Depression for Surviving Ancestral Hardships

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Abstract: Although researchers have attempted to explain depression as an evolutionary adaptation, those prior attempts have been incomplete at explaining the phenomena and ineffective at providing treatment tools. The discussion provided here attempts to improve the theory and point to effective tools. Depression dims hope and leads to a reduction in most non-essential human behaviors: sexual interest fades, and pleasurable activities can lose their appeal. A clinical diagnosis of depression can persist for weeks, months, and sometimes even years. I theorize that depression evolved due to recurring ancestral hardship situations that involved elevated risks of subsequent starvation and other dangers. Depression evolved to enable humans to survive the social forager's hardships. Depression can be considered a counterpart to the hunger adaptation for long-term survival since nutritional calories were precious and not to be misspent unproductively. Evidence to support this theory of depression is provided based on situations that trigger depression and a general understanding of how hunter-gatherers manage risks individually and cooperatively. This theory may also explain some other puzzling observations associated with depression: the connections among hoarding, depression, infertility, and immunosuppression, why depression occurs in the peripartum period and following the death of a loved one, the anxiety that depressed people often feel, why depression persists for extended periods, and the remarkable physiological similarities between depression in humans and animal hibernation. Recommendations for treating people with depression are to make them healthy, well-fed, productive, and valued by others.

Keywords: Depression; Free-Riding; Hardship; Hoarding; Hunger; Starvation; Infertility; Adaptation

Introduction

Depression is considered one of the most significant causes of disability, with an estimated 300 million sufferers worldwide (Ferrari et al., 2013). The leading adaptive theories of depression currently view it as a mechanism either to make a difficult decision or to send a social signal (Andrews & Thomson, 2009; Hagen, 2003; Nesse, 2000, 2019; Watson & Andrews, 2002). However, these theories do not fully address questions about depression such as the value of months spent in lethargy, the connections to infertility and seasonality, why depression causes hoarding and compulsive shopping, and why depression is almost entirely absent among some populations.

It seems unlikely, at first, that a single adaptation might explain both seasonal and postpartum depression. Still, resource-poor seasons and times of childbirth may represent hardship situations of heightened mortality that caused the evolution of depression as a countermeasure. I propose that human minds evolved a mechanism to sense mortality risk months in advance based on personal and environmental cues and that this mechanism causes depression.

I will: discuss certain anomalies observed in existing depression theories, highlight some historical starvation examples, discuss the theory of emotions as coordination mechanisms (and show how depression may fit into this theory), consider evidence related to common symptoms of depression (such as lethargy, binge-eating, and insomnia), and finally list the kinds of interventions that are likely to succeed in the treatment of depression.

Individuals experiencing starvation are generally lethargic and often exhibit poor mental health due to inadequate nutrition; they also tend to express various forms of depression (Keys, Brožek, Henschel, Mickelsen, & Taylor, 1950; Russell, 2005; Tucker, 2007). Researchers have been impressed by the body's efficiency during starvation situations and have also noticed a beneficial energy conservation function associated with seasonal depression (Davis & Levitan, 2005; Tushnet, 1966). Such efficiency most likely stemmed from survival adaptation tactics during our ancestral past. Our challenge is to examine whether anti-starvation adaptations can also cause depression in non-starved individuals.

The human immune system may be a useful analogy for this prestarvation theory. The immune system has evolved to defend against invasion dangers caused by parasites, viruses, and

bacteria; however, these same adaptations can also result in undesired reactions to pollen, harmless allergens, and even one's own cells, sometimes causing significant harm. Similarly, depression may have once served a critical function before it became the problem that it now is.

Starvation is common among wild animals (McCue, 2012). Human starvation is rare in this time and age, but ancestrally it has contributed significantly to human evolution because reproductive fitness corresponds with longevity (Hill & Hurtado, 1996). Human emotions have been vital in the generation of adaptive behaviors to enhance fitness (Tooby & Cosmides, 1990) and therefore evidence for emotional behavior guarding against starvation and related threats should be easily observable.

Historic Starvation Situations

Analyzing historical examples of starvation may help shed light on the kinds of hardships humans experienced and which may have led to the development of depression. Westward group migrations in the 1800s provide two well-documented and extreme examples of starvation; both examples also include reports of cannibalism (Grayson, 1993; Stewart, 1936). In the winter of 1846–1847, 87 travelers set off to California; however, only 47 survived in an incident known as the Donner Party (Stewart, 1936), where most of the party became trapped in the snowy Sierra Nevada mountain range without food for months. Similarly, in 1856, approximately 500 Mormon travelers known as the Willie Handcart Company were caught in snowstorms with few provisions; sixty-eight members died during this ordeal (Grayson, 1993). Historical starvation examples may offer insights into the relationships between social support, gender, survival, and depression, which will be discussed later in this article.

Hunter-gatherers seem to possess exceptional mental health (Thomas, 2006). This observation has led some researchers to believe that depression is a “disease of modernity” (Hidaka, 2012) due to its increased prevalence among wealthier modern populations. To my knowledge there are no reports in the anthropology literature of active and successful hunter-gatherers who are depressed; a sound theory of depression should provide insights into the reasons for this.

The Puzzle of the Lengthy Duration

Lengthy periods of lethargy, inactivity, loss of interest, emotional pain, and distress characterize depression. The authoritative DSM-5 definition of depression stipulates symptoms for at least two weeks to obtain a clinical diagnosis of depression; however, the typical patient experiences symptoms for months or even years (American Psychiatric Association, 2013). To be considered an adaptation, a behavior usually provides superior benefits over other behaviors available in a given situation. Any potential advantages to the typical symptoms of depression seem mysterious since inactivity does not in itself promote reproductive fitness and because time is valuable to any creature with a lifespan and limited opportunities. Despite the impressive longevity of humans, we also have limited timelines. We have a finite reproductive career that limits our reproductive opportunities. The importance and utility of any mechanism that costs such a considerable amount of time without contributing to reproductive goals should be questioned.

Although depression may appear to be a maladaptive waste of time, most current leading theories state that it is useful for sending a social signal or making a difficult decision, such as when giving up on a goal. When considering such theories, the duration of depression becomes a question worth considering: would it not be advantageous if the adaptation operated more quickly, thereby enabling one to promptly get on with other fitness-related tasks such as foraging, sharing, and reproduction? Purely social theories of depression do not provide much insight into why depression would last so long. Other social emotions, such as anger, gratitude, and respect, are far less time-consuming. For example, it does not take long to make a demand, thank someone, give a gift, or show recognition of an individual's status and importance. If a pure social advantage exists for depression, or if it is for decision making, why must it persist for months and involve such apparent costs? During emotions of fear or disgust, an individual can swiftly decide to avoid an object by giving up on their desire before feeling the fear or disgust. Why would depression need such prolonged periods? It can be adaptive to be cautious and guarded in a dangerous situation; however, requiring extended periods of months to years would not seem to be advantageous against most dangers. The theory provided here may better explain the lengthy duration of depression; the presence of troubling conditions on the horizon means that it can be adaptive to continue to prepare for the hardship indefinitely.

A randomized controlled trial gives more evidence against the prevailing theories of depression. When researchers put a group of depressed adults on a healthier diet, they gave the control group social support. Though both groups saw the incidence of depression decrease, it was the groups on the healthier diets that showed more improvement (Jacka et al., 2017, 2018). That observation does not fit well with either social-signaling or decision-making theories of depression.

The Puzzle of Hoarding

Many hoarders meet clinical depression criteria. While hoarding was once considered a typical symptom of obsessive-compulsive disorder (OCD), the current medical view is that it is a separate disorder that appears to be more closely associated with depression (American Psychiatric Association, 2013). Approximately 2 to 5 percent of the American population are hoarders (Pertusa et al., 2010) and similar to depression, it appears to be more prevalent among females (Nordsletten et al., 2013). There is a significant correlation observed between hoarding and both depression and having a higher body mass index, which can guard against starvation (Frost, Steketee, & Tolin, 2011; Timpano et al., 2020; Tolin, Frost, & Steketee, 2010).

Despite an inability to clean their homes or sustain employment, hoarders can still perform basic tasks such as shopping. They have the energy to add to their hoard with the things they buy, receive, or find daily: whether online, in-store or from what others discard, their shopping is compulsive and independent of their financial status. Hoarders tend to have disorganized and unsanitary homes loaded with items purchased or gathered over the years. In many instances, the clutter extends to every room in the dwelling with possessions often piled haphazardly on the floor or furniture, to the point where even kitchens and bathrooms can become non-functional. Hoarders discard little or nothing at all, not even old newspapers, magazines, rotten food items, and containers; they are attached to their possessions and often refuse to dispose of them even with the aid of family members who are trying to help them.

Like depression, many hoarders report that their hoarding began or intensified after a change in a relationship (such as a death, divorce, or birth of a child) (Tolin, Meunier, Frost, & Steketee, 2010). Hoarders often isolate: they do not allow visitors into their homes. Also, hoarders tend to be unmarried and not in any close relationship (Frost & Gross, 1993). Moreover,

others usually view hoarding as foolish and repulsive. Hoarding, given these social disadvantages, contradicts social theories of depression; it also lends no support for decision-making theories of depression since the decisions made by hoarders appear unwise.

Few theories of depression make any attempt to explain hoarding or compulsive shopping despite the apparent connections between the behaviors. However, hoarding does have obvious utility when preparing for a potential period of hardship and scarcity: stored food (even if rotten) can provide sustenance during periods of hardship since it can either be consumed or utilized to attract animals that can be captured, killed, and eaten. People will consume mostly inedible items such as moldy bread, lamp oil, and leather under starvation conditions. Non-food goods may also be utilized for survival purposes or traded for food or other essential goods. Many birds and mammals also store foods (Sherry, 1985). Most current theories of depression cannot adequately explain these phenomena. An adaptation evolves to provide an individual, specifically their genes, with either survival or reproductive benefits. Since depression causes a reduction in reproduction-related behaviors, its utility must lie in survival. A comprehensive explanation should show how early humans managed ancestral dangers to avoid starvation and other critical threats during difficult times.

Theory of Emotions

After discussing some of the puzzles of depression, the discussion turns to some background theory to help solve these puzzles. Tooby and Cosmides described an evolutionary–psychological theory of emotions as follows:

“Emotions are coordinated systems that organize action appropriate to situations... the operation of human psychological mechanisms are orchestrated by emotions that frame present circumstances in terms of the evolutionary past. For a Darwinian, there is no escaping the past.” (Tooby & Cosmides, 1990)

“The conditions or situations relevant to the emotions are those that (1) recurred ancestrally; (2) could not be negotiated successfully unless there was

a superordinate level of program coordination (i.e., circumstances in which the independent operation of programs caused no conflicts would not have selected for an emotion program, and would lead to emotionally neutral states of mind); (3) had a rich and reliable repeated structure; (4) had recognizable cues signaling their presence; and (5) would have resulted in large fitness costs if an error had occurred... According to this theoretical framework, an emotion is a superordinate program whose function is to direct the activities and interactions of many subprograms, including those governing perception, attention, inference, learning, memory, goal choice, motivational priorities, categorization and conceptual frameworks, physiological reactions (such as heart rate, endocrine function, immune function, gamete release), reflexes, behavioral decision rules, motor systems, communication processes, energy level and effort allocation, affective coloration of events and stimuli, and the recalibration of probability estimates, situation assessments, values, and regulatory variables (e.g., self-esteem, estimations of relative formidability, relative value of alternative goal states, efficacy discount rate); and so on.” (Tooby, Cosmides, Lewis, Haviland-Jones, & Barrett, 2008).

Based on this description, emotions arise when the evolved system detects key situational cues in the present that are similar to those from ancestral environments. Since “the system of psychological adaptations that comprises each individual meets the present only as a version of the past” (Tooby & Cosmides, 1990), when an individual experiences negative emotions without any apparent cause, it may be possible to trace it back to an undesired ancestral situation — such as the condition of being unproductive.

Emotions direct subprograms and organize actions appropriate for specific situations; depression may also fit this definition of emotion as a superordinate program that directs subprograms. The ubiquitous lethargy associated with depression may have evolved to avoid discretionary movement in a safe setting, facilitating bodily energy conservation. Depression tends to last longer than other emotions such as anger, jealousy, or gratitude; nevertheless, the same underlying evolutionary mechanism may have created them all. I will discuss how the

social dynamics of hardship situations may have led to dysphoria, anxiety, and low self-esteem observed among depressed people. During scarcity, inactivity caused by energy conservation can jeopardize the all-important group membership essential to human well-being. First, though, the threat of starvation will be discussed, as researchers may have overlooked it as a potential driver of mood adaptations.

“Field biologists studying all types of animals can testify that death from starvation is not an uncommon event among wild animals. Despite the fact that death from starvation can be a major factor regulating animal populations ecological theorists routinely overlook its biological significance.” (McCue, 2012)

Hunger is an instinct that guards against starvation: it spurs such actions as hunting, gathering, and stealing. Despite being a motivating force, hunger actions may not always be useful in all situations. During droughts and other famines, for instance, food is scarce, and exploration may be fruitless and calorie-wasting. Within a group, individuals deemed unproductive and devalued may be denied food as others may believe it is undeserved; in such situations, it can sometimes be better to stay hungry to avoid conflict. I propose that depression is the passive, conservative counterpart to the active hunger adaptation since calories can be conserved, not just consumed and expended. In this view, appetite and lethargy are critical partners in combating starvation risks and can be considered the primary adaptations for increasing food consumption and decreasing wasteful energy expenditure, respectively.

In recent years, researchers have found other adaptations that also can help guard against undernutrition, such as humans’ ability to automatically recall valued food locations (New, Krasnow, Truxaw, & Gaulin, 2007). Neuroscientists almost named the foundational “seeking system” of the brain as the “foraging system” since its primary function ancestrally appears to be combating undernutrition (Panksepp, 2004). Such adaptations make it clear that hunger is not the only adaptation that evolved to combat starvation. There is no reason to expect that the hunger instinct would not align with an energy-conserving counterpart. If this counterpart is not lethargy and depression, then what is? A recent study found that although depressed patients lose interest in most pleasurable activities —anhedonia—they usually find pleasure and reward in food (Fussner, Mancini, & Luebke, 2017). Such observations further support the belief that

depression may primarily function to prevent potential starvation: pursuing other goals costs calories while consuming food provides calories.

When discussing depression triggers, proximal causes are of interest: the events or situations that seem to trigger depressive episodes. As in any question in biology, insights into causes may be gained by inquiring about the evolutionary cause and determining what recurring problem evolved the adaptation in the first place. Upon understanding the evolutionary cause, the proximal causes can then become apparent. I propose that the evolutionary cause of depression is mortality from personal or group hardship situations. The proximal causes of depression are situations that resemble ancestral ones that tended to precede starvation and related threats, such as droughts. The six main types of such situations will be discussed further in the paper.

Our mood system may have evolved to automatically detect such dangerous situations, track them via internal regulatory variables (Tooby & Cosmides, 2008), and adjust our behavior accordingly. Sensing that drought is approaching is adaptive, for example, since it would provide additional time for foraging in preparation for upcoming lean months. The fact that famine does not occur in most modern environments is irrelevant; as Tooby and Cosmides stated, the ancestral past matters most; the evolved system experiences the present as a version of this past. Avoiding mortality is not an entirely learned behavior; it is not something that one can learn to avoid as there are no second chances for the victim. What complicates matters even further is that humans are a social species and do much more food sharing, even among non-relatives, than other species.

Starvation and the Evolution of Moods

Famines can eliminate families and human clans, occasionally even entire animal species, and thus reshape the gene pool. Researchers observe the power of starvation during famine caused by drought, as when an isolated population of finches exhibited significantly larger beaks in a single generation (Boag, & Grant, 1981) because the large beaks were better at cracking the available seeds. Deadly famines can also eliminate competitors and grant survivors relief from competition for resources, thereby boosting their fitness. Adaptations that guard against starvation threats may have been critical since starvation can have a monumental genetic impact. Animals have evolved several strategies for starvation risk management. Such strategies include

(1) avoiding starvation by migrating to habitats where food is not limiting, (2) storing large amounts of fat in their tissues, (3) adjusting mass and energy allocation among competing tasks, and (4) reducing total energy expenditure” (McCue, 2014). I propose that depression is an automatic selection of the fourth strategy: reducing total energy expenditure while dealing with the associated social consequences.

No animal can simultaneously employ all four starvation risk management strategies: during migration, animals cannot minimize energy expenditure since traveling has energetic costs associated with it. Therefore, a coordination mechanism is needed to ensure that the adaptations are not working against each other, and this coordination mechanism needs to be a long-term mechanism since starvation approaches slowly and steadily over long periods. Switching between strategies each day would be of minimal benefit because of counteracting effects that would cancel out the benefits: for example, it would be more beneficial to choose either migration or reduction of energy expenditure than to try and switch back and forth between both. Though humans do not migrate, ancestral humans were nomadic and frequently traveled in search of food in the wild with the usual result of locating food that would more than compensate for the caloric expenditure. Depression may be, essentially, a long-term commitment to the strategy of reducing energy expenditure instead of foraging for food. As with other substantial behavior changes, however, new collateral risks can arise from such a commitment, as discussed later.

Depression may defend against starvation by detecting the earliest possible precursors to the threats of scarcity, allowing quick and effective engagement to minimize the risk. Once starvation weakens a person, it may be too late to counteract the danger; therefore, it is essential to engage the system before significant weight loss or physical weakening. The mood system may adjust behavior to enhance the ancestral likelihood of survival by conserving calories through lethargy and pregnancy avoidance. Muscle movement is energetically expensive: an athlete burns calories ten times faster when running than when at rest, and even the act of walking will burn calories at three times the rest rate (Ainsworth et al., 2011). Locomotion itself can therefore increase the risk of animal starvation if it does not result in offsetting successes. Just as hunger may help boost caloric input, discretionary movement reductions may help prevent needless caloric expenditure. Such energy conservation strategies are apparent in

lethargy, increased sleep, and increased pain sensitivity: all of these cause a decrease in movement. Energetic behaviors were likely adaptive only when current circumstances were propitious, as in the depression theory proposed by (Nesse, 1990). Under this view, depression evolved since ancestral humans who became depressed at appropriate times had lower mortality rates than those that did not become depressed. Figure 1 shows that the mood system may switch into and out of depression based on whether a hardship or a favorable situation seems to be approaching.

Figure 1: The automatic mood system governs depressed moods. Detecting a hardship situation causes a transition to a depressed mood while detecting a favorable situation causes a transition back to a normal mood.

Naturally, every strategy has trade-offs, and the same behavior that reduces a particular risk may increase another; however, as long as the initial risk is the greater of the two, the behavior can be adaptive. Some of these trade-offs will be discussed later in the paper, but first, I will examine how situations that trigger depression today were related to mortality threats in the past.

Six Types of Prestarvation Situations

The proximal causes for depression observed in modern environments may not initially seem related to material scarcity and starvation; however, close examination reveals that such situations may have increased the odds of subsequent mortality in ancestral environments. When humans lived in small groups of sharing hunter-gatherers, the critical assets protecting against starvation were one's productivity, the productivity of nearby family and friends, and their eagerness to share and provide support when needed. This section will examine some situations that can trigger depression today and how a similar ancestral situation may have risked starvation and related mortality. For brevity, I use the term "prestarvation" to refer to these situations even though other mortal dangers besides starvation also threatened humans during these times. Table 1 provides a summary of these situations.

Table 1: Examination of some current situations that can trigger depression and how this type of ancestral situation may have impacted the risk of starvation and related threats.

Prestarvation Situation	Reasons for Mortality Risk Increase
Illness or injury	Foraging would not be safe or wise because of increased predator and reinjury risk
Resource-poor environment	Unsuccessful foraging is calorically costly
Childbirth	Mother needs calories at a time when foraging is more challenging and less safe for her and her child
Repeated Failures	Unsuccessful foraging is calorically costly
Low social support, status, and valuation	Without reliable support, starvation is more likely; higher risk of complete rejection
Loss of a close family member	Without reliable support, starvation is more likely

Illness or Injury

One trigger for the occurrence of depression is an illness or injury. Depression is common among hospital patients (Katon, 2003). Ancestrally, disability would place one at a greater risk of starvation because of the inability to forage safely. For example, a broken leg will

require as much as six weeks of immobility for healing. Personal productivity is not currently an option, and depression could be adaptive since it would facilitate conserving resources and preventing further injury during the weeks needed for healing. It would have been adaptive to remain in the safest place available, with blankets or perhaps animal pelts, to help stay warm and rely on social support during this time. In this view, minimizing calorie expenditure would increase the chances of recovery during healing.

Resource-Poor Environment

A second proximal cause for depression is a resource-poor environment. In hardship situations such as ancestral droughts, famines, or during annual “hunger months,” the odds of starvation rise due to a lack of food sources in the area. Foraging activities are simply foolish and wasteful if there are no food sources at a given place and time. Depression can thus be adaptive in conserving energy by preventing needless caloric expenditure (Engel, 1962). Eventually, when lands become fertile and food sources become available again, the advantage of depression disappears. Audrey Richards describes a striking contrast in a southern African tribe’s mood and behavior before and after the annual rains:

I have noticed among the Babemba of North-Eastern Rhodesia—a purely agricultural and hunting people-- that the feeling of general excitement and expectancy at the different epochs in the year is very marked. In the months before the rains come the heat is intense. The ground is hard and cannot be worked at all, and the country is blackened by forest fires. Food is beginning to be short, and the people are listless. The older people sleep a large part of the day, and even the children sit in the shade too tired to play. With the first heavy thunder showers this suspense is broken, and the people shout and sing. In a few days they shoulder their hoes and hurry out to dig the newly softened earth. An African spring is an unforgettable experience to the European, who watches a strip of blackened bush burst suddenly, almost in a night-time, into vivid green. But the keen delight of the native and humming activity of his village during the sowing months is perhaps equally impressive. There is, moreover, a real sense of

expectancy and interest in the beginning of tree-cutting preparatory to the making of the new gardens, and in the burning of the piled branches which serve to fertilize the fields, besides the joy in the time of harvest which must be universal among all agricultural peoples. I have been conscious throughout the year of the natives' relief and pleasure as each stage of the work is reached, even though the operations involved in cultivation seemed often dull and arduous in the extreme. (Richards, 1948)

In his words, the difference between severe lethargy and joyful work in this group was simply the rain and the productive activity it enabled. Even in cases where food is sufficient, a resource-poor environment seems to have an impact. Researchers who stay in Antarctica during the six-month winter period are prone to depression (Cravalho, 1996). Seasonality may explain why many people experience depression in the fall or winter, as regions away from the equator enter a less fertile time of year when many organisms go dormant, and little growth occurs outdoors. Seasonal depression is often referred to as seasonal affective disorder, or SAD. The observation that most weight gain occurs at the start of winter (Yanovski et al., 2000) supports this prestarvation theory since these stored calories may represent adaptive weight gain that protected ancestral humans upon entering their worst season of the year. Note that the Donner and Willie Handcart groups' starvation situations both occurred during the winter, as do starvation-related deaths of many wild animals.

Humans prefer fertile landscapes such as those near water. When humans lived as hunter-gatherers, they nomadically moved from one productive place to another. Living in barren regions likely caused ancestral humans to be unsatisfied and depressed since no activity would result in food production. Interacting with nature can alleviate depression (Berman et al., 2012) and this observation supports prestarvation theory since it may have been positive interactions with nature in the form of foraging that defended against starvation and related threats.

Childbirth

From a caloric point of view, a baby is a substantial investment since both mother and child will need considerable amounts of food before childbirth and after. Caloric requirements of the fetus are highest towards the end of gestation; this increased demand for calories continues during lactation. The expectant mother's weight increases rapidly during the second trimester in preparation for this upcoming caloric challenge. Among hunter-gatherers, the high demand for calories places both the mother and the child at an elevated risk of starvation when the mother is less able to forage safely and independently. It would have been adaptive to sense such an increased risk and conserve bodily energy reserves, if possible. The increased incidence of depression around this time may reflect an automatic recognition of such needs; depression may have helped hunter-gatherer mothers to survive these demands.

At six weeks postpartum, a mother experiencing depression is less able to successfully breastfeed her newborns (Hatton et al., 2005), possibly reflecting automatic conservation of the nutrients similar to the passive caloric preservation that occurs with lethargy. From an evolutionary point of view, while the loss of a child would be damaging, the mother's death would be a worse outcome. A mother who survives may subsequently live for many more years and raise other offspring, achieving an overall evolutionary benefit. A mother who dies loses the possibility of future offspring; her existing offspring lose critical support and are also likely to perish. The demand for calories is even higher for multiple-birth pregnancies due to the presence of additional consumers. Correspondingly, the odds of postpartum depression are higher (Choi, Bishai, & Minkovitz, 2009; Fisher & Stocky, 2003; Thorpe, Golding, MacGillivray, & Greenwood, 1991). These observations add to the view that depression is an adaptation for caloric problem situations.

Hunter-gatherer women often select the best hunters as mates. Male contribution to the diet increases reproductive success (Marlowe, 2001), indicating that potential starvation may be part of the evolutionary reason for the mate choices made during a woman's reproductive years. Thus, female mate choice also adds to the viewpoint that undernutrition was a major recurring problem that necessitated many behavioral adaptations.

Repeated Failures

A fourth trigger of depression is repeated failures in the pursuit of goals. When success is elusive, the likelihood of a depressive episode increases. Ancestrally, the occupation of humans was hunting and gathering, also known as foraging. The person who repeatedly fails at foraging is at a higher risk of starving, all other things remaining equal. Hunting often took boldness, skill, stamina, and many years of practice to master, and gathering often involved walking long distances, sometimes in the heat, possibly carrying an infant and supervising young children. Success was often elusive; otherwise, the human population would have grown at a much faster rate than the rates observed, as happened once agriculture became widespread. Foraging was one of our ancestors' riskiest activities: snakes, leopards, or other predators could be deadly, including hostile neighbors. Experiencing a string of failures may have been a vital cue to conserve resources and wait for circumstances to change before trying again; eventually, prospects would improve, new plants would grow, new animals would be born, and competitors may leave or die. Cycles are typical in ecology. Time can be an ally to a struggling forager. It makes sense to forage only when the likely rewards are larger than the risks involved; recent experience is often the best predictor of likely risks and rewards.

Low Social Support, Status, and Valuation

A fifth proximal cause of depression is low social support, status, and valuation. Though less straightforward, this trigger also relates to mortality risk among hunter-gatherers. When undervalued by their peers, an individual will track the situation with low self-esteem and will more likely become depressed (Baumeister & Leary, 1995; Leary, Tambor, Terdal, & Downs, 1995). People who lose a job have higher depression rates, partially due to the unemployed's generally lower social valuation. Low-income people typically suffer depression more frequently than others, partly due to this lower valuation and fewer available resources. Even the act of relocating to a place where people do not yet know or value an individual will place that individual at a greater risk of developing depression.

In ancestral environments, obtaining food often involved considerable risk and effort. Therefore, it was highly adaptive to have a buffer against the risk of starvation and related threats, one that humans provided each other through sharing. Peers who are willing to share

food are an excellent buffer against such threats since the probability of many people failing at foraging on a given day is less than the probability of a single failure. Ethnographers have found that sharing reduces the risk of spending prolonged periods without food (Kaplan et al., 1985). Other people can provide for an individual during times of need; however, not everyone receives this support. People perceived as a burden to others generally receive less food and have lower survival prospects. People of low social status and those unrelated to others in the group were sometimes ignored or shunned.

Evidence from the Hadza tribe of Tanzania suggests that good foragers from both genders prefer to associate with other good foragers and avoid non-producers (Marlowe, 2010). A study of the injuries and illnesses of the Shiwiari forager-horticulturalists revealed that most of the subjects would have died at some point in their lives if others had not brought them food during disease conditions (Sugiyama, 2004). Elizabeth Marshall Thomas spent numerous years with hunter-gatherers in the Kalahari of Africa in the 1950s and described a depressed man who could not hunt and never got married. For years, his widowed sister, his only living relative, supported him with food; after she passed away, the other members of his tribe continued to ignore him and his hunger. Becoming an outcast in his weakened state, unsupported and unable to support himself, he most likely fell victim to a leopard or another predator (Thomas, 2006). This kind of scenario may have been frequent among foragers: during times of scarcity, weak and older people are sometimes rejected or even killed to facilitate the survival of others (Pinker, 2011).

The danger of being expelled as a group member may explain the feelings of worthlessness often reported by people experiencing depression. It can be considered dangerous, and even deadly, to consume food that one did not deserve -- free-riding on others' work. However, highly valued people, such as relatives, would often not be seen as free-riders. Undeserving food consumption could itself have been a dangerous situation that recurred again and again over evolutionary time. Being a worthless individual to the group could be deadly, yet feelings of worthlessness could help guard against going too far into that trap by motivating prosocial behavior and preventing selfish behavior. The vital need to maintain membership within a group may have led to the evolution of social emotions such as guilt and shame that become prominent in depressed people (Kim, Thibodeau, & Jorgensen, 2011). When available,

social support is protective against starvation and other related threats: therefore, it also prevents depression.

Loss of Provider

A last trigger of depression is the loss of a provider, which often occurs when a spouse dies. During bereavement, a person expresses the same symptoms as a depressed person (Sidney Zisook & Kendler, 2007), and romantic breakups can cause similar symptoms. As evidenced through the lyrics of countless love songs, mates usually value each other more highly than other people value them, and this may be seen as a prominent case of the previous trigger. The most reliable food-sharing partners during ancestral environments were often spouses and other close relatives. Families shared food regularly: parents naturally sharing food with their offspring and with each other. A mate was a key food-sharing partner, as both partners often shared a strong interest in supporting offspring. During a breakup or following a spouse's death, the individual loses a close sharing partner, which increases the odds of subsequent starvation. The mood system may sense this situation and adjust automatically, even before any actual undernutrition occurs.

When experiencing a situation of scarcity in life, the surrounding people will significantly impact the odds of a person's survival: being with close family and friends enhances survival chances while being an outsider to the group diminishes these chances. Family and friends are more likely to help and less likely to harm the individual; they may share food, water, and blankets, for example. The Donner Party example illustrates this advantage: members of larger kin groups were better off. For the 25 individuals between 20 and 39 years of age, the average kin group size for survivors was 6.8 but only 2.3 for those who perished (Grayson, 1990). The saying "blood is thicker than water" is applicable in this situation. This critical assistance is likely due to kin selection (Hamilton, 1964), social norms, and the mutualism of close groups.

The difference in support may be most apparent when it is the people, rather than natural causes, that directly cause one's demise: after a shipwreck, when several people become adrift in a lifeboat without food for weeks, they will sometimes resort to cannibalism to assist in their survival (Petrinovich, 2000), and non-kin are often the victims. According to tradition, a lottery

determines the unlucky passenger. However, there are reasons to doubt that this indeed occurs in many cases. Following their rescue, there is no opportunity to ask the “lottery loser” if the lottery was fair, and the survivors have a strong incentive to say that it was. Time and again, it is the outsider who is the first to be sacrificed while friends and family protect their own in such situations (Petrinovich, 2000).

While shipwrecks are too recent to have made a massive impact on human evolution, they still illustrate that some situations are more perilous than others during scarcity conditions. Individuals surrounded by family and friends typically survive at higher rates than those alone, which explains why we naturally spend our free time with family and friends: it makes us feel safer than when we are with strangers. Individuals sense situations where they are not valued and tend to avoid such situations. Ancestral people who were unable to avoid such situations were more likely to become victims of selection, both of the natural and less natural varieties, which therefore made them less likely to leave descendants. Thus, we instinctively desire social support since it provides us with survival advantages; it is a lifeline that keeps us safe and sufficiently fed. In the absence of social support, lethargy and risk-avoidance (two characteristics of depression) can help with food and safety problems. However, these two characteristics of depression are less effective in providing food and safety and may cause others to view someone as a free-rider. From that, we can see why social support is protective against depression: both are defenses against hardship-related mortality; however, social support can make depression unnecessary and is thus the preferred option. Without dependable help from others, depression may have served as a crucial backup role.

Thus far, I have discussed the primary types of situations that can trigger depression and the conditions that likely preceded starvation and related threats in the past. A combination of these situations can lead to depression more often than a single situation since a combination can eliminate an individual’s primary and backup sources of food, resulting in a far more dangerous situation. In my theory, depression has the adaptive purpose of coordinating a sustained defense against starvation and related threats, which may be needed when one cannot produce food or depend on others to provide it. These ancestrally dangerous situations may have caused the adaptation of depression to evolve, and our mood system may have become sensitive to cues of these

prestarvation situations. Though the industrial food system rarely fails to provide food in the modern world, humans may still respond to these ancestral cues for reasons to be discussed later in this article. Now the discussion turns to other supporting evidence.

Infertility

Examining the associations between infertility and depression provides more evidence for this prestarvation theory of depression. A history of depression doubles the chances of a woman's infertility (Lapane et al., 1995). Infertility may seem maladaptive since it lowers the number of offspring, but during ancestral prestarvation situations infertility may have adaptively prolonged a woman's lifespan by keeping calories available for survival instead of investing them in offspring. It is adaptive to reproduce when survival is not in doubt; however, when survival becomes uncertain, it can become more adaptive to avoid reproduction. Depressed women are more likely to miscarry (Nakano et al., 2004; Sugiura-Ogasawara et al., 2002), which may be due to an intuitive perception of a greater risk of maternal starvation following a full-term pregnancy. Offspring generally require abundant food: one study of modern hunter-gatherers estimated that a child needs 10–13 million calories by age 18 (Kaplan, 12/1994). Treatments of depression usually increase fertility (Frederiksen, Farver-Vestergaard, Skovgård, Ingerslev, & Zachariae, 2015), providing additional evidence and support to the theory that depression and some infertility may be adaptations for the same underlying problem. Like starving people, depressed people often lose interest in sexual activity (Keys et al., 1950), likely due to the evolutionary danger of pregnancy in the absence of food security.

Physicians sometimes diagnose infertility and depression as part of polycystic ovarian syndrome (PCOS) (Dokras, Clifton, Futterweit, & Wild, 2011). Many patients with PCOS experience depression, infertility, and additional body hair (hirsutism) (Kahsar-Miller, Nixon, Boots, Go, & Azziz, 2001). I will return to this later.

Gender Differences

Researchers usually find depression to be more prevalent in females than in males (Albert, 2015). The westward migration disasters mentioned earlier can help explain why. Proportionally more males died than females in both examples. In the Donner Party example,

male mortality was 57% compared to female mortality of 29% -- a 2-fold difference. This imbalance parallels mortality rates typically seen during times of severe hardship, when food is scarce for extended periods (such as during famines), the survival odds tend to be worse for men than women (Petrinovich, 2000; Zarulli et al., 2018). When considering everyone in the Willie Handcart Company, the odds of male deaths were triple those of female death. Among individuals older than 40, the odds become a striking 10-to-1 against men (Grayson, 1996).

The method by which women attain such a survival advantage during famines is interesting. Women typically require less food compared to their male counterparts due to their smaller stature (Ogden, Fryar, Carroll, & Flegal, 2004), higher stores of subcutaneous fat (Enzi et al., 1986), and lower metabolic rates (Cunningham, 1980). Although no clear conclusions can be drawn from the association between sex and hardship-related mortality due to the presence of multiple factors, the evidence does show that depression may help protect against the effects of hardship. During states of depression, a person burns fewer calories and takes fewer risks. Women tend to be more prone to depression and experience it sooner during scarcity; this may provide them with a survival advantage over men.

Physiology

Examining the physiology of depression gives more evidence for this prestarvation theory. The physiology of depression closely resembles the physiology of hibernating mammals during the winter months:

“Pre-hibernation in bears and major depression with atypical features are both characterized by fat storage through overeating, oversleeping, and decreased mobility. Hibernation in bears and major depression with melancholic features are characterized by withdrawal from the environment, lack of energy, loss of weight from not eating and burning stored fat, changes in sleep pattern, and the following similar neurobiological findings: reversible subclinical hypothyroidism; increased concentration of serum cortisol; acute phase protein response; low respiratory quotient; oxidative stress response; decreased neurotransmitter levels; and changes in cyclic-adenosine monophosphate-binding activity.” (Tsiouris, 2005)

Hibernation, a type of dormancy, evolved to minimize the food calories needed for survival during resource-poor winter months (McCue, 2012), thereby aiding animals in avoiding starvation. The high degree of correspondence between depression and hibernation suggests that both states may have evolved independently to address the same underlying issue, supporting this prestarvation theory. Sleep tends to occur excessively among depressed people and can be adaptive since it supports energy conservation (Berger & Phillips, 1995). Sleep will be further discussed later. Blankets, clothing, insulation, and warm places can also help protect endotherms such as humans against starvation. A warm body loses fewer calories to thermogenesis (e.g., shivering) to maintain steady body temperature. Animals “insulate against starvation” by saving calories in fat to reduce later starvation risk (McCue, 2012). Although depressed people are generally more sensitive to pain, several studies have found that they tolerate hot items better than usual (Bär et al., 2005), similar to how starving subjects prefer hot soup (Keys et al., 1950). This tolerance and preference for heat may represent an adaptive desire for “warmth” calories, thus providing further support to prestarvation theory.

Returning to the discussion of infertility and PCOS, note that hirsutism is often seen among such cases. This may represent an ancient adaptation, not just a quirk. Ancestrally, this body hair may have helped better insulate from the cold, protecting from potential starvation. The common PCOS symptoms of infertility, weight gain, lethargy and atavistic body hair may have combined to provide a concerted effort against starvation.

Researchers have reported that both starving (Tushnet, 1966) and depressed people (Schleifer et al., 1984; S. Zisook et al., 1994) have suppressed immune systems. Immunosuppression may be another energy-conserving mechanism in these situations. All biological systems involve trade-offs, including the immune system; a less-active immune system conserves calories. An inactive and isolated person is less likely to suffer injury and encounter pathogens than an active risk-taker, thereby requiring less immune system activity, enabling the calorie savings.

The Deadliness of Free-Riding

In a highly social species such as humans, relationships can determine who survives and who perishes. Therefore, the discussion returns to social dynamics in order to consider evidence that may appear contradictory. While depressed people often gain weight, some lose weight instead, which would not protect against starvation. Can the prestarvation theory be considered as accurate if the depressed person's behavior does not seem to address the main risk in every case? Yes, there is still reason to believe it. Survival from scarcity in ancestral environments was not as simple as eating whatever food becomes available; human groups rarely exhibit such behavior. There is also the critical matter of maintaining group membership; if others do not think a person deserves food or a place in the group then that person is not safe. Homicide was not uncommon among hunter-gatherers (Daly & Wilson, 1988), and thieves were often targets of group anger. It would be of minimal benefit for a starving person to steal food or consume food that others allow him or her to take if the result is to be identified as a free-rider (Delton, Cosmides, Guemo, Robertson, & Tooby, 2012; Price, Cosmides, & Tooby, 2002), as this identification would most likely lead to ostracization and potential death (Spillius, 1957). Starvation is not the only risk: rejection by others could quickly prove to be equally bad; in most cases, the consumed food could have gone to another person. Humans find strength in numbers (i.e., in cooperative groups), yet an individual's place in a group is rarely guaranteed; avoiding work will cause an individual to risk expulsion from the group. A person who needs to avoid starvation may eat despite contributing nothing to the group. Others may become resentful or angry if they sense that the consumer is not doing a fair share of the work. Since calories were often precious, anger from others during this time could be deadly. Thus, it may have been more adaptive to humbly avoid eating while in a depressed state to ensure that others were not angered. Subsequently, once normal conditions return, one might continue with everyday foraging without the burden of a damaged reputation. Those that avoided eating while depressed may have been better at maintaining cooperative relationships even when they were not producing food on their own, and it may have even helped inspire pity and aid towards them.

There is a strong correlation between depression and binge eating (Nicholls, Devonport, & Blake, 2016). Binge eating is often done at night, alone, likely due to shame; it may have been adaptive in ancestral environments to hide that kind of eating so that other people do not

become resentful of an individual they may view as free-riding. Binge eating could have therefore helped protect against starvation as one might obtain undeserved calories unnoticed, in support of this prestarvation theory.

Depression is associated with anxiety and the social emotions of guilt and shame (Kim, Thibodeau, & Jorgensen, 2011). Depression renders people less productive -- they have less to offer to others. Depression can help a person survive, but it does not help other people's survival the way foraging does; this may partly explain why depressed people tend to isolate themselves and avoid others. During regular times, humans solved the food security problem socially through sharing. Depression limits sharing and reciprocity and therefore has a substantial negative impact on an individual's social life. Others do not view those pursuing a conservative and lethargic strategy as attractive. Guilt and shame may have functioned during prestarvation situations to prevent individuals not valued by others from appearing overly selfish. Such emotions may have served to help prevent the devaluation (Sznycer et al., 2016), rejection, ostracism, or even murder of depressed people. People with insomnia often also have depression, anxiety, and fears of other people that seem excessive from modern perspectives (Freeman, Pugh, Vorontsova, & Southgate, 2009). Ancestrally, these fears may have been adaptive for this situation of someone who was not contributing to his or her group, who could be at risk of complete rejection.

Researchers have documented a "cheater-detector" mechanism in humans (Cosmides & Tooby, 2015; Delton et al., 2012; Sznycer et al., 2016): it is adaptive to notice when someone is taking more than giving, such as by taking food without contributing to the fitness of others. The cheater-detector is adaptive since exchange partners who detect a cheater will often cut their losses by avoiding, criticizing, or punishing the cheater. Therefore, it may also be adaptive to notice when oneself is taking more than giving: call it a "self-cheating-detector." This detector can help generate adaptive behavior: guilt and shame can limit and hide selfish behavior, thus protecting against complete rejection from the group. Bands of hunter-gatherers are often fluid: groups join together and split apart as the members see fit. Productive people will live and share with those they choose to. Once a cheater-detector mechanism evolves, it is logical that a self-cheating-detector also evolves due to selection against apparent cheaters. The cheater who senses a risk of consequences is better off because he or she may find ways to avoid them.

Researchers have found that people with depression are more interested in social information than others (Hildebrand-Saints & Weary, 1989), and this sensitivity may help avoid severe negative consequences.

People suffering from depression often sleep more than others but sometimes they sleep less; similarly, they often overeat but sometimes eat inadequately. This complexity may be due to the inherent tension between conserving energy and being a valued and contributing group member. Overeating and oversleeping can cause resentment from others. Many other group members will not tolerate endless free-riding during hardship situations if they see it as exploitation. For this reason, depression is more complicated than just starvation avoidance. An unproductive hunter-gatherer was likely to conflict with others.

This conflict with others may explain why depressed people often isolate themselves, as an isolated person is less likely to suffer the punishment of a free-rider. In a highly social species such as humans, there are times when passive energy conservation may be most adaptive when hidden from others; however, in severe cases, conservation may be impossible to hide unless one is completely isolated and unnoticed. It may be better to be alone than to be with others who may be offended or angered by something one eats, says, or does. In ancestral times, losing the goodwill of other people could be deadly. An adaptive course of behavior would chart a middle road and avoid both kinds of failure: starvation on one side and complete rejection on the other.

The combination of depressed people's tendency to isolate themselves and their depression's unattractiveness may be responsible for a dangerous aspect of this condition in modern times. Low social valuation is a trigger for depression since those without support from others are at a higher risk of starvation and other related threats. However, depression itself is fundamentally unattractive since a severely depressed person avoids spending energy in ways that could be beneficial to others. Subjects in an experiment devalued and rejected people who appeared depressed (Gurtman, Martin, & Hintzman, 1990). Therefore, depression and low social valuation may reinforce each other in an unhealthy spiral. It often requires energy and action to redeem oneself to others, and yet a depressed person does not feel that he or she has any willpower to spare, placing them in a trap that is difficult to escape.

Ancestrally, a person likely escaped from this trap if and when he or she could forage again and help support others. In modern environments of abundance, this type of escape is not available since foraging is not a readily available activity for most people, and it provides little value to others since they already have the food they need. Additional ways of being valuable, e.g., employment or volunteering, may seem out of reach to a depressed person. Due to its ancestral importance, foraging offers immediate rewards unlike the rewards of working for a paycheck. Therefore, in modern environments, depression may be a trap that is more difficult to escape since depressed people find it hard to become valuable and valued. This downhill spiral may lengthen the duration of depression during modern times.

Why People Hoard

Our ancestors guarded against scarcity and famine. Pastoralism, the herding of animals, allows food provision when needed; it may be as old as agriculture (Little, 2015). One can view pastoralism as an effective way of storing food for the long term since animals are an enduring source of high-quality food. Though the archaeological record is unclear, it is not hard to imagine nomadic hunter-gatherers switching from a lifestyle in which they follow wild herd animals for hunting to one in which they actively control and protect those same herds. Soon after the adoption of agriculture around 10,000 years ago, housebuilders began adding specialized indoor grain storage rooms (Kuijt & Finlayson, 2009). In *The Mountain People* (Turnbull, 1987), the Ik group reveals a secret cave full of supplies to cope with famines. With this prestarvation theory in mind, hoarding behavior is not a surprising observation among depressed people. I theorize that hoarders are following survival instincts. Humans have a long evolutionary history as foragers: shopping and bringing things home may provide hoarders with relief by keeping anxiety and severe depression away. Hoarders' items provide them with the satisfaction of abundance, a sensation that they will not have to "go without." In effect, hoarders may be avoiding painful feelings through the feeling of productivity that they achieve each day when they bring something of value or potential value home.

The depression adaptation engages when one is neither productive nor valued enough by others. Those are the only two reliable means of provisioning, so when neither seems to be effective, then the individual heads toward disaster. Lethargy can, at least, slow down the

progression by buying some time that may enhance survival. The advantage of compulsive shopping and hoarding over other behaviors is that they can be done on one's own: a person can feel productive even when other people do not value them.

The Puzzle of So Much Food

If this prestarvation theory of depression is correct, then it seems odd that so many people are experiencing depression at a time in history when the actual starvation risk appears to be the lowest it has ever been in most of the world. One might think that starvation does not exist in this age and time. A related question is why people overeat when no starvation risk is evident. However, the past explains the present, and some aspects of modern life do not mesh well with our stone-age brains. It appears that eating does not entirely resolve food security concerns: the mood system looks at cues beyond eating to sense that the current situation may lead to starvation or related mortality.

A hypothesis about recurring situations may explain this. There was occasional food abundance during ancestral times, often during the most fertile season of the year; sometimes, everyone could get as much honey as desired. However, this abundance rarely lasted long, since the good fortune would end, and the harshest part of the year would return. The amount of food available during the best season does not indicate the coming scarcity during the most unfavorable season of the year, not to mention the difficulties that could ensue should illness, injury, or other hardships arise. A full stomach is only one indicator of the odds against starvation. Abundance fluctuates depending on temperature, rainfall, predator and prey populations, chance, and other factors. The more reliable indicator would have been general personal productivity and the supportiveness of others. Being near the peak of one's foraging productivity and having other productive adults nearby who value that individual may have best indicated food security. The mood system likely uses cues for these kinds of situations in choosing which superordinate program to engage. Researchers have noted that food by itself does not entirely satisfy all actions related to human hunger: sufficiently fed people living in poverty regularly exhibit the same moods and behaviors such as impulsivity, irritability, and anxiety that hunger can induce: "within affluent societies the poor experience a substantial burden of hunger, despite obtaining sufficient or excess calories on average" (Nettle, 2017).

Considered by itself, abundant food produced by other people may only modestly convince the mood system of food security.

The fact that food is inexpensive and readily available nowadays may be irrelevant to the mood system; what matters is that food was precious in the past when these adaptations evolved. We live in an unusual time from an evolutionary perspective in which most humans have year-round access to food that is obtainable without physical activity. This change may constitute most of the mismatch that makes modern lifestyles so different from ancestral lifestyles. Given that humans do not obtain food in the same manner encountered in the environment of evolutionary adaptation (Tooby & Cosmides, 1990), perhaps we should not be surprised if the mood system sometimes mistakenly senses dangers that are not present. Therefore, more research is needed to understand modern industrial food systems' full impact on human well-being.

Conclusion

Researchers often describe early humans as hunter-gatherers; however, in a broader sense, they could also be called starvation-battlers since hunting and gathering were not the only survival strategies. Sometimes, the battle took the form of caution and conservation, allowing time for wild foods to grow on their own. Early humans hunted, gathered, shared, and sometimes waited. The theory presented here postulates that depression evolved to enable humans to survive the social forager's hardships. The need to battle potential starvation and related threats has been key to life since its inception, and it has had an enormous impact on the adaptations that have evolved. Indeed, the mood system evolved long before the industrial agriculture food system did. Therefore the mood system remains insensitive to the industrial food system, similar to how the human fear system is surprisingly unaware of the dangers of automobile accidents (New, Cosmides, & Tooby, 2007). Our mood system monitors the types of cues found in small-group hunter-gatherer lifestyles, not the kinds of signals related to desk jobs, money, grocery stores, and the presence of canned foods. The past-present mismatch may be most significant in how we now obtain food.

Other depression theories seldom address aspects such as its association with hoarding, infertility, immunosuppression, insomnia; its similarity to hibernation; and the loss of interest in

sex commonly observed in depression. This prestarvation theory describes fitness advantages from depressive behavior in such cases. The theory states that ancestral starvation and related threats, related to uncertainty about one's productivity and others' supportiveness, could be sensed in advance of any food shortage. Depression evolved as a superordinate program to coordinate a conserving defense against such threats: it is more likely to arise in situations of injury, illness, a resource-poor environment, childbirth, repeated failure, low social valuation, and bereavement since these situations frequently preceded mortal danger ancestrally. Selection preferred careful self-preservation. Therefore, interventions for depression should focus on ways to help people feel healthy, well-nourished, productive, in fertile environments and especially valued, the opposite of what someone in dangerous circumstances of scarcity would have experienced during ancestral times.

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