2) present an argument for its importance as a new paradigm in the profession.

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Origins of evolutionary psychology

Evolutionary psychology in itself was not developed until the last quarter of the 20th century —however its theoretical origins are actually quite ancient (Austad & Nesse, 2020; Nesse, 2019; Van Vugt, 2017). Indeed, the earliest origins of evolutionary psychology can be said to stretch as far back to the writings of Aristotle (384 BC–322 BC) and Hippocrates (460 BC–370 BC), if we consider the most general notions of biological inheritance as a theoretical starting point. For the sake of practical considerations however, it is pertinent to rather start with Jean-Baptiste Lamarck (1744–1829) in early 19th century France, who more profoundly articulated early basic concepts of evolution regarding the inheritance of traits—or the passing on of characteristics (genetically) from parent to offspring (Barton et al., 2007; Burkhardt, 2013; Kovac, 2019). Lamarck also noted that the environment itself acts upon organisms (specifically animals in this instance) and this can cause them to change (or adapt), bringing about certain (beneficial) characteristics. Lamarck however incorrectly believed that the exact nature of what was actually being inherited was dependent upon the *behaviors* of the parent animal and what physical attributes were used (or disused) over the course of its lifetime. A rather classic example given by Lamarck pertains to that of the giraffe (*Giraffa* spp.) and its feeding habits (Burkhardt, 2013; Kovac, 2019). Lamarck theorized that the long neck and forelegs of giraffes were the result of the parent animal increasingly stretching its neck and forelimbs to attain higher and higher leaves—thereby causing these body parts to stretch *over the course of its lifetime*. The giraffe would then pass on these new "acquired characteristics" to their offspring and so forth. An equivalent example in the case of human beings provided by Lamarck was that of blacksmiths. Blacksmiths generally develop large, muscular arms through the nature of their work and this too would, according to Lamarck, be passed onto their children—an idea which for all intents and purposes, has been determined to be false. This refuted notion of soft inheritance is known as "Lamarckism" (Barton et al., 2007; Burkhardt, 2013; Kovac, 2019; Wilson, 2000).

It is without question that the works of the British naturalist Charles Darwin (1809–1882) provide a direct line to the development of evolutionary psychology. Darwin's theory of evolution, which was published in his book *On the Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life* (1859), has arguably been one of the most influential publications in the history of humanity. In this seminal book, Darwin describes what he coined as "natural selection," which can be understood as the engine of evolution. It is through the process of natural selection that the forces of nature itself act upon a species, selecting for particular characteristics that allow for it to be the most biologically successful in a given environment at a given time. This "descent with modification" means that the natural environment will favor certain traits over others, which is known as being evolutionarily "fit"—thereby driving evolution forward by the survival and thus reproductive success of "the fittest" (those forms and species that cannot adapt on the contrary may become rare or extinct). To that end, Darwin famously first began to conceptualize this law of the natural world as a young naturalist while sailing around South America as hinted in his celebrated scientific memoir, *Voyage of the Beagle* (1839). In particular, Darwin began to formulate the beginnings of evolutionary theory while noting the incredible variation of closely related species of finches and giant tortoises on the Galapagos islands (Barton et al., 2007; Darwin, 1859; Ruse, 1975). It is relevant to

point out that the finches and giant tortoise species evolved unique traits (including beak shape and shell structure, respectively) across the geographically close, neighboring islands of the Galapagos archipelago in accordance to food availability and subsequent *niches* or ecological roles within a given environment (Darwin, 1859). This process is known as adaptive radiation, which is an evolutionary burst of *speciation* or the formation of new species based upon niche availability (Barton et al., 2007; Darwin, 1859; Dugatkin, 2009; Wilson, 2000).

The impact of Darwin's theory has had profound effects upon the history of the world in a multitude of ways. It is to this day, considered to be one of the best substantiated theories in the history of science—and has effectively laid out an argument against the literal, biblical accounts of creationism that had been a bedrock of Western Civilization for nearly 1900 years (Barton et al., 2007). The evidence for natural selection can be found through diverse scientific fields, including (but not limited to) biology, anatomy, genetics, physiology, and geology (Barton et al., 2007; Dugatkin, 2009). The first four disciplines listed are particularly relevant when we consider direct implications for evolutionary psychology—which is an application of Darwinian theory to the overlapping fields of psychiatry, psychology, as well as clinical social work by extension (Barkow et al., 1992; Austad & Nesse, 2020; Nesse, 2019; Van Vugt, 2017).

It is notable that Darwin himself had an interest in psychological processes and he prophesized in *On the Origin of Species* that psychology in the future would be "based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation" (Darwin, 1859, p. 488)—essentially giving a definition of evolutionary psychology in a broad stroke. Moreover, following his *On the Origin of Species*, Darwin wrote two books that have also certainly served as foundational works for the development of evolutionary psychology. These now classic volumes are entitled *The Descent of Man, and Selection in Relation to Sex* (1871) and *The Expression of the Emotions in Man and Animals* (1872). It can be effectively argued that Charles Darwin's theory of evolution played a role in the development of modern psychology in general from the very beginning (Brysbaert & Rastle, 2009; Buss, 2005; Marcaggi & Guenole, 2018). Sigmund Freud (1856–1939) himself, the founder of psychoanalysis, later applied Darwin's idea of acquired characteristics to mental illness (as well as to the concept of "unconscious memories"—which has since been proven to be false) (Brysbaert & Rastle, 2009; Marcaggi & Guenole, 2018).

Darwin and Freud were both critical forebears to the development of evolutionary psychology—but they were not the only scientists responsible for the groundwork of the theory. Indeed, another branch of psychology influenced by Darwin known as functionalism played an important role. As an aside, functionalism was notably developed in the United States (unlike Freud, who was based in Vienna, Austria) and served as a major force in American psychology at the turn of the 20th century (Brysbaert & Rastle, 2009; Green, 2009; Myers, 2001). The physician, psychologist and philosopher Dr. William James (1842–1910) has largely been considered to be one of the greatest figures of this movement within psychology (Green, 2009; Myers, 2001). Functionalism holds the very much Darwinian idea that human psychological systems are adaptive functions related to biological survival—and therefore the result of natural selection (James, 1890; Myers, 2001). Given the medical and scientific origins of this movement, there was an emphasis about the evolutionary role of physiology within the group (most famously in case of John Dewey), examining the *dualism* of the body and mind, including in the significant case of the nature of the reflex arc (i.e., the

involuntary physical reaction to a stimulus—including the well-known knee jerk or patellar reflex) (Green, 2009; Myers, 2001).

Evolutionary psychology also holds an important historical relationship with the development of 20th century ethology (Buller, 2005; Tooby & Cosmides, 2005; Van Vugt, 2017). Ethology is the scientific study of animal behavior and aspects of this science has allowed for comparative research between the animal kingdom and our own species. The European ethologists Konrad Lorenz (1903–1989) and Nikolaas Tinbergen (1907–1988), close colleagues hailing from Germany and the Netherlands, respectively, were centrally important scientists in the advancement of this field in the 20th century (Pellegrini, 2008; Wilson, 2000). A particular work worth noting written by Lorenz is entitled *On Aggression* (1966), in which the author (like Tinbergen) was quite direct about the significant implications of ethology in learning more about our own species. Konrad Lorenz's *On Aggression* frames aggression, violence, and associated ritualistic behaviors foremost through biological and evolutionary mechanisms. These same behaviors and emotions are furthermore addressed by Lorenz in the prism of human psychosocial behavior and how this has implications for society at large. One of Nikolaas Tinbergen's central contributions to the development of evolutionary psychology was his research on instinct, which was published in his *The Study of Instinct* (1951). This important concept will be addressed in detail later on in the article.

As indicated, the importance of ethology in the overall development of evolutionary psychology was that it provided a deeper understanding of the biochemical and physiological mechanisms which drive behavior in animals (particularly mammals), including our own species. In examining these complex biological processes, there is a major concept here in that their causation can be either *proximal* or *ultimate* (distal) in nature—and this has implications in the study of evolutionary psychology. Proximal causation means that something can be explained from the likes of structure and function, while ultimate cause refers back to the evolutionary explanations themselves (Barton et al., 2007; Dugatkin, 2009). In terms of aggression for example, intraspecific, aggressive behavior like rutting in deer is associated with acquiring access to mates and this can be understood as a (more immediate) proximal cause. The ultimate (or distal) causation here would be the cyclical biochemical signaling occurring in the brain during mating season—and the existence of this signaling (as an evolutionary psychologist would point to), is the result of natural selection through the process of evolution.

A major subsequent step toward the development and synthesis of evolutionary psychology was the integration of concepts taken from the field of sociobiology. The tenets of this field were discussed in the publication of a ground-breaking book entitled *Sociobiology: The New Synthesis* (1975) written by Edward Osborne ("E.O.") Wilson (1929–2021). E.O. Wilson was a world-famous biologist (specializing in entomology or the study of insects and their kin), naturalist, and (consequently) an environmental activist by trade who interestingly had been referred to by certain admirers as "Darwin's natural heir"—an immense title indeed (Dugatkin, 2009; Dugger, 1981; Kaufman, 2013; Semeniuk, 2006; Wilson, 2000). E.O. Wilson's first biological passion was bugs—particularly the *eusocial* ones, including the likes of ants and termites. Eusociality is notably the most intricate and complex level of sociality, involving a dynamic, delineated, and intergenerational system of related animals. Eusocial species include certain types of insects, crustaceans, and mammals—including our own species (Dugatkin, 2009; Wilson; 2000). The study of eusociality in animals has allowed for a living laboratory of intricate social phenomena—including in regards to cooperation, selfish

behaviors, and biological altruism (or selfless helping behaviors between various genetic relatives). Biological altruism is associated with the reduction or even elimination of the helper's own *direct* biological fitness—but increases *indirect* inclusive fitness, in which certain shared genes can be passed on, including those responsible for the altruistic traits themselves (Dugatkin, 2009; McGuire et al., 1992; Wilson, 2000). E.O. Wilson's book was key in the development of evolutionary psychology precisely because of the application of Darwinian theory to the development of the selection for behavior in social species.

In 1992, the book *The Adapted Mind: Evolutionary Psychology and the Generation of Culture* was written by Jerome Barkow, Leda Cosmides, and John Tooby. This work of commissioned papers was critical in laying down the foundation for evolutionary psychology as a distinct field. The major argument made by the authors was to effectively emphasize that the human brain—the biophysiological source of our behaviors—is a product of natural selection—and this idea in itself is all-encompassing, cutting across cultures, races, and ethnicities throughout our species (Austad & Nesse, 2020; Buss, 2020; Nesse, 2019; Van Vugt, 2017). It is precisely this sort of universality which the authors refer to as the tenet of *The Adapted Mind*.

For Barkow et al. (1992), the human brain evolved to suit the relatively small hunter-gatherer societies of the Pleistocene epoch , a geological era marked by prehistoric megafauna (including the iconic mammoths, giant ground sloths, and saber-toothed cats) as well as other species of now extinct humans—including the Neanderthals and Denisovans, who have nonetheless contributed to our own DNA (Petr et al., 2020; Barton et al., 2007). For the authors of *The Adapted Mind*, a key premise is that some 10,000 years later, the human brain is still very much designed for a Pleistocene world—one that is of course long gone. Indeed, Cosmides and Tooby (1997) in their accompanying *Evolutionary Psychology: A Primer*, make the argument that "our modern skulls have a Stone Age mind" (p. 14) and this has important theoretical implications—including the prevalence of psychopathology and behavioral dysregulation in our complex 21st century world (Austad & Nesse, 2020; Nesse, 2019; Van Vugt, 2017). Amongst the fundamental ideas in relation to this is that humans evolved in part due to a growing eusociality (note again E.O. Wilson's book) within the species, which benefitted from such behaviors in terms of survival and reproduction. The movement also emphasizes how physiology itself was influenced by the forces of evolution (as described in case of functionalism as well). Therefore, in evolutionary psychology, neurological mechanisms are understood as systems developed to understand and interpret the external world (Austad & Nesse, 2020; Barkow et al., 1992; Nesse, 2019).

For researchers like Barkow, Cosmides, and Tooby, there is a recurring theme that as evolutionary psychology fundamentally examines the evolutionary development of the brain (along with cognition, behavior, and perception), it offers a more profound theoretical basis and insight into numerous matters of the human psyche. Evolutionary psychology has thus also been dubbed as a *metatheory,* which underscores once again its great value and scope in application (Buss, 2005, 2020). It is for these stated reasons that evolutionary psychology has steadily gone on to impact a variety of other professional fields, including medicine, business, and teaching, among others (Buller, 2005; Buss, 1995, 2005; Van Vugt, 2017). In addition, as an approach, evolutionary psychology has important applications in other branches of psychology and mental health, including in developmental psychology, social psychology, and of course, clinical psychology and social work (Austad & Nesse, 2020; Nesse, 2019; Roberts et al., 2012).

Principles of evolutionary psychology

The principles of evolutionary psychology are, as noted, founded upon the Darwinian ideas of natural selection and evolution (Barkow et al., 1992; Brysbaert & Rastle, 2009; Scoville, 2020). In framing the human mind within an evolutionary context, the brain can be understood as the product of selective adaptation, which ultimately has allowed for our species to be highly evolutionarily successful, leading to the domination of our planet. It should be further emphasized that brain evolution itself (as can be said with other parts of human anatomy) can be understood from a macro as well as a micro-centric process. For example, when we refer to gross anatomy (i.e., brain anatomy seen by the naked eye) as well as histology (cell and tissue make-up and structure), we can be said to be referring to the products of macro-evolution (Tooby & Cosmides, 2005). Alternatively, when understanding the evolutionary development of the brain in terms of the genome (the complete set of genetic material found in an organism), proteome (the entire protein compliment), or transcriptome (the entirely of the mRNA or *coding* RNA in an organism), we are referring to the products of microevolution—"micro" because such changes cannot be seen by the casual observer as the evolutionary change essentially comes down to gene frequency and development over the course of time (Dugatkin, 2009; Tooby & Cosmides, 2005; Wilson, 2000).

As previously described, evolutionary psychologists note that the human brain is understood to have evolved (in both size and complexity) over the course of many millennia during the Pleistocene epoch (Barkow et al., 1992; Hublin et al., 2015; Tooby & Cosmides, 2005). To be clear, while our genus, *Homo*, evolved into existence in Africa about two million years ago, our species has existed for only about quarter of a million years and since that time, gradually expanded its range throughout the Old World and then New World—over the course of tens of thousands of years (Barton et al., 2007; Tooby & Cosmides, 2005; Wilson, 2000). It is believed that the anatomically modern *Homo sapiens* actually appeared prior to what has been dubbed as the human "Cognitive Evolution," where there was an evolutionary leap forward in human technology, art, and cultural development around 70,000 years-ago—and this event roughly coincided with major migratory expansions of our species across the Old World (humankind would not cross the Bering land bridge until around 20,000 years ago into the Americas) (Klein, 2008; Ko, 2016; Neubauer et al., 2018; Tattersall, 2017; Wilson, 2000). This fascinating natural history sets the theoretical backdrop for evolutionary psychology.

Tooby & Cosmides, (2005) make the perhaps obvious argument that from the anthropocentric point-of-view, humans have long (falsely) believed that as a species, our decision-making process is based almost wholly upon "reason" (i.e., logic, thinking), which contrasts that of the animals, who historically have been believed to function predominantly (if not entirely) on "instinct." What is instinct and how does this relate to evolutionary psychology? Instinct can roughly be understood as the innate behavioral response toward some kind of stimuli that is essentially the opposite of reason (Myers, 2001; Tinbergen, 1951; Tooby & Cosmides, 2005; Wilson, 2000). From our arrogantly human perspective, instinct was largely seen as the driver of behavior in the animal kingdom and separate from our more "evolved" species (whether by divine creation or through evolutionary processes). Darwin yet again was the first modern thinker to scientifically dispute this and later, the functionalists took the concept of instinct and applied it to the workings of our psyche in a revolutionary way. First and foremost, the functionalists acknowledged that the existence

of instinct is not just present in our species, but it actually *abounds in our thought processes as well as our behaviors* (Green, 2009; Tooby & Cosmides, 2005). This idea was adopted by and is deeply held by the evolutionary psychologists from the inception of the theory who take it further, and maintain that instinct lies at the root of learning itself (Barkow et al., 1992; Buss, 2020; Tooby & Cosmides, 2005). Indeed, as discussed, the very origins of evolutionary psychology are profoundly connected in natural processes, ethology, and comparative biology. Given this framework, one could argue that fundamentally, the notions of "human exceptionalism" only exist in the sense as it would for *any other species* that has evolved in a unique way as the result of natural selection and other evolutionary forces over time (that is to say, *every other species*).

Evolutionary psychology is guided by fundamental principles which serve as the framework for this theory. These principles recognize that the human brain is the product of evolutionary processes which generally lead us to think and behave the way we do as a species. Barkow et al. (1992) outlined a total of five (5) basic principles that create the core of the metatheory upon its inception in *The Adapted Mind*. The first principle essentially states that the human brain is an organ which is akin to a computer, complete with its own biological "circuitry" (i.e., neurons, glial cells, and the associated intricate network of the central nervous system). The neurons themselves, the functional unit of the central nervous system (CNS), are in fact specialized cells that work through electrochemical charge differentials known as action potentials, which are electrical impulses (Barkow et al., 1992; Cosmides & Tooby, 1997; Marcus, 2009). The central nervous system (brain and spinal cord) and also the peripheral nervous system (collections of integrated neurons—the nerves and ganglia outside of the CNS), serve as the programming structures for the mind and further control and guide our perception and behavior by interacting with other regions of the body (Barkow et al., 1992; Marcus, 2009; Tooby & Cosmides, 2005).

The second major guiding principle of evolutionary psychology states that our nervous system evolved as the result of the environmental challenges in which our ancient ancestors faced (Barkow et al., 1992; Cosmides & Tooby, 1997; Tooby & Cosmides, 2005). A central, recurring idea stemming from the second guiding principle is that again, our brain is designed for the Pleistocene world consisting of small human hunter-gatherer societies which (for all intents and purposes) no longer exists. This can have profound effects on our mind/body wellness in the post-modern, human-dominated, 21st century Anthropocene world (an epoch which was preceded by the Holocene from about 11,500 BC to somewhere around 1950 AD—depending on the source). The third guiding principle of evolutionary psychology considers brain circuitry in the context of consciousness. How does one define "consciousness"? Consciousness in the human (and broadly animal) sense can roughly be understood as a state of awareness of existence and the external environment. For the so-called "higher-order" animals such as our own species, this can additionally be understood as an awareness of self (Squire et al., 2008; Jones, 1999). Evolutionary psychology maintains that what we are conscious or aware of represents just a small part of what actually occurs in the human mind at any given moment—an important idea in modern psychological theories which easily goes back to Freud and his research on the workings of the unconscious mind (Barkow et al., 1992; Buss, 1995; Cosmides & Tooby, 1997).

The fourth principle of evolutionary psychology states that there is *specialization* within the neural circuitry which deals with different adaptive problems (Barkow et al., 1992; Buss, 2020; Cosmides & Tooby, 1997). Examples of functional specialization are quite numerous. A great

example of this "mini-circuitry," which are also referred to as "modules," are the twelve pairs of cranial nerves which deal with a variety of functions, such as our senses (hearing, sight, smell, taste, vision), eye and head movement, and balance (Squire et al., 2008). It should be emphasized that the brain and nervous system are highly integrated and complex, involving both sensory and motor input and output. As indicated, the specialization modules of the fourth principle include inherent and instinctual adaptations such as the senses, which serve as a basis for higher level cognitive functioning, including things that more traditionally have fallen under the categories of learning and rationality (Cosmides & Tooby, 1997; Tooby & Cosmides, 2005). To be clear, the basic system here is found in one form or another throughout the animal kingdom, to which we too in the end are reluctant members.

The last principle of evolutionary psychology states that (as previously described in the "Origins" section), the human brain can be understood to be the product of the "Stone Age," in reference to the tool-making technology of the Pleistocene (and into the Holocene) (Cosmides & Tooby, 1997; Ko, 2016; Tooby & Cosmides, 2005). For the great majority of human history, our species lived in roughly egalitarian hunter-gatherer societies and our brains evolved for this type of existence. Indeed, while our species has been said to exist for approximately some 250,000 years (beginning roughly during the mid-late Pleistocene epoch), the development of agriculture only began to exist about 9500 years ago during a period known as the Neolithic Revolution in the Fertile Crescent (Near East) during the early Holocene (Cosmides & Tooby, 1997; Wilson, 2000). It would take an additional 5000 years for about half of humanity to have transitioned to agriculture and settlement—leaving little doubt for the math that the vast amount of human history (96–98%) has consisted of one particular way of life (Barkow et al., 1992; Cosmides & Tooby, 1997). This context provides a deeper insight into our development as a species over the course of evolutionary time and just how recent human sociological development has changed into something far more grandiose and complex.

There are critics who argue that the fundamental principles of evolutionary psychology are too reductionist in nature—that is to say that the complexities of the human mind and the human condition become overly simplified into little more than a listing of biological functions through this theory. Scientific evidence points to the primacy of nature and evolution as the organizing principles in the development of our species and by virtue, our brains (Bolhuis et al., 2011; Cosmides & Tooby, 1997; Ko, 2016; Wilson, 2000). At the same time, clinicians will often note that *nurture* is also a relevant and powerful force—and this is something that we often see as social work practitioners and as lifelong students of the human condition (Cosmides & Tooby, 1997; Lipton, 2001; Pinker, 2004). Certainly, human beings are shaped by their experiences and this affects the workings of the brain, which has increasingly been demonstrated to possess a remarkable amount of plasticity and functional variation partially in accordance with the environment we are exposed to throughout life itself—a poignant note to consider indeed (Barkow et al., 1992; Lewontin & Levins, 1999).

Application

An overview for social work practice

The previous sections served as a general introduction into the origins and principles of evolutionary psychology. The purpose of presenting this background was to provide a basic primer for the central argument here—which is that evolutionary psychology is relevant for

the social work profession and can benefit the practitioner. So why then has the influence of evolutionary theory been so limited up until this time in social work education and practice? As this section will describe, there does not appear to be only one explanation for this but rather several contributing factors.

The complexities of the human mind and behavior require a multidisciplinary approach toward understanding. In order to have a deeper conceptualization of the mechanisms behind human cognition, emotions, and actions, fundamental knowledge of the human brain is certainly necessary (Barkow et al., 1992; Cabral-Sacadura & Neves-Almeida, 2018; Cosmides & Tooby, 1997; Egan et al., 2013; Montgomery, 2013). Indeed, the comprehension of psychosocial knowledge is arguably limited and incomplete without appreciating the neuroscience and neurobiology which serve as the ultimate causation for our feelings and behaviors and this of course relates back to the profound nature of evolutionary psychology (Buss, 2020; Cabral-Sacadura & Neves-Almeida, 2018; Cosmides & Tooby, 1997). Given the incredible growth in knowledge of brain functionality over the past two decades in particular, numerous allied health and behavioral health professions have moved to integrate aspects of brain science into their curriculums, such as nursing for example (Egan et al., 2013; Shapiro & Applegate, 2000). Interestingly, this has largely not been the case with social work education or practice, even though there is extensive scientific evidence supporting the likes of evolutionary theory and neurobiology as key elements in the biopsychosocial model (Cabral-Sacadura & Neves-Almeida, 2018; Egan et al., 2013; Matto & Strolin-Goltzman, 2010; Shapiro & Applegate, 2000; Yorke & Begère, 2018). To that end, the Council on Social Work Education (CSWE) itself has included aspects of biological development as part of the wider social work curriculum—however, educational integration remains overwhelmingly poor and inconsistent to the detriment of practice, interdisciplinary work, and research alike (Egan et al., 2013; Matto & Strolin-Goltzman, 2010; Montgomery, 2013).

The current literature describing the potential relationship between evolutionary psychology and social work remains markedly thin. In case of the literature reviewed for this paper, only a single article ($n = 1$) focused in on specific social work applications for this theory (Sayre & Walker, 2014). This being said, the available literature does overwhelmingly argue for the integration of elements of evolutionary psychology into social work education and practice for the sake of (1) having a more profound, holistic understanding of our patients and (2) engaging in more effective multidisciplinary work (Cabral-Sacadura & Neves-Almeida, 2018; Egan et al., 2013; Matto & Strolin-Goltzman, 2010; Montgomery, 2013; Sayre & Walker, 2014; Yorke & Begère, 2018). There are numerous domains within the scope of social work practice by which the application of evolutionary psychology can help to offer a greater depth of understanding of our patients, including in terms of the ultimate causation of many forms of psychopathology and behavioral issues within the biopsychosocial framework (Cosmides & Tooby, 1997; McGuire et al., 1992; Montgomery, 2013).

Disorders

Depression

Depression is a highly prevalent, universal disease with about 280 million cases worldwide (occurring in about 4% of the population globally)—it is truly a global condition that has societal and economic implications (Keller & Miller, 2006; Richards, 2011; World Health Organization [WHO], 2021). Depression is of course characterized by an extended period

of low mood (sadness, hopelessness) and this may lead to dysregulation in other areas of life, including normal eating, sleeping, energy, and in severe cases, can lead to suicidal ideation and attempts (American Psychiatric Association, 2022; Bernard, 2018; WHO, 2021). Depression can be situationally based, biologically based, or a blend of these factors (American Psychiatric Association, 2022; Wakefield & Horwitz, 2008; WHO, 2021) It is important to emphasize that there is a symptomatic overlap with, but crucial differences between, the continuum of normal manifestations of sadness (including grief) and depressive disorders—which has been at times a challenge for diagnosticians (Bernard, 2018; Friedman, 2012; Wakefield & Horwitz, 2008). To that end, Bernard (2018) qualifies sadness as an emotion "with an adaptive function," whereas depression is defined as a state "included in the emotional realm which persists in time and renders the subject dysfunctional in its environment" (p. 7). This latter assertion is not universally agreed upon and evolutionary psychologists have proposed alternative hypotheses for the continued existence of depression (Akinola & Berry Mendes, 2008; Gilbert, 2005; Nesse, 2011; Wakefield & Horwitz, 2008).

On depression, Nesse (2011) acknowledges that the evolutionary benefit of having a low mood is a curious phenomenon and examines the deeper question as to why "the capacity for mood exists in the first place" (p. 704). There are evolutionary psychologists who argue for the adaptiveness of major depression, even suicide itself—though this is of course not without controversy (Gilbert, 2005; Nesse, 2011). Wakefield and Horwitz (2008) describe a rather fascinating potential finding about the benefit of struggling with depression, by noting that for those who have suffered from depression, the experience can give the (former) sufferer a good deal of insight as it pertains to life and its meaning (in terms of appreciation, value, etc.)—and this in itself can be understood as an advantage in fitness. In a related point, Wakefield and Horwitz (2008) further note a resilience in those people who have experienced depression. Both of the above insights are thought-provoking considerations for practice and in providing support for our patients.

There also appears to be a relationship between the depressed state and creativity—a distinction that has also been made in certain studies related to bipolar disorder (Akinola & Berry Mendes, 2008; Wakefield & Horwitz, 2008). This idea as discussed by Wakefield and Horwitz (2008) may be interrelated with the changes in perspective after having experienced a depressive episode—and what the implications of surviving this illness holds for meaning itself as described above. These aspects of experiencing depression may also relate to the rather common comorbidity which exists between depression and anxiety (Wakefield & Horwitz, 2008).

Anxiety

Anxiety, which can be basically understood as an increase in worry and fear, is like depression, an extremely common condition that is seen ubiquitously in the practice setting (Baxter et al., 2012). Evolutionary psychology provides a framework for understanding the pathogenesis of anxiety in a distal manner (Bateson et al., 2011; Marks & Nesse, 1994; McGuire et al., 1992; Nesse, 1994). From an evolutionary perspective, anxiety can be basically understood as a means by which organisms defend themselves against perceived threats in the environment (Marks & Nesse, 1994). In the practice setting, social workers often see a spectrum of different anxiety disorders, including general anxiety, panic attacks,

and various types of phobias, among other manifestations of this condition (Brady et al., 2013; Marks & Nesse, 1994).

McGuire et al. (1992) notes that most phobias can be basically categorized as "normal fears that are heightened and occur at exaggerated levels" (p. 91). McGuire et al. (1992) adds that anxiety can be put into an evolutionary context, with its existence framed as a "pre-prepared" (language that seems to describe *instinct*) survival strategy. This notion is rather striking, when one considers common types of triggers (or perceived threats), such as "heights, storms, animals, separation anxiety, and fears of leaving home" (p. 91). Such anxieties can be readily understood to have helped paleolithic humans survive in a wild, dangerous world. While these fears today are considered pathological depending on the degree of symptoms, there remains an important rationale pertaining to safety behind them. In this respect, Nesse (2011) compares the utilitarian (useful) existence of anxiety in general terms to that of sweating, coughing, and pain—referring to these physiological states as evolutionary "regulation mechanisms" (p. 705). In other words, anxiety is a response to environmental conditions—and this has practical considerations for treatment whether through cognitive behavioral therapy, exposure-based therapy, or mixed methodological approaches used to reduce and extinguish symptoms (Bateson et al. 2011; Nesse, 2011).

Psychotic disorders

It is estimated that approximately 1.5-3.5% of people in the United States suffer from a psychotic disorder, which includes schizophrenia, schizoaffective disorder, and schizophreniform disorders, among other types (Calabrese & Al-Khalili, 2022; Keller & Miller, 2006; Moreno-Kustner et al., 2018). This percentage amounts to about 5-10 million individuals. Globally, schizophrenia and related disorders are of a relatively low prevalence as compared to the likes of depression and anxiety—but psychotic disorders bear a disproportionately high economic burden as being (collectively) one of the top 15 causes of disability worldwide (Moreno-Kustner et al., 2018).

Psychotic disorders are not uncommon in practice and broadly speaking, symptoms may include delusional thinking, disorganized speech, auditory and visual hallucinations, poor personal hygiene and self-care, as well as issues with interpersonal relationships in various respects which may affect friends, family, work, etc. (American Psychiatric Association, 2022; Calabrese & Al-Khalili, 2022; Keller & Miller, 2006; Moreno-Kustner et al., 2018). That being said, as highlighted by Kelleher et al. (2010), symptoms typically associated with psychosis, particularly hallucinations, were once regarded as divine and mystical experiences—and this belief persisted well into the 19th century. In other words, the pathological nature of psychotic disorders has only been recognized and identified as being so in the recent past.

Keller and Miller (2006) note that schizophrenia does not appear from an evolutionary point-of-view to assume any type of advantage—and this can arguably be extended to any number of severe mental disorders. When one considers the symptomatology of psychotic disorders, a disproportionately high number of people with these diseases struggle to find sexual partners (if they are seeking them at all) and hence, many are childless (Burns, 2005; Keller & Miller, 2006). It is noteworthy to point out that studies have shown that there is a genetic component to a number of psychotic disorders, with schizophrenia for example appearing to be polygenic in nature and running in families (Ayano, 2016; Burns, 2005; John et al., 2020).

There are different theories which explain the development and existence of serious mental disorders within the framework of evolutionary psychology. The existence of hallucinations in particular has been understood by certain evolutionary psychologists, including Nesse, as a kind of cognitive overload due to the complexities of human sociality and eusociality (Burns, 2005; Kelleher et al., 2010). Kelleher et al. (2010) similarly describe the existence of hallucinations as the evolutionary result of threat detection—in this case a kind of hypervigilance which may result in false positives. In the distant past, psychotic behaviors may have been beneficial for early human populations as a form of hypervigilant predator alarm system—but such an evolutionary trait would not necessarily benefit the population at large (Dodgson & Gordon, 2009; Kelleher et al., 2010).

Antisocial personality disorder

Antisocial personality disorder (ASPD), which is also referred to as sociopathy or psychopathy in particularly severe cases, lies in the Cluster B grouping of personality disorders, which are characterized by dramatic and unpredictable thoughts and actions (Ekselius, 2018; Gabbard, 2014; Murphy & Stich, 2000). ASPD is a condition by which there is a long-term, "pervasive pattern of disregard or a violation of the rights of others, which may include deceitfulness, the violation of social norms, impulsivity, aggressiveness, a reckless disregard for self and others, and an overall lack of remorse with an onset before the age of 15 years," (Gabbard, 2014, p. 1016). The DSM5 further explains that in regards to the above, the age onset is important in terms of severity, as is the adult age of diagnosis (18 years or older—as this is the cutoff between juvenile and adult diagnoses), and the patient being considered must have a minimum of three (3) of the characteristic attributes described above (American Psychiatric Association, 2022; Gabbard, 2014). Sociopathy can then be considered a condition by which the patient is lacking a conscience to one degree or another, is prone to or engaged in criminal behavior, and can indeed cause direct or indirect harm upon others, which of course is detrimental to the society in which the sociopath lives (Black, 2015; Gabbard, 2014; Murphy & Stich, 2000). It is significant to note that the existence of sociopathy is not limited by demographic qualifiers like culture, society, race, and sex (Holzner et al., 2020; Tielbeek et al., 2017). Indeed, ASPD exists across cultures at a consistent prevalence/percentage rate of approximately 4% in early and mid-adulthood with these numbers declining to under 1% in old age as (1) certain symptoms tend to subside later in the life cycle and (2) members of this patient population are generally at high risk for dangerous, life-threatening behaviors earlier in life which can affect overall ASPD numbers (Holzner et al., 2020). For perspective on these statistics, if one considers the current number of people in the United States as 330 million, it can be estimated that there are approximately 13 million people with ASPD in the country at any one time. To that end, it is relevant to note that ASPD is one of the most readily diagnosable and commonly seen of the personality disorder family of illnesses, no doubt in part because of the nature of diagnosis itself (Gabbard, 2014; Murphy & Stich, 2000).

Evolutionary psychology examines why a given psychopathology may exist as a result of natural selection as well as *despite* natural selection (Duntley & Shackelford, 2004; Durisko et al., 2016). To that end, it is important to return to the idea of evolutionary fitness when considering disease etiology. What would be the evolutionary benefit for the development of sociopathy? There has been an idea in biology itself that selfishness, especially in terms of eusocial species, is not biologically beneficial (Dugatkin, 2009; Green, 2009; Wilson, 2000).

From a very basic standpoint, being selfish does not make sense when examining cooperative animal societies, as it is detrimental to the *whole group* to which it belongs (Dugatkin, 2009; Durisko et al., 2016; Wilson, 2000). That being said, behavioral variation exists within all species and this is evolutionarily important unto itself. For example, if environmental conditions were to drastically change and require a proportional shift in behavior with eusocial species, the more selfish (or less social) outliers would be key to long-term survival.

Therefore, in the case of ASPD, we see a kind of alternative survival strategy—one that favors (biologically) selfish behaviors relative to the "norm" and as such, is understood as "abnormal" and "maladaptive" (Duntley & Shackelford, 2004; Durisko et al., 2016). In an article by Durisko et al. (2016), the existence of the ASPD spectrum (i.e., sociopathy, psychopathy) is classified as an "alternating selection," and by this the authors explain that in certain situations and environments, this personality disorder would actually be selectively favorable (with the likes of a lawless, post-apocalyptic society immediately coming to mind). Strikingly, through the prism of evolutionary psychology, this would place the existence of ASPD (with its uniform global distribution pattern) as objectively speaking, effectively a sort of "normal"—albeit as a proportionally small genetic and behavioral variant within our species. This undoubtedly controversial explanation for some connects to a bigger idea in regards to mental illness in general—which is that there is an evolutionary benefit for their existence under certain environmental conditions, a concept that in genetics is referred to as *balancing selection*, in reference to the "good" and "bad" forces present in the variant type and their subsequent net benefits in evolutionary terms (Durisko et al., 2016; Mealey, 1995). This fascinating explanation for the etiology of ASPD and mental illness at large provides an ultimate causation for the evolution of what under the present circumstances is understood as "psychopathology."

There is another evolutionarily significant point to be made about ASPD that is directly linked to the very behaviors that define the condition. To that end, sociopaths are generally uninhibited and promiscuous as compared to the general population. Major studies have led to the conclusion that those with ASPD tend to have children earlier and more of them, which contributes to a kind of evolutionary fitness in part through adaptive learning by being "superficially charming"—a term often used to describe sociopaths (Murphy & Stich, 2000; Tielbeek et al., 2017). Moreover, it is of note that several studies have actually determined a negative association between psychopathy (severe ASPD) and violence against genetic relatives—which has been interpreted to be a kind of nepotism and by extension, a kin survival strategy (Harris et al., 2001; Krupp et al., 2013). This is indeed a fascinating conclusion when considering the diagnostically strong and statistically heightened relationship between antisocial personality disorder and harmful behaviors in general.

Genetic studies have further bolstered the relationship between ASPD and selection. For example, Tielbeek et al. (2017) concluded that antisocial behavior in itself is in fact heritable. Tielbeek et al. (2017) conducted what is known as a *genome-wide association study*—which means that certain variations and traits are associated with specific markers within the genome itself and these can be related back to patients with given disease states. This genomic evidence provides further and rather compelling data for certain clear fitness advantages of the sociopath that might not otherwise be considered from other theoretical points-of-view. Evolutionary psychology is at the crossroads of mental health, natural history, medicine, and genomics.

Behaviors and social phenomena

Obesity

Obesity refers to excessive body fat, with a body mass index (BMI) of over 30 considered to be the marker for the "obese" categorization (World Health Organization [WHO], 2022). For perspective, a BMI of 18.5 to 24.9 is considered to be "normal range," while a BMI of 25–29.9 is classified as "overweight" (CDC, 2022; WHO, 2022). Obesity is a significant global health concern, particularly in industrialized nations including the United States—where over a third of adults are afflicted with this condition (Maner et al., 2017; Wells, 2006). Obesity is multifactorial in nature, and proximal causes for obesity may include diet, physical activity, socioeconomics, as well as endocrine and genetic factors (Gluckman & Hanson, 2008; Wells, 2006; WHO, 2022). Obesity is an important risk factor for a number of diseases, including heart disease, cancer, and stroke (CDC, 2022; Maner et al., 2017; Siervo et al., 2009; Wells, 2006; WHO, 2022). The WHO (2022) notes that today being obese and overweight is more deadly than underweight-related deaths. The prevalence of obesity has increased steadily over the past century, particularly in industrialized nations and today nearly 1.9 billion adults are overweight, of which 650 million people qualify as being obese (WHO, 2022). In the United States, certain projected figures predict that upwards of 85% or more of adults will qualify as being obese by the end of the present decade—with other developing nations closing the gap (Hruby & Hu, 2015). The above statistics all have relevance for clinical practice as being overweight can have both physical and emotional consequences for our patients (Avila et al., 2015; Hruby & Hu, 2015). Concerning mental health specifically, obesity can decrease quality of life and a high comorbidity with mental illness remains, including (but not limited to) binge eating disorder, body image disorders, mood disorders, and self-esteem issues (Avila et al., 2015; Talen & Mann, 2009). Hruby and Hu (2015) furthermore note that obesity is "associated with anatomical as well as functional changes in the human brain," (p. 685).

Evolutionary psychology of course examines obesity in the context of evolutionary fitness. To that end, it is important to note that fat is the major type of long-term energy storage in mammals. The deposition of fat in ultimate terms, serves to protect animals against malnutrition (Bellsari, 2008; Wells, 2006). Thus, fat buildup is a kind of survival strategy in times of food (intake) scarcity and this can be classically seen with mammals prior to entering periods of hibernation, torpor, as well as during pre-migration periods (Dugatkin, 2009; Heldstab et al., 2016; Wilson, 2000). Wells (2006) notes that physiologically speaking, human beings are particularly susceptible to obesity in relationship to other animals. This is particularly fascinating when one considers that human beings originate from the warm savannahs of Africa (Hublin et al., 2015; Wells, 2006). Indeed, as noted by Heldstab et al. (2016), humans are "unusual among non-aquatic mammals (namely the cetaceans) by having a large brain and a relatively high amount of body fat," (p. 25). To that end, from a physiological perspective, the brain itself is a very high-energy organ and uses about 20% of the total energy—and there does appear to be an important evolutionary correlation here (Heldstab et al., 2016).

In addition to the above, there is evidence of what is known as a "fast life history strategy," which argues that certain impulsive behaviors (including those of the sexual nature) early in life can yield a larger number of offspring even though the lifespan of the impulsive individual may be relatively short—as described in the previous section in the

case of ASPD (Caldwell & Sayer, 2019; Maner et al., 2017). Such lifestyle behaviors can also be applied to excessive food consumption, in which the development of obesity in some may relate to experiencing environmental unpredictability—particularly during childhood (Maner et al., 2017). In regards to this proposed strategy, it should be emphasized that the process of evolution is always and *ultimately* a long game—therefore, if an individual life strategy results in a premature death but yields many offspring nonetheless, this individual is still considered successful from a fitness perspective (unlike an individual who produces fewer or no offspring). For the sake of our patients, it is finally important to recognize that there are studies which indicate that the "fast life history strategy" does also appear to bear a relationship with socioeconomic status as well, where there is a negative difference in the accessibility to healthy and less fatty foods for those who are economically depressed (Caldwell & Sayer, 2019; Maner et al., 2017). Research in this domain underlines the importance of the relationship between proximal and ultimate factors while considering the wellbeing of our clients in practice.

Abuse in mixed families

There are in fact evolutionarily-based predictors regarding familial violence and kin—and this is an important consideration in clinical practice. As has been carefully researched, the presence of a non-genetic parent in the home is a major risk factor for child abuse (Archer, 2013; Lightcap et al., 1982). In numerous studies regarding parental violence toward children in blended families, there are higher rates of abuse from perpetrating parents toward their stepchildren as opposed to their own biological offspring (Archer, 2013; Daly & Wilson, 1985, 1988). Generally speaking, the abusers also tend to be the adult males in the home—and this also has significance in evolution and in nature (Archer, 2013; Lightcap et al., 1982).

Roughly parallel behaviors to blended family abuse can be found in nature, in the case of *intraspecies* violence—or a type of aggression occurring between members of the same species (Dugatkin, 2009; Lorenz, 1966; Lukas & Huchard, 2014). The specific type of intraspecific violence in nature which can be considered to be akin to child abuse is infanticide, where this type of killing is seen in the context of rival male mating access competition in many mammalian species (Dugatkin, 2009; Lorenz, 1966; Lukas & Huchard, 2014). This is a sexual strategy which will reduce the fitness of rival males by killing off their offspring. Such acts of violence can subsequently cause hormonal changes in the now childless females, allowing for them to enter into estrus, and hence, provide the opportunity for the rival to mate and pass on their own genes (Dugatkin, 2009; Van Shaik & Kappeler; Lukas & Huchard, 2014). In a comparative analysis conducted by Lukas and Huchard (2014), the researchers interestingly noted that amongst the different social systems of the mammalian species examined in the study, infanticide curiously was determined to occur in (1) social species and those (2) with nonseasonal breeding. Polyandry was determined to be the only successful defense against infanticide—by effectively confusing the group of potential fathers (Lukas & Huchard, 2014). It is noteworthy that in case of the mammalian Order Primata, to which we belong, there often exists a year-round association between adult males and females—which serves to *reduce* the risk of infanticide from happening—and this may also have certain applications to human social situations, such as in blended families (Van Schaik & Kappeler, 1997).

As noted by Daly and Wilson (1988) in a study on familial homicide, evolutionary models further predict that genetic relationship appears to be an important correlation between matters of conflict and conflict resolution in broad terms. The inverse also holds true when looking at biological altruism through the prism of familial support and investment, or engaging in behaviors that generally benefit relatives (Dugatkin, 2009; Rachlin & Jones, 2008; Wilson, 2000). Thus, when understanding the existence of altruistic behaviors in nature, it is generally true that parental investment in the offspring is correlative with the degree of relatedness (Daly & Wilson, 1988; Dugatkin, 2009; McGuire et al., 1992; Wilson, 2000). From a genetic point of view, this is logical when understanding this phenomenon in terms of passing along familial genes—the closer the kinship, the more the genes are shared. The mathematical formula for this can be understood by what is known as "Wright's coefficient of relationship," in which the correlation between genes and relatedness can be calculated (Dugatkin, 2009; Rachlin & Jones, 2008; Wilson, 2000).

Infidelity

Human beings are broadly considered to be a "mildly polygynous" species, where, although monogamy loosely prevails as a mating system, polygamous societies remain prevalent (French et al., 2018; Schacht & Kramer, 2019). French et al. (2018), in this regard reports that ethnographic research indicates that upwards of 82% of *cultures* allow for polygyny, whereas just 1% allow for polyandry. Sex outside of marriage in broad terms is a common occurrence across different cultures and societies (Schacht & Kramer, 2019). This latter behavior includes of course infidelity ("cheating"), which is generally defined as the violation of the sexual and also emotional exclusivity commitment between a couple (Schutzwohl, 2004).

When examining the nature of infidelity from the perspective of evolutionary psychology, it is important to regard the history of mammalian mating systems as well as rearing young, particularly in the case of our own Order. In nature, mammalian males are generally (but not always) more promiscuous than their female counterparts and this has implications when considering reproductive success and evolutionary fitness (Kvarnemo, 2018). In nature, having multiple mates can mean an increase to more resources, paternity dilution (in case of females engaging in polyandry), and more genetically variable offspring—which is vital in terms of evolutionary viability (Kvarnemo, 2018).

In case of primates specifically, Reichard (2018) notes that monogamy is more common among this Order than in other mammalian groups. However, this label is somewhat misleading as monogamy itself in this case can be defined as either (1) solely as a reproductive strategy or as a (2) means to protect against infanticide—and the former definition is rare in Primata (Reichard, 2018). French et al. (2018), broadly categorizes monogamy in primates as belonging to four different domains including (1) pair bonding, (2) mate guarding, (3) emotional attachment, and (4) biparental care—and once again, there is a variation between species. The latter domain listed—the evolution of biparental care has important implications when the evolution of sexual behavior is examined in our own species and how this applies to aspects of culture and cultural "norms" (French et al., 2018; Kvarnemo, 2018).

When considering the differences between the sexes in our own species, *Homo sapiens*, McGuire et al. (1992), notes that males are "are more promiscuous, take more physical risks, and engage in more antisocial behavior," (p. 91). These behaviors have implications for

reproductive success in terms of fitness as such behaviors may correlate with the number of partners he has and the number of offspring produced (recall in this case the "fast life history strategy"). Human mothers have historically been cooperative breeders, and this particular approach to raising offspring is not unique to our species (Dugatkin, 2009; Kramer & Russell, 2015). Such generalized differences between the sexes in terms of mate-seeking and child-rearing practices within our species bears consideration when looking at the phenomenon of infidelity from an evolutionary perspective. Of course, this need not be a crutch or an excuse for unfaithful behaviors, but rather an area of additional insight when working with our patients and clients in this often emotionally difficult arena of life.

Substance abuse

Substance abuse continues to be a serious, pervasive social crisis across American society and beyond. A number of social policies have attempted to curb its existence here in the United States, with limited success—indeed, the so-called "War on Drugs" which was declared in the early 1970s, has been deemed a critical failure (Aanstoos, 1993; Minhee & Calandrillo, 2019). Substance abuse is effectively a catchall term which encompasses many types of drugs, drug intake methods, frequency, and people. Substance use disorders are a serious group of related diseases that yield high social and economic costs, effecting approximately 20 million Americans in 2020 (Substance Abuse and Mental Health Services Administration, 2022). Given the behavioral-based onset that ultimately leads to substance use and abuse (genetic predispositions aside), it has been included in this particular subsection.

Substance use has traditionally been understood through proximal contexts, where the individual psychosocial histories of our patients are the predominant focal point. In this manner, the clinician allies with the client and an attempt is undertaken to carefully map the origins and development of the substance use and abuse (Nesse, 2002). This approach is undoubtedly important in better understanding our patients and how we can best help them. Broader analyses, such as the relationship between societal factors and substance abuse also constitute proximal explanations for substance abuse. Evolutionary psychology on the contrary attempts to explain this phenomenon through ultimate causation, and in so doing, puts the existence of substance abuse into a deeper, more profound context (Chick, 2002; Nesse, 1994, 2002). Indeed, paleontological evidence has shown that not just early humans, but also hominins themselves (our direct evolutionary forbears) ingested psychoactive compounds—chemical altering drugs—as part of their ancient diets (Hall, 2002). Thus, there is a profound evolutionary relationship between humanity and substance use.

Substance use in general serves any number of purposes by attempting to artificially induce an enhanced state of wellness—and this is a fundamental concept (Nesse, 1994; Nesse & Berridge, 1997). The above can be quite simply illustrated by the act of taking an analgesic for a headache, a decongestant for a cold, or even enjoying a cup of coffee to provide a sense of wakefulness. In these basic examples, we see the (1) cause and (2) effect—the basic rationale for *drug use*. The effect here, as noted by Nesse (1994), is both physical as well as emotional. That is to say, if a drug works then the idea is *we feel better*. In this regard, Nesse (1994) rather brilliantly reduces human emotions to fundamentally variations of (1) pleasure and (2) pain. Moreover, Nesse (1994) notes the strong correlation between the former emotional state and evolutionary fitness, stating that experiencing "good food, sex, friendship, having friendships, children, and admiration traditionally are qualities

associated with reproductive advantage" (p. 341). From the evolutionary psychology theoretical framework, psychoactive drug use is effectively a mechanism by which feelings of pleasure can be enhanced in an artificial, short-handed way—and thus, in *certain cases*, drug-seeking behavior can lead to repeated, uncontrolled usage of the given substance (Nesse, 1994; Nesse & Berridge, 1997). Drugs may or may not increase reproductive success, though an altered mental status may in certain instances lead to increased and risky sexual behaviors and reproduction (Hall, 2002).

Nesse (1994) notes that *all* human beings have the capacity to engage in substance abuse and yet, not all of us are substance abusers—this has evolutionary implications. Numerous scientific studies have shown that there are genetic determinants at play when considering major factors for substance use. To that end, certain populations of humans are more susceptible to substance abuse than others. For example, this differential has been studied in East Asian populations in terms of reduced rates of alcoholism, which is apparently due to a difference in a single gene nucleotide (Nesse, 1994).

The examination of the ultimate causation of substance abuse creates an expansive picture that is much greater than individual experience—and even that of an individual species. In this regard, the behaviors that drive substance abuse are intimately involved with receptors in the *limbic* or the "reward system" of the brain, and the associated dopaminergic neurons, serotonergic neurons, and the likes, which can be found across the animal kingdom and throughout hundreds of millions of years of phylogenetic history (Chick, 2002; Nesse & Berridge, 1997).

There is another fascinating point to consider when understanding substance abuse—this time stemming from the evolutionary development of drug toxins in the plant kingdom. Nesse and Berridge (1997) make the analogy of human substance use in general to that of the flower and the bee. Thus, by the plant successfully offering a chemical attractant to an animal, it is effectively afforded with an important evolutionary advantage in terms of reproduction and dispersion. To that end, Nesse and Berridge (1997), use the examples of tobacco, cocaine, and opium poppies—all of which have become widely distributed species precisely due to the result of their psychoactive qualities which are sought after by their human consumers. Such recent insights surrounding the relationship between evolution and substance use bring a greater depth of understanding to addiction studies and treatment. Addiction science does not exist within a bubble but rather within a complex, multivariate system and for the purposes of this paper, this critically includes a vast continuum of phylogenetic time (Chick, 2002).

Racial and ethnic discrimination

Racial and ethnic discrimination exists globally and remains a scourge for humanity and human social progress at large (Cosmides et al., 2003; Jackson, 2017). Modern ideas of race developed considerably during the European Age of Exploration and the subsequent colonial periods in part to justify the growth of global empires, which expanded during the eighteenth and nineteenth centuries by conquering and subjugating peoples (Jackson, 2017; Shields & Bhatia, 2009). Race was then, as it remains today, a fluid construction that varies within societies. To that end, Shields and Bhatia (2009) note that during the latter half of the 19th century, race could refer to a (1) particular nation of people (i.e., the "German race"), (2) people living over a vast region (i.e., "Caucasoid people"), or (3) as an identifier to refer to a given group sharing (or appearing to share) related physical features. Shields and Bhatia (2009) point out that Charles Darwin himself

associated race with this latter definition. At the same time, it is worthwhile to note that Darwin believed that all humanity shared a common evolutionary descent. He did not share the belief held by a number of his contemporaries that different races represented different stages of evolutionary development of the human mind in particular—an idea that widely continued to be espoused by many well into the middle of the last century and still lingers on today in the fringes of 21st century society (Jackson, 2017; Shields & Bhatia, 2009).

Race itself is now known to be a social construct rather than one based upon scientific fact—nonetheless it exists in the minds of human beings and this does have meaning, evolutionarily speaking (Cosmides et al., 2003; Jackson, 2017; Shields & Bhatia, 2009). Cosmides et al. (2003) explain that it was actually through the process of gene sequencing that "folk" theories of race were scientifically refuted as human variation *between* populations of groups considered to be racially homogenous were actually found to be *more diverse* than when comparing differences between the socially constructed races. Moreover, the genetic variation within our species was discovered to be surprisingly limited given the seeming differences in human physical variation. The unexpectedly limited genetic variation between human populations and the lack of identifiable genetic markers for the socially constructed racial groups precisely means that the idea of "race," the human equivalent of the likes of a "subspecies," is not scientifically applicable—as opposed to other forms of life where concrete genetic evidence has become the phylogenetic benchmark for these types of classifications across the kingdoms of life (Cosmides et al., 2003). Nonetheless, it is clear that overwhelming scientific evidence has not changed our human obsession with race. Part of this problem appears to be a type of demographic encoding that occurs with basic human interactions themselves, along with other characteristics, including distinguishing traits such as sex and age—factors that have played an important role in the evolution of the likes of gender and culture (Cosmides et al., 2003; Shields & Bhatia, 2009). These three factors have been determined by some to be the primal interpretations of "person perception"—with the latter characteristics seemingly more practically applicable for the Stone Age brain (Cosmides, 2004; Cosmides et al., 2003). This argument makes sense from a paleo-sociobiological perspective when considering the small bands of ancient humans that existed and their practical need to interpret the world around them in terms of their intraspecific cohorts. Cosmides et al. (2003) rightly note that racial encoding is perhaps a stranger phenomenon on its surface because Pleistocene hunter-gatherer societies would not have needed to distinguish phenotypical "racial differences" of other human bands due to the limited geographical locations of these groups—as paleolithic humans traveled in a rather limited fashion by foot (Cosmides, 2004; Cosmides et al., 2003). For this reason, it has been hypothesized that the seemingly encoded existence of "race perception" can be understood in terms of coalitions and alliance cues—an idea which bares a relationship with the human tendencies for violence and aggression. Cosmides (2004) notes that ethnographically speaking, cues may be linguistic, manner-based, customary, dress-related, or contain other types of badges of ethnicity. In case of societies that are not ethnically integrated, Cosmides (2004) emphasizes that it is shared appearance—broadly defined as "race"—which can correlate with these same cue patterns and thus serve as an interesting marker for coalition. This is a rather intriguing argument when considering the violent history of our species in relationship to what has been perceived as racial differences.

Future challenges and considerations

Social work is not traditionally a profession that has been associated with the hard sciences (Egan et al., 2013; Montgomery, 2013). It is rather a human-centric social science that has incorporated aspects of other fields, including within the social sciences and in the allied health professions. The ability of social work to be an interdisciplinary profession can be considered to be a strength and perhaps a crucial feature in allowing for the likes of evolutionary theory and neuroscience to be effectively assimilated into education and practice—which philosophically falls in line with the standards of the CSWE (Egan et al., 2013; Montgomery, 2013). Practitioners of social work need not be biologists, but by having a fundamental, applicable knowledge of evolutionary psychology and its main component parts (evolutionary theory, neuroscience), there is an exciting opportunity to truly advance the profession.

Conclusion

As described in the outset of this paper, the history linking the integration of evolution and psychological processes is intimately connected and can be found in the seminal works of Darwin and Freud (Buss, 2005; Green, 2009; Marcaggi & Guenole, 2018). During the course of the early 20th century, these fields became more fragmented, self-contained disciplines, only to conceptually reintegrate in a meaningful and widespread way toward the close of the century, as evidenced by the development of evolutionary biology (Barkow et al., 1992; Buss, 1995, 2020). Social work is a profession that is interdisciplinary and resilient and this reality is reflected by the many diverse roles taken on by its practitioners in advocacy, healthcare, private practice, education, and beyond. In all of these cases, the social worker can benefit from understanding both the proximal and ultimate causations of human thought and behavior, the latter of which is only possible through the acquisition of deeper, applicable scientific knowledge that evolutionary psychology provides.

At the same time, it cannot be understated that while evolutionary psychology is a theory that is concerned with ultimate causation, there is the real opportunity for this theory to be more inclusive toward proximal-explaining theoretical constructs, which would be able to more effectively consider causes less distal in the lives of our patients (i.e., allowing for the inclusion of more immediate causation, namely the complexities of individual life experience). The proposed wider parallel inclusion and consideration of proximal theory would also most certainly deny the critics of evolutionary psychology a major area of contention (i.e., reductionism). For example, we can consider the impacts of role theory, systems theory, and/or psychodynamic theory (among many others) as complimentary proximal theoretical frameworks to better understand our patients and clients along with evolutionary psychology—which attempts to explain human psychosocial phenomenon from the perspective of evolutionary processes over the course of many millennia.

It is the hope that this review provided an effective understanding of the theoretical development and virtues of evolutionary psychology for social workers. For clinical social work in particular, evolutionary psychology holds a remarkable promise for deepening the scientific understanding of our patients' thoughts, emotions, behaviors and problems—as well as perhaps our own. Moreover, from a professional point-of-view, there is an enormous opportunity to allow for a greater scientific knowledge base into the proverbial clinical tool

kit—including aspects of evolution, genetics, and neuroscience—areas of study that historically social workers have not been traditionally associated with. That being said, our field is interdisciplinary, dynamic and inclusive, and these noble attributes should serve as the engine by which social work grows its roots and branches intellectually—particularly as the empirical evidence for the likes of evolutionary psychology continues to grow and influence other fields of study, both inside and out of the social sciences (Austad & Nesse, 2020; Cosmides et al., 2003; Egan et al., 2013; Nesse, 2019; Roberts et al., 2012).

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References

Aanstoos, C. M. (1993). Review of Prohibition's second failure: The quest for a rational and humane drug policy. *The Humanistic Psychologist*, *21*(3), 379. https://doi.org/10.1037/h0101466

Akinola, M., & Berry Mendes, W. (2008). The dark side of creativity: Biological vulnerability and negative emotions lead to greater artistic creativity. *Personality & Social Psychology Bulletin*, *34* (12), 1677–1686. https://doi.org/10.1177/0146167208323933

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev ed.). https://doi.org/10.1176/appi.books.9780890425596

Archer, J. (2013). Can evolutionary principles explain patterns of family violence? *Psychological Bulletin*, *139*(2), 403–440. https://doi.org/10.1037/a0029114

Austad, S., & Nesse, R. M. (2020). Good reasons for bad feelings: Insights from the frontier of evolutionary psychiatry. *Evolution, Medicine, and Public Health*, *2020*(1), 28–29. https://doi.org/10.1093/emph/eoaa002

Avila, C., Holloway, A. C., Hahn, M. K., Morrison, K. M., Restivo, M., Anglin, R., & Taylor, V. H. (2015). An overview of links between obesity and mental health. *Health Services and Programs*, *4*(3), 303–310. https://doi.org/10.1007/s13679-015-0164-9

Ayano, G. (2016). Schizophrenia: A concise overview of etiology, epidemiology diagnosis and management: Review of literatures. *The Journal of Schizophrenia Research*, *3*(2), 1–8. https://doi.org/10.15226/2374-6874/3/2/00131

Barkow, J. H., Cosmides, L., & Tooby, J. (1992). *The adapted mind: Evolutionary psychology and the generation of culture*. Oxford University Press.

Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. R., & Patel, N. H. (2007). *Evolution*. Cold Spring Harbor Laboratory Press.

Bateson, M., Brilot, B., & Nettle, D. (2011). Anxiety: An evolutionary approach. *The Canadian Journal of Psychiatry*, *56*(12), 707–715. http://doi.org/10.1177/070674371105601202

Baxter, A. J., Scott, K. M., Vos, T., & Whiteford, H. A. (2012). Global prevalence of anxiety disorders: A systematic review and meta-regression. *Psychological Medicine*, *43*(5), 897–910. https://doi.org/10.1017/S003329171200147X

Bellsari, A. (2008). Evolutionary origins of obesity. *Obesity Reviews*, *9*(2), 165–180. https://doi.org/10.1111/j.1467-789X.2007.00392.x

Bernard, J. E. R. (2018). Depression: A review of its definition. *MOJ Addiction Medicine & Therapy*, *5* (1), 6–7. https://doi.org/10.15406/mojamt.2018.05.00082

Black, D. W. (2015). The natural history of antisocial personality disorder. *The Canadian Journal of Psychiatry*, *60*(7), 309–314. https://doi.org/10.1177/070674371506000703

Bolhuis, J. J., Brown, G. R., Richardson, R. C., & Laland, K. N. (2011). Darwin in mind: New opportunities for evolutionary psychology. *PLoS Biology*, *9*(7). https://doi.org/10.1371/journal.pbio.1001109

Brady, K. T., Haynes, L. F., Hartwell, K. J., & Killeen, T. K. (2013). Substance use disorders and anxiety: A treatment challenge for social workers. *Social Work in Public Health*, *28*(3–4), 407–423. https://doi.org/10.1080/19371918.2013.774675

Brysbaert, M., & Rastle, K. (2009). *Historical and conceptual issues in psychology*. Pearson.

Buller, D. J. (2005). *Adapting minds: Evolutionary psychology and the persistent quest for human nature*. Perseus Publishing.

Burkhardt, R. W., Jr. (2013). Lamarck, evolution, and the inheritance of acquired characters. *Genetics*, *194*(4), 793–805. https://doi.org/10.1534/genetics.113.151852

Burns, J. K. (2005). An evolutionary theory of schizophrenia: Cortical connectivity, metarepresentation, and the social brain. *The Behavioral and Brain Sciences*, *27*(6), 831–855. https://doi.org/10.1017/S0140525X04000196

Buss, D. M. (1995). Evolutionary psychology: A new paradigm for psychological science. *Psychological Inquiry*, *6*(1), 1–30. https://doi.org/10.1207/s15327965pli0601_1

Buss, D. M. (2005). *The handbook of evolutionary psychology*. John Wiley & Sons Inc.

Buss, D. M. (2020). Evolutionary psychology is a scientific revolution. *Evolutionary Behavioral Sciences*, *14*(4), 316–323. https://doi.org/10.1037/ebs0000210

Cabral-Sacadura, J., & Neves-Almeida, H. (2018). Social work and neurosciences: Speeches and theoretical contributions. *European Journal of Social Science Education and Research*, *5*(2), 179–186. https://doi.org/10.26417/ejser.v5i2.p195-202

Calabrese, J., & Al-Khalili, T. (2022, July 21). Psychosis. StatPearls Publishing. Retrieved January 20, 2023, from https://www.ncbi.nlm.nih.gov/books/NBK546579/

Caldwell, A. E., & Sayer, R. D. (2019). Evolutionary considerations on social status, eating behavior, and obesity. *Appetite*, *132*, 238–248. https://doi.org/10.1016/j.appet.2018.07.028

Centers for Disease Control and Prevention. (2022). *Assessing your weight*. Retrieved February 12, 2022, from https://www.cdc.gov/healthyweight/assessing/index.html#:~:text=If%20your%20BMI%20is%20less,falls%20within%20the%20obese%20range .

Chick, J. (2002). Evolutionary psychobiology: Any relevance for therapy? *Addiction*, *97*(4), 473–474. https://doi.org/10.1046/j.1360-0443.2002.t01-2-00086.x

Cosmides, L. (2004). Knowing thyself: The evolutionary psychology of moral reasoning and moral sentiments. *Business, Science, and Ethics*, *4*, 91–127. https://doi.org/10.5840/ruffinx200447

Cosmides, L., & Tooby, J. (1997). *Evolutionary psychology: A primer*. Center for Evolutionary Psychology.

Cosmides, L., Tooby, J., & Kurzban, R. (2003). Perceptions of race. *Trends in Cognitive Sciences*, *7*(4), 173–179. https://doi.org/10.1016/S1364-6613(03)00057-3

Daly, M., & Wilson, M. (1985). Child abuse and other risks of not living with both parents. *Ethology and Sociobiology*, *6*(4), 197–210. https://doi.org/10.1016/0162-3095(85)90012-3

Daly, M., & Wilson, M. (1988). Evolutionary social psychology and family homicide. *Science*, *242*(4878), 519–524. https://doi.org/10.1126/science.3175672

Darwin, C. (1859). *The origin of species by means of natural selection*. John Murray.

Dodgson, G., & Gordon, S. (2009). Avoiding false negatives: Are some auditory hallucinations an evolved design flaw? *Behavioral and Cognitive Psychotherapy*, *37*(3), 325–334. https://doi.org/10.1017/S1352465809005244

Dugatkin, L. A. (2009). *Principles of animal behavior (Second edition)*. W.W. Norton & Co.

Dugger, W. M. (1981). Sociobiology for social scientists: A critical introduction to E.O. *Wilson's Evolutionary Paradigm. Social Science Quarterly*, *62*(2), 221–233.

Duntley, J. D., & Shackelford, T. K. (2004). Towards an evolutionary forensic psychology. *Social Biology*, *51*(3–4), 161–165. https://doi.org/10.1080/19485565.2004.9989092

Durisko, Z., Mulsant, B. H., McKenzie, K., & Andrews, P. W. (2016). Using evolutionary theory to guide mental health research. *The Canadian Journal of Psychiatry*, *61*(3), 159–165. https://doi.org/10.1177/0706743716632517

Egan, M., Neely-Barnes, S. L., & Combs-Orme, T. (2013). Integrating neuroscience knowledge into social work education: A case-based approach. *Journal of Social Work Education*, *47*(2), 269–282. https://doi.org/10.5175/JSWE.2011.200900109

Ekselius, L. (2018). Personality disorder: A disease in disguise. *Upsala Journal of Medical Sciences*, *123*(4), 194–204. https://doi.org/10.1080/03009734.2018.1526235

French, J. A., Cavanaugh, J., Mustoe, A. C., Carp, S. B., & Womack, S. L. (2018). Social monogamy in nonhuman primates: Phylogeny, phenotype, and physiology. *Journal of Sex Research*, *55*(4–5), 410–434. https://doi.org/10.1080/00224499.2017.1339774

Friedman, R. A. (2012). Grief, depression, and the DSM-5. *The New England Journal of Medicine*, *366*(20), 1855–1857. https://doi.org/10.1056/NEJMp1201794

Gabbard, G. O. (2014). *Gabbard's treatments of psychiatric disorders* (5th ed.). American Psychiatric Publishing, Inc.

Gilbert, P. (2005). Evolution and depression: Issues and implications. *Psychological Medicine*, *36*(3), 287–297. https://doi.org/10.1017/S0033291705006112

Gluckman, P. D., & Hanson, M. A. (2008). Developmental and epigenetic pathways to obesity: An evolutionary-developmental perspective. *International Journal of Obesity*, *32*(S7), S62–71. https://doi.org/10.1038/ijo.2008.240

Green, C. D. (2009). Darwinian theory, functionalism, and the first American psychological revolution. *The American Psychologist*, *64*(2), 75–83. https://doi.org/10.1037/a0013338

Hall, W. (2002). Taking Darwin seriously: More than telling just so stories. Evolution and addiction. *Addiction*, *97*, 472. https://doi.org/10.1046/j.1360-0443.2002.t01-1-00086.x

Harris, G. T., Skilling, T. A., & Rice, M. E. (2001). The construct of psychopathy. *Crime Justice*, *28*, 197–264. https://doi.org/10.1086/652211

Heldstab, S. A., van Schaik, C. P., & Isler, K. (2016). Being fat and smart: A comparative analysis of the fat-brain trade-off in mammals. *Journal of Human Evolution*, *100*, 25–34. https://doi.org/10.1016/j.jhevol.2016.09.001

Holzner, K. J., Vaughn, M. G., Loux, T. M., Mancini, M. A., Fearn, N. E., & Wallace, C. L. (2020). Prevalence and correlates of antisocial personality disorder in older adults. *Aging & Mental Health*, *26*(1), 1–10. https://doi.org/10.1080/13607863.2020.1839867

Hruby, A., & Hu, F. B. (2015). The epidemiology of obesity: A big picture. *Pharmacoeconomics*, *33*(7), 673–689. https://doi.org/10.1007/s40273-014-0243-x

Hublin, J. J., Neubauer, S., & Gunz, P. (2015). Brain ontogeny and life history of Pleistocene hominins. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *370*(1663), 20140062. https://doi.org/10.1098/rstb.2014.0062

Jackson, J. P. (2017). Cognitive/evolutionary psychology and the history of racism. *Philosophy of Science*, *84*(2), 296–314. https://doi.org/10.1086/690720

James, W. (1890). *The principles of psychology*. Harvard University Press. Reprinted 1983.

John, J., Bhattacharyya, U., Yadav, N., Kukshal, P., Batia, T., Nimgaonkar, V. L., Deshpande, S. N., & Thelma, B. K. (2020). Multiple rare inherited variants in a four generation schizophrenia family offer leads for complex mode of disease inheritance. *Schizophrenia Research*, *216*, 288–294. https://doi.org/10.1016/j.schres.2019.11.041

Jones, D. (1999). Evolutionary psychology. *Annual Review of Anthropology*, *28*(1), 553–575. https://doi.org/10.1146/annurev.anthro.28.1.553

Kaufman, W. (2013). *The evolutionary ethics of E.O. Wilson*. The New Atlantis. https://www.thenewatlantis.com/publications/the-evolutionary-ethics-of-e-o-wilson

Kelleher, I., Jenner, J., & Cannon, M. (2010). Psychotic symptoms in the general population – An evolutionary perspective. *British Journal of Psychiatry*, *197*(3), 167–169. https://doi.org/10.1192/bjp.bp.109.076018

Keller, M. C., & Miller, G. (2006). Resolving the paradox of common, harmful, heritable mental disorders: Which evolutionary genetic models work best? *The Behavioral and Brain Sciences*, *29*(4), 385–452. https://doi.org/10.1017/S0140525X06009095

Klein, R. G. (2008). Out of Africa and the evolution of human behavior. *Evolutionary Anthropology*, *17*(6), 267–281. https://doi.org/10.1002/evan.20181
Ko, H. K. (2016). Origins of human intelligence: The chain of tool-making and brain evolution. *Anthropological Notebooks*, *22*(1), 5–22.
Kovac, L. (2019). Lamarck and Darwin revisited. *EMBO Reports*, *20*(4), e47922. https://doi.org/10.15252/embr.201947922
Kramer, K. L., & Russell, A. F. (2015). Was monogamy a key step in the hominin road? Reevaluating the monogamy hypothesis in the evolution of cooperative breeding. *Evolutionary Anthropology*, *24*(2), 73–83. https://doi.org/10.1002/evan.21445
Krupp, D. B., Sewall, L. A., Lalumière, M. L., Sheriff, C., & Harris, G. T. (2013). Psychopathy, adaptation, and disorder. *Frontiers in Psychology*, *4*, 139. https://doi.org/10.3389/fpsyg.2013.00139
Kvarnemo, C. (2018). Why do some animals mate with one partner rather than many? A review of causes and consequences of monogamy. *Biological Reviews*, *93*(4), 1795–1812. https://doi.org/10.1111/brv.12421
Lewontin, R., & Levins, R. (1999). Evolutionary psychology. *Capitalism, Nature, Socialism*, *10*(3), 127–130. https://doi.org/10.1080/10455759909358878
Lightcap, J. L., Kurland, J. A., & Burgess, R. L. (1982). Child abuse: A test of some predictions from evolutionary theory. *Ethology and Sociobiology*, *3*(2), 61–67. https://doi.org/10.1016/0162-3095(82)90001-2
Lipton, B. H. (2001). Nature, nurture, and human development. *Journal of Prenatal and Perinatal Psychology and Health*, *16*(2), 167–180.
Lorenz, K. (1966). *On aggression*. Methuen Publishing.
Lukas, D., & Huchard, E. (2014). The evolution of infanticide by males in mammalian societies. *Science*, *346*(6211), 841–844. https://doi.org/10.1126/science.1257226
Maner, J. K., Dittmann, A., Melzer, A. L., & McNulty, J. K. (2017). Implications of life-history strategies for obesity. *PNAS*, *114*(32), 8517–8522. https://doi.org/10.1073/pnas.1620482114
Marcaggi, G., & Guenole, F. (2018). Freudarwin: Evolutionary thinking as a root of psychoanalysis. *Frontiers in Psychology*, *9*, 892. https://doi.org/10.3389/fpsyg.2018.00892
Marcus, G. (2009). How does the mind work? Insights from biology. *Topics in Cognitive Sciences*, *1*(1), 145–172. https://doi.org/10.1111/j.1756-8765.2008.01007.x
Marks, I. M., & Nesse, R. M. (1994). Fear and fitness: An evolutionary analysis of anxiety disorders. *Ethology and Sociobiology*, *15*(5–6), 247–261. https://doi.org/10.1016/0162-3095(94)90002-7
Matto, H., & Strolin-Goltzman, J. (2010). Integrating neuroscience and social work: Innovations for advancing practice-based research. *Social Work*, *55*(2), 147–156. https://doi.org/10.1093/sw/55.2.147
McGuire, M. T., Marks, I., Nesse, R. M., & Troisi, A. (1992). Evolutionary biology: A basic science for psychiatry? *Acta Psychiatrica Scandinavica*, *86*(2), 89–96. https://doi.org/10.1111/j.1600-0447.1992.tb03234.x
Mealey, L. (1995). The sociobiology of sociopathy: An integrated evolutionary model. *The Behavioral and Brain Sciences*, *18*(3), 523–541. https://doi.org/10.1017/S0140525X00039595
Minhee, C., & Calandrillo, S. (2019). The cure for America's opioid crisis: End the war on drugs. *Harvard Journal or Law and Public Policy*, *42*(547), 548–623.
Montgomery, A. (2013). Toward the integration of neuroscience and clinical social work. *Journal of Social Work Practice*, *27*(3), 333–339. https://doi.org/10.1080/02650533.2013.818947
Moreno-Kustner, B., Martin, C., Pastor, L., & McKenna, P. J. (2018). Prevalence of psychotic disorders and its association with methodological issues. A systemic review and meta-analyses. *Plos One*, *13*(4), e0195687. https://doi.org/10.1371/journal.pone.0195687
Murphy, D., & Stich, S. (2000). Darwin in the madhouse: Evolutionary psychology and the classification of mental disorders. P. Carruthers & A. Chamberlain (Eds.), *Evolution and the human mind: Modularity, language and meta-cognition* (pp. 62–92). Cambridge University Press.
Myers, G. (2001). *William James: His life and thought*. Yale University Press.
Nesse, R. M. (1994). An evolutionary perspective on substance abuse. *Ethology and Sociobiology*, *15*(5–6), 339–348. https://doi.org/10.1016/0162-3095(94)90007-8
Nesse, R. M. (2002). Evolution and addiction. *Addiction*, *97*(4), 470–471. https://doi.org/10.1046/j.1360-0443.2002.00086.x

Nesse, R. M. (2011). Why has natural selection left us so vulnerable to anxiety and mood disorders? *The Canadian Journal of Psychiatry*, *56*(12), 705–706. https://doi.org/10.1177/070674371105601201

Nesse, R. M. (2019). *Good reasons for bad feelings: Insights from the frontier of evolutionary psychiatry*. Dutton.

Nesse, R. M., & Berridge, K. C. (1997). Psychoactive drug use in evolutionary perspective. *Science*, *278* (5335), 63–66. https://doi.org/10.1126/science.278.5335.63

Neubauer, S., Hubline, J. J., & Gunz, P. (2018). The evolution of modern human brain shape. *Science Advances*, *4*(1). https://doi.org/10.1126/sciadv.aao5961

Park, S. (2013). Evolutionary explanation of psychopaths. *International Journal of Social Science Studies*, *1*(2), 1–7. https://doi.org/10.11114/ijsss.v1i2.79

Pellegrini, A. D. (2008). The role of development on evolutionary psychology: Tinbergen revisited. *Psychological Inquiry*, *19*(1), 38–40. https://doi.org/10.1080/10478400701774121

Petr, M., Hajdinjak, M., Fu, Q., Essel, E., Rougier, H., Crevecoeur, I., Semal, P., Golovanova, L. V., Doronichev, V. B., Lalueza-Fox, C., de la Rasilla, M., Rosas, A., Shunkov, M. V., Kozlikin, M. B., Derevianko, A. P., Vernot, B., Meyer, M., & Kelso, J. (2020). The evolutionary history of Neanderthal and Denisovan Y chromosomes. *Science*, *369*(6511), 1653–1656. http://doi.org/10.1126/science.abb6460

Pinker, S. (2004). Why nature and nurture won't go away. *Daedalus*, *133*(4), 5–17. https://doi.org/10.1162/0011526042365591

Rachlin, H., & Jones, B. A. (2008). Altruism among relatives and non-relatives. *Behavioral Processes*, *79*(2), 123. https://doi.org/10.1016/j.beproc.2008.06.002

Reichard, U. H. (2018). Monogamy in primates. In M. Trevathan, M. Cartmill, D. Dufour, C. Larsen, D. O'Rourke, K. Rosenberg, & K. Strier (Eds.), *The international encyclopedia of biological anthropology* (pp. 1–3). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118584538

Richards, D. (2011). Prevalence and clinical course of depression: A review. *Clinical Psychology Review*, *31*(7), 1117–1125. https://doi.org/10.1016/j.cpr.2011.07.004

Roberts, C. R., Van Vugt, M., & Dunbar, R. I. M. (2012). Evolutionary psychology in the modern world: Applications, perspectives, and strategies. *Evolutionary Psychology*, *10*(5), 762–769. https://doi.org/10.1177/147470491201000501

Ruse, M. (1975). Charles Darwin's theory of evolution: An analysis. *Journal of the History of Biology*, *8* (2), 219–241.

Sayre, M. M., & Walker, R. (2014). Evolutionary theory and neuroscience: An explanatory theory for social work. *Journal of Human Behavior in the Social Environment*, *24*(8), 966–972. https://doi.org/10.1080/10911359.2014.939799

Schacht, R., & Kramer, K. L. (2019). Are we monogamous? A review of the evolution of pair-bonding in humans and its contemporary variation cross-culturally. *Frontiers in Ecology and Evolution*, *7* (230), 1–10. https://doi.org/10.3389/fevo.2019.00230

Schutzwohl, A. Which infidelity type makes you more jealous? Decision strategies in a forced-choice between sexual and emotional infidelity. (2004). *Evolutionary Psychology*, *2*(1), 121–128. https://doi.org/10.1177/14747049000200118

Scoville, H. (2020). *Introduction to evolutionary psychology*. Thought Co. https://www.thoughtco.com/what-is-evolutionary-psychology-1224501

Semeniuk, I. (2006). Can E.O. Wilson really save the world? *NewScientist*, *191*(2571), 54–56. https://doi.org/10.1016/S0262-4079(06)60617-9

Shapiro, J. R., & Applegate, J. S. (2000). Cognitive neuroscience, neurobiology, and affect regulation: Implications for clinical social work. *Clinical Social Work Journal*, *28*(1), 9–21.

Shields, S. A., & Bhatia, S. (2009). Darwin on race, gender, and culture. *The American Psychologist*, *64* (2), 111–119. https://doi.org/10.1037/a0013502

Siervo, M., Wells, J. C. K., & Cizza, G. (2009). The contribution of psychosocial stress to the obesity epidemic: An evolutionary approach. *Hormone and Metabolic Research*, *41*(4), 261–270. https://doi.org/10.1055/s-0028-1119377

Squire, L., Berg, D., Bloom, F., Du Lac, S., Ghosh, A., & Spitzer, N. (2008). *Fundamentals of neuroscience* (3rd ed.). Academic Press.

Substance Abuse and Mental Health Services Administration. (2022). *Alcohol, tobacco, and other drugs*. http://www.samhsa.gov/find-help/atod

Talen, M. R., & Mann, M. M. (2009). Obesity and mental health. *Primary Care: Clinics and Office Practice*, *36*(2), 287–305. https://doi.org/10.1016/j.pop.2009.01.012

Tattersall, I. (2009). Human origins: Out of Africa. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(38), 16018–16021. https://doi.org/10.1073/pnas.0903207106

Tielbeek, J. J., Johansson, A., Polderman, T. J. C., Rautainent, M. R., Jansenm, P., Taylor, M., Tong, X., Lu, Q., Burt, A. S., Tiemeier, H., Viding, E., Plomin, R., Martin, N. G., Heath, A. C., Madden, P. A. F., Montgomery, G., Beaver, K. M., Waldman, I., Gelernter, J., and Posthuma, D. (2017). Genome-wide association studies of a broad spectrum of anti-social behavior. *JAMA Psychiatry*, *74*(12), 1242–1250. https://doi.org/10.1001/jamapsychiatry.2017.3069

Tinbergen, N. (1951). *The study of instinct*. Clarendon Press/Oxford University Press.

Tooby, J., & Cosmides, L. (2005). Conceptual foundations of evolutionary psychology. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 5–63). John Wiley & Sons, Inc.

Van Schaik, C. P., & Kappeler, P. M. (1997). Infanticide risk and the evolution of male – female association in primates. *Proceedings of the Royal Society, Biology*, *264*(1388), 1687–1694. https://doi.org/10.1098/rspb.1997.0234

Van Vugt, M. (2017). Evolutionary psychology: Theoretical foundations for the study of organizations. *Journal of Evolutionary Design*, *6*(1), 1–16. https://doi.org/10.1186/s41469-017-0019-9

Wakefield, J. C., & Horwitz, A. V. (2008). Noonday demons and midnight sorrows: Biology and meaning in disordered and normal sadness. *Contemporary Psychoanalysis*, *44*(4), 551–569. https://doi.org/10.1080/00107530.2008.10745975

Wells, J. K. (2006). The evolution of human fatness and susceptibility to obesity: An ethological approach. *Biological Reviews*, *81*(2), 183–205. https://doi.org/10.1017/S1464793105006974

Wilson, E. O. (2000). *Sociobiology: The new synthesis, twenty-fifth anniversary edition*. Harvard University Press. https://doi.org/10.2307/j.ctvnrttd

World Health Organization. (2021). *Depression*. Retrieved February 02, 2022, from https://www.who.int/news-room/fact-sheets/detail/depression

World Health Organization. (2022). *Obesity*. Retrieved February 12, from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

Yorke, J., & Begère, T. (2018). Where the rubber hits the road: Neuroscience and social work. *Social Work in Health Care*, *57*(2), 79–94. https://doi.org/10.1080/00981389.2017.1407861