

Please cite as: Veit, W. & Browning, H. (2022). Hominin Life History, Pathological Complexity, and the Evolution of Anxiety. Preprint.

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# Hominin Life History, Pathological Complexity, and the Evolution of Anxiety

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## Abstract:

In order to address why numbers of patients suffering from anxiety and depression are seemingly exploding in 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 to re-characterize human fearfulness as an adaptive trait.

## Main text:

Grossmann (2022) elegantly reviews and synthesizes evidence from a variety of different disciplines to defend what he calls the *fearful ape hypothesis*, i.e. the view that the apparently excessive human fearfulness traits 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 dangers experienced by human infants, but rather through enhancing cooperative care and success in the highly interconnected societies of the human species. Grossmann argues that in early ontogeny expression of fearfulness can enhance affective attention and care-giving from mothers and others in their proximity, which also leads to increased 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 are 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,b) pathological complexity framework for the evaluation of life-history trade-offs in evolution and disorders of consciousness. Pathological complexity can be operationalized as the number of parameters and constraints in the Darwinian optimization problem, studied by modern state-based behavioral and life-history theory, and enables us to assess the difficulty of different life history strategies in the pursuit of fitness-maximization. The suffix '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.

If Grossmann is right and there is a trade-off here that made the risk for anxiety *worth having*, then we ought to find a point at which further increases in fearfulness should be seen as pathological. After all, even if levels of fearfulness that we or at least Western, Educated, Industrialized, Rich and Democratic (WEIRD) societies currently wrongfully treat as maladaptive precursors of anxiety and depression that doesn't mean that there is no such level at which they would be pathological. Nevertheless, Grossmann's hypothesis may push the boundaries of what is seen as part of normal human variation and help us to better understand and diagnose anxiety as a distinctly pathological state.

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 forthcoming), which has direct links to Grossmann's proposal since his proposal could potentially be used to explain differences in 'fearfulness' between human males and females, since its role in infant-care will be especially important to mothers. Nevertheless, despite its initial appeal we think that Grossmann's hypothesis should be linked to the employment of life history theory in psychology and anthropology to advance it further. After all, it is precisely because 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 numbers of cases in depression and anxiety in WEIRD countries could be due to an evolutionary mismatch. Rather than thinking of these as 'flaws' with the individual, it is the restructuring of our modern Western individualized societies where these traits are considered pathological.

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 changes such as to make excessive fear an obstacle to thriving in these environments, i.e. modern humans in WEIRD societies face vastly different pathological complexity challenges in their life histories than our hominid ancestors. But in order to assess whether Grossmann is right we require a detailed comparison of hominin life histories. What are the benefits and drawbacks of higher levels of fearfulness in chimpanzee or human life? While Grossmann has drawn 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 predictions that can be tested.

**Conflict of interest statement:**

The authors have no conflicts of interest to report.

**Funding Information:**

WV's research was supported under Australian Research Council's Discovery Projects funding scheme (project number FL170100160).

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