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Female high heel shoes: a study of comfort

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Abstract. Protection was the basic principle underlying the creation of footwear, once humankind felt the need to protect feet from direct contact with soil, heat, cold and sharp objects. However, this accessory soon acquired cultural, aesthetic, symbolic significance, and apparently it was not related to comfort. This work aims to analyze comfort in women footwear, especially high heels shoe. We intended to understand the emotional relationship of consumers with this type of accessory, as well as to understand to what extent women are willing to give up comfort in favor of aesthetics. For this purpose, a questionnaire was designed, aimed at the female audience in order to understand the relevance of women's footwear, their daily relationship with shoes, the specificity of heels and the problems caused by it.

1. Introduction

As an object, footwear embeds cultural traditions and values. Also, it operates as a multidimensional indicator of social class, gender, status, beyond protection. Its importance is highlighted even in Greek mythology, since Zeus has gifted Hermes with winged sandals that allowed him to fly [1]. Even then shoes were seen as a mystic object with supernatural powers going far beyond its physical dimension. We may recall how shoes appeal to our childish imagination of superpowers, for example in Cinderella fairy tale or in the case of the little red shoes of the Wizard of Oz. (figure1).



Figure 1: Hermes with winged sandals; Cinderella crystal shoe; The Wizard of Oz little red shoes

In fact, footwear is a fashion icon that changes throughout times, echoing different epochs. Fashion trends influence shoe design and model, as well as the height or shape of the heel.



Like clothing, footwear is an accessory of great importance in the composition of personal image, as well as in categorizing characteristics of the individual personality, depending on the style and model of the chosen shoes. "Our choice of shoes reflects our personality, they reveal if we are audacious or distinct, conservative or free spirit (...) shoes communicate our desires for a specified social status and lifestyle, as well as proclaim our needs for power and sex " [2].

Among the many elements that make up the universe of women's footwear, one in particular has an outstanding significance, the "high-heel". This element leads to the manifestation of two classes of very different audiences, those who love and those who completely reject it. For many it is considered a symbol of femininity and seduction, but others consider it a suffering and submission symbol. O'Keeffe claims that this accessory can place women in a position of power and control, which is the main focus of seduction and femininity [3].

The orthopaedic professionals recommend the occasional use of high-heel shoes, as they may cause serious health problems, involving deformities of the toes, postural damage, and muscle shortening, among others.

2. Footwear and comfort

"Comfort is an emotional state defined by the simultaneous occurrence of physical and psychological well-being induced by sensations, thoughts, images, objects, environment and situation that invoke pleasant feelings and emotions (positive hedonic valence)" [4]. It is a fundamental requirement for the current society as it has great relevance in the decision-making of the consumer when buying a product.

Because it is a subjective qualitative variable, comfort can be defined in several ways. Iida defines it as "an ergonomic quality of the product" and this is highly valued by users of footwear [5].

Therefore, it is not possible to outline a universal concept of comfort, since its perception differs from person to person and depends very much on the situation being experienced, which makes comfort a very subjective concept. It can, however, be divided into several dimensions to facilitate its comprehension and evaluation, namely sensorial, thermophysiological, ergonomic and psycho-social dimensions [6].

The thermophysiological comfort of shoes has to do with the properties of the raw materials and how they allow the transference of moisture and heat. Similarly, the sensory comfort is related to the physical-mechanical properties of the materials and how those are transmitted to the feet by direct contact. The ergonomic comfort in shoes is associated with the shoe fitting to the foot. It is essential that all stages of prototyping and manufacturing of the footwear "(...) are based on "forms" that respects the anatomy, physiology and biomechanics of the feet" [7].

However, the production of high-heel shoes often disregards comfort and foot health in order to accomplish an attractive design. Despite the medical alert, high-heel shoes grant devotion among many women, which may be linked to the symbolism related to this accessory. "The association between high-heels shoes and sensuality is related to the fact that it produces changes in the female body. The increasing of heel-height causes changes in the hip movements, the bust and buttocks become more evident, and create an effect of legs elongation, the use of this accessory creates in the mind of the consumer a sense of psychological comfort in relation to her power seduction" [8]. Therefore psycho-social comfort is related to psychological well-being and personal satisfaction, which are linked to social and fashion demands.

2.1 Use of high-heeled shoes and its consequences

Increasing the height of the heel in the shoe directly modifies the distribution of body pressure in the feet, impairing the balance of the body, safety of walking, and altering the posture of the spine [9]. The human foot naturally exhibits a slight imbalance in body distribution. When walking barefoot, 43% of the weight is projected to the front of the feet, while the remaining 57% is directed to the heel portion.

Orthopedic specialists usually recommend the daily use of 2cm heel shoes since it helps balancing the distribution of body weight throughout the length of the foot.

Inappropriate choice of the footwear model can cause a number of foot health problems. The most frequent diseases diagnosed by orthopedists are articular, dermatological, circulatory and postural. The use of unfitting shoes due to the use of poorly developed, inappropriate material or inadequate modeling, can increase the appearance of problems and injuries in the feet. These problems are potentiated in women's shoes, since the incorrect production of high heel footwear can cause deformities in the feet, in addition to the above.

According to the International Society of Foot Surgery, 80% of the world population suffer from some type of problem in their feet or posture, caused by a lack of adequate structure of the shoes or abusive use of high-hell shoes [10].

The *hallux valgus* consists of a lateral deviation of the great toe, caused by the continuous pressure exerted on the large toe [10]. This pathology associated with the use of narrow and pointed footwear often requires orthopedic or surgical interventions (figure 2). The pointed toe shoes, by compressing the toes, deform the first finger outward and the fifth finger inwards, which can lead to the appearance of a bunion, overlapping fingers, finger dislocations, ingrown nails, bursitis, epithelial hardening and callus [11]. Poorly developed heels and insoles can cause pain in the arch of the feet and backbone. The inside finishing of the footwear may also cause severe problems to the feet, such as coatings that inhibit freedom of movements; low quality synthetic materials that do not absorb sweat and may cause fungal infections; sewing and clippings that can injure the epithelial tissue of the feet [11].

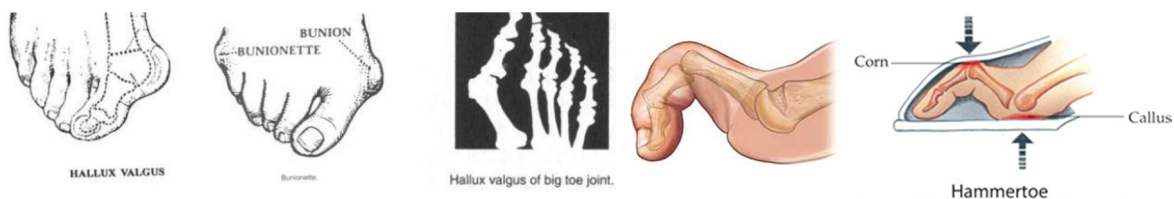


Figure 2: hallux valgus & hammertoe

Another problem associated with the use of incorrect footwear is the "hammer toe". This deformation is caused by the use of heel shoes that puts excessive pressure on the metatarsal phalangeal joint as an effect of the posture imposed by high heels [10].

The high heel alters the original position of the feet, causing it to remain in the position of dorsal hyperflexion, and ends up harming the joints between the metatarsal and the proximal phalanges of the toes. This change in the posture of the foot causes the entire load of the body to be thrown forward and directed to the joints of the fingers. This negative effect is potentiated by pointed footwear, in addition to high heels [12].

3. Experimental Part

This research aims to analyse female's shoes, especially high heel shoes, trying to understand the emotional relationship that this accessory sets in the mind of the consumer and how far she is willing to abdicate comfort for the benefit of aesthetics [13].

3.1 Methodology

For the development of this work, a literature search was led and served as a conceptual framework for the second phase of the research in which a survey, targeting a female universe, was conducted

through online platform. The questionnaire comprised 28 questions divided into six parts, seeking to facilitate the collecting, comprehension and analysing of the data. The questionnaire was organized as follows: the first part intended for socio-demographic characterization of the sample, followed by questions aiming to identify the footwear consumption habits of the sample. In the third part we intended to identify the relation of respondents with different type of footwear using images of shoes with different height of the heels (figure 3). Then, questions were asked about ergonomic comfort and foot problems. Psychological perception of the respondents regarding high heels composes the fifth part. Finally an open question allowed the respondent to express her opinion freely on the subject [13].

Most of the questions that compose the survey were closed answers type (one or multiple choices) but it also included some open question for a deeper and subjective exploration. A questionnaire test was applied to check comprehension and clarity of the questions. After proper corrections, the questionnaire was presented in online electronic format and spread by email (based on researcher's electronic mail database) and social media, for a casual, non-probabilistic sample.



Figure 3: Footwear typology organized by height of the heels shoes

3.2. Results

The online survey collected the responses of 574 women. The sample was mostly composed of “Younger” (ages under 24) and “Young Adults” (ages between 25 e 35), with a weight of 70% and 15% respectively, followed by “Adults” (age 36 to 45) and a lower representation of the “Mature” group (over 46 years) with a 7% and 8% respectively.

For practical reasons, we will present here the results of the two most representative groups of the study, the “Younger” and the “Young Adults”, representing together 85% of the sample. The data analysis showed that for this group comfort is the most important criterion when buying shoes (36,51% of the Younger; 40,11% of the Young Adults) and they do not have the habit of using high-heels shoes (50.12% of young people do not wear high heels, compared to 53.93% of young adults).

The price is the second most important criterion at the time of purchase (33.36% of Younger, 29.38% of Young Adults), followed by design (29.86% of Younger, 30.51% of Young Adults).

In regard to footwear consumption habits of the group, the majority of young people (38.46%) claim to have 5 to 10 pairs of shoes, followed by 33.25% with 11 to 20 pairs of shoes. Young adults tend to have more than 20 pairs (34.83%) and 31.46% of them say they have only 5 to 10 pairs.

About the relation of respondents with different types of shoes, among the images used in the questionnaire, the Young people claimed to use more "sneakers" models (48.52%) and B "ballerina flats" models (14.2%). The Young Adults elected for their day to day the models B (33,88%) and E – boots (14,88%).

We found that the majority does not use high-heel shoe (over 5 cm), but when asked what type of shoe they would like to use more often, a significant part of the respondents indicated the models with high heels – the Younger preferred models P (17,73%) and M (12,84%), whilst Young Adults chose N (19,19%) and O (14,14%) models. This demonstrates that most women are not satisfied with the type of shoe they currently use. A possible explanation for this discrepancy may be that the lack of ergonomic features in high heels shoes prevents women from wearing the product they want in order to guarantee their comfort.

Women in the group of those wearing high heels were asked to indicate which type of footwear caused more discomfort (based on figure 2). Among Young people the more frequent responses were N and P models (22.99% and 22.03%, respectively); Young Adults referred N and O models (32.32% and 26.326%, respectively).

When asked about the meaning of high heels, the majority linked this type of footwear with beauty and femininity (61.20% of Younger; 53.04% of Young Adults) followed by sacrifice and discomfort (17.6% Younger; 21.74% of the Young Adults). Open answers allowed for some more categories, such as elegance, posture, attitude, feel good; safety, occasional need.

When trying to understand the psychological perception of the interviewees that actually use high-heel shoes, the scenario changes: 51,5% feel more feminine; 24,7% feel special and powerful; 15,5% conditioned in their movements and 8,2% normal (uninterested). To conclude, a significant part of the respondents claimed that, when using high-heel shoes, the accessory provides a psychological feeling of being more feminine.

4. Final Considerations

The research demonstrates that the high-heel shoe is an accessory that carries a high aesthetic power in the minds of consumers. This association is due to the symbolism of this type of footwear, because it is an almost unique element of the feminine universe. Despite the symbolic power and the imaginary of seduction and femininity, the discomfort of this accessory seems more important for women when choosing their footwear. In fact, they end up preferring flat, comfortable shoes in their daily life, even if they wish to use high-heels shoes. These results demonstrate that the footwear sector, a strong segment of the world economy, needs to invest in research and development, seeking to combine comfort and aesthetics in high-heel shoes.

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