

Study on the Sexual Attractiveness of Male Beard and Female Long Hair to the Opposite Sex

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Abstract: In contemporary society, men gradually increase their demand for shavers to keep their faces clean. Women also seem to pursue long hair by using a wig or artificial hair integrations. So, this paper will analyze these phenomena by studying the role of male beard and female long hair in mating selection from an evolutionary psychology perspective. This work is largely based on empirical evidence, previous studies, and relevant theories (such as short- and long-term mating strategies, parental investment theory, and good genes theory) to verify the hypotheses and generate the results. Unlike our initial assumptions, the result shows that women prefer men with beards in short-term relationships and men without beards in long-term relationships. The results also indicated that men prefer long-haired women more in long-term relationships while not having any preference for long-haired women in short-term relationships.

Keywords: male beard, female hair, mating strategy

1. Introduction

In modern society, shavers have become a popular product. The global razor market is expected to expand at an annual growth rate of nearly 7% in the next decade and exceed the valuation of 50 billion U.S. dollars in 2031 [1]. Wig and hair growth products have also become commonly used. The international haircare products industry has an annual sale of relevant products of 8.74 billion U.S. dollars in 2019 and is expected to increase at a compound annual growth rate of 4.7% between 2020 and 2027 [2]. It is known that popular beauty products usually help increase self-esteem and positively affect one's image. Therefore, the focus of this work is to explore whether men's beards and women's long hair have the possibility of increasing sexual attractiveness to the opposite sex. To study whether beard and long hair are external traits affecting mating selection between women and men, this work used the methods of combining literature and specific case studies in different regions. The following sections will review the relevant literature on different theories that help explain our hypotheses and support our reasoning.

Mating selection is one of the crucial decisions for sexual reproduction organisms. Sexual selection shapes the evolution of the sexual characteristics of the selected object. This process indicates that the chosen party will continue to keep and enhance their sexual characteristics in line with the interests

of choosers, such as the tail feathers of male peacocks. Within the selected party, male secondary sexual characteristics usually appear in adolescence due to androgen exposure. And facial hair is the most distinctive secondary sexual characteristic among men. Facial hair growth is often regarded as a sign of masculinity because male sex hormone testosterone triggers it. However, human skin is not hairless, and adults have an average of 10,000-20,000 hair follicles on their faces [3, 4] The dermal papillae of male beard hair follicles contain more 5 α reductase activity than the hair at the end of the body [5]. Since testosterone is required to be converted to dihydrotestosterone by 5 α reductase, can conclude that the more beard in a male face represents the more testosterone contained in their body. Testosterone may show the physical health of the males because it has an inhibitory effect on the immune system. Therefore, the apparent sexual dimorphism of facial hair strongly suggests the origin of human sexual selection [6]. As a male feature, male facial hair shapes the continuous evolution of the beard through female choice and male competition.

In evolutionary psychology research, the discussion on the sexual attractiveness of certain physical traits has lasted for many years. Evolutionary psychologists have distinguished the types of male beard and female long hair that people prefer in short-term and long-term mating strategies. Some representatives are good gene theory, parental investment theory, pathogen aversion theory, and negative frequency rate-dependent selection.

1.1. Long-term mating strategy

The design feature for a long-term mating strategy is to keep a stable relationship and increase fertility since both sexes need to invest heavily in the long-duration committed relationship for their offspring. Most mating selections are scrupulous because people need to select good genes to pass them to the descendent. In this way, good qualities such as kindness, intelligence, and good health would be crucial to consider within the long-term mating strategy [7]. Besides, there are some distinctive desires different for the men and women under the long-term mating strategy. Men usually value youth and beauty more because their mates' young age generally cue the high fertility value [7]. More specifically, the younger a woman is, the higher probability for them to produce more offspring.

In contrast, women typically value financial prospects and social status more because those things can bring them better material foundations for a better life and support to their kids [7]. For instance, women who choose their mates carefully tend to prefer a man willing to stay with her for a long time to protect their children. Thus, women and their kids can both enjoy reproductive welfare, including a better material basis (money, food, shelter) to obtain better life and support [8].

1.2. Short-term mating strategy

Between different sexes, they also have different desires to pursue in the short-term mating. Women need to invest their body and energy for nine months to take the consequence of having sex while men only obligate for little or no investment [9]. The short-term mating strategy for men is to have sex with as many women as possible to maximize the reproductive benefits since they are not required to invest too much.

Many people believe women won't pursue short-term mating because of their significant investment in taking the consequence of having sex. They even agree with the views that having as much sex would also bring them the risk of damaging their reputation, lowering the perception of their mate value, and the possibility of experiencing violence [7]. However, women, especially those who already had a partner, will also pursue short-term matings because they can get an increased chance to access resources, such as jewelry, money, free dinner, or clothing [7]. In addition, as Buss stated for short-term extra-pair mating (EPC), pursuing short-term mating for those who already had an affair provides them with the chance to switch to a superior mate [7]. Through dating and knowing

other mates, females can compare the financial prospects, personality, and health conditions for different males and choose the better option. Thus, women's selection for the short-term mating strategy is also conscientious and beneficial for human beings.

1.3. The good gene Hypothesis

The good gene theory is that healthy genes are more attractive because of the genetic advantages to their offspring (enhancing the overall health level, physical attractiveness, and success rate of breeding offspring) [10]. The beard on men's faces is positively correlated with testosterone levels [11]. Bearded male faces show that they have higher resistance to diseases because testosterone is related to the decline of the immune system [12]. In fact, in a study on the inhibitory effect of testosterone on the production of cytokines by human PBMC, researchers found that testosterone may reduce the production of IL-6 by monocytes and indirectly inhibit the production of immunoglobulin by B cells, which harms human immune system [13]. Therefore, more beards mean the male may have better genes to avoid diseases. That is, when women choose a short-term mating strategy in the highest fertility period before and after ovulation, they will choose healthier male partners than ordinary men for getting reproductive and genetic benefits by giving offspring immunity. Thus, during the process for females to look for more male looking men to mate with them, facial hair can enhance women's awareness of male masculinity [14-16] and report a greater probability of mating and reproductive success [17].

1.4. Parental Investment Theory

According to the parental investment theory, women's reproductive resources are limited compared with men (the reproductive period is shorter than men.) For example, women need to endure breast-feeding, which is the most frequent work of raising offspring. It makes it difficult to obtain resources for themselves and their children when taking care of young children. In contrast, men can repeatedly mate in a short time and do not need to provide high-level investment in offspring. Also, they only invest energy in mating as frequently as possible to directly increase the probability of their reproductive success and gene continuity. Thus, men appear to lower their restrictions for having sex only with particular types of women, likely long-haired women, in the short-term mating. From the view of evolutionary psychology, women belong to chooser in humans for offsetting the disproportionate parental investment. Although Weaver & Herold [18] research shows that women can accept casual sex [19], it is found that only 6% of women are willing to accept casual sex with a stranger. When looking for a long-term partner, women do not show a strong preference for men's good genes. On the contrary, they pay more attention to men's social status, ambition, and generosity. Men who own a lot of resources indicate they are able and willing to invest resources for women and their offspring for a long time, including raising offspring together, spending time, and paying money.

1.5. The Pathogen Aversion Hypothesis

From the pathogen aversion theory, the parasitic infection may reduce an individual's ability to signal their quality via ornamentation [20]. Therefore, women tend to choose men with beards because the beard can cue one's ability to resist parasitic infection. In this way, men with beards are preferred by women than ordinary men since they can bring more reproductive and genetic benefits by having less risk of disease and passing high-quality disease-resistant genes to the next generation [14].

1.6. Negative Frequency-Dependent Selection

A woman's preference for a man's beard may depend not only on the beard performance of the male individual but also on whether other male individuals in their environment have a beard [21]. Rare individual beards may mean that the male individual has stronger survivability, so negative frequency dependent selection can be applied [21]. At the same time, it can also help Women avoid mating with familiar individuals and individuals similar to their previous spouses, so as to help increase the genetic diversity of offspring, reduce the risk of infection and improve their viability [21].

1.7. Exoparasite Avoidance Hypothesis

According to Exoparasite Avoidance Hypothesis, humans will take the initiative to stay away from people or animals carrying or potentially carrying parasites and their reproductions and have an aversion to them [22]. This can effectively help humans resist ingestion or exposure to pathogens [23].

The selection pressure from ectoparasites leads to the evolution of human ectoparasite defense behavior. In response to ectoparasites, hairless selection may be an adaptation to reduce the ectoparasite load by reducing the easily hidden habitats of ectoparasites [24]. The advantage of hairlessness may accelerate human sexual selection [26]. Through the study that the contribution of body hair (such as beard) to sexual attraction is affected by the aversion response to epidemic and ectoparasite clues, Prokop speculates that when the risk of ectoparasite infection increases, people without hair (shaved beard) are more sexually attractive [26].

2. Results

2.1. Men with beards are more sexually attractive to women than men with beards in short-term relationships

Men's secondary sexual characteristics are indirectly evolved through women's sexual selection. Beard marks the maturity and masculinity of human men. Women express a highly professional desire for short-term partners which means they will more care about man's secondary sexual characteristics [27]. These desires may represent an adaptation to short-term mating. Women tend to express their desire and appreciation for men with high-quality genes, which helps women obtain higher reproductive benefits, such as high-quality genetic offspring, therefore men with beards are more attractive to women.

Bearded men's faces show higher resistance (Immunity) to diseases because bearded men's faces mean they have higher levels of testosterone. Testosterone have a negative impact on the immune system during the process of individual development, however, broken immune system may be an expensive secondary sex sign that shows the health level of males [28]. So females will prefer Bearded men's faces and expect higher levels of testosterone that are carried by these men will pass down to next generations.

The "sexy son hypothesis" indicates that women have evolved a preference for men with good genetic phenotypic indicators [29]. According to this hypothesis, women prefer bearded men in seeking short-term relationships. Because if women give birth to offspring through mating with bearded men, their offspring will carry high quality genes and more likely to be selected by the opposite sex as sexual partners and pass on the mother's genes. Therefore, Kenrick and colleagues' [30] research results showed that when women consider one-nightstands rather than stable mating relationships, they show expectations for their partner's growing a beard.

2.2. Men without beards are more sexually attractive to women than men with beards in long-term relationships.

When looking for long-term sexual partners, research shows that women pay more attention to men's long-term supply ability and kind and generous character, which shows that he is able and willing to provide resources for women and children [31].

Bearded reflects high testosterone levels in human men [32], testosterone level tendencies may affect men's mating strategies. Research shows that men who only want to have children with their current partners have lower testosterone levels, while men with higher testosterone levels tend to have more sexual partners, they are more interested in short-term sexual relationships and divorce more frequently [33]. According to the parental investment theory, females tend to invest more resources in their offspring than males, so women will be more cautious in choosing mates who devote resources to their offspring because if women choose unfaithful men in long-term mating relationships, they will have to raise their offspring alone at great cost and stress.

Men may show a preference for their beard, which can be used for Intrasexual competition [34]. Having a beard means men have higher testosterone levels and stronger physical immune system function, which makes bearded men more sexually attractive in short-term mating strategies. However, men who think they are sexually attractive are more likely to adopt short-term sexual mating strategies than other men. In fact, when men have the opportunity to pursue short-term mating strategies, they tend to do so because their mate value and physical attractiveness are high [31]. This is because men have low reproductive costs (it takes far less nutrients to produce the same number of sperm than to produce eggs), so men are more likely to abandon partners in long-term mating relationships or mate with multiple women at once to maximize the number of male's offspring. So, men with beards have a lower long-term sexual attraction to women than men without beards.

Therefore, the literature analyses of hypotheses 1 and 2 shows that women prefer men with beards when having short-term sexual relations with men while preferring men without beards when maintaining long-term sexual relations with men. This result denies our hypothesis 1 but verifies our hypothesis 2.

2.3. Females with long hair are not more sexually attractive to males than those with short hair in the short-term relationships

From Triver's theory of parental investment [9], parental investment is human investment such as time, money and mental consumption after the offspring is born, which reduces the ability to produce or invest in other offspring. Women usually take on more parental responsibilities than men since they need to endure the pregnancy for nine months and follow-up breast-feeding. Since this is the case, the sex investing less in offspring need to face more competition to find a mate [35]. Although it is commonly accepted that men would prefer more attractive women to have sex with, the reality shows that men discriminate less to find short-term mates. Since they do not have the option to select certain attractive women among the vast number of competitors, men tend to lower their expectations for their short-term mates. Thus, men do not prefer long-haired women more for short-term mating. In addition, males' mate preferences are also less selective or discriminating primarily in the context of short-term mating [26]. As sexual strategies theory, which is extended based on Trivers' parental investment theory by Buss and Schmitt, mentioned men's desire for casual sex is expected to be greater since there is little or no investment for them. Men also require less consent before sexual intercourse. This phenomenon can be explained because they are lesser responsible for having sex and short-term relationships than women since they are not the ones who would get pregnant. Thus, it makes sense that they are inclined to maximize the number of low-cost short-term mating than women [31]. What's more, in R. D. Clark and Hatfield's experiment in 1989 [36], approximately 75%

of men agree to have sex with someone they have been introduced not long ago. Even in the 20 years after replicated studies, 59% of single men still agreed to the proposition that “Would you go to bed with me?” Suppose most men accept the random sex invitation. In that case, it means that they do not have specific preferences for women to have short-term mating.

In general, males do not have demanding requirements for their short-term mates. They just want to maximize their reproductive benefits by finding multiple partners and saving more time before consenting to sex [35]. Thus, women with short hair are not excluded from being a potential short-term mate for men even though long hair is one characteristic increasing female attractiveness.

2.4. Females with long hair are more sexually attractive to males than those with short hair in the long-term relationships

According to heterosexual marriages, females with long hair are more sexually attractive, so males tend to choose long-haired women as their partners. This phenomenon is due to different reasons. Women with long hair are more visually lovely, mature and sexy, all regarded as signs of femininity. From an evolutionary perspective, “males will marry and mate with females with higher attractiveness (such as long hair). Male may have evolved to have a strong desire for at least a moderate level of physical attractiveness in order to have a reasonable probability of fertility.” [37]. “A female ancestor who is considered to be moderately attractive is likely to be able to reproduce” [39]. Therefore, to marry a woman and form a long-term partner, men will choose visually appealing women, such as long hair. “The one crucial point is that men are expected to desire physical features indicative of a woman’s relatively young age (e.g., long hair, full lips, clear and glowing skin, clear and wide eyes, small chin, lustrous and neotenous face, good muscle tone; [38]). One source of evidence for evaluating these hypothesized preferences comes from self-report surveys that ask men and women to rate, rank, or nominate what they prefer in long-term mates. In 1986, Buss and Barnes found that men ranked physical attractiveness as more important in long-term mating than women ($d = 0.92$). Feingold conducted a meta-analysis of self-reported mate preferences surveys and confirmed that men prefer physical attractiveness in potential long-term mates more than women do (overall $d = 0.54$) [39]. Since numerous studies have replicated these basic sex differences in long-term mate preference for physical attractiveness [28, 40, 31, 41]. Buss [39] surveyed long-term mate preferences across 37 cultures and found men prefer younger women as long-term mates in 100% of cultures. Men preferred “good looks” in potential long-term mates more than women did across 34 of 37 cultures [1993].”

In addition, studies have shown that men will choose the opposite sex younger than themselves as long-term partners. [42] suggested that 25-year-old men are more willing to marry women four years younger than themselves. The minimum acceptable age is 20 and the maximum acceptable age is 30. A 25-year-old woman will marry a 25-35-year-old man. However, by the age of 65, a man will marry a woman between 50 and 60. Similarly, a survey of 21,245 singles between 18 and 65 years old (the average age is 31 years) found that men value physical attractiveness and relatively young age more than women.

The results of this series of surveys indicate that men choose younger partners in order to reproduce offspring. Therefore, men do not only want heterosexual partners who are younger than them. At the same time, they also wish for a heterosexual with high fertility. Combined with the previous reason, long hair is the starting point for men to judge whether a woman is young and then enter a deep relationship. More young women tend to wear long hair or wigs to make themselves look more feminine because women in this period (unmarried) pay more attention to their appearance and pay more attention to the length, luster or hair colour. On the contrary, middle-aged and older women tend to have short hair because they focus their lives on family and career. For example, some middle-aged women will have short hair because of heavy housework to comb their hair more quickly. The

same is true for business-oriented middle-aged women. They tend to devote more time to work. Therefore, this also proves that men will first choose long-haired women on the premise that they confirm that the opposite sex is indeed at the peak of fertility.

Most women choose to use long hair to optimize their facial shape. Because for men, there is a golden triangle relationship between women's age, fertility and mate value, and women's reproductive ability declines sharply with age. Hence men prefer women's young physical characteristics. Men will choose female young or immature facial features or good facial proportions. Especially the thin chin, small nose, big eyes, and big and full lips [38]. However, not all women are born with such excellent facial proportions. Thus, their long hair can help them perfectly modify facial contours and other shortcomings of facial features. Especially for women with square and round faces, long hair can help modify facial contours.

Hair density shows effects on age, health, and sexual attractiveness. [49] found that men prefer women's long and thick hair to provide a larger surface for the distribution of sex pheromone produced in the apocrine glands. The Faculty of Biology and Psychology did an experiment to investigate the attractiveness of virtual hair with different ages, health, and hair density of people through applying four density levels to hair models. Hair density shows inter-individual variation due to natural and clinical conditions (e.g., female pattern hair loss [43]), decreasing with age. Robbins et al. [44] report that hair density alone peaks in the late 20ies, before it begins to steadily fall beyond age 30 years [44]. They created a full set of individual 40 hair models. Hair density had a strong effect on attractiveness perception following the pattern reported for age and health perceptions, i.e., original (100%) density was perceived as most attractive and 40% density as least attractive (40% vs other density levels, all $p < 0.001$; 60% vs 100%, $p < 0.01$). So that the younger the women, the denser their hair, which makes them more popular in long-term relationships.

In summary, the literature analysis did contradict our original hypothesis 3 that women with long hair have greater sexual attractiveness to men for short-term mating. However, our old hypothesis 4 is supported by previous research, which shows that men prefer long-haired women in long-term relationships.

3. Discussion

The research value of hypothesis 1 is to explore whether women prefer men with beards under short-term sexual partner selection strategies and to prove whether women pay more attention to the good immune system and high-quality inheritance transmitted by sexual partners through sexual dimorphism of beards. According to The Ovulatory Shift Hypothesis, female preference for male characteristics is strongest around ovulation in the menstrual cycle [45]. Women of childbearing age showed a stronger preference for male characteristics when considering short-term sexual relationships. Although most evidences prove that hypothesis 1 is wrong, according to the ectoparasite avoidance hypothesis, male hair may also provide ideal conditions for the proliferation and transmission of ectoparasites and cause heterosexual pathogen aversion. This theory holds that in the high possibility of pathogens being infected, females will prefer to choose no bearded males to avoid being infected by diseases.

The research value of hypothesis 2 is to explore whether male beards play a positive or negative role in establishing a long-term relationship with the opposite sex based on establishing a long-term relationship. Hypothesis 2 helps us study the impact of male beards on long-term sexual attraction and courtship strategies based on sexual dimorphism. Men with facial hair may reflect higher levels of testosterone compared to men without it. Higher testosterone levels indicate more masculinity, while overly masculine men may be more violent than their fewer masculine counterparts and pose a threat to women and offspring in long-term relationships. However, studies have shown that some

women believe that men with beards look older, have higher social status and better parenting skills [46, 47, 48]. These are ideal characteristics of women's long-term love partners [49].

However, older men have shorter life expectancy in the future, so they are unlikely to provide resources to support the survival of future generations in the long term, and the sperm of older men are more likely to produce harmful mutations and increase the health risk of future generations, which is growing Copulation is expensive in the environment. In fact, some elderly men increase their youth by shaving their beards to attract the favour of the opposite sex. Some studies have shown that only women with high fertility prefer masculine men as mating partners, which has nothing to do with their choice of short-term or long-term mating strategies, which may be due to the increase of progesterone [50].

According to the Negative frequency-dependent preferences, a woman's preference for a man's beard may not only depend on one's phenotype of beard, but also on whether other males in that environment have a beard [51]. If most people in the society do not have a beard, women would find men with beards more attractive. This can be explained by rare traits that may cue for greater survivability since they are the one trait different from the majority that existed so far. In this way, women may believe that a tenuous trait may possess the good genes to pass for their kids just based on what the majority in that environment are. In addition, negative frequency dependent selection also claims that human nature wants to prevent the loss of rare alleles, and maintain additive genetic variance [59]. Thus, it leads women to avoid mating with familiar individuals and individuals like their previous mates. Therefore, if the majority of men are without beards, selecting men with beards helps women to increase the genetic diversity of their offspring, reduce the risk of infection, and improve their viability.

4. Limitations

A number of limitations of our paper are worthy of mentioning. First, since our paper is an analytical research paper based on relevant data and conclusions from previous studies. Thus, because of the limited paper published so far, the result we got primarily depends on the available studies. That is, our research results on both short and long-term mating strategies are still controversial since most of the previous papers we reviewed have relatively small sample sizes and narrow participants only at a certain age.

Secondly, our research results may only be applied to a few cultures and regions because we did not cover many differences in selection caused by different cultures in different regions. Every culture and region have different perceptions for the same physical trait. For instance, wheat skin is a universally desirable skin colour in western countries. However, light and white skin are more attractive, especially within modern East Asian culture. Therefore, the results we got may not be applied to the whole world scope. Or at least more studies are required to generalize our results.

Besides, there are some disputes about the differences of beard preference caused by economic development and different cultures. For instance, some studies show that the intensity of sexual selection for male secondary sexual characteristics depends on the economic and ecological conditions of the local society. In countries with high degrees of social heterosexuality, national health index, and human development index, women's preference for more masculine men is stronger. This study points out that women will choose more masculine faces when they have more choices. However, evidence from China shows that with the development of the economy, women prefer men who obtain feminine looks. This may be because feminine male faces in long-term mating strategies mean that men will be responsible for raising offspring and providing economic services for the family. And other beneficial factors.

5. Future Study

The research value of this paper is to explore the role of beard and long hair based on the establishment of short-term and long-term relationships. Because the articles reviewed mainly focus on evolutionary psychology and biology, there is a lack of relevant research on the differences caused by social culture. Therefore, the possible research direction in the future will be the short-term and long-term mating choices of women in eastern and western social culture whether the beard and long hair has the effect of sexual attraction. Also, since pregnancy brings a series of significant changes in women's hormone levels, this work can further study whether their hormone changes affect women's preference.

6. Conclusion

In the research on the sexual attractiveness of male beards and female long hair, this paper reviews the theories of good genes theory, parent investment theory, pathogen aversion theory, and negative frequency rate-dependent selection. The paper put forward the preference for male beards and women long hair based on short-term and long-term mating strategies for different genders. The final results show that women prefer men with beards in short term mating strategies and men without beards in long-term mating strategies. Similarly, even though this work hypothesized that men would prefer long-haired women in both short and long-term mating, the work finally found out that men would not filter out women through different standards through the parental investment theory. Men want to maximize their reproductive benefits in the short term, and thus, the result this work got is that there are no significant preferences for men to choose for long-haired women in the short-term. At the same time they do prefer long-haired women in long-term mating.

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