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## Hominin life history, pathological complexity, and the evolution of anxiety

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doi:10.1017/S0140525X22001923, e79

### Abstract

In order to address why the number of patients suffering from anxiety and depression are seemingly exploding in Western, educated, industrialized, rich, and democratic (WEIRD) countries, it is sensible to look at the evolution of human fearfulness responses. Here, we draw on Veit's *pathological complexity framework* to advance Grossmann's goal of re-characterizing human fearfulness as an adaptive trait.

Grossmann elegantly reviews and synthesizes evidence from a variety of different disciplines to defend what he calls the *fearful ape hypothesis*, that is, the view that the apparently excessive fearfulness traits observed in humans as compared to other great apes should not be seen as pathological, but rather as an old adaptive strategy of our hominid ancestors. What makes it beneficial, however, is not – as one might assume – a greater level of danger experienced by human infants, but rather its effects through enhancing cooperative care and subsequent success in the highly interconnected societies of the human species. Grossmann argues that in early ontogeny, expression of fearfulness can enhance affective attention and caregiving from mothers and others in their proximity, which also leads to increased future cooperation. Rather than just being a maladaptive pathology, enhanced fearfulness should be seen as the outcome of natural selection having led to a design optimum where a risk for anxiety and depression is traded off against the role of fearfulness as an affective foundation for cooperative care in humans.

Here, we aim to strengthen Grossmann's fearful ape hypothesis by placing it in the context of Veit's (2022a, 2022b, 2022c) pathological complexity framework for the evaluation of life-history tradeoffs in evolution and the classification of disorders of consciousness. Pathological complexity refers to the complexity of the fitness challenges faced by an organism. It can be operationalized as the number of parameters and constraints in the Darwinian optimization problem of fitness, studied by modern state-based behavioural and life-history theory. It thus enables us to assess the difficulty faced by different life-history strategies

in the pursuit of fitness maximization. The prefix “pathological” is here not meant to indicate that this complexity is inherently pathological, but rather that it is only within life-history theory that we can distinguish pathological from adaptive traits.

Grossmann has argued that despite the increased risk for anxiety, the social benefits of heightened fearfulness will outweigh this drawback and make the trait one worth having within the types of human society in which we evolved, that is, small, cooperative groups. If he is right, then there will also be a point at which further increases in fearfulness will no longer be beneficial, and instead should be seen as pathological. While it may be common that we (or at least Western, educated, industrialized, rich, and democratic [WEIRD] societies) treat even low levels of fearfulness as maladaptive precursors of anxiety and depression, through this framework we can see that this attribution may be wrong in some settings, while appropriate in others. Grossmann’s hypothesis can assist through pushing the boundaries of what is seen as part of normal human variation and thus help us to better understand and diagnose when and how anxiety occurs as a distinctly pathological state.

One potential application is in understanding differences between the sexes. Previously, we have used the pathological complexity framework to argue that greater self-protection in human females should be seen as an adaptive, rather than pathological, trait that evolved as an optimal life-history strategy for females (Veit & Browning, 2022). This has direct links to Grossmann’s proposal, because it could potentially be used to explain differences in “fearfulness” between human males and females, as its role in infant care could be especially important to mothers.

Nevertheless, despite its initial appeal we think that to advance it further, Grossmann’s hypothesis should be linked to the employment of life-history theory in psychology and anthropology. After all, it is precisely the fact that humans at the age of 2.5 years show more fearfulness than other great apes (Herrmann, Hare, Cissewski, & Tomasello, 2011), that calls for a comparative approach to resolve what Grossmann calls the *human fear paradox*. Like Grossmann, we think that the exploding number of cases of depression and anxiety in WEIRD countries could be because of an evolutionary mismatch. Rather than thinking of these as “flaws” within the individual, it is instead the restructuring of our modern Western individualized societies where these traits are considered pathological. Returning to the idea of a tradeoff between the cooperative benefits of fearfulness and the risks of poor mental health, this will strongly depend on the socioecological context – what is beneficial within one type of social world.

In thinking about these changes in human life histories from small cooperative hunter–gatherer communities towards large-scale societies, it will hardly be surprising that an evolved fearfulness response to novelty could lead to severe cases of depression and anxiety in our modern ever-changing environments. The adaptive pressures have changed such as to now make excessive fear an obstacle to thriving in these environments, and the increase in independent living and concurrent decline in cooperative care shift the balance of the tradeoff. Modern humans in WEIRD societies face vastly different pathological complexity challenges in their life histories than our hominid ancestors. In order to more fully gauge the strength of Grossmann’s proposal, we require a more detailed comparison of hominin life histories, including different great apes, our own ancestors, and cross-cultural studies of modern societies. This would allow a full assessment of the benefits and drawbacks of higher levels of fearfulness in different forms of hominin life; an assessment of the

pathological complexity of these different life histories with regards to the fearfulness trait. While Grossmann has made a good start in drawing from a wide range of literature, future work will have to try to operationalize and measure the adaptive value of fearfulness, which will enable us to make sense of the evolution of anxiety and derive further testable predictions regarding its distribution.


**Financial support.** WV’s research was supported under Australian Research Council’s Discovery Projects funding scheme (project number FL170100160).

**Competing interest.** None.

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## Cooperative care as origins of the “happy ape”?

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doi:10.1017/S0140525X22001832, e80

### Abstract

Grossmann proposes an interesting framework to explain how heightened fearfulness among humans could be evolutionarily adaptive in the context of cooperative care. I would like to propose that cooperative care may also be a potential mechanism promoting *enhanced happiness expression* among humans, shedding light on questions about the scope and boundary of the fearful ape hypothesis.

Grossmann proposes that heightened fearfulness could be evolutionarily adaptive in the context of human cooperative care, which explains why humans display enhanced fearfulness compared to other apes. I would like to propose that the central mechanisms stipulated may also be potentially applied to explain the evolution of *enhanced happiness expression* among humans, which may shed light on questions about the scope and boundary of the framework.

The target article first presents evidence showing that humans are “fearful apes” who display heightened fearfulness compared to chimpanzees. In fact, humans may also experience and display more enhanced happiness than chimpanzees do. Humans are a particularly happy species, evolved to experience positive feelings not only to positive stimuli but also to even neutral stimuli