

The shape of beauty: determinants of female physical attractiveness

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Summary

Rarely has one research area gained as much attention as that which is observed for female physical attractiveness. The past decade has resulted in numerous, exciting developments, particularly with respect to three proposed determinants of beauty: waist to hip ratio (WHR), body mass index (BMI), and curvaceousness. The goal of our paper is to provide a highly necessary review of contemporary research on the female attractiveness, including an in-depth examination of these factors.

In our review, we first discuss WHR, an index of fat deposition, which is calculated by measuring the circumference of the waist compared to the circumference of the hips. WHR is controlled by the sex hormones, and increases as women age, and hence, may influence perceptions of attractiveness. This factor has been hotly contested, as some researchers have claimed that a WHR of approximately 0.7 is universally most attractive, whereas others have found inconsistent findings, or suggest the importance of other factors, such as BMI.

Body mass index (BMI), calculated by dividing the body weight (in kilograms) by height (in meters) squared, serves as a measure of body fat. Although WHR and BMI are correlated, they lead to different conclusions, and the importance of BMI as a measure of female attractiveness is debated in the literature. Similar to WHR research, BMI and its role in attractiveness is not cross-culturally consistent and is affected by the availability of resources within a given environment.

It may be the case that both WHR and BMI influence female attractiveness. However, there has been little investigation of this possibility. We have explored this issue in our research, which revealed that both influence attractiveness, but in addition, we noticed that curvaceousness was also a factor. Curvaceousness is the degree of "hourglass" shape as determined, for example, by the size of the bust, relative to the circumference of the hips and waist, and the size of the buttocks. However, curvaceousness does not appear to be temporally stable as a marker of attractiveness, and it is not consistent across modes of presentation. For example, models in male-oriented magazines are more curvaceous than models in female-oriented magazines.

In summary, faced with these recent findings, it is difficult to ascertain agreement among the various factors, especially when researchers investigate each determinant in isolation. We conclude that, although researchers have made many important initial steps in examining female attractiveness, there remains much to be discovered.

Keywords: body mass index, curvaceousness, physical attractiveness, waist to hip ratio

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Introduction

Compared to the many research areas, physical attractiveness has gained an inordinate amount of attention. Researchers have utilized several approaches, such as attempting to isolate the various phenotypic (i.e., physical) proportions underlying beauty,^{1,2} as well as the environmental causes of variation in attractiveness,³ the effects that attractiveness has on interpersonal relationships,⁴ variation in cross-cultural evaluations of attractiveness,⁵ and even the role of attractiveness in choosing a partner for mating.⁶ The vast majority of attractiveness research is conducted on women and how these factors relate to female beauty. Furthermore, although there is a considerable history of attractiveness research, the past decade has led to many new and exciting developments, especially with respect to the physical determinants of female attractiveness. However, during this time, a complex and rather conflicting image has appeared. Thus, the goal of our paper is to review the major, recent findings and derive a general conclusion on the shape of beauty. We will begin by discussing the importance of female attractiveness as compared to male attractiveness, and then proceed to discuss three primary attributes that appear to underlie beauty.

The importance of female attractiveness

In this review, we will be paying particular attention to female attractiveness because it has been studied to a far greater extent than male attractiveness, and seems to have a more substantial role in mating behavior in particular. This difference in research focus is not without understandable reason; men place considerably more importance on female attractiveness than women place on male attractiveness.^{6–8} Moreover, women pay close attention to other women's attractiveness, relative to other traits and characteristics.⁹ Thus, given the salience of female beauty, it is not surprising that it has been well studied relative to male attractiveness. This dichotomy is well captured by the sexual selection theory, which connotes that people select mates to maximize their reproductive success⁸ or, in other words, to maximize the probability that they will successfully have children. Therefore, according to this theory, people prefer physical features that serve as cues of reproductive value, such as youth for women, which is based on the assumption that a young woman is presumably more fertile than an older woman. However, although both women and men prefer attractive rather than unattractive mates, the critical nature of female attractiveness has been stressed to a much larger degree because of its universal, adaptive nature.^{6,10,11} During humans' long evolutionary history, women have been unable to secure their own

resources, such as sufficient food and shelter, because of the demands of producing and raising offspring. Hence, women are thought to prefer men who possess resources, as well as skills relating to parenting and protection of offspring. In contrast, men are believed to prefer attractiveness in a mate beyond all other characteristics, where attractiveness is an indicator of a woman's potential to successfully provide offspring.

In fact, women even compete among themselves in terms of attractiveness, and this competition appears to be most fierce during times of heightened fertility. In one study,⁹ women in the maximally fertile phase of their ovulatory cycle, based on self-report, rated female faces significantly less attractive than women in less fertile phases. There was no corresponding effect for male faces, suggesting a unique process occurs when women judge other women. Because women presumably compete for mates possessing resources and parenting ability, and to a lesser degree, attractiveness, female competition is expected to be strongest when conception is most probable. Due to the critical nature of women's beauty for winning mates, it is logical that women compete in this arena.

Having now established the motivation for examining female attractiveness, we are left with a remaining question – what is the actual shape of female beauty? How does an attractive female really look? There have been numerous factors proposed over the past decade. We will now present three factors that have gained much research attention and have been found to influence perceptions of female physical attractiveness: waist to hip ratio (WHR), body mass index (BMI), and curvaceousness. In addition, we will present some less well-explored but also important issues such as the sex of the evaluator, societal influences, and the mode of presentation.

Waist to hip ratio

One of the first factors to be empirically isolated as a determinant of female physical attractiveness was WHR. WHR is an index of fat deposition, calculated by dividing the circumference of the waist (at the narrowest point around the torso, under the iliac crest) by the circumference of the hips (at the greatest protrusion of the buttocks). The development of WHR is controlled by the sex hormones, such that estrogen stimulates fat deposition on the hips, buttocks, and thighs whereas inhibiting fat deposition in the abdominal region.⁷ As women approach menopause, more fat is deposited around the waist, and WHR increases.¹² Moreover, WHR has been found to be related to hormonal effects, risk of major disease, and fertility.¹³ It was proposed that WHR, which varies independently of weight, is involved in the initial stages of mating by influencing men's decision

to initiate contact with women.¹ In other words, it acts as a filter to exclude women who are unhealthy and have low reproductive capacity. Some research has revealed that women and men rate, regardless of the weight or body fat, a figure with low WHR (i.e., 0.7) as most attractive, as well as the most healthy, of higher reproductive value,^{1,14} and younger.¹⁵ When line drawings of figures are used, there is a negative relationship between WHR and attractiveness; as the WHR of the drawings increased, the attractiveness ratings decreased.¹ Similar results were obtained in a study of the centerfolds and Miss America beauty contestants, as a WHR of 0.7 remained relatively stable over the time period that was analyzed,¹ and among cross-cultural samples.¹⁴

Although there have been contemporary replications of these findings,¹⁶ the overall conclusion remains quite contradictory. For example, in one study, underweight women were rated more attractive than normal-weight or overweight figures, and figures with a high WHR (i.e., 0.86) were considered more attractive than figures with a low WHR across all weight conditions.¹⁷ Similarly, it has been demonstrated that waist size, hip size, and weight can be varied to produce differences in WHR judgments on attractiveness,¹⁸ which suggests that WHR is not a stable marker of attractiveness that is independent of body size. Additionally, there have been several studies that fail to find cross-cultural support, as countries with limited Western exposure demonstrate preferences for larger WHRs.^{19,20} Others have noted that the original WHR figures did not allow for the examination of the effects of hip versus waist size, but rather only examined the two together.²¹ In fact, when waist and hip size are individually manipulated to calculate WHR, waist size has a significantly larger influence on attractiveness ratings than hip size.²² Furthermore, the original research only included figures with WHR ranging from 0.7 to 1, and thus, it was not possible to determine whether the often-selected 0.7 WHR is optimally attractive, or whether an increased range would lead to different results.¹⁸ The verdict about WHR as a primary indicator of attractiveness has yet to be derived, but there seems to be little agreement between it and other measures of bodily and facial attractiveness.²³

Body mass index

A second factor that has been considered is that of BMI, calculated as body weight (kg) divided by height (m) squared, which serves as a measure of body fat. WHR is positively related to BMI, as BMI may result in an increased or decreased WHR, especially when BMI is very low or very high.¹⁴ However, it appears to be the case that BMI explains more variance in attractiveness than WHR.^{2,24} Therefore,

according to these results, BMI is of more importance in accounting for evaluations of attractiveness than WHR.

Although it may be a critical indicator of attractiveness, cross-cultural inconsistencies show that it is not stable. In cultures where women have limited economic opportunities and wealth, men consider women with high levels of body fat to be considered attractive, whereas the reverse is true for cultures that have an abundance of resources.²⁵ In fact, there is a direct relationship between female obesity and socioeconomic status in resource-poor societies, and an inverse relationship between female obesity and socioeconomic status in resource-rich societies.²⁶ When resources are scarce and individuals are presented with the risk of malnutrition, people tend to prefer women that are heavier (i.e., those possessing a higher degree of body fat). In contrast, faced with the risk of over-consumption in resource-rich locations, people prefer lighter women.²⁷ It is curious that these trends occur only for female attractiveness and weight; there is no relationship between socioeconomic status and men's weight, for example.²⁶

These differences are apparent not only at the cultural level, but also at an individual level. Men who perceive themselves as financially poor or hungry prefer heavier women than men who perceive themselves as financially successful or not hungry.²⁷ These trends can be observed in the media as well; during times of difficult social and economic conditions, *Playboy* Playmates of the Year were significantly heavier than during more prosperous times.³

The interaction of WHR and BMI

A handful of recent studies have shown that there are important relationships between WHR and BMI, and that none, by itself, is a reliable indicator of female physical attractiveness. For example, when men were presented with nude photographs of women's frontal view (faces obscured) and back view, as well as their faces, attractiveness was negatively correlated with BMI.²³ However, it was not simply a matter of men declaring thin women as most attractive, as the most attractive women, according to men's evaluations, were those with intermediate levels of body fat and WHR.

To further investigate this interplay of WHR and BMI, we have examined the stability of these measures in *Playboy* centerfolds over a 48-year period.²⁸ To conduct a deeper analysis of the data, we also included measures of waist to bust ratio, bust to hip ratio, and an androgyny index, calculated as waist/hip (hip*bust)**0.5. All measures except weight showed temporal change, such that over time, bust and hip size decreased whereas waist size increased. Furthermore, BMI and bust to hip ratio decreased, whereas WHR, waist to bust ratio, and androgyny index increased. Therefore, neither WHR nor BMI appears to be stable over

time, and hence, neither appears to be a consistent marker of female physical attractiveness. In fact, over time, the models became more androgynous and less curvaceous.

Bodily curvaceousness

Our study on *Playboy* centerfolds aptly demonstrates the necessity of discussing a third factor, curvaceousness, which appears to be central to judgments of female attractiveness. Curvaceousness refers to the degree of the "hourglass shape," such as the bust to waist ratio²⁹ or enlarged breasts, buttocks, and hips combined with a slender waist.⁷ Evaluations of curvaceousness in relation to attractiveness change over time, as evidenced by an analysis of body measures of models in *Vogue* and *Ladies Home Journal* between 1901 and 1981.²⁹ When a high number of women began to graduate from college or entered the American job market, the models became less curvaceous, implying that women tend to not emphasize a feminine shape when their economic prospects are positive. Curvaceousness may also be associated with mating strategy.²⁹ Curvaceous women, who are most attractive to men, can successfully marry to secure resources for offspring. Women who are minimally curvaceous are not as attractive to men, and hence, must use alternative strategies, such as obtaining independent economic success.

An added layer of complexity concerning perceptions of attractiveness in conjunction with curvaceousness is the sex of the person performing the evaluation. For example, if one may assume that models in popular magazines represent the pinnacle of female attractiveness, there are intriguing noteworthy differences in the model's body shape, depending on the primary readership's sex. That is, models in male-oriented magazines, such as *Playboy*, tend to be more curvaceous than models in female-oriented magazines, such as *Vogue*.³⁰ Women and men also have differing opinions about what is attractive with respect to body weight. It is apparent that women believe that a thinner woman is maximally attractive to men than one that men actually prefer.³¹ Furthermore, it is intriguing that, in addition to being sensitive about personal body weight, women are also sensitive to body shape. Many women are self-conscious about the distribution of fat on their bodies, and pay special attention to excess fat located on their buttocks, hips, and thighs.³² Even traits such as eating behavior, especially restraining one's eating, interact with perceptions of female body shape attractiveness.³³

Further considerations: the mode of presentation

If the controversies within each of the factors were to be resolved, there exists at least one issue that still requires consideration – the venue in which the woman's attractiveness

is judged. For example, an attractive woman acting in a movie does not necessarily have the same morphology as an attractive woman in a photograph. We have recently examined this issue by comparing the bodily measurements of actresses starring in adult media movies and magazines.³⁴ We found that low BMI was related to frequent movie starring, whereas WHR, waist to bust ratio and bust size were not. Conversely, low WHR, low waist to bust ratio, and larger bust size were related to frequent magazine starring, whereas BMI was not. It should be noted that we are not the first to propose that there exists a difference in attractiveness as a result of the mode of presentation. Recently, it has been hypothesized that models in *Playboy* are potentially selected on their physical attractiveness, rather than facial attractiveness, whereas mainstream movie actresses may rely more on facial attractiveness than physical attractiveness.³ Although not directly related to our findings, it does add support to the notion of domain-specific attractiveness perception.

Discussion

In summary, contemporary research has revealed a complex, and at times conflicting, picture of female beauty. It is apparent that many factors influence a woman's attractiveness, including her WHR, BMI, and level of curvaceousness, but how these features interact or the relative importance of each factor compared to the other is still unknown. It remains to be proven that there are stable indicators of female attractiveness, or that any attribute can withstand the tests of time and cross-culture applicability. The issue is further complicated by the use of methodology; compared to the facial attractiveness research, the state of physical attractiveness research is poor³⁴ and does not appear to be quickly improving, as many researchers rely on line drawings or similar stimuli with poor ecological validity. Moreover, in this review we have focused strictly on physical attractiveness, and omitted any discussion of nonphysical features that impact assessments of attractiveness. For example, simple availability positively influences evaluations,³⁵ as does status,³⁶ and interpersonal variables such as familiarity and respect.³⁷ After a decade's worth of research, we are only beginning our exploration into the shape of beauty.

Conclusion

Our review of the contemporary literature reveals that determining the components of female physical attractiveness is a complex and challenging task. The three factors that have been the focus of recent research, those of WHR, BMI, and curvaceousness, represent a promising start, but only a start, to understanding the shape of female beauty.

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