An exploration into aesthetics and comfort of dress shoes for working Australian women

A thesis submitted in fulfilment of the requirements for the degree of

Master of Design

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August, 2018
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Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the project is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

I acknowledge the support I have received for my research through the provision of an Australian Government Research Training Program Scholarship.

9th August 2018

Sally Brindley-Mills
Acknowledgements

I would like to thank all the volunteers for my three independent studies, without their time and patience; I would not have been able to complete the research.

I would like to acknowledge my supervisors Dr. Sean Ryan and Dr. Scott Mayson for their support and guidance throughout the years. Also, thank Dr. Jenny Underwood for her encouragement and valuable suggestions towards my research.

Sincere thanks to Footmotion (Toowong, QLD) and staff for facilitating the 3 D foot scanning and contributing to my study. I wish to express a special thank you to Gavin Kelly for his generosity in the use of his premises, time, support and sharing his knowledge in footwear. My appreciation is extended to David Gregg from Binary Healthcare (Melbourne, VIC) for his expertise and assisting in liaising with Gavin Kelly and footwear industry contacts.

I would really like to thank Packer Leather Pty Ltd (Narangba, QLD) for their contribution of kangaroo leather for my co-design shoe prototypes. Thanks also to Andrew Luke for his expertise in leather, support and knowledge in local and international footwear manufacturing sector.

Jane McPhee for her encouragement and support to advance my footwear experience internationally and pursue my research masters. Our passion for shoes inspired me to focus on shoes that are aesthetic and comfortable for the working women.

My family have been a very patient, understanding and supportive of my study over the past four years. I wish thank my beautiful daughters, Siena, Lucca and Rimini that have given me the motivation and love to keep going.

Finally, the most important person is my husband, Paul, which has been my rock throughout this journey. His endless support, inspiration and motivation gave me the encouragement and determination to complete my master’s degree.
Abstract

The majority of ready-to-wear shoes available in Australia are currently made in South-East Asian countries, mimicking current fashion styles, but compromising on quality to reduce cost for the Western market. It can be a challenge for women to purchase a suitable pair of dress shoes that is visually pleasing, functional and appropriate for a work environment. This research project investigated the availability of suitable dress footwear for working women within the Australian market.

There are plenty of visually appealing shoes available on the Australian retail market and online, although if the shoe is not also comfortable, it may cause harm to feet. It is generally accepted that good fitting footwear with a medium heel height will minimise harm to the foot and discomfort to the wearer, but working women still predominantly select footwear based on aesthetic appearance, influencing footwear design. Comfort and practicality are not necessarily considered as high a priority, yet adverse pathologies become increasingly apparent during prolonged wear.

A survey was undertaken to determine the criteria by which Australian women select shoes, on the understanding that this selection was from the current range of footwear available. The survey results suggested that women had problems purchasing the correct size shoes for their feet and had problems with fit, while some women had problems purchasing the appropriate style of shoe for their requirements. Appearance and colour were the primary selection criteria, while comfort, fit, quality and price were considered less important by the women surveyed. In the results of the foot scanning study there was variability in women’s feet in terms of length and width, even though they all considered themselves a size 38.

It was noticeable that there was also variability in women’s foot sizes and in shoe dimensions for any particular shoe size, which contributed to discomfort when wearing shoes. To investigate these concerns, a selection of Australian women (n=15), within the specified 30 to 60 age group and with the same shoe size (38), were enrolled into a scanning study. Each woman had her feet scanned to measure length, height, width, circumference and angle for both left and right feet. Since many of these women had purchased cheaper but aesthetically-pleasing shoes imported from China, manufacturers from this country were also selected
when purchasing six pairs of size 38 shoes. The inner dimensions (i.e. shoe size) of these shoes were then measured by inserting silicone rubber into the left shoe of each pair and then scanning this cast (once set) in the same way as the women’s feet above. The 3D scanning measurements for the feet and shoe casts were then compared, with the results indicating that shoes made in China were narrower in width and had a smaller ball girth circumference than the scanned feet.

It was apparent that women considered a number of factors before purchasing shoes for work, but the priority and relevance of these factors was not clear. To investigate and elucidate the potential concerns faced by women when purchasing shoes, a focus group of Australian working women (n=8), within the specified age group, was enrolled in a co-design study. This co-design workshop invited a collaboration of ideas from the focus group participants, to share their personal experiences, thoughts and preferences in shoe design. During the workshop the participants developed concept ideas through group discussion of their own individual criteria for purchasing shoes, experiences, comfort and visual appeal preferences, to create versions of more desirable dress shoes. The focus group developed three different shoe design styles that they believed would be improved shoe designs options for the working woman as the outcome from the co-design workshop. The shoe designs were then manufactured in China to create prototypes for product testing and feedback.

It was evident from the outcomes in this study that currently-available dress shoes in the Australian retail market were inadequate to address the requirements of fit and aesthetics for the workplace. Women have expressed concern about the challenges of buying a pair of shoes that meets their criteria of comfort and suitable heel height and are suitable for walking and standing in a work environment. This is partly related to the fact that shoes that are available are inconsistent and variable from their stated size, in terms of shorter length, being narrower in width and having a smaller ball girth circumference. A significant concern to working women was also that choice was limited by the availability of footwear. This thesis has also demonstrated the value of a co-design study to determine what is more desirable in dress shoes. Application of these findings can be useful to retailers, designers, manufacturers, importers and working women towards ensuring that comfortable and aesthetic shoes are available in the Australian market.
Chapter 1. Introduction

1.1 Introduction

The choice of shoes available for women has some potentially conflicting criteria, where women have to often select between comfort and aesthetics. Women tend to prefer visually pleasing footwear over comfort footwear, and that this choice leads to a variety of problems. The footwear market in Australia offers a broad range from inexpensive to luxury brands. It is the overall aesthetics of the shoes that strongly influences the decision to purchase, within a woman’s price range. However, problems may emerge once the shoes have been worn over a period time since the footwear may not be comfortable or practical for the intended function. There are specific areas of a shoe that may be used to characterise discomfort, including heel height, width, heel cup, shoe shape, arch support, and different types of fabrications to name a few.

In the past both men and women had footwear custom-made by cobblers using individual shoe lasts (moulds). Women wore and owned fewer pairs of shoes than today due to their simpler lifestyle. In the early twentieth century, following the industrial revolution, footwear started to be mass produced and shoes could be purchased from retail stores and were ready to wear (Matevosyan, 2015, Riello and McNeil, 2006). Footwear today can still be custom-made by a bespoke cobbler, but time and cost generally restrict this option. Of greater relevance is the fact that the requirements of footwear today have changed since women are very prominent in the workforce and need to be able to walk and stand in a pair of shoes for 6 to 8 hours a day or longer.

Comfort and appearance are not always considered together when designing shoes and this is apparent on fashion catwalk shows all around the world where models are barely able to walk in the highly visual yet extreme footwear. High fashion shoe designers are experimenting with different styling ideas, fabrications and technology and pushing the boundaries in fashion catwalk shows. However, it would appear that ready-to-wear footwear rarely meets the needs of the fashion-conscious consumer. Manufacturers are remodelling ideas and using
cheaper soles, heels and techniques to meet reactive fast fashion trends, where there is a strong focus on low retail price points (personal observations when visiting Chinese shoe manufacturers). Of greater concern is that ergonomics are usually not considered when it comes to high heels (Lin and Chen, 2015), potentially causing injury and fatigue to wearers. It could therefore be suggested that contemporary footwear manufacturers have significant potential to improve and provide shoes that are aesthetically pleasing and comfortable for the ready-to-wear footwear market.

In the research of the literature there has been investigation into shoe selection, comfort, fit and ergonomics in footwear and some areas of aesthetic design. Though the majority of the footwear research is very scientific and the practitioners have engineering or science backgrounds. Where there is some extensive research in a variety of footwear areas, especially running and sports. Some of the specific focus areas researched have been on plantar pressure of the foot, effects of wearing high heels, footwear ergonomics, design 3D surface scanning of the foot, and footwear health issues. It would appear that aesthetic and comfort design in footwear is of high importance, although they are both subjective areas when it comes to evaluating the precise factors that contribute to good aesthetics and enhanced comfort. The area of dress footwear design is limited in research, particularly when analysis of comfort and aesthetics is combined. This is despite research highlighting the importance of both, especially in relation to health, well-being and the strong preference of aesthetics by the consumer (Au and Goonetilleke, 2007, Farndon et al., 2016).

Measurement and sizing is an important aspect of this review of the literature, although the majority of current research involves improving last development and 3D foot scanning to enhance accuracy and validation. The section on manufacturing and bespoke highlights global trends in Asia, United Kingdom and America but, significantly, there is no mention of the Australian footwear industry. Finally, the review of the literature for co-design is an important emerging trend in various fields, such as telecommunications, health care and information technology, with emerging relevance for sports footwear, and may therefore have significant potential for dress footwear.

The aim of this thesis is to utilise scientific and design-based research approaches to define the specific aspects of design that contribute to comfort and visual appeal in working
women’s footwear. Anecdotal evidence from podiatrists suggested that a particular demographic group of working women, aged 30-60 years, were most vulnerable to foot pathologies, hence women will be selected from this age group to determine their requirements in terms of price, comfort and aesthetics. Surveying women to define the different criteria by which they purchase dress shoes in the Australian market will assist in understanding their priorities and restraints. Consumer feedback is also the mechanism by which designers and importers respond to changing styles and what selections are offered. The next issue to address will then be what actually defines comfort, a relatively subjective area that may be sacrificed or prioritised lower with respect to aesthetics. This thesis will address a significant but neglected question about shoe sizing: “Is each shoe and foot the same size?” This will be addressed by accurately measuring the size of popular imported shoe brands and the feet of women within the selected demographic. An important final study will be to determine what the ideal shoe is when considering visual pleasure and comfort. Since these parameters can be relatively subjective, the appropriate approach to investigate will be through a collaborative design process with a focus group of working women within the demographic defined above.

The outcomes from this research will elicit factors that determine why women select shoes and what factors may affect comfort. These design parameters could lead to future recommendations for importers, buyers, manufacturers and designers within the footwear industry.

“A woman can carry a bag, but it is the shoe that carries the woman.” (Christian Louboutin, ‘RECOLLECT: Shoes’ 2014 -15, Powerhouse Museum, Sydney)
Chapter 2. Literature review

2.1 Introduction
An unavoidable limitation of this review of the literature is the limited research on footwear design incorporating aesthetics and comfort in dress shoes. The majority of research into footwear is focused on sporting requirements and investigating the impact on the foot and body. Other publications involving the foot or footwear are of a very scientific approach and include topics such as, ergonomics, plantar pressure, gait, unstable footwear on leg muscles, 3D surface scanning of the foot, and foot health issues. As such, there are limited references available to contribute to this review and it is hoped that the current project will encourage further research into this important area for working women.

2.2 Community of Practice
Since the selection of shoes can be relatively subjective, it can be difficult to define what a woman will look for when deciding to purchase shoes. My objective is to investigate and define the gap between aesthetic design and comfort design for affordable working women’s footwear. A Community of Practice (CoP) is a collective group of people that share the same profession, interests or expertise and are able to discuss and share joint learning’s on a regular basis (Wenger, 1998). Within my CoP there is a well-established investigation group in this area of comfort in footwear, technical design components, last development, technology and the foot itself, although the area of design is not represented in the same depth. My research therefore takes a scientific approach to what is traditionally design-focussed industry.

I was able to interact in person and collaborate with some of the prominent practitioners based in Hong Kong to gain feedback and future directions for my project. Ameersing Luximon specialises in Ergonomics and shoe last development and Yan Luximon specialises in Ergonomics. Ravindra Goonetilleke specialises in ergonomics, mathematical modelling factors and sports footwear (collaborative research with Nike). Goonetilleke’s post-graduate students
are studying thermal pressure, pressure points, foot stress, damage and injury. The majority of the research is very scientific and the practitioners have engineering or science backgrounds. However, the interaction and feedback from my CoP encouraged me to explore a design-based research approach to more accurately investigate this area of design in footwear. It was clear from the practitioners that aesthetic and comfort design in footwear is of high importance, although it is a grey or subjective area when it comes to evaluating and pinpointing what factors specifically contribute to aesthetics and/or enhance comfort. Some of the methods and approaches proposed by these leaders in the field were used to develop my own research strategies and these will be cited below. In particular, the research parameters of 3D foot and shoe cast scanning for a comparison study was initiated from my CoP research studies.

Other areas of my CoP are bespoke shoe makers and designers, particularly in Australia. Bespoke shoe makers, such as Brendon Dwyer¹, Rocco², Andrew McDonald³, Brothers Footwear⁴, are making shoes for individual clients that are unable to purchase shoes in their correct size and/or width. Other clients are also ordering individual shoes to be made with specific aesthetic designs with added comfort that they cannot purchase from the Australian retail market. The online store, Shoes of Prey⁵ offers a range of choices within set design styles from colour, heel height and toe shape. This CoP directly aligns with my hypothesis that there is a gap between the range of shoes available in the Australian retail market and consumer needs. To better understand the factors affecting shoe availability and suitability will require various tools to define, including surveying women’s buying behaviour and requirements within dress footwear. Factors identified as contributing to what may be considered ideal in a dress shoe can then be further investigated using a co-design approach.

Other shoe designers (small business owners), such as Tom Gun (no longer trading) and Babi Bello⁶ and Zeta⁷ are producing high quality shoes which have a point of difference from the

¹ https://brendandwyer.net/
² https://www.roccopshop.it/en/
⁴ http://www.brothersfootwear.com/
⁵ https://www.shoesofprey.com/
⁶ http://fashionprologue.com/babi-bello-ladies-shoes-online/
mass produced shoe importers. Some of these designers are manufacturing their smaller ranges in Brazil, Italy or Spain to achieve a higher quality, both in manufacture and fit. This approach to design could indicate that Australian women want more variety, quality and better fit in footwear.

On a broader scale, a CoP can extend to the fashion trend and forecasting databases, journals, books and magazines to provide an insight into what is the up-to-date trends in footwear both in Australian and globally. Most importantly, a CoP can offer an understanding of newest fashion trends and how it may impact the selection of women purchasing shoes.

2.3 How women select shoes
Since, as stated above, the selection of dress shoes can be subjective and highly personal, it would be useful to define how and why women may select a particular pair of shoes. Women select shoes for several reasons, but the primary factor is often for visual appeal, particularly for colour (Au and Goonetilleke, 2013). The heel height is also a contributing factor in the selection since it will elevate the wearer, make them look taller and, in turn, feel good about themselves (Australian Podiatry Association, 2002). In a group discussion women suggested that higher heels also have a perception of sensuality both to the wearer and the opposite sex. Purchasing footwear therefore still heavily relies on aesthetic appearance (high fashion trends), contributing strongly to the role that aesthetics play in footwear design. However, it is concerning that women are more likely to purchase shoes based on fashion and aesthetic appearance than comfort, a feature consistent in other countries (Au and Goonetilleke, 2007, Farndon et al., 2016). There is, however, clearly a lapse in consideration of aesthetics when it comes to the recommendations of podiatrists. The shoes are typically more functional than aesthetic, leading patients to preferentially wear more fashionable shoes, despite possible negative consequences to their well-being and health (Farndon et al., 2016).

The selection of shoes can also be determined by the retail price and women will generally buy within their budget (Au and Goonetilleke, 2007). Irrespective of costs, both high end designer shoes and mass produced shoes are designed in line with the latest fashion trends. This results in shoes in each price bracket looking similar in terms of heel height, colour and detailing, but it also means that cheaper shoes may compromise fit, quality and comfort to
maintain visual appeal. Comfort and practicality are rarely considered as a priority at the time of purchase but become increasingly apparent during wear (Farndon et al., 2016). This is compounded by the fact that women will often only trial the shoes for a matter of a few minutes on a carpeted area, which provides additional cushioning during the short duration of actually wearing the shoes. When discussing purchasing of footwear, women openly admit they permit a ‘wearing in’ period in hope that the shoes will stretch and soften, with comfort increasing over this time.

High heels are a popular choice for women when purchasing a pair of shoes, especially if the higher heel is a fashion trend for the season. It has been reported that high heels appear to be more popular with women in South-East Asia and are practically appealing to the younger female (16 to 35 years) to enhance appearance (Luximon et al., 2012). This may be due to Asian women, in particular, tend to be shorter in stature and want to look taller and therefore have a strong desire to wear high heels more regularly. Despite this other authors have stated that women from others countries are regularly wearing high heel shoes (Cronin, 2014, Moore et al., 2015, Zollner et al., 2015). Higher heels contribute to additional height, they make the legs appear longer, calves more shapely and body slimmer (Australian Podiatry Association, 2002, Kouchi, 2013). High heels also provide a perception of sensuality and attractiveness to the opposite sex, enhancing the ‘feel-good’ factor in the wearer®. However, high heels affect posture with the spine curving more and pushing out the bottom and chest, changing the female form (Australian Podiatry Association, 2002).

It should be noted, however, that not every woman wants to wear a pair of high heel shoes and, according to Hannah Rochell (2014) from the Australian newspaper: “Fashion has finally worked out that women will kill for a comfortable shoe” (Rochell, 2014, p. 16). It appears that the biggest issue with high heels is comfort: “Heels can be painful, or they can be slightly less painful. But they are never comfortable” (Rochell, 2014, p. 16). Today there is more choice in shoes, particularly flat style footwear. European fashion catwalk shows are featuring cool brands with flat shoes as part of their ranges. “There is certainly a move to flat shoes and a demand for flat shoes”. “It is all about comfort” (Rochell, 2014) (Rochell, 2014, p. 16)

Despite the trend to wearing flat shoes (minimal heel height), it is the opinion of some women that flat shoes are inappropriate for the corporate or professional workplace since they do not compliment a suit or stylish outfit that would traditionally be worn by women in the office. In addition to attire aesthetics, the corporate image expectation of the employer often requires dress shoes with a higher heel (Murphy, 2015). It is a concern for some women that the selections of shoes off the retail shelf are often limited in this area. There is also an assumption that the same size shoe will be the same in fit and comfort, however this can vary according to different brands. It is not until the shoes have been worn for a period of time that it becomes apparent that comfort issues occur, often with foot pain.

“When Hillary Clinton was asked recently how she bestrode the globe, she said: “Wear flat shoes, that’s my advice”. “She did conclude that it was nice not to have to think about how much her feet were hurting while at work or at a party, and happily wears flats today” (Murphy, 2015, p. 25).

2.4 Aesthetic Design
Women openly admit that they are initially attracted to a pair of shoes for their visual appeal. These areas include colour, heel high, fabrication, components used, toe shape, foot exposure, styling and detailing. It appears there are numerous factors contributing to an interpretation of good aesthetics in footwear and therefore it is difficult to accurately define (Au and Goonetilleke, 2007). A more basic question arises when considering whether form or function should be the primary consideration for footwear design. According to Au and Goonetilleke (2013, p. 178): “If a woman does not like the initial appearance they are unlikely to examine the shoes any further”. Similarly, women tend to choose shoes based on fashion and appearance and sacrifice physical comfort for psychological comfort, despite the risk of personal injury (Au and Goonetilleke, 2013).

It would appear the selection of shoes for their appearance is not gender specific and shoes need to fit the individual both mentally and physically. This image of the shoes would have an impact on the wearer’s self-image, self-esteem and pride and often a more fashionable shoe would be selected over practicality (Farndon et al., 2016). It is a general assumption by the wearers that shoes designed for comfort are less likely to be aesthetically pleasing or
fashionable, particularly since they are usually more casual (flat sole) walking or sport shoes rather than dress footwear (Farndon et al., 2016).

Despite these preconceptions, there is no specific evidence that a high heel automatically equates to preferred aesthetics and flat shoes can provide high self-esteem and pleasure in wearing. For example, a pair of Prada loafers (low heel) can be as much a fashion statement as a pair of Louboutin stilettos (Rochell, 2014). Current fashion trend reports indicate that flat shoes are no longer just having a moment in fashion, but have mainstream acceptance and have attained a kind of ‘permaglam’ that in the past this would not have been considered as a fashion trend (Murphy, 2015). However, long-standing preferences remain and it is clear that the high heel will remain a statement of high fashion. The appeal of the high heel becomes apparent when considering that almost all other uncomfortable or impractical aspects of women’s apparel, including the bustle and corset, have become obsolete, nevertheless women still insist on impractical footwear (Mistry, 2015). Therefore it would appear that women are prepared to compromise comfort to achieve the desired fashion look of the time.

2.4.1 Comfort
Women are rather dismayed by the past tradition of foot-binding in China, yet women today continue to suffer pain and hurt their feet by the shoes they wear. They restrict their walking and movement by wearing high heels, yet it is a perception that these shoes look more feminine (Murphy, 2015). There are a variety of criteria used to determine comfort in footwear, including heel height, heel cup, heel width and shape, toe shaping and width, arch support, sole construction and different types of fabrications. A survey of the difference between comfortable and uncomfortable ladies’ shoes reported that the main differentiating factors were: size of the shoe, unpleasant odours, texture, the feeling of the shoe, the sound the shoe emits, temperature and humidity inside the shoe, and amount of discomfort or pain when wearing the shoe (Au and Goonetilleke, 2007). These differences were primarily in the tactile (size, texture, feel, climate), auditory and olfactory sensations. It is therefore apparent that there are many contributing design factors that affect the comfort of a woman’s shoe.
The perceived comfort of a shoe varies depending on the individual and there are several factors reported, such as fit, material properties and construction of the upper of the shoe, skeletal alignment, and style. The most common aspects reported to affect comfort are;

1. Feeling of support from the upper
2. Foot-bed contact with the foot
3. Stability of the shoe as a whole (Branthwaite et al., 2014).

There is a perception that there are plenty of shoe choices available on the Australian retail market, although it is not known if these shoes provide a good fit or are comfortable to wear. A study in the United Kingdom found that foot issues were common, with 61% of women experiencing foot pain due to poor fitting footwear (Farndon et al., 2016). From the same research it was noted that if the shoe was tight on the wearer it may cause tissue compression or loose fitting shoe causing slippage friction to the wearer. In the United Kingdom 72% of the elderly wear ill-fitting shoes despite the shoes causing foot pain (Branthwaite et al., 2014). In Australia these figures are not known nor been investigated. Other studies have reported that a snugger shoe fit gives the wearer a feeling of increased comfort and supports the theory that “a tight shoe results in a faster and more efficient gait” (Branthwaite et al., 2014, p. 121). This could explain why people select tight fitting shoes, while still contributing to foot pain, pathology issues and discomfort.

A qualitative study examined comfort and fit of ladies’ dress shoes in 20 women aged 23 to 44, from Hong Kong (Au and Goonetilleke, 2007). Each woman was requested to bring their most comfortable and most uncomfortable pair of dress shoes and was observed while walking on a treadmill. It was apparent from a questionnaire that the shoes were purchased for visual appeal, but had limited long-term comfort, particularly for the toes, metatarsophalangeal, arch and rear foot regions (Au and Goonetilleke, 2007). This study highlighted that there was no consistent feature of what made a shoe comfortable or uncomfortable, and there was no singular problem area that caused discomfort. Therefore it would appear that comfort can be difficult to pin point and women may not be able to recognise comfort in shoes. Comfort factors may vary according to the activities performed during the day, time of day and health status, which could alter the perceived fit to the wearer.
(Au and Goonetilleke, 2007). Nevertheless, the research did indicate that comfortable dress shoes tended to be worn for longer time periods and comfort issues became more apparent during wear (Au and Goonetilleke, 2007).

Corporate women typically work long hours (~6 to 10 hours daily) and dress codes traditionally require shoes with a higher heel. However, these same women, particularly as they mature, would be likely to prioritise comfort during leisure time and select shoes, such as flat sole, sport and walking shoes, which have a high degree of comfort (Luximon et al., 2012). This is typical of Australian women when walking to work or catching public transport, when flat or sports shoe is worn as an alternative to the high heels. While this is not an ideal situation, it meets the need to be able move faster and relieve addition stress on the feet. Luximon (2012) therefore argues for interchanging heel heights to avoid high levels of dynamic walking pressure and internal foot stresses (Luximon et al., 2012). This suggests a need for comfort by establishing an ideal heel height in combination with an aesthetic dress style.

A study to investigate biomechanical elevation of the heel was conducted to establish what might be a more ideal heel height for a woman (Luximon et al., 2012). The high heel can cause considerable discomfort, long and short term injury to both the body and feet. It was apparent from the study outcomes that a 5.1 cm heel height reduced the pressure on the forefoot and heel region, balancing the distribution of pressure for the entire foot. This indicated that the lower elevation might provide a more ideal heel height than 10.2 cm height for design in the future (Luximon et al., 2012). Comfort in shoes was also related to the curve of the sole (Between the heel and ball of the foot), width, the suppleness of the leather used on the shoe and suitable heel height for the individual (Thomas and Veysset, 2015). However, there are other factors that affect the foot biomechanics from toe shape, heel shape, shoe inserts and shank curve that need to be further investigated in the future.

A podiatrist in Brisbane has had success after starting her own comfort shoe label ‘Frankie 4’ five years ago. The aim of the new shoe label was to combine comfort and aesthetics after hearing on numerous occasions that shoes recommend by podiatrists had limited or no visual appeal. The philosophy is: “a good pair of shoes makes people feel better, and the more people move, the happier they are” (Stafford, 2016, p. 5). There are now several footwear
companies selling shoes in Australia claiming that their shoes are comfortable and visually appealing, such as Frankie ⁹, Bared ¹⁰, Airflex ¹¹, Rockport ¹², Ziera ¹³ and Ecco ¹⁴. This may be the case, however the majority are a more casual styling, low heel or flat sole and would not be suitable for professional working women.

2.4.2 Fit
Comfort and fit can be interchangeable, “fit governs comfort” (Au and Goonetilleke, 2007, p. 687), because, if the shoes do not fit the wearer, then this can create an issue of comfort or foot pathology. A driving factor proposed for this research is the fact that ill-fitting or incorrect shoes may be harmful to the wearer. For example, increased heel height can intensify forefoot plantar pressure, while toe box flare not matched to the wearer’s foot shape can increase pressure on the toes (Karimi et al., 2016). It is therefore important that good fitting footwear is worn every day to minimise harm to the foot and discomfort (Branthwaite et al., 2014).

However, “Given that, individual variations in the foot’s dimensions are high, matching the shape of the foot to a suitable shoe style and therefore improving the fit can be challenging” (Branthwaite et al., 2014, p. 116). When women purchase shoes, they usually ‘know’ their size and select accordingly without any measurements been taken, regardless of shoe style (Standardization, 2015). Women’s footwear in Australia rarely offers a width range within a shoe size, indicating one width size would fit all. It is also an assumption that every shoe in the same size should be the same or similar fit. A further reason why this is not always the case is that fit (shoe size) appears to depend on the manufacturing country of origin (Standardization, 2015). Similar problems of sizing and fit appear to be an issue in United Kingdom and there is a concern that designers and manufacturers are not taking to the time to address the problem of poor fit and to improve their shoe product range (Branthwaite et al., 2014).

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¹³ https://zierashoes.com/au
¹⁴ http://au.shop.ecco.com/
2.5 Health issues

One aspect of shoe selection that can be neglected but it vitally important is the role that shoes may play in short- and long-term health. As woman age, their feet become more sensitive and less tolerant to high heeled and ill-fitting shoes, particularly if they have had children. Dr Suzanne Levine, a podiatrist, states that: “as we age, we lose the fat padding on our feet”, supporting the concern that the feet are more susceptible to injury with age. The primary client compliant is “they suffer from a burning feeling under the balls of their feet” (McMahon, 2014, p. 31). The use of cushioning inserts in shoes can lessen the incidence of sensitive feet and enhance comfort while wearing heeled shoes at work (Yung-Hui and Wei-Hsien, 2005). Though, some shoes do not appear to accommodate this modification since it tightens the shoe. The soft gel inserts have a limited life span (2 to 3 months depending on amount of wear) and are an additional expense on top of the original cost of the shoes. The alternative to using inserts in shoes is a current trend in New York, where injections of Sculptra (poly-L-lactic acid) into the balls of the feet to increase cushioning. This expensive treatment needs to be repeated every 6 to 9 months to retain the required cushioning to wear fashionable shoes (McMahon, 2014).

Many women resort to wearing flat shoes while commuting to work and then change, if adhering to a dress code. This is less than ideal since women effectively require two pairs of shoes. Even if women preferred or were permitted to wear a comfortable shoe at work, the work-place often dictates expectations and requirements, compromising the choice to protect the feet and general health. Traditionally corporate women are required to wear dress shoes with a higher heel and are on their feet for long periods of time. A well-known shoe blogger (Mathilde Toulot) in France suggests that wearing high heels in the work place can be a distraction to the wearer’s thoughts and more time is spent focusing on foot pain and discomfort rather than the tasks required (Thomas and Veysset, 2015).

An important consideration, irrespective of dress codes or expectations, is that standing for 2 hours or more in uncomfortable shoes induces pain and fatigue in the low legs, lower back and body, with swelling and discomfort. The shift to standing desks could also cause pathology issues in the modern office environment. It appears that continuous standing on a hard floor causes discomfort and increased legs issues, especially with flat-bottomed shoes or barefoot (Karimi et al., 2016). Therefore it would seem that there needs to a compromise
between high heeled and flat bottom shoes to achieve an ideal heel elevation, which was discussed above in the section of comfort. There is a significant reduction in the incidence and extent of problems when women wear comfortable shoes, particularly styles recommended by podiatrists, since these shoes are typically more functional than aesthetic. Despite this good advice from their podiatrist, men and women still tend to preferentially wear more fashionable shoes, ignoring the possible negative consequences to their well-being and health (Farndon et al., 2016). Therefore common issues continue with blistering, chafing, black toes, bunions, pain and tired feet resulting from poor fitting shoes (Goonetilleke, 2003).

Despite high heels causing foot health issues, they are currently widely worn by women around the world. A study was conducted examining the load transfer of biomechanics in order to design better fit and comfort in shoes. When heel elevation is increased in the shoe it transfers the foot centre of pressure from the mid-foot region to the forefoot region. The internal stress of the foot bones is therefore increased, especially in the second, third and fourth metatarsals; this region in particular has high risk for foot issues in high heeled shoes (Luximon et al., 2012).

In the same study by Luximon (2012) it was reported that a 5.1 cm heel height reduced the pressure on the forefoot and heel region, as previously mentioned in the comfort section. The shank curve design is also an important factor to distribute the foot pressure, especially when the foot fits the arch of the shank (Luximon et al., 2012). Overall heel elevation had significant effects on centre of pressure, contact area and internal stress of the foot when wearing high heeled shoes. One study suggested that a low heel is not more harmful than flat heel shoes, when plantar pressure and internal stress-strain are examined (Luximon et al., 2012). However, in the case of higher heeled shoes (10.2 cm) that are worn for a long time daily, the forefoot has a higher risk of disease (Luximon et al., 2012). Where other author’s recommend that permanent use of high heels should be avoided, they cause imbalance to the wearer and therefore predisposed to falls and injuries (Mika et al., 2016).

According to Anna Murphy, fashion director at ‘The Times’ in London, women working in fashion are expected to wear high heel shoes varying from 10 to 15 cm in heel height. In the fashion world 10 cm heels are considered ‘comfortable’ as this is the visually accepted standard in the competitive fashion office environment (Murphy, 2015). Interestingly,
Murphy herself now no longer wears high heels after reading a book; *A short Guide to a Long Life* by Dr David Agus (Agus, 2014). The book listed 12 most important things for a healthy life, with comfortable shoes prominent on the list, prompting Murphy to shun high heels. Angus states that wearing uncomfortable shoes may impact on the entire body due to excessive inflammation. The inflammation has been linked to degenerative diseases today, including cancer, heart disease and Alzheimer’s (Agus, 2014). The College of Podiatry in the United Kingdom warns women that wear high heels regularly at work can be prone to bunions, ankle sprains, back issues and tight calves. A time of “one hour, six minutes and 48 seconds” is the time it takes for the women to encounter pain from the high heels (Bates and Parkinson, 2016).15

Despite all this support for foot health, a London female employee from a corporate finance company (Price Waterhouse) was sent home in May 2016 for not wearing shoes with a heel. The heel height required by the employer was 2” to 4” and no flat shoes were part of the uniform rules (Khomami, 2016). This apparent infringement of a personal right to well-being was able to be over-ridden since employers in the United Kingdom can legally enforce a ‘reasonable’ dress code, providing there has been adequate time to purchase the required attire, and can dismiss employees that fail to follow the dress rules. This is despite reports that high heels can cause damage to the feet, joints and increases the risk of osteoarthritis (Bates and Parkinson, 2016). There is also evidence that the foot and body have to compensate for changes in the structure of the foot while wearing a high heeled shoe, regular wearers are more likely to endure foot pain, tissue damage, increase muscle activity and change their gait (Chien et al., 2014). The subsequent change in foot shape and load distribution can induce lower back pain, plantar pain, discomfort, muscle fatigue and even deformities (Luximon et al., 2012). These problems are exacerbated in the forefoot region of women who continually wear high heeled shoes, with the foot becoming less tolerant and requiring more support and comfort over time (Luximon et al., 2012). High heels will also cause tightness and shorting of the calf muscle and therefore alter the ankle motion (Borchgrevink et al., 2016, Zollner et al., 2015). Importantly, the earlier the age that high heels are worn increases the potential for hallux valgus to occur (Borchgrevink et al., 2016).

A report by Mistry (2015) in the Weekend Australian newspaper 6-7 JUNE suggested that shoe heel heights in the work place have changed. Over the past 15 years there has been an expectation that 9 to 11 cm high heel shoes were required as part of women’s employment in the fashion industry. Recently, shoe designers, such as Roger Vivier, Paul Andrew, and Edgardo Osorio, have reviewed heel heights and considered the comfort and potential for health issues of the consumer. They are now making a single style of shoe with a 3 to 4 cm heel height. Many shoe designers agree that women cannot wear high heels all day let alone every day and have changed the shoe ranges to accommodate the consumer needs. An example is Osorio, designer for Aquazzura, who has made versatility and comfort a priority and offers seven shoe styles in three heel heights and one shoe style in four heel heights (Mistry, 2015).

Enclosed shoes recently have become mandatory in some Australian workplaces due to Occupation, Health and Safety (OH&S) regulations in a variety of professions. Footwear therefore needs to meet safety and practicality standards, although this further restricts the availability of visually pleasing shoes. Regardless of gender, shoes need to fit mentally and physically; the image of the shoes have an impact on the wearer’s self-image, self-esteem and pride and often are more fashionable shoe is selected over practicality (Farndon et al., 2016). It would therefore appear that footwear design must accommodate both visual appeal and potential foot safety requirements.

From recent studies it has been shown that the shoe heel height has a greater impact on gait and balance than the heel thickness. Footwear design needs to be analysed and modified to accommodate ergonomics, with size, outline and shape of the foot strongly considered. This could be achieved through 3D scanning of the foot and combining 3D printing to obtain accurate measurements and models, creating an ideal fit to a person’s foot. The introduction of 3D printing for the future would provide a new design and manufacturing process decreasing the cost, shorten the supply chain, creating more options for the consumer and a better fit (Lin and Chen, 2015).
2.6 Measurements and sizing

A variety of methods have been used to measure foot size, including manually drawing around the foot, using a tape measure, the popular Brannock device (foot-measuring tool), or using a plaster cast. Traditional casting methods of the foot have used plaster of Paris, but this has been shown to be unreliable when casting the foot, since the timing of application and the use of water could affect the accuracy of the final cast (Khomami, 2016). In more recent studies it has been shown that 3D scanning of the foot provides an accurate representation of the foot and is a quicker, easier and cost effective way to collect data for analysis from a larger number of people (Petrova and Ashdown, 2008, Telfer and Woodburn, 2010). It has been shown that 3D laser scanning of the foot permits accurate and repeatable measurements of the foot (Telfer and Woodburn, 2010). The 3D scanners provide a more detailed assessment of the contours of the foot and more precise anthropometric measurements. Digital scanning techniques have been proven to be more accurate and reliable to capture the foot measurements compared to previous methods. There are several 3D scanners available on the market that perform similar functions and have comparable results (Carroll et al., 2011, Telfer and Woodburn, 2010). The two main types of scanners are a hand-held 3D scanner or a 3D scanner box or platform.

An important reason for accurate foot measurement is that discrepancies between the shoe and foot are obvious contributors to discomfort, while correct fitting footwear will minimise harm and discomfort to the foot. Any mismatch between fit and advertised sizing may have the potential to cause short and long term foot issues and pathologies. It was highlighted in the United Kingdom that footwear manufacturers and designers should be focusing on improving the product range and conversing with clinicians to increase awareness of sizing issues between styles (Branthwaite et al., 2014). Similarly, Australia does not appear to have clear shoe standard measurement guidelines or product testing as each shoe label displays their own individual size chart on the internet, such as Mather\(^\text{16}\), Sandler\(^\text{17}\), Wittner\(^\text{18}\), Asos shoes\(^\text{19}\).

\(^{17}\) http://www.sandler.com.au/sizes
\(^{19}\) http://www.asos.com/au/women/footwear-size-guide/%3Fsزgد%3D8
2.7 Manufacturing/Bespoke

The design of what could be regarded as comfortable footwear does appear to have many variables associated with it, particularly when shoes are worn over a longer period of time. The quality may be compromised in South-East Asian factories to meet the low price points for the majority of ready-to-wear shoes available in Australia, Asia and America. Equally, the majority of Western retailers rely on Asian manufacturers to provide the shoe lasts for mass production and subsequently a mismatch in foot measurements occur (length and width) might arise, resulting in poor fit and other footwear problems (Goonetilleke, 2003). There is not sufficient current research to know what shoe sizes may suit foot sizes of different regions, nor between the difference in sizes between Australia and America. Yet Australia uses a range of size standards from United Kingdom, Europe and America. These factors could support the need for more customisation and technological approaches to overcome many of these fitting problems.

What is becoming increasingly obvious is that Chinese and other South-East Asian manufacturers must adapt their mass production approaches to improve fit and last selection, else risk jeopardising their future market, since otherwise they would be unable to meet the requirement for diversification and higher quality products (Wang and Tseng, 2013). It is likely that future demand will require more comfortable and effective design, with cost a lower priority than the current market. Large-scale customization may be the model of the future and a win-win strategy for both the footwear producer and consumer (Wang and Tseng, 2013). This may be more effective in a country with a larger population, but even in the smaller-scale market of Australia, bespoke, value-added localised manufacturing would give an opportunity for customers to satisfy their individual needs in comfort and design.

British shoemaking in Northampton is flourishing after many years of decline and there is a strong demand from overseas markets for craftsmanship and individuality, instead of mass production. The county of Northampton is the home to some of the most prestigious men’s footwear brands, such as Prada-owned Churches, Joseph Cheaney and Sons, Hermes-owned John Lobb, Crockett & Jones, and many others. This region in the East Midlands is known for its fine quality British products, and cobblers are now thriving, it has not been this busy since
In the 1950s (Dixon, 2014). Another example of a manufacturer catering to consumers perusing better quality and fit is a customised shoe factory in Shenzhen, China, where 90% of the production is for individual clients, primarily women from Hong Kong. It would appear that footwear available on the retail market is not satisfactory and this producer is catering to a trend for both women and men to want a better fit, quality and comfort in the footwear. This type of attitude could support a trend for buying quality and bespoke or mass customisation footwear in the future.

In the United Kingdom in the 1980s, the production of footwear began to move offshore and shoemaking jobs started to disappear and factories closed their doors in Northampton. However, recently after decades of decline, orders are increasing and so is the production of footwear. The irony is that there is now a demand from China, the very country that offers cheap production and the footwear industry globally. Other Asian countries also showing interest in demand are South Korea, The Philippines and Japan. “What foreign buyers see is heritage, craftsmanship and individuality – not mass market” (Dixon, 2014). This trend in Northampton supports a theory that people will want higher quality footwear rather than quantity with poor quality in the future. This could therefore suggest that there is a global need for customisation of footwear for both men and women to improve fit and quality of construction methods.

In Australia shoe designers (small business owners), such as Tom Gun and Babi Bello, are producing high quality shoes which have a point of difference from those of the mass produced shoe importers. These designers are manufacturing their small ranges in Brazil and Italy to achieve a higher quality, both in manufacture and fit. These designers further support the view that Australian women are requiring better quality both in comfort and aesthetic design. Therefore purchasing fewer shoes at a higher price range rather than quantity at a cheaper price point could achieve a better outcome for the wearer’s feet.

There is disagreement (findings reported above) about what constitutes comfort, a good fit, correct sizing and visually pleasing footwear for women. Considering the information above, the inadequate communication between manufacturers and designers, and the trend to custom made footwear, it might be that another way to achieve better footwear for working women would to explore the possibly of co-design.
2.8 Co-design

Collaborative design is not new in footwear and there have been several sports companies that have had success with online personalised footwear. Well-known companies, such as Nike iD, Mi Adidas and Your Reebok allow their consumer to personalise the appearance of the shoes, primarily with colour, for a diverse collection of footwear. However, Levi Strauss in the apparel market has not had the same success with their attempts to offer personalised goods (Head and Porter, 2011, Kang and Kim, 2012).

Co-design has become increasingly popular in a variety of fields and could be beneficial to developing products that meet customers’ needs, creating positive outcomes (Steen et al., 2011). Steen strongly argues that: “co-design can be understood as a process of collaborative design thinking: a process of joint inquiry and imagination in which diverse people jointly explore and define a problem and jointly develop and evaluate solutions” (Steen, 2013, p. 27). Another form of collaborative design is ‘Mass customisation’ (MC), a combination of custom-made and mass-produced products driven by an emphasis on niche markets within the global economy. This is similar to co-design but on a mass scale for production purposes (Kang and Kim, 2012). Therefore introducing co-design into different areas of footwear would be a logical path to improving and enhancing both design and comfort in shoes available for the retail market.

A published study on co-design research with an elderly group to gain a better appreciation of their experiences and daily lives, to increase their participation in social networks (Steen et al., 2011). In another study with a group of 50 school students, the group was divided into smaller groups of four with one facilitator. The facilitator then guided the children’s focus by storytelling to obtain their views and ideas for possible new business creation (Steen et al., 2011). This was intended to generate innovative creativity in the design of new telecom services. While both these co-design groups were not for a design based study, it still examined the experiences and knowledge from a relevant cohort of people to develop concepts. Co-design can be referred to as ‘collective creativity’ and can be applied across a range of design disciplines, where it might be understood as a “creative cooperation during design processes” (Steen et al., 2011, p. 53). This could therefore be a tool to form a focus
group of women to explore the possibility of improving women’s comfort, fit and aesthetics in dress shoes for the future.

2.9 Conclusions
In summary, there are many diverse reasons as to why women may select footwear and only limited scientific evidence to define comfort, fit and design in a shoe. This thesis will investigate the gap then explore how aesthetics and comfort could be combined to achieve more desirable dress shoe designs for the working women. The first inquiry therefore will need to define the attitudes that Australian women currently hold toward the relationship between the visual appearance and comfort of dress shoes. Investigating the different motives why women purchase dress shoes will assist in understanding their priorities and limitations. It should be noted that choice in terms of a Woman’s footwear can be personal preference or the availability of footwear on offer or a combination of both.

Following on from exploring attitudes, it is then necessary to examine what is currently a very subjective area of what parameters might constitute a comfortable dress shoe. The lack of standards or scientific opinion and substantial anecdotal evidence suggests that defining comfort in a shoe is a contentious area. It then naturally follows that combining the needs, in terms of what women expect or are expected to wear, with definitive standards of comfort should provide guidance of what a shoe may look like which combines visual pleasure and comfort. Closing the loop, contemporary feedback could be elicited using a collaborative design process inviting group of participants to share their personal experience and knowledge in purchasing and wearing dress shoes towards what should be more desirable footwear in the future.

The overall aim of this research is to develop better insight into working women’s dress shoe selection, requirements, preferences and availability, to make future recommendation to the Australian footwear industry.
Chapter 3. Survey of attitudes from Australian women towards purchasing shoes

3.1 Introduction
The visual appearances of a pair of shoes are the most important features of the overall design and this will strongly influence the likelihood of purchase. Despite this, aesthetics can be personal and difficult to define as each woman has their own individual interpretations (Au and Goonetilleke, 2007). The perception of comfort is also a subjective parameter, but has little to no relationship to the shoe’s appearance. A qualitative study examining comfort and fit of ladies’ dress shoes was conducted in Hong Kong (Au and Goonetilleke, 2007). The twenty participants were requested to bring their most comfortable and most uncomfortable pair of dress shoes and were surveyed while walking in these shoes on a treadmill. The participants completed a survey designed to obtain their perceptions of shoe fit and comfort. This survey highlighted an interesting perspective of determining comfort in shoes since there was no consistent singular feature of what made a shoe comfortable or uncomfortable. Unfortunately, there are few other studies or published information examining the relationship between design and comfort in women’s dress footwear.

Research findings on women’s footwear have reported that women will select shoes on their appearance as the first priority and consider all other areas as a secondary consideration. It would appear that it is not unusual for a woman to select a pair of shoes solely for their visual appeal and be prepared to risk harm to their feet and forgo comfort (Slater 1985).

In the current study a survey was used to determine how and why women purchased shoes. The survey focused on dress shoes for the work place and not shoes worn in leisure time. The results from this study will provide a better understanding of the requirements for Australian women’s footwear and examine the relationship between aesthetic design and comfort design for affordable working women’s footwear.
3.2 Methods
A survey was designed to investigate the criteria by which Australian women select a pair of shoe, including aesthetics, brand and comfort. The questions were directed to working women and sought their views, requirements, needs and how they purchase dress footwear. There was a range of questions covering the categories of comfort, aesthetics, preferred brands, price range, size and satisfaction of shoes in the market place. The survey questions were initially based on a study by Au and Goonetilleke (Au and Goonetilleke, 2013) and then refined and updated following feedback obtained with personal conversations with footwear industry, stakeholders and women.

One hundred and forty three working women, ranging in age from 30 to 60 years participated in the online survey, for a period of 3 weeks, inviting women to participate and participation was anonymous. The survey was advertised on open popular fashion social media sites. There were 31 questions in total and it was anticipated that the time required to complete the survey was approximately 5 to 10 minutes. Most questions were a Leichhardt scale format, although more open-ended responses were available for questions 26 and 30 (Appendix 1).

3.3 Results
A total of 143 women completed the survey, with the majority (76%) between the ages of 30 to 60 years, while some women (n=4) elected not to disclose their age and a third (31.7%) were between 50 to 59 years.

The survey results suggested that women in Australia had difficulties when purchasing footwear. Women appear to have some difficulty (75%) in purchasing the appropriate size for their feet and 66.5% appeared to have experienced problems with fit (width and depth). When asked if there was a problem with purchasing the right style of shoe for their foot (Q. 10), many (64%) indicated that this was a concern. The survey responses showed that 60.3% of the participants considered that appearance (Q. 12) was highly important. When asked to compare appearance and comfort (Q. 11), appearance rated a higher priority (42%) than comfort (23%), while 90% of participants considered that the colour of the shoes was very important or important (Fig. 1).
When women were specifically questioned (Q. 11), in the survey about comfort, 88% of women rated comfort as an important factor when purchasing a pair of shoes. However, 88% also had indicated problems with comfort within their shoes after wear. The survey (Q. 18) was specific about the time frame of wearing shoes and the appearance of discomfort, 58% of participants acknowledging that they had comfort problems within the time period of 2 to 4 hours of wear, shown in Fig. 2.

Figure 1. Selecting shoes for colour

Figure 2. Time period for discomfort
Question 20 specifically asked the participants to indicate areas of discomfort in shoes, the majority responded with discomfort in the toe area (62%), lower foot (36%) and 27% acknowledged issues with the back of heel. Only 29% of women admitted they had problems with fit in an early question (2), therefore this must become more apparent after wearing the shoes for a period of time. To support this theory, question 19 indicated that the majority (93.8%) of the women surveyed have shoes in their wardrobes they rarely wear due to discomfort levels. Most women (84%) preferred to buy leather footwear over any other material or product and mostly (60%) preferred to purchase a low to medium heel height.

The participants that responded in the survey indicated they worked across a broad cross-section of occupations. The participants indicated (Q. 6) that they would either mostly walk or stand 3 hours a day (32%) or stand or walk all day (25%) during an 8 hour day. The majority of these women (82.7%) usually wore the same shoes to and from work (Q. 8), although 60% indicated they would change their shoes if walking longer distances. It also appeared to be common practice (60%) for women to wear the same pair of shoes to work 2 to 3 days a week.

The majority (89%) of women surveyed prefer to purchase their shoes in a retail store rather than online, although 73% of the women participating in the survey did not buy from one specific store or brand, but tended to shop from a variety of retail outlets. The average price women paid for a pair of shoes was $100 to $200, with 59% of women indicating they would purchase 3+ pairs per season (Q. 23).

Most women (61%) indicted in the survey said that they had no idea of the country of origin of the footwear they had purchased, but 75% of the women surveyed were not satisfied or uncertain with the shoes available on the Australian retail market and would like more variety, better quality and lower price (Q. 30).

### 3.4 Discussion

The overall response rate to the survey was highly positive with 133 responses within 2 weeks of the survey been uploaded and 143 responses by the end of 3 weeks. This outcome supported the notion that Australian women have an interest and opinion about shoe selection. The survey focused on dress shoes for the work place and not shoes worn in leisure
time. Leisure shoes are usually flat soled, with casual styling, occasionally with open toes and often heavier or sporting in appearance.

An important finding was that 75% of the women surveyed had experienced some problems when purchasing footwear relating to size, while 66.5% had problems with fit and 64% had difficulty finding an appropriate style. It would therefore appear that the footwear available in Australia for women may not adequately cater for their needs or expectations, although there is little in the literature concerning this issue.

Aesthetic appearance (Q. 12) was considered to be highly important for 60.3% of participants when it came to purchasing a pair of shoes. When asked to compare appearance and comfort (Q. 11) 42% of participants indicated appearance as the primary reason for how Australian women selected shoes, with comfort (23%) rated much lower. Interestingly, the participants then indicated (Q. 16) that comfort was a higher priority (88%) than fit, price and quality. Despite this, the importance of appearance when selecting a pair of shoes was similar to what had been reported in other countries (Au and Goonetilleke, 2007). Furthermore, 90% of women rated colour as important when selecting shoes. It may therefore not be surprising that 88% of participants had experienced varying degrees of discomfort with their shoes upon wear (Fig. 3). Similarly, Au and Goonetilleke (2007) reported that women had difficulty assessing comfort in a shoe prior to wear and suggested that women may state they are selecting for comfort but in reality are primarily influenced by appearance when purchasing a pair of shoes. It was interesting that the majority of women (84%) preferred footwear made from leather over any other alternative fabrication, although it was uncertain if the women associated leather with comfort and/or quality.
One issue that was apparent from the responses to the survey was the time period over which discomfort appeared when wearing shoes, with 58% of participants indicating that they experienced discomfort within 2 to 4 hours of wear. This appeared to be associated with particular regions of the shoe, including the toe area (62%), lower foot (36%) and the back of the heel (27%). It would appear that there may be insufficient width, particularly in the toe region, leading to discomfort. However, because only 29% of women admitted they had problems with fit in the survey (Q. 2), it may be that problems with fit may become more apparent after wearing the shoes for a period of time. This was consistent with an earlier study (Cheskin, 1987) in which it was reported that both a firm or loose fit can still cause discomfort issues and lead to pain or injury to the wearer. However, it may appear that several regions of a shoe may contribute to discomfort, with 93% of the women surveyed owning shoes that they rarely wore due to discomfort.

The survey participants responded that they were employed in a broad range of occupations, with 32% walking or standing for 3 hours a day, while 25% stood or walked throughout an 8 hour day. Most (82.7%) women surveyed wore the same shoes to and from work, with few changing their shoes to travel. Many of the survey participants (60%) wear the same pair of shoes 2 to 3 days a week, although many also responded that they would change their shoes if walking longer distances was required. It therefore seems likely that shoes worn at work

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*Figure 3. Purchasing shoes on appearance*

![Chart showing how important the appearance is when purchasing a pair of shoes](chart.png)
are limited in function or walking distance and may not be comfortable or practical for walking greater distances.

There was a strong preference (89%) for shoes purchased in a retail store rather than online, which suggested that women are wanting a more personal experience and to be able to try on the shoes, hence achieving a better overall fit and avoiding returns online if unsatisfactory. Also the age group of 30 to 60 years may be less versed in purchasing a pair of shoes online generally. The survey results also suggested that Australian women did not pursue bespoke footwear as an alternative option, possibly due to financial considerations, or may not be acquainted with bespoke craftsman. The participants (73%) did not purchase shoes from one specific store or brand, but tended to shop in a variety of retail outlets. This result suggested that women were not finding satisfaction within a particular brand or store and prepared to shop around to compare styling and price points. The participants surveyed were specifically asked about purchasing price ranges, with the average price paid for a pair of shoes to be in the range $100 to $200, with 59% of women purchasing 3+ pairs per season. This could suggest that women want to purchase more shoes per season but are restricted by the availability of style, fit and size in Australia.

The majority (60%) of women surveyed (Q. 28) indicated they did not know where their shoes were manufactured, although a cohort of women (44%) in the next question did indicate that their shoes were manufactured in China or another Asian country. This may reflect some confusion as to where their shoes were actually manufactured or an assumption that shoes were generally manufactured in Asia. Three quarters of the women surveyed were not satisfied or uncertain with the variety of shoes available on the Australian retail market. The women indicated they would like more variety in styling, better quality and lower price. The open-ended responses to this survey question (Q. 30) suggested that some participants preferred European manufactured footwear and felt the these shoes had a better fit, quality and were more price competitive (when purchased overseas) than shoes manufactured in Asia and imported into Australia. It could also mean that the sizing of European shoes is similar to Australian sizing requirements of width and length, therefore meeting some of the comfort issues. It appeared from the participants surveyed that 44% were purchasing shoes manufactured in Asian countries, but these shoes did not meet Australian women’s consumer needs.
The results from this study suggest that shoes imported into Australia may not be an ideal fit for the average Australian woman’s foot. One possibility is that the shoes are constructed from shoe lasts more suited to an Asian women’s foot, which is generally smaller and narrower. This could explain why women in Australia are having issues with fitting and comfort since the majority of shoes are manufactured in Asia. It should also be noted that the relatively lower cost of shoes imported from Asian countries is achieved by mass production using cheaper construction methods, such as glue instead of stitching and synthetic inners instead of leather, with limited arch or padding for foot support, all contributing to a lower level of comfort. These concerns are exacerbated by the fact that women would usually only spend 5 to 10 minutes trying on the shoes in the store and walk a couple of metres, often on carpet (creating additional padding at the time), so the poorer quality of the shoes would be less apparent.

3.5 Conclusions
This study has demonstrated that Australian women have some problems purchasing the required footwear from fit, size and appropriate style. The women surveyed purchase footwear for their aesthetic appearance and colour, while comfort, quality and fit are less of a priority. It would appear that women initially have problems determining the degree of comfort, which becomes more apparent after wearing the shoes for a period of time. This discrepancy in footwear comfort may be a significant topic for future study. Overall the survey had a positive response rate and the women surveyed were not satisfied or uncertain with the shoes available on the Australian retail market and indicated they would like more variety, better quality and lower price.


Chapter 4. Foot and shoe scanning case study

4.1 Introduction

There are plenty of shoes to choose from in the Australian retail market, although it is not known if these shoes provide a good fit or are comfortable to wear. In the previous chapter of this thesis, a survey of Australian women found that 80% of respondents admitted they had shoes in their wardrobe they did not wear due to discomfort issues. The majority (58%) of these women also stated that they experienced comfort problems following 2 to 4 hours of wearing their shoes. These findings suggested that women may select shoes primarily on appearance, with significantly less consideration for comfort or ergonomics (Farndon et al., 2016). If high-heeled shoes are required for work they are less likely to be comfortable, particularly within the price range selected from a previous survey of $100 - $200. One issue that may not have been considered as contributing to discomfort is the fact that there may be discrepancies in fit and sizing in shoes available commercially in Australia.

While it has been established in this thesis that ill-fitting or incorrect shoes may be harmful to the wearer, there would be an expectation that a labelled shoe size is consistent. However, experience with other items of apparel may bring into question this assumption, since ‘medium’ appears to cover a range of dress sizes. It would therefore be prudent to determine if shoes sizes are consistent and accurate.

There are a number of methods available to measure foot size, including manually drawing around the foot, using a Brannock device, plaster cast or different types of scanners. However, 3D scanning of the foot has been shown to be accurate, while also providing a quick, easy and cost-effective way to collect and compare foot sizes from a large number of people (Petrova and Ashdown, 2008, Telfer and Woodburn, 2010). Similarly, 3D scanning could also be used to accurately measure shoe sizes if the interior of the shoes can be defined. In this study, an advanced 3D scanner was used to measure the dimensions of feet from women who had indicated a specific foot size (38) and from a range of shoes labelled as size 38 following a cast of each shoe using silicone rubber. The next section of the study is where the shoes then could be tried onto the participants for feedback on fit, sizing and comfort.
4.2 Methods

4.2.1 Foot Scanning

In this study a representative sample of the population with a specific foot size was scanned and then compared, using the same technology, to accurate casts from shoes of the same size. Previous approaches to measuring foot size included manually drawing around the foot, using a Brannock device, using a plaster cast or other scanners. However, it has been shown that 3D laser scanning of the foot permits accurate and repeatable measurements of the foot (Telfer and Woodburn, 2010). There are other 3D foot scanners available on the market, such as the ARTEC 3D scanner, which was used during pre-testing, but was found to be time consuming. This partly related to the fact that the ARTEC 3D scanner was particularly sensitive to movement and distance, adding additional noise onto the scanned image and then requiring extensive editing. An INFOOT USB 3D foot scanner was used in preference to a hand-held 3D scanner for speed, accuracy, and convenience. This scanning process was fast, non-intrusive and low risk to participants (Fig. 4).

Fifteen Australian women currently in the work force, aged between 30 to 60 years and normally wearing a shoe size 38 were enrolled in the study. Each of the participants had both feet scanned with an INFOOT USB 3D foot laser scanner (Fig. 4). When using the foot scanner the participants were required to stand with equal weight on both feet, involving a small risk re-balance to minimise risk of fall when standing in scanner box, participants held onto a hand rail. The INFOOT scanner captures accurate data up to 0.3 mm with a scanning speed of up to 16 seconds creating a high quality resolution scan using eight cameras and four laser projectors. The foot is marked with anatomical landmark points and 20 measurements were collected for each foot. The scanning software also used foot analysis and measurement algorithms. The points of reference for scanning are shown in Fig. 5.

Figure 4. INFOOT USB 3D foot laser scanner
(From: www.iwl.jp/main/infoot_high.html)
Figure 5. Scanning points and measurements.

The lines measure: 1. Instep circumference, 2. Ball girth circumference
(From: www.iwl.jp/main/infoot_high.html)

The participants were women selected from a pilot survey that indicated a willingness to volunteer for further research studies. These particular participants did not have any ankle or foot pathology issues or disease at the time of testing, this question was part of the study
induction and confirmed prior to scanning. The completion time for each participant was approximately 15 minutes, scanning both left and right feet. The INFOOT scanner meshes the raw data from the foot form and anatomical landmark points then calculates the foot measurements.

On conclusion the computer software processed the information and created an anthropometric model of both feet (Fig. 6). The scan revealing a full 3D image of each foot (Left and Right) appears on the screen with its size, width (A,B,C,D,E) and arch height and heel angle according to the software measurement standards. The standard width sizing is based on the Brannock measuring device (USA patent) and length based on USA foot measurement standard sizing. A women’s foot width measurements can be categorised in terms of; AA/A = narrow, B = Average, C/D = wide and E = extra wide, (Fig. 6).

Figure 6. 3D imagery of the foot and sizing measurements

A measurement table is created within the software for analysis, breaking the measurements into length, height, width, circumference and angle for both left and right feet. This data is mapped according to the average foot size (Fig. 7).
Figure 7. Left and Right foot soles displays the length and width points taken during the scan

Foot scan measurement table displays a breakdown of measurements; both left and right feet; Length, Height, Width, circumference and angle (rows 2 & 3). The individual foot measurement differences (row 4) and measurement comparison to the average foot (row 5).

4.2.2 Shoe Cast Scanning

The second part of the case study involved purchasing six pairs of commercially-available dress shoes that had been manufactured in China and labelled size 38. The majority of lower priced shoes imported into Australia are from South Eastern Asian countries, primarily China. Therefore selecting shoes manufactured in China was part of the selection and study criteria. The six shoe styles varied from a heeled pumps, heeled loafers to low and high heel ankle boots (Fig. 8). These same shoes were from a variety of commercial brands within a set price range of $70 to $200 Australian dollars. A pilot study (unpublished results) had determined that the most common size worn was a size 38 to 39 and that Australian women were likely to spend between $100 and $200 Australian dollars for work shoes. Six different styles of shoes were purchased specifically for this study from a variety of chain retail stores that sell Australia-wide. The shoe selection criterion was determined on suitability for a professional working woman’s enclosed dress shoe and casting potential. The footwear had to be fully enclosed and limited in forefoot depth (no toe cleavage) to accommodate the liquid casting
material. The lining of the shoe needed to be relatively smooth to avoid the liquid seeping into the lining fabrication, which would create additional issues in removing the cast. Also any possible areas within the shoe interior that would likely to leak the casting liquid had to be identified and secured (zip openings) with masking tape.

**Figure 8. Six shoe styles used for casting and fittings**

![Shoe styles](image)


The interior of the left shoe from each of six styles was cast with a liquid product, Pinkysil, silicone rubber. Only one shoe of the pair required casting and the left was selected to be consistent, with no other reasoning behind this selection (Fig. 9). Traditional casting methods of the foot have used Plaster of Paris, but this has been shown to be unreliable, since timing, water quantity and removal of the cast could all affect the accuracy of the final cast (Carroll et al., 2011, Dombroski et al., 2014). Furthermore, the shoe must be cut away to expose the cast once it has set and Plaster of Paris is not sufficiently flexible to permit removal without being damaged. The liquid silicone (mixed 1:1 by volume) was fast setting and resulted in an accurate and flexible cast with shape memory ability. The silicone maintains its original shape after setting, regardless of having been flexed numerous times or removed from its cast. A further advantage of the Pinkysil formulation was that it had a thicker liquid consistency and
was rapid setting, so the pouring of the cast could be completed in stages, to avoid any overflow and achieved a full cast of the shoe interior. Once set, the cast was removed by flexing the silicone in shoe mid-region or very carefully cutting through the exterior of the shoe in some cases. There were some minor difficulties removing the cast, since the Pinkysil seeped through the shoe lining and/or adhered to the heel cup liner, resulting in two shoes being destroyed as the cast was carefully cut from the shoe. In these particular cases the shoes were destroyed to maintain the cast and only one of the pair remained for fitting on the participants.

Figure 9. Six shoe castings


Each shoe cast was then scanned with the INFOOT USB 3D foot scanner collecting the same measurements that were collected from the feet of the participants (Fig. 7). The scanner software processed the information and created a 3D image of the cast and measurement table for analysis, breaking the measurements into length, height, width, and circumference of the shoe cast interior (Fig. 10). Only the left shoe was cast, so there was no reading for the
right shoes, hence a measurement of 0.00 (Fig. 10) with no difference in variation able to be calculated from the left shoe. Furthermore, several regions of the casts could not be measured using the scanner, such as the ankle, instep and arch regions, since these areas were either not able to be cast (e.g. ankle) or the design of the shoe did not actually cover a specific area (e.g. some shoes were cut away over the instep). The only accurate measurements for comparison between feet and shoe casts were therefore foot length, foot width, heel width, height of forefoot and ball girth circumference (Fig. 7 & Fig. 10).

The advantage of the INFOOT scanner in the current study was that it captured data down to a resolution of 0.3 mm within 16 seconds for the entire foot, creating a high quality and accurate scan with minimal movement impact. The 3D scanners provide a more detailed assessment of the contours of the foot and more precise anthropometric measurements. This accuracy was also useful for scanning the shoe casts and making measurement comparisons between the foot and interior of the shoes. There does not appear to be any other studies that have scanned feet and shoe casts and then compared the dimensional measurements.

Figure 10. Shoe cast scan measurement table and 3D imagery of the shoe cast and sizing measurements.
4.2.3 Shoe Fittings

The benefits of using a flexible casting material such as ‘Pinkysil’ was that the casts could be removed without needing to destroy the shoe in most cases (4/6 shoes) for this part of the research study. Each of the six different styles of shoes that had been cast could then fit onto the scanned participants’ feet to assess fit and comfort. This proved more effective when both shoes were intact, since the participant needed to be able to walk in the shoes to assess comfort and fit. For the shoes where the left foot was destroyed to remove the cast, a different shoe was substituted and the participant was instructed to consider the right shoe only. The shoes were then rated from the most comfortable to the least comfortable, on a scale of 1 to 6. Then the results were recorded into a table with the rating: 1, being the most comfortable and rating: 6, being the least comfortable. The questions put to the participants were divided into sections of the shoe in terms of fit and comfort on the foot; length, width, mid region, toe/forefoot region, cushioning and arch support.

The participants were asked to walk in each pair of shoes approximately 20 to 25 metres in total on a carpet surface and test how the shoe’s fit and comfort felt on the foot or feet (depending on whether a pair was available for testing). The distance and carpet surface was to simulate a retail store or indoor office and similar environment as if the participants were purchasing the shoes.

4.3 Results

4.3.1 Foot and shoe comparison

The dimensions of the feet (mean ± SD) from the 15 participants were as follows: foot length 239.8 ± 4.7 mm; width 96.5 ± 4.2 mm; heel width 61.4 ± 2.6 mm; height of forefoot 40.8 ± 3.6 mm; ball girth circumference 235.6 ± 9.6 mm. The dimensions of the shoe casts (n=6) were (mean ± SD): shoe length 250.8 ± 6.8 mm; width 80.7 ± 3.6 mm; heel width 57.1 ± 1.9 mm; height of forefoot 43.1 ± 7.3 mm; ball girth circumference 208.2 ± 14.1 mm.

These results showed that the shoes were on average 5% longer than the average foot length, although one shoe brand was 12 mm less than the average foot length, meaning less than 1 mm different in the shoe and foot length. The shoe heel width measurement was approximately 8% smaller than the foot mean and the shoe forefoot in height was
approximately 5% higher than the foot mean. The most significant difference was in the width, with shoes on average 20% narrower than the participants’ feet. Similarly, the ball girth circumference in the shoes was on average 13% smaller than the foot mean (Fig. 11).

**Figure 11. Foot and shoe comparison after scanning**

![Foot and shoe comparison chart](image)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Length</th>
<th>Foot Width</th>
<th>Heel width</th>
<th>Height of Forefoot</th>
<th>Ball Girth circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shoes</strong></td>
<td>280.0</td>
<td>240.0</td>
<td>200.0</td>
<td>160.0</td>
<td>120.0</td>
</tr>
<tr>
<td><strong>Feet</strong></td>
<td>240.0</td>
<td>200.0</td>
<td>160.0</td>
<td>120.0</td>
<td>80.0</td>
</tr>
</tbody>
</table>

**4.3.2 Shoe Fittings**

There were several discrepancies in the rating of comfort and fit in the shoe styles provided, despite all the women having claimed they wore a size 38 shoe size on a regular basis. However, this does not take into account individual preference and perception of comfort and fit and there was not one pair of shoes that achieved a 100% approval from all the participants. The perceived comfort in a pair of shoes can vary according to the individual with numerous physical factors being recorded as significant (Au and Goonetilleke, 2007, Farndon et al., 2016).
The results were varied; however the most popular (42%) pair of shoes was a leather lower heel (2.6cm) ankle boot from the higher end of the price range. This shoe appeared to have been rated as having slightly better cushioning, softer leather and wider fit. The least comfortable rating out of the six pairs of shoes assessed by the participants (66%) was a shoe that appeared to be shorter in length (12 mm less than average) and width, indicating a discrepancy in the size (Fig. 12, shoe 5). The majority of people found this particular pair of shoes difficult to walk in causing discomfort in the toe (particularly the 2\textsuperscript{nd} and 3\textsuperscript{nd} metatarsals) and width regions. The same pair of shoes is 5.9 to 17.9 mm shorter in measurement than the typical effective last length range from the ISO/TS (the International Organisation for Standardization/Technical Specification) conversion tables for size 38. Another pair rated the second least comfortable, appeared to be a half to one size longer in length than the other shoes purchased for the study (Fig. 12, shoe 6). These same shoes also gapped in the mid-section of the shoe, indicating an inconsistency with a regular size 38. According to the ISO/TS conversion measurement tables this pair of shoes is approximately 13.7 to 1.7 mm longer in length. Both pairs of these shoes rated as the least comfortable out of the six pairs and were from the lower end of selected price range. Noted that shoe 4 (Fig. 12) has the longest measurement length due to the sharp pointed toe shaping and is for a styling purpose only.

The six styles of shoes presented to the participants did not rate very high for cushioning in the inner sole or arch support. The majority met the length requirement but lacked adequate width for comfort and fit (Fig. 8). Not all the participants’ feet were able to fit into each of the six different styles of size 38 shoes due to arch height and width constraints.
4.4 Discussion

A comparison of the scans of the participants’ feet and shoe casts revealed some significant differences, despite the shoe and foot being described as the same size. On average, the shoe width measurements were 20% narrower than the participants’ feet, which was confirmed when study participants tried on the shoes purchased for this study. While it is acknowledged that the perceived comfort in a pair of shoes can vary according to the individual, with numerous physical factors being recorded as significant (Au and Goonetilleke, 2007, Branthwaite et al., 2014) the majority of the shoes were tight, particularly in the width, and participants had difficulty walking in some of the shoes. Interestingly, Jimmy Choo (international footwear designer) stated that shoes require adequate width for comfort to be achieved by the wearer (personal comment). Since foot issues are common and 61% of women in the United Kingdom suffered from foot pain due to poor fitting footwear (Farndon et al., 2016), it seems reasonable to suggest that poorly fitting shoes may be creating problems at work for women in Australia.
In the current study it was also found that the ball girth circumference mean of the shoes was 13% smaller than the participants’ feet. Again, this was confirmed when the study shoes were fitted onto the participants’ feet, with participants indicating that the shoes were very tight around the toe region, crushing the second and third metatarsals in particular. Remarkably, even though the mean length of the study shoes was 5% longer than the mean length of the participants’ feet, there were still one third of the shoes tested in the case study that did not appear to be the consistent length for a size 38. The shoes were either short (toes touching the end of the shoe) or a half to one size longer in the length. Not only did the shoes vary in the length mean, but they were also narrow in width. One pair of shoes in particular measured 5.1 mm narrower than the average mean, which could lead to questioning the sizing standard used in Australia. However, shoe sizing and fit irregularities do not appear to be uncommon in the United Kingdom either (Branthwaite et al., 2014). The six pairs of shoes were purchased from large chain retail stores and were in the lower selected price range (under $100). When the same shoes were fitted to the participants’ feet, the shoes were rated the most uncomfortable and poorest fit from the six pairs. The synthetics materials used in the shoe uppers of both pairs had no added cushioning or arch support in the inner sole area to enhance fit. This could suggest that sizing, fit and comfort is compromised for price.

There appeared to be less difference between foot and shoe size for the heel width measurement. Even though the shoe was approximately 8% smaller than the foot at the heel, this did not appear to concern participants and, indeed, may have been preferred to provide a snug fit to minimise heel slippage. Despite this, some participants (45%) found that the centre back heel cup-shaping in half of the shoes was too curved and pushed into the heel of the wearer causing discomfort and pain. This would appear to be a design flaw and the shoe last used to make these particular shoes may not accurately reflect the shape of the heel shaping and is therefore a result of poor design and/or lack of product testing. However, improving fit can be a problem as there are numerous shoe styles and individual foot shapes varying in dimensions (Branthwaite et al., 2014).

In the feedback from the shoe fitting study the majority of the participants indicated that the shoes had limited cushioning in the inner sole, particularly in the forefoot and heel regions, and had little or no arch support. Both of these factors could be expected to cause considerable discomfort and foot pathology for the wearer over a period of time. Importantly,
these factors were also identified in a pre-study survey where women found shoes to be uncomfortable after 3 to 4 hours of wear. A number of other studies have also found that standing for 2 hours or more in uncomfortable shoes induces pain and fatigue in the low legs, lower back and body, with swelling and discomfort (Karimi et al., 2016). These untoward signs are not usually reported when wearing shoes recommended by podiatrists, since these shoes are typically more functional than aesthetic, but these patients (men and women) still tend to preferentially wear more fashionable shoes, despite possible negative consequences to their well-being and health (Farndon et al., 2016).

The standards shoe measurements for Australia appear to be variable, partly due to local shoe manufacturing being almost non-existent, and it appears that each Australian shoe label has their own set of standard measurements and openly displayed on the internet. However, the majority of Australian footwear labels tend to base their shoe measurements on UK or European sizing. There are three main sizing systems (Mondopoint, European and UK) and foot length is the common denominator. The length of the foot is the first point of reference when measuring and fitting shoes. It is also the assumption that a person will continue to purchase the same size regardless of the shoe style or type (Standardization, 2015).

The typical European and UK last length for a size 38 is 247-59 mm (depending on shoe point) and no width specified. The shoe mean in the study was slightly longer in length than the ‘standards’, however this does depend on the toe point of the shoe. However, there is one shoe style that measured below the required length for the ‘European and UK Standards’ size 38 and feet mean measurements. The width for both UK and European shoe size conversion was not mention in ISO/TS (the International Organisation for Standardization/Technical Specification) or measurements stated. Therefore it is difficult to analyse width without set standards and only the shoe castings and scanned foot measurements could be examined for comparison.

**4.5 Conclusions**

This study provided data to analyse the differences in shoes and women’s feet sizing and fit. A comparison was then made between a typical woman’s foot in a specific size and the shoes available for this foot size. The results from this study indicate that there is a discrepancy
between the fit and sizing labelled on shoes imported into Australia, similar to that reported in the United Kingdom. Similarly, Australia does not appear to have clear shoe standard measurement guidelines or footwear product testing, which is further contributing to the size discrepancy and poor fit. Imported shoes from China were too narrow in width, had inconsistent length and smaller ball girth circumference, despite their labelled size, leading to comfort issues and potentially to short or long term foot damage.

In would appear from this study that there is a need for some consumer collaboration with footwear companies to product test the proposed footwear, respond to feedback and form some data bases on current foot measurements in Australia.
Chapter 5. Co-design workshop and industry interviews

5.1 Introduction
Co-design has become increasingly popular in a variety of fields from the health care sector to telecommunications, and ITC services. The co-design process can be beneficial to developing products, increase quality, lower costs, and achieve higher satisfaction and loyalty from customers and users (Steen et al., 2011). Co-design can be defined “in a broader sense to refer to the creativity of designers and people not trained in design working together in the design development process” (Sanders and Stappers, 2008). Co-design is a form of “collective creativity” and can be applied across a range of design disciplines (Steen et al., 2011, p. 53). Prominent sports’ footwear companies have had commercial success allowing their consumer to be involved in collaborative design to personalise the aesthetics of the shoes, predominantly with colour (Kang and Kim, 2012).

Co-design principles may also be useful to determining appropriate shoes for working women in terms of comfort and aesthetics. There are plenty of visually appealing shoes available on the Australian retail market and online, but if these shoes are uncomfortable and/or poor fitting they may cause harm to feet. However, the exact definition of comfort in a pair of shoes can vary according to the individual with numerous physical factors being regarded as significant (Au and Goonetilleke, 2007, Karimi et al., 2016). The lack of suitable good quality choices in dress shoes therefore elicits a challenge to buy a pair of shoes with satisfactory comfort and suitable heel height that will also be suitable for walking and standing in a work environment.

There are conflicting reasons why women purchase and wear different styles of dress shoes for their place of work. A co-design workshop could potentially resolve some of the differences by means of a design investigation. In the current study, a focus group selected was intended to represent a range of work professionals and variety of ages within the specified research age group. Each participant in the group spent 4 to 7 hours on their feet
during their working day and stated they experienced some form of foot pain with uncomfortable shoes.

The co-design workshop invited a collaboration of ideas from the group of participants, sharing their personal experience and knowledge in purchasing and wearing dress shoes to create versions of more desirable dress shoes, where aesthetics and comfort are combined. Co-design can be a way of combining knowledge of thinking, feeling, facts and values together; and uniting practical experience and reflection (Steen, 2013). In this study a co-design workshop was a way for the participants to discuss and develop ideas for future shoe designs for a professional work environment.

### 5.2 Methods

A group of eight professional working women, in the age group of 30 to 60 years, participated in a 3 ½ hours co-design workshop. Each participant was from a specific demographic, with employment indoors and the majority in an office style environment with enclosed shoes the required or preferred dress code. These women would therefore wear dress shoes over a long working day of 7 to 9 hours. Preliminary outcomes from this project (see Chapter 2) showed that women developed foot problems when wearing dress shoes for at least 3 to 4 hours each day. The study design and number of participants were similar to a previous study where 17 people were initially interviewed and narrowed down to form a focus group of eight participants (Steen et al., 2011).

The participants in the current study were selected from an earlier pilot survey (n=35) and indicated that they were available for further research studies. The group was narrowed down to represent working professionals and variety of ages within the specified research age group. The workshop was presented with a range of activities from an open discussion of their own experiences purchasing shoes, participants presenting their own shoes in terms of comfort and visual appeal, discussing current footwear trends and ideas for improving comfort. In the last stages of the workshop, to create more interaction between individuals, the group of eight women were randomly separated into two smaller groups. Group sizes of 4 to 5 have been reported to be ideal for engagement and interaction (Bourner et al., 2001,
Garvin et al., 1995). The groups were then brought back together for further and final discussions about their proposed ideas.

Each participant provided full informed consent prior to participation in the study. Ethical approval was obtained from RMIT University’s College Human Ethics Advisory Network (CHEAN).

5.2.1 Activities of the co-design workshop

5.2.1.1 Section 1: Purchasing shoes in Australia
The first part of the workshop involved the eight individual participants’ sharing their personal experience and knowledge of buying shoes in the Australian market and any issues they had experienced with comfort and design. This led to an open discussion within the group, where a variety of retail stores and individual shoe brands were discussed. The participants were very receptive to discussing their own points of view when it came to shoe purchasing. Topics suggested for discussion were colour selection, price points, styling within enclosed shoes, quality of construction, heel heights, shoe fabrications and different toe shaping. The group did raise other specific areas of discomfort, as well as sandals, shoe inserts, expectations of dress code within their workplace and season (summer versus winter). Season was an unexpected topic for the group discussion. The lack of enclosed shoes suitable for summer was a concern within the focus group.

5.2.1.2 Section 2: Participant’s individual shoes
The second part of the workshop involved the participants each bringing two pairs of their own shoes to the workshop for discussion (pros and cons): a pair of pleasing aesthetic shoes and a pair of pleasing comfortable shoes (Fig. 13 & Fig. 14). This allowed each participant to openly discuss both pairs of shoes, including why they purchased the shoes and how the shoes performed after wearing. Comfort became a priority in the discussion with individual feet issues, areas of pain caused by the shoes and time spent in the shoes. Other aspects then arose, such as personal likes and dislikes, price, shoe brands, manufacturing country of origin, heel height, quality, colour, cushioning, fabrications and other aesthetic details of the shoes.
Figure 13. Participant’s shoes: *comfortable examples*


Figure 14. Participant’s shoes: *Visually pleasing with minimal comfort examples*

Section 3: Improvement to shoes
The participants discussed what type of changes could be made to improve shoes, to enhance their wearability (aesthetics and comfort). A PowerPoint presentation of past, current and forecast trends in footwear was shown to the group as a starting point for discussion. This led the group to discuss their views on current trends of footwear, wearability, visual appeal, styling details, heel height of shoes. For the next stage the group divided into pairs to encourage further discussion, and a range of shoe inserts was available to the groups to examine. The inserts were to encourage the group of participants to examine different areas of comfort within the shoes and the possibility for improvements. The inserts samples were for arch and heel support, forefoot padding, and additional padding overall (Fig. 15). Then each pair of participants gave feedback to the group as a whole on how they would enhance shoes for wearability in a working environment.

Figure 15. Shoe inserts examples from various companies used on co-design workshop

20 Scholl: Products; Gel Activ - flat shoes, Party Feet - invisible gel heel cushions, soft touch, ultra slim and blister shield plasters.
Footcare tacco: Products; Woody and Ortho-Medical- Senkfusskeil
Waproo: Product; Dream feet - high heels
Foot petals: Product; Arch cushions
Kiwi: Product; Smiling feet – Gel heel cushions
Generic brands from China, Shenzhen: three different foot cushions, two different heel cushions and gel arch cushion.
5.2.1.3 Section 4: Co-design of shoes
The final stage of the co-design workshop was to divide participants into two separate groups to formulate ideas that might lead to the creation of designs closer to the ideal shoe. As this was the last stage of the workshop the intention was to maintain focus and a smaller group would achieve a more ideal interaction, quicker, more effective generation and discussion of design ideas. The parameters of the activity were to consider comfort for standing and walking in the work place combined with visually pleasing shoe styling. Eight different shoe lasts were provided at the start of the activity for the groups to examine. There was a variety of toe shapes (points, curves and square) and heel heights to discuss within the group for design preferences. The group also had a selection of shoe inserts to test and discuss (Fig. 15), including shoe drawing templates as drawing guides, mixed drawing media, drawing paper, footwear trend magazines and books. Each group openly discussed their individual views to then form co-design ideas. Some drew directly onto the shoe last (Fig. 17) or used a template shoe drawing and others relied on magazines/books as aids to develop their ideas with design notes. Through this process the groups attempted to create more desirable shoe designs in appearance and comfort. Once designs were developed, a collation of visual and verbal ideas was gathered, to produce a co-design collection of shoe designs. Further reflection of the shoe design ideas occurred a few weeks later via email, before finalising the prototypes’ drawings and specifications.

The prototype designs were sent to Hong Kong for a quotation and feasibility appraisal, before the selected designs were manufactured in a sub-contracted custom footwear factory in Shenzhen, China. The prototype ideas for more ideal shoes for the workplace could be used for future comparisons and assessment.

5.2.1.4 Section 5: Interviews with footwear importers
To gain an understanding of current market trends, three prominent footwear importers were interviewed and all companies imported from a variety of countries and distributed Australia wide. Specific questions were asked in reference to which countries they currently import from and their purchasing criterion (Appendix 2). The duration of the interviews was from 45 minutes to an hour and was conducted at the company premises with the company manager participating in the interview process.
5.2.1.5 Section 6: Interviews with podiatrists

Following on from the interviews with footwear importers, some understanding of the health issues associated with poor fitting shoes was considered relevant. Two podiatrists were interviewed and asked specific questions in reference to common foot issues with women aged between 30 and 60 years of age (Appendix 3). The interview time was approximately 20 to 30 minutes and conducted with a podiatrist at the practice clinic.

5.3 Results

5.3.1 Interviews with footwear importers

Footwear importers have undergone major changes in their business model to maintain their position in an evolving current footwear industry. For example, the majority of clothing labels are now manufacturing their own footwear ranges to sell in their retail stores and no longer rely on importing companies. To gain further insight into current import companies, three footwear importers21 catering to independent shoe retail stores in Australia were interviewed. They indicated that they imported a broad range of shoes, with price points from $100 to $330, depending on the origin of the manufacturing country.

Another aspect that has changed over the past six years (since the Global Financial Crisis) is the country of origin. This is a direct response to the need to reduce costs and maintain quality, although the importers were unanimous in their concerns that overall quality of footwear manufacturing has declined. The original countries of preference were China and Italy and now they have extended to Spain, Portugal, Brazil and Eastern European regions, such as Bosnia and Romania. Each country is offering different footwear characteristics, so China is more fashion based, while Spain has more colour options, Portugal focuses on comfort and Brazil has competitive price points. Each importer’s footwear volumes are different with some importing 20,000 to 25,000 shoes per season and 40,000 to 45,000 shoes for a summer season.

The buying criteria for the importers interviewed were similar, with the design look or appearance of the shoe being the first priority, followed by comfort and/or quality. All three

21 The footwear importers wish to remain anonymous for this thesis due to the confidential nature of their business.
importers rated comfort as an important factor, particularly over the last 3 to 4 years, but the visual appeal of the footwear is still the primary selling point. All the importers were open to customer feedback and, while this was limited, were strongly focussed on comfort.

Finally, the importers were asked where they saw the future of footwear manufacturing. Interestingly, they all thought that footwear would be manufactured worldwide with a focus on Europe and Brazil. There was a strong belief that importing has become more competitive and there is a demand for cheap footwear to meet the global trends of fast disposable fashion by the consumer.

5.3.2  Interviews with podiatrists
Two podiatrists were interviewed and asked specific questions in reference to common foot issues with women aged between 30 and 60 years of age. These podiatrists stated that the most common foot issues were plantar fasciitis (inflammation of the arch), plantar plate injury (forefoot issues), along with heel pain, corns and callus. The majority of the foot pathologies are long term or permanent and are caused by poor fitting footwear, wearing high heels and also flat heeled shoes, but it will depend on individual foot structure and forefoot shape of the shoe worn.

Interestingly, the podiatrists suggested that women have very limited knowledge about good foot health and damage to the foot has already occurred before comfortable shoes were recommended. One podiatrist expanded on this and stated that not all women were necessarily poorly informed, but shoes are mass produced and targeted at a ‘normal’ foot. Width in footwear can be an issue and consumers need to look further afield to find good fitting shoes or buy online. However, women are reluctant buy online since they cannot try on the shoes, especially if they already have existing problems with shoe fitting. The podiatrists were also concerned that there was an insufficient availability in mainstream retail stores of appropriate shoes that are considered fashionable but protect against foot pathologies.

The next question focussed on whether women were wearing the correct footwear and both podiatrists agreed that this was not the case. Younger women tended to prefer fashionable shoes and were more likely to consider comfort as they matured. Underlying this was a concerning tendency for women to select shoes that did not fit their feet. This may partly
relate to the fact that few footwear stores have suitably trained assistants to correctly fit shoes, so customers are frequently left to fit themselves based on prior experiences, resulting in the shoes selected being too tight through the forefoot and loose in the rear foot.

The podiatrists interviewed recommended that women should be wearing shoes with an average heel height (they suggested ~ 5 cm), a wedge or block heel and cushioned sole made from rubber rather than leather. If a woman insisted on a higher heel, then the podiatrists recommended that this is combined with shoe styles that have straps either around the ankle or that cross at the mid-foot and with limited cleavage to better support the foot. It is also recommended that women should vary the heel height worn through the week and not always wear high heels to maintain better foot health. One podiatrist actually suggests specific brands to her clients that provide comfort and can also be worn to work, including Airflex, Rockport, Portlands and Ziera. Both podiatrists cautioned that any advice depended on the individual’s work situation and whether they are on their feet for long periods of time. Both podiatrists also expressed concern that while some women will wear prescribed shoes on a regular basis, others will probably select more fashionable shoes and ignore the potential consequence of poor fit to the health of their feet.

5.3.3 Co-design workshop
In the initial discussions the co-design workshop group as a whole agreed that there were not adequate working dress shoes available to purchase in the Australian retail market. There was a concern that it has become a challenge to buy a pair of shoes that meets their criteria of comfort and suitable heel height, let alone is suitable for walking and standing in a work environment. The group preferred a medium heel height of approximately 4 to 6 cm for a working woman’s dress shoe. Visually, the participants felt there is a lack of colour (majority black) in enclosed dress shoes, especially in summer, where shoes (not sandals) suitable for corporate wear are required. Neutral colours, such as navy, nude, beige and grey, were the preferred colours by the participants. It was established that this specific demographic focus group regularly wore enclosed shoes with an elevated heel height. The group agreed that when they purchase a pair of shoes the initial attraction was the visual appeal and the majority wanted the shoes to appear ‘elegant and sexy’. The cost of the shoes was the second consideration with the comfort aspect to follow as part of the selection criteria. The participants did not have a preference for any particular brand or retail store but did comment
on favouring shoes from European countries if they were within a price range of $200 or less. There appeared to be an assumption from the women’s personal experiences that European shoes offered better quality in construction, materials, fit and comfort.

The second section of the workshop involved the participants bringing two pair of their own shoes to the workshop for discussion, a pair of pleasing aesthetic shoes and a pair of pleasing comfortable shoes. The majority of the shoes brought to the workshop had a heel height ranging from approximately 5 to 10 cm. This allowed each participant to show each pair of shoes to the group and discuss why they purchased the shoes from a visual perspective. The participants were very enthusiastic with sharing their views on the shoes they had brought to the workshop. The participants felt it was a neglected topic but an important issue in their daily working life. Of the shoes that were deemed more comfortable, eight pairs were made in Europe or Brazil and the other eight pairs were made in South-East Countries. These particular shoes appear to have more cushioning in the ball of the foot region, heel and arch support creating more comfort. If the shoe had a higher heel height and was rated as comfortable shoe then the majority of these shoes either had a platform sole or wedge heel style. The majority of shoes deemed uncomfortable were all made in China, with issues including limited cushioning (particularly in the ball of the foot region), no arch support, toe region narrow (crushing metatarsals) and angle overly steep (heel to forefoot) pushing forward creating for the wearer foot and back pain. There was a consensus that these shoes rated uncomfortable were slightly lower in cost. According to participants the most uncomfortable fabrication was a patent leather composition, since these shoes did not have any stretching capacity or breathability. Five out of the 8 pairs of shoes nominated as the most uncomfortable shoe examples in the workshop were a patent fabrication.

Two footwear importers interviewed stated that quality varies in shoes imported from China. Over the past six years (since GFC) the overall quality has declined and they indicated that they were now importing from countries in Europe, including Eastern Europe. All three footwear importers agreed that comfort was not the primary reason for selection of imported shoes, with appearance and quality (within a set price range) a higher priority when they selected shoes to import. This was consistent with the co-design study, although two of the importing companies did state that comfort was more of a consideration than previously.
In section three of the workshop, the majority of the participants agreed that their feet had changed over time; child birth was a considered contributor and their feet had become more sensitive. Comfort in shoes was therefore more of a priority and they were unable to easily purchase a satisfactory pair of shoes. This was consistent with other authors that comfort was difficult to define and women have individual discrepancies (Au and Goonetilleke, 2007, Branthwaite et al., 2014), although there was a near-unanimous agreement within the focus group that the main areas of concern were that the shoes were too narrow and had insufficient cushioning in the ball of the foot region. Some participants highlighted that when a shoe had a sharper pointed toe, the shoes tended to be narrower in the width, therefore issues occurred with the metatarsals being crushed together causing foot pain. Other areas of concern raised were the centre back heel cup shaping, heel heights available (either very high or low), no selection of width sizing and limited size range for the larger foot. Many of the focus group had resorted (due to comfort issues) to wearing other shoes on the way to work and changing or wearing flat shoes while at work, which was not an ideal situation as an elevated shoe heel height was desired. Some had tried to use cushioning inserts in their shoes in the past to solve some comfort issues but found some shoes do not accommodate this additional insert (it tightens the shoe) or that this is only a temporary measure and is an extra cost to a pair of shoes. However, the inserts introduced into the workshop did initiate some discussion as some of the participants had not tried the more recent inserts on the market and had been reluctant due to past experience and/or high price.

The podiatrists interviewed suggested that the most common foot issues with women aged between 30 to 60 years of age was plantar fasciitis (inflammation of the arch) and plantar plate injury (forefoot issues). This was consistent with the responses from participants in the co-design study, with uncomfortable shoes a common concern. The podiatrists stated that the common foot issues were directly caused by high heeled and poor fitting shoes, related to the limited understanding of foot health and what constituted a correctly fitting shoe.

In section four of the workshop, the group divided into two groups for the co-design exercise. While the participants did not necessarily have design or drawing backgrounds, this did not appear to restrict them from communicating their ideas visually (Fig. 16). Each group separately decided on the same shoe last toe shape (relatively soft point) and heel height of 5 to 6 cm (Fig. 17). The toe shape and heel height, they agreed, would meet their expectations
of what was elegant and sexy for a suitable dress work shoe. Once these two factors were decided within the groups they then united their ideas, discussed current trends to form designs on paper and by drawing on the shoe lasts. Current fashion trends were not the main influence, however the group did consider the footwear trends and certainly it was part of the overall design criteria. One group narrowed their ideas into two shoe design ideas, one a sling back style with a kitten heel (5 cm height) and the other a shaped wedge heel (back 6 cm and front 2 cm height) and rounded toe shape. The second group co-designed only one style with a pointed shaped toe, Louis style heel (6 cm height) and cross over straps at the centre front for additional support (Fig. 18). All three shoe design styles were openly discussed within the entire focus group and it was unanimously agreed that all the designs had good visual appeal for a professional working shoe.

Figure 16. Co-design workshop last design sketches
When comfort was discussed it appeared that their requirements aligned with additional cushioning in the inner sole, particularly in the ball of the foot region, added arch support and soft heel cup shaping (Fig. 18). The fabrication recommend for all shoes was soft leather on both the exterior and leather lining of the shoe. The participants were also interested in some of the leather having a textured surface for a more aesthetic appeal in parts of the design. This influence of texture was a reflection of current fashion trends and may explain the choice of why patent leather was a popular choice and its availability in dress shoes.
Figure 18. Co-design shoe examples

**Shoe 1**
- Padding used under inner sole
- Extra cushioning in ball of foot
- Arch support
- Wider fit in lower shoe region
- Heel height 5 cm
- Kitten heel
- Soft pointed toe
- Soft leather with textured/pattern leather on toe region

**Shoe 2**
- Wedge heel
- Back heel height 6 cm
- Front height 2 cm
- Wedge to shape to curve inwards (more Stream line look)
- Heel cup minimal curve
- Wider fit across forefoot
- Padding under inner sole
- Extra cushioning in ball of foot
- Arch support
- Rounded toe
- Softer leather or suede

**Shoe 3**
- Use 2 colours together or texture & colour
- Louis style heel
- Pointed toe
- Wider fit in lower shoe region
- Padding used under inner sole
- Extra cushioning under ball of foot
- Arch support
Figure 19. Co-design prototypes

5.4 Discussion
The results from this study suggested that group discussions in a co-design workshop can be an effective strategy to share ideas and personal experiences with wearing dress shoes in a work environment. One of the positive responses from the workshop was that it encouraged individuals to openly discuss shoe issues and generate ideas for design and comfort in what would be perceived as closer to ideal shoes. Co-design can be referred to as a collaboration of creative development between people not trained in design and designers to generate design concepts (Sanders and Stappers, 2008).

Commercially-successful sports footwear companies have already engaged in collaborative design with consumers to personalise the appearance of their footwear, via the internet. The online toolkit offers services to allow the consumer to select predominantly colours within a range of dissimilar footwear styles. However, it does not appear that aesthetics is the foremost priority when purchasing performance sporting footwear, instead fit is identified as the consumer’s primary interest (Head and Porter, 2011). In contrast, Levi Strauss in the apparel market did not have the same success when offering personalised goods (Head and Porter, 2011, Kang and Kim, 2012), although this could reflect that people are more conservative with apparel. Therefore establishing a co-design workshop as part of a research study appeared to be a logical step to discuss and develop design ideas closer to that of an ideal dress shoe. In the case of this study the co-design workshop was not necessarily
modifying an existing shoe design but instead initiating a combination of ideas to design more ideal dress shoes bringing together aesthetics and comfort. If a woman wanted individual shoe requirements then they would have to engage a bespoke shoe maker for a custom made shoe, which often is very expensive and beyond most women’s budgets.

The overall response to the co-design workshop with a small focus group of participants was highly positive. A published study (Steen et al., 2011) used similar numbers for co-design research with the aim to gain ‘inside knowledge’ from an elderly group to gain a better appreciation of their experiences and daily lives, to increase their participation in social networks. While the latter co-design group was not involved in a design based study, it still examined the experiences and knowledge from a relevant cohort of people to develop concepts. The participants in the current study were very willing to give their time and share their views and ideas to co-design their interpretation of better dress shoes. The group unanimously agreed that dress shoes available in Australia for women did not adequately cater for their needs or expectations. It would appear this type of co-design workshop would be a good strategy for a new or existing company to implement to improve their shoe designs and meet some of their consumer needs. A podiatrist in Brisbane has had success after starting her own comfort shoe label ‘Frankie 4’ five years ago (Stafford, 2016). The aim of this shoe label was to combine comfort and aesthetics, after hearing on numerous occasions from her patients that shoes recommend by podiatrists had limited or no visual appeal (Stafford, 2016). This label is directed at slightly more casual footwear and has now started to introduce dress sandals with a higher heel.

Each participant in the workshop had experienced some problems when purchasing dress shoes relating to fit, size or appropriate styling. Several participants within the group felt that it has become a challenge to purchase a pair of shoes. The shoes need to be functional and suitable not only for a work environment but also able to stand and walk over the duration of a working day. It was stated that there are ‘plenty of beautiful shoes out there’ but they cannot be worn and are definitely not made for walking.

Aesthetic appearance was the most common reason why the majority of the participants in the group purchased dress shoes. Despite this, comfort was heavily discussed within the group and was a concern, especially after the shoes had been worn for several hours. This
same issue of comfort has been discussed in the literature review (chapter 2). There was a near-unanimous agreement within the workshop group that the two main areas of concern were the narrow width and not enough cushioning in the ball of the foot region in the shoes. Similarly, (Au and Goonetilleke, 2007) reported that women had difficulty assessing comfort issues in a shoe prior to wear. The authors also suggested that women may state they are selecting for comfort, but in reality are primarily influenced by appearance when purchasing a pair of shoes (Au and Goonetilleke, 2007). There has been limited research in this area of dress footwear as stated in an earlier chapter; however, this research has addressed some of the gaps in aesthetics and comfort footwear design within Australian. Other areas of concern for the participants were the design of the centre back heel cup shaping, heel heights available (either very high or low), no selection of width sizing, half sizing and limited size range for the larger size foot (40 to 42+) in Australia. Women from both the co-design workshop and survey with larger feet (40+) felt that the sizing stock is limited or non-existent in some brands. Some of the women are often forced to buy more expensive brands or source online, therefore buying suitable footwear becomes even more difficult.

The co-design workshop group of participants was selected from an age group of 30 to 60 years old. It was strongly agreed that as they matured, particularly if they had children, their feet became more sensitive and less tolerant to high heel and ill-fitting shoes. This view was supported by a podiatrist, Dr Suzanne Levine, who stated: “as we age, we lose the fat padding on our feet”. Levine also stated that the number one client complaint was: “they suffer from a burning feeling under the balls of their feet” (McMahon, 2014, p. 31). A research study recommended cushion inserts for women to wear at work to enhance comfort by relieving foot pressure and reduce impact force on the foot (Yung-Hui and Wei-Hsien, 2005). Despite this, some of the participants in this co-design workshop had placed cushioning inserts in their shoes to improve comfort, but some shoes would not accommodate this modification (it tightened the shoe) or it was only a temporary measure. The inserts have a limited life span (2 to 3 months) and are an additional expense on top of the original cost of the shoes. There are other alternatives to padding the shoes, such as injections of Sculptra (poly-L-lactic acid) into the balls of the feet to increase cushioning, but the focus group felt this was a rather extreme measure.
The workshop participants agreed that there was not one particular retail store or brand of shoe that appeared to be consistent with fit or comfort suitable for a work environment. Comfort brands were mentioned by all the participants in the group, such as Birkenstock, Merrell, Rockport, Ecco, Portlands, Frankie 4 and sporting brands that they wore in leisure time, but are not suitable for professional working woman’s attire. These shoes tend to be more casual, with a flat sole; some have open toes and are heavier in appearance. This has led to many participants resorting (due to comfort issues) to wearing flat shoes to travel to work and then changing to their ‘work shoe’ or continuing to wear the same flat shoe while at work, which is not an ideal situation depending on the type of work position they held. In May 2016 a London female employee from a corporate finance company (Price Waterhouse) was sent home for not wearing shoes with a heel. The heel height required by the employer was 2” to 4” and flat shoes were prohibited as part of the uniform rules (Khomami, 2016), this was discussed in more detail in Chapter 2.

Recently, enclosed shoes have become more common and often mandatory in the Australian workplace due to Occupation, Health and Safety (OH&S) issues in a variety of professions. Footwear must therefore meet safety and practicality standards, but the availability of suitable shoes that satisfy safety requirements and are also visually pleasing is highly limited. Research has indicated that shoes should satisfy psychological and physical requirements, often meaning that more fashionable shoe would be selected over practicality (Farndon et al., 2016). Interestingly, the podiatrists interviewed stated that women have very limited knowledge about good foot health and damage to the foot had already occurred before comfortable shoes were recommended.

It was clear that the participants in the group wanted dress shoes that gave the perception of being ‘elegant and sexy’. The participants nominated a heel height of 5 cm or more would provide some elevation to the wearer and modify the gait, enhancing the elegance in the way the wearer’s body moves. A pointed or slightly rounded toe shaping provided the illusion of a longer slimmer line and more elegant appearance with a suit, skirt or dress (Fig. 16). The co-design process moved very quickly and both groups separately decided on the same shoe last toe shape (soft point) and heel height of 5 to 6 cm. The toe shape and heel height, it was

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agreed, would meet their expectations of ‘elegant and sexy’ for a suitable dress work shoe.
Interestingly, in a biomechanical elevation of the heel study, it was apparent that a 5.1 cm heel height reduced the pressure on the forefoot and heel region, balancing the distribution of pressure for the entire foot. This indicated that this lower heel height elevation might provide closer to ideal heel height for design in the future (Luximon et al., 2012).

The final outcome from the co-design workshop was that all three shoe design styles (Fig. 18) were openly discussed within the entire focus group and it was unanimously agreed that they all meet the visual appeal criterion. Therefore it would appear that there is not one ideal or perfect pair of shoes from a visual perspective. Bruno Frisoni, artistic director for Roger Vivier, stated: “The perfect shoe does not exist” as he reflected on shoes changing with each season and recognises that every woman has different preferences (Thomas and Veysset, 2015, p. 153). Designing better shoes involves consideration of many criteria, including colour, texture, fabrication, heel height, toe shape and shoe style to form the accepted visual ‘look’, while also being cognisant of individual preferences.

When comfort was discussed it appeared that their requirements aligned with additional cushioning in the inner sole, particularly in the lower foot region, added arch support and soft heel cup shaping. The desired fabrication recommend for all shoes was to be soft leather on both the exterior and lining of the shoe (Fig. 19). This is consistent with the research results that comfort is based on the curve of the sole (between the heel and ball of the foot), width, the suppleness of the leather used on the shoe and suitable heel height for the individual (Petrova and Ashdown, 2008). Overall the outcomes of the co-design workshop have good potential design ideas for dress footwear in the future.

5.5 Conclusions
In conclusion, the intended outcomes from the co-design workshop were to reduce the negative consequences to the well-being and health women’s feet. This co-design workshop was successful, resulting in the development of ideas for improving dress shoe designs, suitable for working women within the 30 to 60 age group. Current footwear fashion trends
were considered in the co-designing of more desirable shoes, but these were not the only factors considered. Shoes intended for a work environment will also have to be functional and wearable, while minor aspects, such as colour, texture and detailing, maintain a current fashionable perspective.

The group agreed that there were insufficient choices available in the Australian retail market for dress shoes that could be worn safely at work. The criteria of comfort and suitable heel height were therefore currently unable to be met. Three pairs of shoes were able to be designed and manufactured from the workshop feedback, which met the criteria of ‘elegant and sexy’, yet provided sufficient width and cushioning in the ball of the foot region (Fig. 19). In a further study the prototype designs would need to be tested for both design and comfort.
Chapter 6.  General Discussion

6.1 General discussion
Achieving a balance between aesthetics and comfort is the greatest difficulty in designing functional dress footwear. There are numerous and complex factors to consider when creating saleable and wearable shoes, particularly when considering the additional constraints of workplace requirements and maintaining pace with constantly changing fashion trends. While there may apparently be plenty of affordable shoes available, much of the design appears to be focussed on aesthetics rather than a good fit or adequate comfort. This practice based research project investigated the suitability of dress footwear for the working woman within the Australia market. An initial study explored the parameters of how woman purchased, wore and prioritised footwear, while a second study accurately measured and compared shoes and feet to determine any differences in sizing dimensions. A co-design workshop was then undertaken to discuss the findings and work towards what may be considered ideal in terms comfort and aesthetics combined for working Australian women’s dress shoes.

The majority of women purchase shoes for visual appeal or ‘look’ and budget, leaving comfort and fit as a second priority. However, discomfort and poor fit rapidly become apparent after the shoes have been worn for a period of time and may lead to the shoes no longer being worn. Poor fitting shoes cause foot and back pain, which may be able to be overlooked if mild and/or if the shoe has high visual appeal. However, 93% of the women surveyed owned shoes that they rarely wore due to discomfort, yet they probably purchased these shoes since they had visual appeal. Interestingly, even the more expensive shoes imported into Australia are not necessarily a better fit (specific country not known), as discussed in the co-design workshop. The majority of women from the same study stated that it was a ‘challenge’ to purchase a pair of dress shoes that combined comfort and aesthetics, particularly for their place of work. Some of the footwear selected and worn at work are limited in function and may not be comfortable or practical for walking greater distances.

There are numerous descriptions of what might constitute comfort in shoes along with individual preferences when it comes to purchasing dress shoes (Au and Goonetilleke, 2007,
As noted above, women may indicate that they require a comfortable shoe, but appear to favour the overall appearance of the shoe over comfort. However, this choice could reflect the fact that women may not know how to identify aspects of a shoe that relate to comfort, by sight or physically trying them on their feet.

Nevertheless, women may not be fully aware of their actual size and do not generally realise that shoe size may vary with different styles, despite this difference being generally understood in clothing. Importantly, women do not usually realise that their foot may have changed with maturity. Participants in the survey indicated that their feet had become more sensitive and less tolerant to firm fit and high heel shoes. Some women’s feet become broader over time and often after child birth the foot can increase in length (arch declining) and therefore change from a half to a full shoe size.

A significant consideration is that women may not have had their foot measured for some time, possibly since adolescence. Shoes for school are usually closely selected, particularly as the young foot is still growing, but once the foot appears to have stopped growing, adult women may consider their shoe size to be constant. Few women request foot measurements in department stores (despite shoe fitting usually being available) and can frequently be observed selecting a shoe they think has visual appeal or appropriate to their requirements, then trying on only the size they believe fits their foot. The majority of shoes are mass-produced and targeted at the ‘average’ foot. If a woman requires more width in footwear this can be a challenge and may require a woman to travel to a specific store, which may not be feasible. Women could also purchase shoes online, but there was reluctance for this option due to known problems with fit and an inability to try on the shoes, stated both by a podiatrist interview and co-design workshop participants. To summarise, there appears to be insufficient fit variations, such as more width within a given shoe size, for shoes at mainstream stores other than specialist stores or pursuing bespoke shoemakers.

An important finding from this project was that not all dress shoes imported from China matched the width and length of an Australian woman’s foot. The preliminary study of a small sample showed that shoes manufactured in China were 20% smaller in width than the average women’s foot for a given shoe size (based on scanning of casts made from the shoes). There was also an inconsistency in length within a size, which would further contribute to
fitting issues. It was noted earlier that poor fitting shoes can cause foot and back pain and contribute to short and long term foot pathologies. However, variation in actual dimensions for a stated shoe size added to variation in individual foot size and shape compounds the problem of shoe fit. In fairness to Chinese manufacturers, there is no actual footwear measurement standard in Australia and we rely on footwear companies adopting sizing standards from other countries, such as UK, USA or Europe. Moreover, the average foot size of Australian women is likely to have evolved over the past decades due to increasing cultural diversity, significantly impacting the dimensions of feet and ‘standard sizing’. Therefore sizing selection is left to interpretation for both individual Australian and foreign footwear companies, to adapt and test their shoe product ranges. This could indicate that poor sizing standards and fit is due to poor design and limited product testing within brands imported into Australia. This is exacerbated by the desire to maintain lower price points, with the compromise usually made on comfort and quality of materials. It is therefore imperative that a review on sizing standards and manufacturing of footwear is undertaken to ensure consistent sizing, fit and comfort are a priority for footwear in Australia.

One significant concern for shoe wearers is that younger women may continue to wear higher heeled and poor fitting shoes for longer periods of time, again reflecting the desire to maintain style on a budget. These women may discern that their feet are more sensitive as they mature and may seek podiatry assistance. However, they are unlikely to wear shoes recommended by their podiatrist since the shoes available are usually less fashionable and certainly not stylish. It should also be noted that even if shoes recommended by a podiatrist were considered acceptable, options for wearing comfortable shoes are limited by the wearer’s appearance expectations, price, availability and expectations from the work place. Women between the ages of 30 to 60 years are more likely to develop foot pathologies, particularly plantar fasciitis (inflammation of the arch), plantar plate injury (forefoot issues) and heel pain, which agreed with the general comments from participants in the survey. Podiatrists (from the study interviews) also stated that the reason many women continued to wear poor fitting shoes, including high heeled and some flat heeled (depending on forefoot shape) shoes, possibly reflected a limited understanding of foot health and knowledge of correct fit by women.
A further trend driving footwear selection is price. Women purchase dress shoes for appearance but also within a limited price range ($100 - $200 on average). The shoe importers interviewed indicated that there was a strong trend for female consumers wanting to buy shoes at a bargain or discount price, exacerbated by competitive market trends driving down prices at all levels. Consumers therefore demand affordable (i.e. normally cheaper) footwear, while still hoping for quality and comfort. There is a similar trend in clothing, where women are happy to discard the previous seasons clothing and replace them with the latest fashions. However, footwear is more complex to manufacture and has numerous components, increasing assembly time and hence cost, thereby compromising quality, fit and comfort. This concern was apparent during the initial survey in which the average consumer appeared to have little interest or knowledge of footwear production, including even where the shoes were manufactured.

An important outcome from this project was that co-design could be a better approach to influence footwear design and manufacture in the future. The co-design workshop made it clear that there is no one ideal dress shoe, since fashion trends change continually and women have individual preferences in appearance and comfort. However, the workshop participants were very specific about aspects of a dress shoe that would improve comfort, including a wider fit, extra cushioning in the forefoot, arch support, heel cup shaping with softer curve, heel height to be 5 to 6 cm and leather as the main fabrication both interior and exterior. Incorporation of these features into the construction of a pair of dress shoes would be a desirable design approach for more ideal shoes for the future. It appears possible that a similar co-design approach could be applied to other categories of shoe design, particularly podiatry and prescribed footwear. Input from a co-design group could be used to improve the aesthetic design and create more fashionable or aesthetically desirable shoes, which would have the additional outcome of less feet pathology and health issues related to wearing uncomfortable shoes.

A broader issue arising from this project is that there is a need for greater customisation in footwear. There is no such thing as an average foot, even within specific sizes, yet shoes sizes are often considered to cater for an average foot, likely based on the country of manufacture and/or the primary country of sale. Obviously, customisation of shoe design has the potential to create more ideal shoes in terms of fit, sizing (length and width), comfort and appearance.
While the ultimate customisation is bespoke manufacturing, this is normally outside the affordability of many working women. However, more general customisation by co-design input for shoes intended to be worn by Australian working women would enhance the affordability, while ensuring comfort and aesthetics i.e. the more desirable shoe. This feedback and information would prove invaluable for importers, buyers, manufacturers and designers within the footwear industry.

6.2 Conclusion and Recommendations

Women prefer choice when selecting apparel, including footwear, but generally favour visual appeal over comfort, particularly when discomfort may not be apparent until after a period of use. This choice is further restricted when importers attempt to predict the ‘look’ or current fashions to avoid unwanted shoes eroding profit margins, since a broad range of shoes are available in Australia from inexpensive to luxury brands. Financial considerations, plus the limited local manufacturing, means that the majority of shoes available in Australia are imported, particularly from Asian countries, may further contribute to comfort issues if sizing and materials used in manufacture are not catering for the needs and conditions of working women who need to wear the shoes for longer periods. This thesis investigated factors that were used by women to select shoes for the workplace and also considered factors that may contribute to the shoes being uncomfortable, including sizing, workplace regulations and, potentially, uncertainty within women of how to select a shoe.

This project therefore investigated a number of aspects of footwear and design to better define the parameters of comfort and aesthetics in dress shoes for the working woman. The methodologies included surveying working women, aged 30-60 years, to define the different criteria by which they purchase dress shoes in the Australian market. Women’s feet within the selected demographic were then accurately measured using 3 D scanning technology and compared scans of castings from shoes of the same nominal size (38). A co-design workshop consisting of a small group from the selected demographic population (i.e. professional women working indoors, primarily in an office style environment, with enclosed shoes the
required or preferred dress code) was used to elicit opinions and preferences for what they considered an ideal shoe.

Despite the widespread availability of anecdotal data, there was a paucity of definitive information about the attitudes of Australian women towards the relationship between visual appeal and comfort in dress shoes available in the Australian market. The initial survey of working women demonstrated that the overall aesthetics of a pair of shoes was the primary contributing factor in the decision to purchase. The survey results also suggested that there were issues with fit and comfort, which only became apparent once the shoes were worn on a daily basis. However, the specific aspects of a shoe that define comfort appeared to be subjective and inconsistent from the feedback received, so it was obvious that women were either unsure of what features could be assessed to define comfort or that women were prepared to downplay this aspect. It was therefore highly relevant that scanning of feet and shoes within a specific size (38) revealed that some of the discomfort in shoes related to variability in stated size, with shoes imported (primarily from Asia) being generally narrower and particularly across the forefoot than the foot they were specified for. It was concerning that no other studies had compared foot and shoe sizes in Australia, since it appeared to be assumed that shoes manufactured overseas were consistent and accurate in size. This mismatch was potentially exacerbated by more women assuming that their foot size has not changed since adolescence when it was last actually measured for size.

A noteworthy outcome from this project was to demonstrate the value of a co-design workshop to specifically explore and define factors that contribute to comfort and aesthetics in dress footwear. However, the most interesting outcome was that three pairs of shoes were proposed, which suggested that a single design may not accommodate the requirements of personal choice, aesthetics and workplace regulations. The workshop highlighted that the design of one pair of shoes did not meet the criteria for every individual and a range of variables complicated this design goal. It was therefore necessary to recognise a range of footwear options that were produced as prototypes, as outcomes from the co-design workshop. Each of the three pairs of shoes offered specific aesthetic and comfort features. Shoe one was of a more elegant appearance with a soft pointed toe shape in textured leather, kitten heel and sling back. Shoe two consisted of a soft pointed toe shape in textured leather,
sculptured heel shaping and wider straps crossing over the forefoot arch for walking comfort. The third shoe had a rounded toe shape, textured leather and wedge heel design for comfort and support for standing. All three pairs of shoes had additional comfort features, including extra cushioning in the forefoot, arch support and memory foam inner lining.

Importantly, the principles of co-design could contribute and influence many industry stakeholders, including shoe importers, manufacturers, workplace guidelines (including Occupational Health and Safety) and retail. The significant diversity in the sizing of footwear imported into Australia also has vital implications for the shoe industry as a whole. The desirability of an Australian standard in footwear sizing to improve overall fit and minimise size discrepancies. A designated shoe size should conform to relatively strict guidelines and the current absence of this Australian standard has likely contributed to the variability in sizing evident today. Future investigations could lead to an introduction to comfort standard benchmarks as part of Australian OHS requirements in work related footwear. The usefulness of a health-labelling system could also be introduced for good foot health, for example; arch, heel and forefoot support, cushioning levels. The Australian footwear industry could encourage women to have regular appraisals for correct size and fit, this could be advertised in store and on foot health brochures, and shoe retailers should be trained to fit shoes correctly.

Furthermore, Australian footwear companies/importers could introduce or increase footwear testing (fit, sizing and comfort) and seek consumer feedback, including from co-design workshops, before proposed shoe designs proceed into mass production or are imported. Australian footwear companies could increase the range of sizes on the market, both in length and width (recognise that there is variability in feet) and offer options in width (A, C, D, E) sizing within set styles of dress shoes. While it would be impractical for all stores to offer all sizes and width ranges, it would be prudent for stores to offer size C and/or D, while other widths (A, E, EE) could be available on order. A wider range of sizes could be available in larger/department retail stores and this could be combined with 3D scanning of each woman’s foot to ensure accurate fit. Importantly, increased 3D scanning would permit the development of a database to review width requirements for all shoes, including dress shoes, in Australia, with the future aim of greater customisation of shoes for all women.
A further important outcome from this research was that women should assume some of the responsibility for poor fit in shoes. It is therefore a recommendation that women regularly (every 2 to 3 years) test their foot size, preferably by 3D scanning, to avoid relying on the assumption that their foot has maintained the same size as when last measured. This has particular relevance if feet have not been measured since adolescence. A better match of shoe to foot size should also be considered as contributing to maintaining good health practice and may therefore be claimable on Medicare, particularly after a specified age, similar to other medically recommended check-ups. This intervention could improve or detect changes in the foot and eliminate many of the foot issues currently occurring. More generally, an increase in education in ‘Foot Well-Being’ could be included in women’s health information, particularly at an earlier age and/or in school health education. It is likely that similar problems could be occurring in other countries and this research could therefore be extended into other regions, such as the UK, other European countries and New Zealand. It would be interesting to compare footwear issues in fit, comfort and sizing to further increase ‘Foot Well-Being’ on a broader global scale.

Moving to the future, the above recommendations could make an important contribution to the wearability (comfort and aesthetics) of Australian footwear and influence shoe importers to adhere to clear and definitive guidelines. The identification of design variables that are both desirable and relatively cost-effective would permit manufacturers, importers and retailers to offer greater benefits to consumers. This outcome from this research has the potential to ensure the footwear industry is cognisant of the changing attitudes of Australian working women and can respond appropriately.
References


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GOONETILLEKE, R. S. Designing footwear: back to basic in an effort to design for people. SEAMEC, 2003 Kuching.


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### Appendix 1. Survey

Please place a cross in the most appropriate box, (also, is it okay to pick more than a single box, particularly for questions: 8, 11, 20, 21, & 29).

1. Do you have difficulty buying the right size for your foot?

<table>
<thead>
<tr>
<th>A great deal</th>
<th>A fair amount</th>
<th>A little</th>
<th>Hardly any</th>
<th>Never</th>
</tr>
</thead>
</table>

2. Do you have problems with purchasing the right fit (width and depth) for your feet?

<table>
<thead>
<tr>
<th>A great deal</th>
<th>A fair amount</th>
<th>A little</th>
<th>Hardly any</th>
<th>Never</th>
</tr>
</thead>
</table>

3. What size do you regularly wear?

<table>
<thead>
<tr>
<th>35</th>
<th>36</th>
<th>37</th>
<th>38</th>
<th>39</th>
<th>40</th>
<th>41</th>
<th>42</th>
<th>43</th>
</tr>
</thead>
</table>

4. What is your occupation? __________________________

5. What is your age group?

<table>
<thead>
<tr>
<th>25 to 29 yrs</th>
<th>30 to 39 yrs</th>
<th>40 to 49 yrs</th>
<th>50 to 59 yrs</th>
<th>60 to 65 yrs</th>
</tr>
</thead>
</table>

6. Approximately how many hours a day do you stand or walk at your employment?

<table>
<thead>
<tr>
<th>Less than 1 hour</th>
<th>2 to 3 hours</th>
<th>4 to 5 hours</th>
<th>6 to 7 hours</th>
<th>All day (8+ hours)</th>
</tr>
</thead>
</table>

7. Do you wear the same shoes at work as you do travelling to and from work?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

8. What situation might you NOT wear the same shoes all day?

<table>
<thead>
<tr>
<th>Driving</th>
<th>Catching Public transport</th>
<th>Walking a longer distance</th>
<th>Do not change</th>
</tr>
</thead>
</table>

9. How often do you wear the same pair of shoes per week?

<table>
<thead>
<tr>
<th>1 day</th>
<th>2 to 3 days</th>
<th>4 to 6 days</th>
<th>7 days</th>
</tr>
</thead>
</table>
10. Do you have problems buying the right style of shoe for your foot?

<table>
<thead>
<tr>
<th>A great deal</th>
<th>A fair amount</th>
<th>A little</th>
<th>Hardly any</th>
<th>Never</th>
</tr>
</thead>
</table>

11. What is the main priority when purchasing a pair of shoes? Rate: 1 to 5 in order
1 = main priority, 2 = second priority, 3 = third priority 4 = fourth priority, 5 = least priority.

<table>
<thead>
<tr>
<th>Price</th>
<th>Fit</th>
<th>Comfort</th>
<th>Appearance</th>
<th>Quality</th>
</tr>
</thead>
</table>

12. How important is the appearance when purchasing a pair of shoes?

<table>
<thead>
<tr>
<th>Very important</th>
<th>Important</th>
<th>Average</th>
<th>Low importance</th>
<th>Very low importance</th>
</tr>
</thead>
</table>

13. Do you wear mostly a certain heel height (cm) for work and social occasions?

<table>
<thead>
<tr>
<th>Flat (1-2 cm)</th>
<th>Low Heel (2-3 cm)</th>
<th>Medium Heel (4-5 cm)</th>
<th>High Heel (6+ cm)</th>
</tr>
</thead>
</table>

14. How important is colour, when selecting a pair of shoes?

<table>
<thead>
<tr>
<th>Very important</th>
<th>Important</th>
<th>Average</th>
<th>Low importance</th>
<th>Very low importance</th>
</tr>
</thead>
</table>

15. How important is to wear current fashion shoes (new season)?

<table>
<thead>
<tr>
<th>Very important</th>
<th>Important</th>
<th>Average</th>
<th>Low importance</th>
<th>Very low importance</th>
</tr>
</thead>
</table>

16. How important is the comfort when purchasing a pair of shoes?

<table>
<thead>
<tr>
<th>Very important</th>
<th>Important</th>
<th>Average</th>
<th>Low importance</th>
<th>Very low importance</th>
</tr>
</thead>
</table>

17. How often do you have problems with comfort once you start to actually wear the shoes?

<table>
<thead>
<tr>
<th>A great deal</th>
<th>A fair amount</th>
<th>A little</th>
<th>Hardly any</th>
<th>Never</th>
</tr>
</thead>
</table>
18. After wearing your shoes over a few hours do you experience problems or discomfort to your feet? If so, how long does it take for the discomfort to appear?

| 1 - 2 hours | 3 - 4 hours | 5 - 6 hours | 7 - 8 hours | Not at all |

19. Do you have shoes that you rarely wear due to poor comfort levels?

| Yes | No |

20. What specific area of the shoes do you normally find uncomfortable?
More than one box may be selected below.

| Back of Heel | Heel | Foot Arch | Lower Foot | Toe Area |

21. Do you prefer certain types of materials, when purchasing a pair of shoes?
More than one box may be selected below.

| Leather | Leather Imitation | Canvas | Woven Fabric | Plastic | No preference |

22. How many shoes do you buy per season?

| 1 pair | 2 pairs | 3 pairs | 4 pairs | 5 pairs | 6 + pairs |

23. What price range do you mostly pay for a pair of dress shoes for work or social occasions?

| Less than $50 | $50 to 100 | $100 to 200 | $200 to 300 | $300 to 400 | $400 to 500 | $500+ |

24. What type of shoes do you mostly purchase?

| Dress shoes for work | Dress shoes for social occasions (evening & day) | Casual shoes |

25. Do you mostly purchase your shoes from a store, online or bespoke?
26. If you purchase your shoes at a store, if there a specific store or chain that you purchase from?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Store/s name ______________________________________________________

27. Is there a particular brand/s of shoes you like to wear?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Name of Shoe Brand/s______________________________________________

28. Do you know where the majority of the shoes you purchased are manufactured?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

29. If your shoes are imported, which country/s are your shoes mostly imported from?
More than one box may be selected below.

<table>
<thead>
<tr>
<th>China</th>
<th>India</th>
<th>Taiwan</th>
<th>Spain</th>
<th>Brazil</th>
<th>Italy</th>
<th>Other</th>
<th>No idea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

30. Are you currently happy with the shoes available on the Australian retail market?
Comments:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

31. If you are happy not to remain anonymous and interested in this field of research and would like to participate in further studies please include your details.

Name, city of residence, & email address:____________________________________
Appendix 2. Interview questions for footwear importers:

1. Which country/s do you currently import shoes from?

2. Have you always imported from the same country/s or has that changed over time?

3. How many years have you been importing footwear into Australia?

4. Are you satisfied with the current quality of footwear?

5. Has the quality improved over time or has it declined?

6. What kind of volumes do you import per season?

7. Who and where do you sell the imported footwear in Australia?

8. What are the main criteria for selection of the shoes imported?

9. Do you design or co-design any of the footwear imported?

10. Do you closely follow fashion trends and buy accordingly?

11. How important is the comfort of the shoes imported?

12. Is comfort the main consideration when purchasing or would it be second to fashion/visual appeal?

13. Do you request or receive feedback from your clients about the shoes imported?

14. If yes, what adjustments to the purchasing criteria have you made in the past?

15. What price range/s do your client’s retail the footwear; under $100, $100 - $200, $200 - $300?

16. Where do you see footwear manufacturing to be in future??
Appendix 3. Interview questions for Podiatrists:

1. What is the most common foot issues with women aged between 30 and 60 years?

2. Would the majority of foot issues be short or long term?

3. Would some of these foot issues be permanent pathologies?

4. What areas of a woman’s foot are more likely to have foot issues?

5. What types of treatments are used to aid the foot?

6. Are any of these foot issues caused by wearing high heel shoes?

7. What other types of shoes cause foot issues?

8. Do poor fitting shoes cause some of these foot issues?

9. Do you believe women are well informed about wearing footwear to maintain good foot health?

10. Do you believe woman in the 30 to 60 age group are wearing the correct footwear?

11. Do you think woman are regularly wearing the correct size and fit for their feet?

12. What type of footwear do you recommend a professional working woman to wear?

13. What if a working woman is required to wear a high heels (2” to 4 “) as part of their dress code?

14. Do your patients (woman) wear the prescribed shoes on a regular basis?

15. Do you have resistance from patients about wearing only fashionable shoes?