# Comfort Characteristics of Ladies' Dress Shoes

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**Abstract**

The objective of this study was to investigate the aspects that make footwear comfortable and also identify the characteristics of comfortable and uncomfortable shoes. Twenty Hong Kong Chinese females participated in the study. A one-on-one interview was conducted. The verbal responses were translated into statements and summarized as 73 characteristics. Footwear comfort and discomfort was found to embed positive and negative sensations respectively, especially in relation to tactile, visual, auditory and olfactory sensations. The important characteristics of comfortable shoes appear to be good fit, suitable heel height, no localized pressure under the ball of the foot, and attractive appearance. Shoes with poor fit in the forefoot region tend to be perceived as uncomfortable.

Keywords: Sensation, Footwear, Comfort

## 1 INTRODUCTION

Due to varying needs, manufacturing systems are changing in order to make items that are one of a kind. But, it is not easy to make such products, especially items such as shoes if the real comfort related needs and the functional requirements are not clear.

In the early 70s', comfort was defined as a lack of discomfort [4]. After more than two decades, Zhang et al. (1996) associated comfort with a feeling of relaxation and well-being [13]. More recently, Goonetilleke (2001) used the concept of positive sensation in relation to comfort [3]. This paper is an attempt to understand the comfort needs of women's dress shoes

## 2 OBJECTIVES

The objective of this study was to investigate the factors that influence the buying decision and identify the characteristics of shoes that are comfortable and uncomfortable.

## 3 METHODOLOGY

### 3.1 Participants

Twenty Hong Kong Chinese females with ages ranging from 23 to 44 years and with a mean age of 30±7.3 years participated in the experiment. Their weight ranged from 42.2 to 63.0kg with a mean weight of 51.7±6.6kg. None of the participants had any foot or lower limb injury. One requirement for participation was that each participant should have at least five pairs of dress shoes.

### 3.2 Materials and Procedures

Each participant was required to bring along her most comfortable and most uncomfortable dress shoes. Verbal protocols were taken to understand four aspects: (1) the criteria related to buying dress shoes, (2) basic requirements for comfortable dress shoes, (3) the perceived characteristics of comfortable dress shoes, and (4) the perceived problems of uncomfortable dress shoes. A one-on-one interview was conducted focusing on the participants' perception of and experience with footwear. The interview was conducted in Cantonese. Participants were probed using free elicitation and laddering [11]. Free elicitation was applied to directly ask about the requirements for comfortable shoes. It allowed a participant to express the attributes that she considered relevant for comfortable footwear. Laddering technique was used to ask the participant to express her feelings and experience with her comfortable and uncomfortable shoes. The process started by asking a participant to elicit higher-level feelings or experience and then asking for the detailed elaborations of those aspects [11]. Also, in order to help participants recall the different features of each shoe, they were asked to wear the shoes and walk on a treadmill for about 5 minutes at a 20 minutes/mile pace. Some questions were posed to the participants during this walking task. The interview continued even after the subject stopped walking on the treadmill. The two types of shoes were counterbalanced among the twenty subjects in order to eliminate any order effects.

## 4 RESULTS

All verbal responses from the interview were recorded. They were transcribed and translated from Cantonese to English. The relevant information was extracted and analyzed further.

### 4.1 Criteria related to buying dress shoes

Participants were asked for the criteria they use to evaluate dress shoes. Ninety-nine responses were collected from twenty participants. On average, each participant considered approximately 5 criteria when evaluating dress shoes. The ninety-nine responses were reduced to 14 criteria due to the repetitive nature of the responses. They were Comfort, Price, Shoe style, Heel, Color, Material, Match occasion/outfit, Size, Safety, Appearance, Fashion, First impression (and

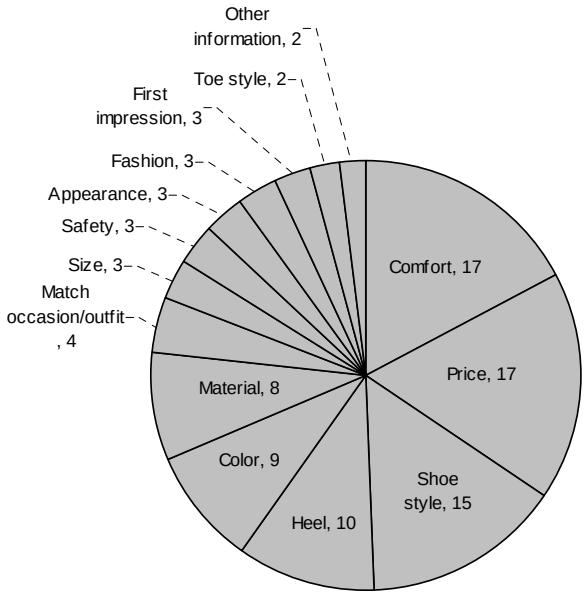


Figure 1: The frequency of occurrence of 14 criteria related to buying dress shoes

frequency of occurrence of each criterion is listed in Figure 1.

Seventeen participants considered Comfort and Price, and 15 participants looked at Shoe style when buying dress shoes. In addition, 11 participants considered all three criteria at the same time. Participants were asked to rate the importance on a 5-point scale (1=least important, 5=most important) of each of these criteria. The average and standard deviation of the importance rating on 99 responses were 3.75 and 0.98 respectively. Comfort, Price and Shoe style all had the same importance rating of 4. This result implies that these three criteria are important for participants when buying shoes.

### 4.2 Verbal data analysis

Participants were also asked the basic requirements for comfortable dress shoes, the perceived characteristics of comfortable and uncomfortable dress shoe. Since laddering technique was used to understand the participants' knowledge, participants expressed responses in different levels of detail. To avoid any loss of information, statements were interpreted at the same level of detail as the raw data [10]. The statements under each category and the frequency of each

brand name), Toe style, and other information (comments from peers and salespersons). The

| **Requirements for comfortable shoes** | **Characteristics of comfortable shoes** | **Characteristics of uncomfortable shoes** |
|---|---|---|
| (12) Fits well in toe region | (11) Is comfortable to wear all day | (6) Does not fit well |
| (10) Has soft insole | (10) Has attractive appearance | (6) Does not fit well around the ball of the foot |
| (9) Is breathable | (8) Has suitable heel height | (6) Irritate skin during putting on or taking out the shoes |
| (7) Fits well | (7) Fits well | (5) Does not allow good body balance |
| (7) Does not irritate skin during putting on or taking out the shoes | (5) Matches my clothes | (5) Does not fit well in toe region |
| (6) Is made of soft material | (5) Is breathable | (5) Causes pain in toe area |
| (6) Has suitable heel height | (4) Has no localized pressure under the ball of the foot | (4) Causes discomfort |
| (5) Is light-weight | (4) Is made of soft material | (4) Does not have durable heel |
| (4) Has stretchable vamp | (4) Does not irritate skin during putting on or taking out the shoes | (4) Is made of stiff material |
| (3) Is comfortable to walk all day | (3) Is comfortable to walk all day | (4) Makes my feet sweat |
| (3) Protects my feet | (3) Is stable when walking | (4) Has localized pressure under the ball of the foot |
| (3) Has parts firmly attached together | (3) Makes me forget I am wearing shoes | (4) Causes pain in ball area |
| (3) Has comfortable toe style | (3) Keeps my feet at comfortable temperature | (4) Causes heel pain |
| (3) Touches the arch | (3) Has accessories which do not irritate skin | (3) Does not allow me to walk fast |
| (2) Is stable when walking | (3) Has outsole of suitable thickness | (3) My legs feel tired |
| (2) Easy to put on and take out | (3) Emits pleasing sound when walking | (2) Affects my back |
| (2) Makes me forget I am wearing shoes | (2) Easy to put on and take out | (2) Is painful when wearing |
| (2) Has a toe style that I like | (2) Get positive comments from others | (2) Does not prevent slipping on floor |
| (2) Causes no pain in ball area | (2) Is fashionable | (2) Does not support my body weight |
| (2) Has appropriate heel breast | (2) Is little bit loose for wearing pantyhose | (2) Easily comes off the foot |
| (2) Distributes body weight appropriately | (2) Fits well in toe region | (2) Does not have attractive appearance |
| (2) Does not need additional insole | (2) Has appropriate heel breast | (2) Is not breathable |
| (2) Has thick insole | (2) Has attractive color | (2) Does not keep my feet at comfortable temperature |
| (2) Has outsole of suitable thickness | (1) Allows smooth heel-to-toe transition | (2) Has a toe style that I dislike |
| (2) Emits pleasing sound when walking | (1) Is not painful when wearing | (2) Does not have suitable heel height |
| (1) Suitable for different weather | (1) Does not cause any skin problems | (2) Emits annoying sound when walking |
| (1) Is not painful when wearing | (1) Prevents slipping on floor | (1) Does not match my clothes |
| (1) Does not cause any skin problems | (1) Supports my body weight | (1) Does not allow smooth heel-to-toe transition |
| (1) Prevents slipping on floor | (1) Protects my feet | (1) Has heels that will get stuck on ground surfaces (e.g. in drain cover) |
| (1) Supports my body weight | (1) Makes me feel happy | (1) Does not have fashionable color |
| (1) Has smooth seam stitches | (1) Makes me feel natural | (1) Is not fashionable |
| (1) Allows me to walk fast | (1) Has fashionable color | (1) Does not have adequate accessories |
| (1) Is not painful during break-in period | (1) Does not make my feet sweat | (1) Alters my foot shape when wearing |
| (1) Has comfortable style | (1) Is light-weight | (1) Does not have comfortable style |
| (1) Has adequate accessories | (1) Is made of material with good texture | (1) Does not have stretchable vamp |
| (1) Does not have unpleasant odor | (1) Has comfortable toe style | (1) Does not touch the arch |
| (1) Is flexible and makes walking easy | (1) Has a toe style that I like | (1) Causes arch pain |
| (1) Absorbs impact shock | (1) Causes no arch pain | (1) Does not fit well around the heel of the foot |
| (1) Has heel of suitable weight | (1) Has heel style that appears to be comfortable | (1) Has stiff insole |
| (1) Does not irritate skin around heel counter | (1) Has thick insole | |
| (1) Has throat which does not irritate skin | (1) Has soft insole | |
| (1) Has stretchable throat | | |
| (1) Has flexible outsole when bent with hands | | |

Table 1: Statements extracted from the requirement for comfortable shoes, characteristics of comfortable and uncomfortable shoes. (The frequency of each statement is given in parenthesis)

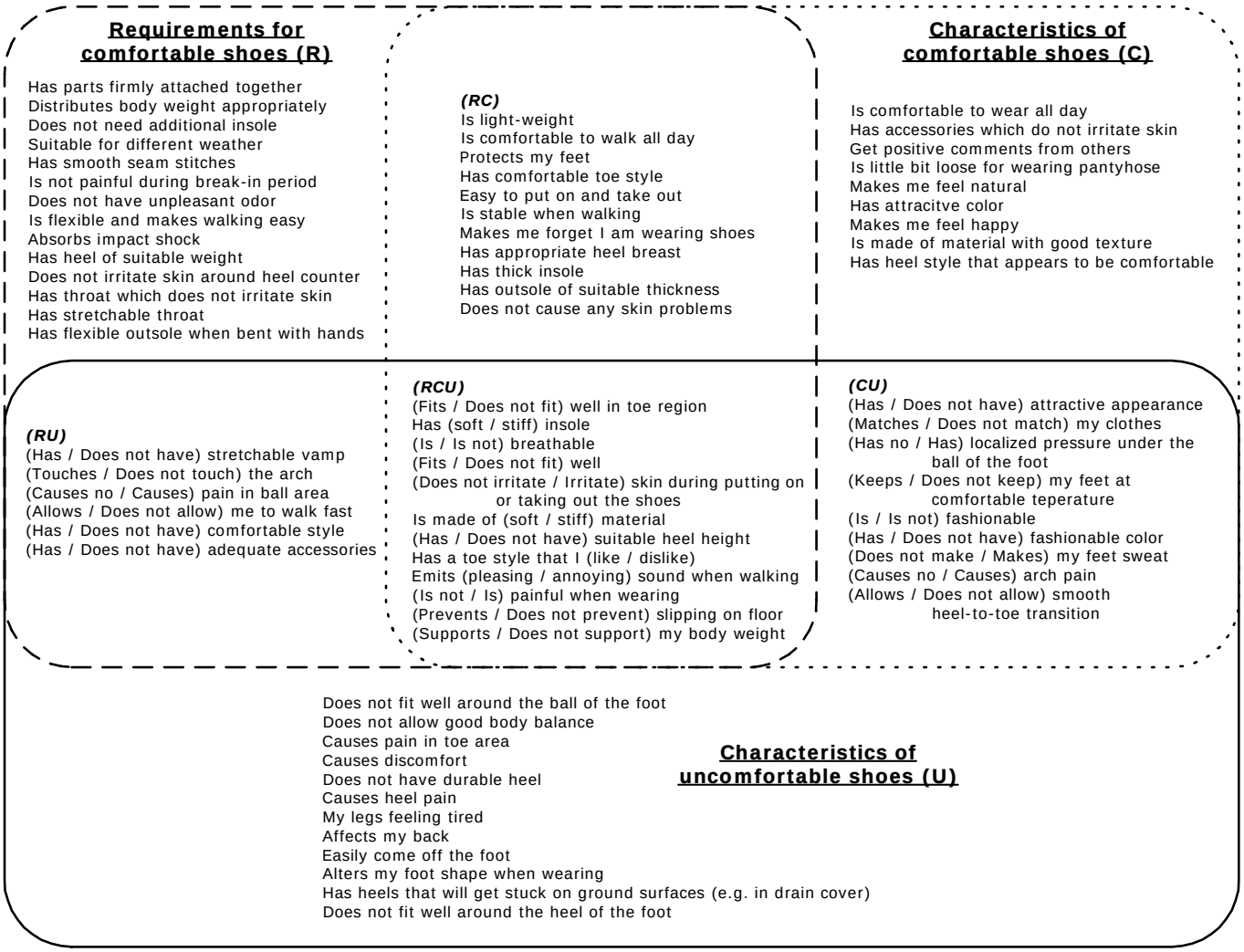


Figure 2: Comfortable and uncomfortable characteristics and requirements

statement are summarized in table 1. Some statements in columns 1 and 2 are the opposite of those in column 3 (see table 1). According to the similarity of the statements, 73 characteristics were identified in relation to the comfort and discomfort of footwear. These are shown in Figure 2. The top level of the figure consists of statements extracted from the requirements of comfortable shoes (R) and the characteristics of comfortable shoes (C). In the centre are statements that are the same in both R and C and indicated as RC. Other overlaps and similarities are shown as RU, RCU and CU. The lowest level of the figure presents the unique characteristics of uncomfortable shoes (U).

## 5 DISCUSSION

In the middle level of Figure 2, the statements for comfortable and uncomfortable shoes are opposites to one another. Thus, each one of these characteristics can be mapped into a uni-dimensional scale to measure both comfort and discomfort; thereby supporting the definition that comfort is a lack of discomfort [4]. But, the same is not true for other characteristics of comfortable shoes (RC and C regions) and uncomfortable shoes (RU and U regions). Zhang et al. (1996) treated comfort and discomfort as different but complementary entities. Some of the characteristics of comfortable shoes are a feeling of relaxation, well-being and perceived satisfaction (e.g., “Makes me feel happy”, “Makes me feel natural”, “Has attractive color”, and “Get positive comments from others”). These statements agree with the Zhang et al. definition of comfort. Zhang et al. also associated discomfort with biomechanical factors [13]. The results show that almost all statements in U regions are related to biomechanical factors (e.g., “Does not fit well around the ball of the foot”, “Does not allow good body balance”, and “Causes pain in toe area” etc). However, the comfort definitions by Hertzberg and Zhang et al. only encompass some parts of Figure 2. The definition given by Goonetilleke (2001) where comfort is related to positive sensations and discomfort to negative sensations encompass the various characteristics outlined by the participants. Tactile, visual, auditory and olfactory sensations were all associated with comfortable footwear.

The preliminary question of the interview in relation to buying dress shoes showed that “Comfort” was one of the most prevalent (F=17) and most important (important rating=4) criteria. Although criteria, such as Size, Material, Heel, Safety, and Toe style (Figure 1), were not as popular as Comfort, the extracted statements (Table 1) indicated that these criteria contribute to footwear comfort. For example, the requirements for comfortable shoes include “Fits well”, “Is made of soft material”, “Has suitable heel height”, “Protects my feet”, and “Has toe style that I like” (the first column in Table 1). As a result, footwear comfort seems to be governed by many factors including material properties of a shoe [2], shoe style, shoe fit [5], [12], physiological factors and psychological

factors [8], all of which contribute towards imparting sensation.

The results of this study show that tactile sensation plays an important role in comfortable shoes (Table 1). More than half the participants (12 out of 20) required a good fit in the toe region (the first column in table 1), but the comfortable shoes of only 2 participants had this characteristic (the second column in table 1). In addition, on closer investigation of the uncomfortable shoe characteristics (the third column in table 1) showed that three of them (i.e., “Does not fit well”, “Does not fit well around the ball of the foot”, and “Does not fit well in toe region”) had high frequency and were related to the shoe fit, especially in the toe area and the ball of the foot. The results indicate that one of the main causes of uncomfortable shoes is poor fit in the forefoot region. This may be due to the dress shoes that have a pointed toe style and high heel. These designs can lead to forefoot deformation, such as hallux valgus, hammer toe, bunions, corns, and other disabling problems [9], [7], [6], [1].

Half of the participants stated that a soft insole was an important requirement for a comfortable shoe. However, only one participant stated that her comfortable shoes had a soft insole (RCU region in Figure 2). Since the most dress shoes do not incorporate an insole, they are added after purchase. This helps explain why “Does not need additional insole”, appears in the R region of Figure 2. None of the participants stated that her shoes do not need additional insoles. Thus, manufacturers ought to consider how to incorporate a suitable insole.

Some unique characteristics of comfortable shoes (C region in Figure 2) relate to the perceived satisfaction. "Is comfortable to wear all day” was found to be related to other characteristics of comfortable shoes such as “Fits well” and “Has suitable heel height”. In addition, it is worth noting that a single tactile sensation at a particular region may be associated with more than one kind of perceived satisfaction. For example, “Has no localized pressure under the ball of the foot” was found to be linked with “Is comfortable to wear all day”, “Make me feel happy” and “Make me forget I am wearing shoes”. This implies that localized pressure under the ball of the foot is very critical for improved satisfaction as it can provide a feeling of relaxation and well being as stated by Zhang et al. [13]. In light of the importance of tactile sensation in relation to comfort, it is essential to put further effort to understand the relationship between sensation at different regions of a foot and footwear comfort.

Besides tactile sensation, visual sensation plays an important role as well. Half of the participants stated that attractive appearance is an important characteristic of comfortable shoes (the second column in Table 1). It is not uncommon for participants to perceive positive and negative sensations from the sound emitted when walking in comfortable and uncomfortable shoes (RCU region in Figure 2). Last but not least, one participant stated that a comfortable shoe should not have an unpleasant odor (R region in Figure 2). This requirement indicates that positive/negative olfactory sensation may be related to footwear comfort/discomfort. Although only one participant expressed such an opinion, it does not imply that this need is not important for footwear comfort. Similar to other needs with low frequencies of occurrence, it may help a shoe designer to design women’s dress shoes to a higher level of satisfaction.

## 6 CONCLUSION

In this study, two interview techniques, free elicitation and laddering, were used to ensure that no key characteristic was overlooked. Each participant wore their own comfortable and uncomfortable woman’s dress shoes to identify the characteristics that make footwear comfortable. Verbal responses were translated into statements. The Venn diagram indicated 73 types of characteristics of footwear comfort and discomfort, which were extracted from three aspects: requirements for comfortable shoes, characteristics of comfortable shoes and characteristics of uncomfortable shoes. The main contribution of this study is twofold. First of all, the results of this study validate the definition of comfort given by Goonetilleke [3]. Tactile, visual, auditory and olfactory sensations are all involved in comfortable shoes. The second major contribution of this study was identifying the comfortable and uncomfortable characteristics of shoes. Good fit, suitable heel height, no localized pressure under the ball of the foot, and attractive appearance are primary requirements for comfortable shoes. In contrast, uncomfortable shoes tend to be ones that have poor fit in the forefoot region. Overall, the study gives good insight into the comfortable and uncomfortable characteristics of women’s dress shoes.

## 7 ACKNOWLEDGEMENT

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