

## **Menopause: Adaptation?**

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Menopause is a biological phenomenon which halts the body of its reproductive roles. Across all females in the human species, menopause is inevitable. However, menopause is not exclusive to humans! Orcas, belugas, short-finned pilot whales, and narwhals have all demonstrated post-reproductive lifespans within each of their species (Cousins, class lecture). Considering that menopause only happens across a handful of species, it begs the question: why does it exist?

Many obstacles are tagged along with menopause outside of the cessation of reproduction. For example, individuals with menopause report experiencing issues regarding their mental health, sleep, sex, and even their genitalia (Bülbül et al., 2021). Upon research with sexually active women, menopause was found to negatively affect their sex drives (Bülbül et al., 2021). Additionally, postmenopausal females with employed partners reported less distress than postmenopausal females with unemployed partners (Bülbül et al., 2021). Furthermore, postmenopausal women report higher quality of life when there is more perceived social support (Jalambadani et al., 2020). This suggests that socioeconomic factors may have influence on menopause, which also calls for the need to study menopause across cultures. That being said, I better hope I am employed when that time comes around for my wife!

Menopause, while not exclusive to just humans, stumps evolutionary psychologists of today. There is divide between evolutionary psychologists on the topic of whether or not menopause is an evolutionary adaption in humans. Researchers such as Kristen Hawkes and George C. Williams and W.D. Hamilton agree that menopause is an adaptation. Even though they agree on this basis, there remains a disagreement on the ultimate cause, which led to many

different hypotheses being proposed. To get a full picture of how menopause can be an adaptation, let us dive into the work of these two researchers, respectively.

### **Adaptation**

Kristen Hawkes' research attempts to explore possibilities as to why humans have evolved to continue living after menopause, while other animals have not evolved in such a way (Hawkes et al., 1998). While Hawkes makes sure to note that other primates, such as chimpanzees, also have windows for fertility (reproductive spans) which shut down as the body ages, she distinguishes a characteristic which only humans seem to possess: Postmenopausal lifespans. (Hawkes et al., 1998). Hawkes poses the question: why do humans have such long postmenopausal lifespans in comparison to other species and primates? (Hawkes et al., 1998). In time, "The Grandmother Hypothesis" was dubbed. Through the Grandmother Hypothesis, Hawkes theorized that menopause is an adaption which evolved through the benefits which came along with elderly individuals, specifically grandmothers (Hawkes et al., 1998). Hawkes' notes that grandmothers who chose to stay with their descendants were able to solidify the fitness of those that they care for. For example, grandmothers can pass down knowledge and techniques to their daughters (Hawkes et al., 1998). They can also provide food and other resources to infants, relieving the mother from all sorts of duties (Hawkes et al., 1998). In other words, Hawkes' believes that grandmothers are the backbone to our fitness and survival, so menopause was evolved as a way to ensure this continues happening.

In Hawkes' framework for the Grandmother Hypothesis, she references George C. Williams' contribution to senescence, and how it supports the idea that menopause is an adaption. However, as mentioned above, they differ in how they attribute the ultimate cause of such a phenomenon. While Hawkes believes that menopause became an adaptation as the value

of grandmothers showed itself to be consistently beneficial across evolution, Williams believes that menopause became an adaptation because selection favored the prioritization of early development in children who were already born, rather than investing in new children time and time again (Williams, 1957). It should be noted that Williams' paper which is referenced here does not directly discuss menopause, but rather expands greatly on the concept of aging in relation to natural selection and genes. Through this, Williams establishes the idea that the value of genes are determined by their reproductive contribution and are maximized as early as possible (Williams, 1957). This hypothesis, although attributing a different ultimate cause, was the catalyst to the Grandmother Hypothesis.

### **By-Product**

While some evolutionary psychologists propose that menopause represents an adaptation, other researchers dispute this perspective, offering alternative explanations that do not characterize menopause as a direct product of natural selection.

One perspective challenges the concept of menopause as an adaptation by highlighting that menopause, although observed in some species beyond humans, remains a relatively rare phenomenon across the animal kingdom. This rarity raises questions about whether menopause universally serves as an adaptive trait. The occurrence of post-reproductive lifespans in certain species, such as orcas, belugas, short-finned pilot whales, and narwhals, while exhibiting menopause-like patterns, does not necessarily imply an adaptive evolutionary function for menopause itself (Cousins, class lecture).

Moreover, critics of the adaptationist viewpoint question whether menopause directly enhances inclusive fitness or reproductive success. They argue that some attributes associated with menopause, such as the reported challenges in mental health, sexual well-being, and socio-

economic factors influencing quality of life, suggest that menopause might not be solely shaped by adaptive advantages (Bülbül et al., 2021; Jalambadani et al., 2020).

In opposition to the adaptationist perspective endorsed by Hawkes and Williams, alternative evolutionary theories propose non-adaptive explanations for menopause. While the adaptationist viewpoint supported by Hawkes and Williams emphasizes menopause as an adaptive trait selected for its advantages, opposing perspectives from various researchers highlight the complexity of attributing menopause solely to evolutionary adaptation. These differing viewpoints within evolutionary psychology underscore the need for further interdisciplinary research to unravel the multifaceted nature of menopause and its evolutionary origins.

One hypothesis which goes against the Grandmother Hypothesis by Hawkes is “The Patriarch Hypothesis”. Proposed by Frank Marlowe in 1999, following the widespread inclusion of the Grandmother Hypothesis amongst evolutionary psychologists and biologists alike, the Patriarch Hypothesis is a very direct summary of human evolution and natural selection which claims that menopause is a by-product of an adaptive trait in men (Marlowe, 1999). Essentially, Marlowe boldly claims that postmenopausal women are able to live long post-reproductive lives due to an adaption in men which extended their lifespans. To be more specific, Marlowe hypothesizes that the adaptation which extended lifespans resides in the X chromosome (Marlowe, 1999). Marlowe theorizes that elderly males throughout the course of evolutionary history have possess skills and intellect which further increases their fitness and survival. Thus, Marlowe claims that selection favored those males, and soon the long-lifespan adaptation evolved in the X chromosome, which is shared by both males and females. Marlowe also claims that this gene does not exist in the Y chromosome, as it would violate the basis of the hypothesis

(Marlow, 1999). As for how Marlowe believes menopause happens, he believes it is simply caused by a decrease of egg cells. This hypothesis, evidently, has a foundation of patriarchal ideas. All in all, the Patriarch Hypothesis, proposed by Frank Marlowe, attributes long lifespans to the contribution of males across evolutionary history, in which males typically flourished as they got older in age.

So, Dorothy, while there may not be a definitive answer which I can give you, I hope these hypotheses help you find comfort in what you are experiencing.

### References

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