Invest In Fit: A Comparison of Poorly-Fitting and Properly-Fitting Bras

Savannah Edmundson

Washington State University

Apparel, Merchandising, Design & Textiles Department

College of Agricultural, Human, and Natural Resource Sciences

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Dr. Carol Salusso
As thesis advisor for Savannah Edmundson, I have read this paper and find it satisfactory.

Signature

Date 5/11/15
Précis

My bras were always uncomfortable since I first started wearing them in 5th grade. About three years ago, I became fed up, and wondered if something could be done about my discomfort. This began what I call my “bra fitting journey.” At this point, I had been sewing since high school, so I understood how body measurements directly relate to clothing size. When it came to bra shopping and figuring out what size I should be wearing, I was always measured by lingerie department sales associates. Since my bras never seemed to fit right, I decided that the associates had been measuring me incorrectly. This means my first goal of my bra fitting journey was to learn how to measure myself. So the research began, and I found plenty of sources. This eventually lead to a three-year-long research process regarding: 1) The differences between a properly-fitting and poorly-fitting bra; 2) Why women are wearing poorly-fitting bras; 3) The solutions to fitting for a better bra; and 4) Where to find a large range of bras for purchase.

Many women are wearing the wrong size bra. According to a study conducted by Wacoal in 2004, 80% of women wear the wrong size bra (Matina, N.D.). I believe that all women can and should be in a better bra, and that support of the breasts can be found at any size. Now the questions I need to answer are: 1) Why are so many women wearing the wrong size? And 2) How can I get more women into a bra that fits better? These questions inspired me to do a creative project to provide the answers and to create a guide for women who need help finding a better fitting bra.

In my project, three models were chosen to participate anonymously. In order to demonstrate the importance of a well-fitting bra, I took several steps. The first step was to analyze how the models’ current bras fit. I then created a questionnaire that asked the models
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about their bra history, to record breast-related measurements, and identify breast shapes that best matched their own. (This questionnaire can be seen at the end of the paper, titled Appendix A.) Finally, I used the filled-out questionnaires to design three custom bras, one for each model. All three models were wearing terribly-fitting bras at first; this served the purpose of my project very well. At the end, I had the models review their bras and express the differences between their old and new bra.

Through the use of many images, I will take you through my creative project from start to finish, beginning at the brainstorming and design process, and ending at a visual comparison between the models’ old bras and custom made bras. My project will create a long-lasting visual impression that will inspire women to begin their own bra searching journey. In the future, I or another researcher could expand on this project, including more participants. While each model was unique, their sizes were all close together. This means that expanding the project to more women with more diversified sizes would create a bigger impact and better represent a wider range of women.

Having conducted this research and product design process, I discovered how difficult it is to make a highly-fitted garment piece. There was a lot of detail work and techniques used that were new. I was also able to get the personal stories from three individuals, and I learned why they weren’t wearing the right size. Their stories reflected the many reasons why most are not wearing the correct size. One model didn’t know how to find a better bra and didn’t have the money to buy more bras. The second model believed she had calculated the size she should have been wearing, but couldn’t find stores with that bra size. The third didn’t even know that a better fit could exist for her. Developing a bra-fitting guide should help women be more successful in wearing a properly-fitting bra.
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Invest In Fit: A Comparison of Poorly-Fitting and Properly-Fitting Bras

I. Introduction

One of my passionate goals in life is to design lingerie while helping women wear bras that fit properly. Since I started doing research a few years ago, and began wearing increasingly better bras, my whole outlook on our culture and how I view my body has changed. From weight loss plans around every corner, to the edited imagery of beauty advertisements, to female celebrities being trashed for gaining weight like the talented rock star Pink, it’s evident that our culture hates body fat unless it is in the form of shapely breasts (Selby, 2014).

Prior to this research and design journey, I always hated my breasts. This feeling was based on: bra size myths; images of perfectly round and perky breasts with thick cleavage smothering advertisements and fashion magazines; comments from my friends and family members about how my breasts would grow eventually, as if small breasts were bad; and how badly my own bras fit. I thought that my breasts were too small, too flat, too pointy, and just plain ugly. It wasn’t until I started my bra searching journey that I started to realize how deep my self-hate was. Through the journey, I learned that all breasts are unique; size doesn’t matter; women should love her body; and they shouldn’t try to change their breasts to please others. Given that breast augmentations were the number one cosmetic procedure for women in 2013, with 290,000 procedures in 2013 alone, it’s clear that there are a lot of women are unhappy with their breasts (Arlington Heights, Ill., 2014).

Part of a woman’s overall physical and mental wellbeing is wearing properly-fitting bras. If a woman wants to lose weight, exercise, or eat healthier, there are thousands if not millions of tips and tricks to aid her (Willard, 2014). When a woman complains about back pain, a friend may suggest a remedy, but if a woman expresses pain from her bra, she’s either told that she
can’t get away from it, or that it’s not “lady like” to talk intimately about her undergarments or body (Yandoli, 2014).

There’s a movement trying to change our cultural views of women’s bodies being shameful and objectified, to a culture where we can freely express our pains and likes of our bodies without receiving scrutiny (Sridharan, 2014; TEDxYouth, 2013). Women shouldn’t be ashamed into wanting one body type. Women also shouldn’t have to answer to others in regards to her appearance. If a woman doesn’t accept a compliment, she’s called terrible names, but on the other hand if she says, “thank you, I agree,” to a compliment rather than just, “thank you,” she’s at risk of being called terrible names as well (Warren, 2015). A woman who is proud of massive weight loss shouldn’t be turned away from fitness magazines simply because she has skin left over that wrinkles and sags (Dwyer, 2014). Instagram accounts shouldn’t be shut down simply because photos of post-pregnancy belly stretch marks were shared (Morgan, 2015). Women should not lose friends due to their “ugly” mastectomy scars (Sparrow, 2014).

Many companies and individuals are supporting self-love, no matter body size, including the This Girl Can campaign by Sport England; the bra designer Ewa Michalak with her models ranging in size, shape, height, and age; and Body Image(s) with a collection of casually nude images celebrating the beauty of diverse women (Bell, 2015; Ewa Michalak, 2014; Baker, N.D.). Even models support a more real perspective on the fashion and apparel industry, including sportswear model Lauren Fleshman. She wrote an article in 2013 addressing the differences between her daily body, with her back slouched and stomach hanging out, and her lean runway body. (Fleshman, 2013)

Lingerie is not porn and believing that lingerie is only about sex is another means to sexualize a woman’s body (Cora, 2014). Sex and lingerie do not have to be interchanged;
foundation garments can be just supportive. But sex and being sexy should not be viewed negatively either. Human sexuality is what makes us who we are as a human race (National Geographic, 2015). Besides, it’s common that women use make-up, hair styling, and apparel to be more sexually appealing. If attractiveness is the goal, then properly fitting foundation garments will make the body appear more balanced and smoother under clothing, and bring the breasts front and center on the chest. Apparel will fit better because it is designed to be placed over supported breasts.

The other major issue is that women are not aware that a better bra exists in the first place. Media shows women with breasts spilling out of too-small bras all the time and there are very loud claims that all bras are painful and annoying (Victoria’s Secret, N.D.; Wonderbra, N.D.; BuzzFeedBlue, 2015). There’s also misrepresentation of the letters associated with bra size in articles and movies, with D usually meaning “huge” (Daily Mail Reporter, 2014; Braless in Brasil, 2011). Because the voice for the benefits of a better fitting bra is being overpowered by all those bad images and misrepresentations in media, women probably do not know to question whether her bra is right for her or not.

If a woman were to discover that she was wearing the wrong size, her correct size may not be easily accessed in the U.S. Some of the most popular lingerie companies have extremely limited size ranges. In the U.S., Victoria’s Secret, Aerie, and Macy’s are major sources to purchase bras. Victoria’s Secret size range included 30AA through 40DDD, Aerie included sizes 30A through 40DD, and Macy’s included sizes 30D through 54D (Victoria’s Secret, 2015; Aerie, 2015; Macy’s, 2015). Macy’s was the only location where a larger band could be found, but cup sizes ended at triple-D. In reality, there are women who need up to a P cup (MissShapen, 2015).
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The other problem is that well-constructed bras are usually more expensive than what is available on the mass market due to more product development costs. From a company that doesn’t specialize in bras, like Target, you can buy a bra for as low as $5.00 (Xhilaration®, 2015). But a company that does specialize in bras and has a larger size range, like Freya, may charge $69.00 for a bra (Freya, 2015). Not being able to easily find what you need at a low price is discouraging and may prohibit women from putting the time into searching for better fitting bras.

My artistic goal for this project was to transform the physical and mental process of searching for a better fitting bra into a three-dimensional, comprehensive example of the time and effort it takes to find a bra that fits well. This project demonstrates that women should be wearing a correctly-fitting bra, and give guidance for finding that bra. A related study was completed by Wacoal in 2004. Wacoal polled 750 women on their current bra size and breast-related measurements and then analyzed whether or not they needed a different bra. The study found that approximately 80% of women were wearing the wrong size (Mattina, N.D.). As well as Wacoal’s study, other informal polls done on bra blogs have inspired me to find women who need better fitting bras, and aid them in the bra fitting and finding process (Braless in Brasil, 2012).
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II. The Creative Project

a) Approach

Since one of my goals was to prove that bra support can be found at any size, I needed to show this through the drafting and creation process of three unique, custom bras that each relied on their own calculations, patterns, and fabrics. In order to make the project more dynamic, challenging, and diverse, three models of different sizes were chosen. To find potential models, I asked my close friends for help. When I needed to look broader, I asked models of the annual Mom’s Weekend Fashion Show that is held every spring by the WSU Apparel, Merchandising, Design and Textiles Department. I figured that a voluntary model that redresses around others many times would be comfortable enough to work with a designer regarding her breasts and bras. In order to make the models even more comfortable, I made their identities anonymous. Throughout this paper, I will call them “Model One,” “Model Two,” and “Model Three.”

Each model was measured and evaluated to determine the bra style, shape, and size that would best fit their breast shapes and sizes. In order to evaluate, I took two steps; one was taking “before” photos of the models wearing their current bras. The photos include a front view, a three-quarter view, a side view, and a back view. I then asked the models to respond to a bra fit questionnaire I developed that included a collection of tables, charts, and images for the models to fill out.

In this bra fit questionnaire (Appendix A), there were five sections. The first section asked what sizes they were currently wearing, when was their last fitting, and where their last fitting was located. The second section had two parts. The first part of the second section held a collection of images that reflected aspects of an ill-fitting bra, and the models were asked to circle areas they experienced with their own bras. The questionnaire then included more specific
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questions regarding how the bra band fit, how the cups fit, and if there was any pain associated with the bra. The third section included a table with key measurements for the models to fill in. The next section instructed the models to circle more illustrations that best matched their own breast shapes, as well as a one-to-five scale of breast tissue density. The final section asked the models to circle photos of the bra styles that they preferred.

From the beginning, I knew I wanted each model to have a uniquely colored bra. I was first conflicted between doing either “nude” shades, or colors, and in the end I chose colored bras because they would make a bigger visual impact. Model One received with a lilac bra, Model Two a fuchsia bra, and Model Three a turquoise bra.

On top of designing bras, I wanted a way to spread the word on properly fitting bras to others in a quick, informative, efficient way. This led me to also creating a tri-fold brochure. In this brochure would be fitting guides, resources, and as much bra-related information as it could hold. I had already created a packet which I presented to the women of one of my sewing classes in the past, so through that I made my basic outline of the brochure. This informational brochure can be found at the end of the paper titled Appendix B.

b) Model Profiles

The model profiles were developed through the use of the questionnaire (Appendix A) and I have provided a collection of tables comparing the selections each model made. It is evident that while each model had similarities in their measurements, each one was still unique in her shape. My comments about their selections can be found after the tables.
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- Basic Information

**Table 1. Model One, Two, and Three’s Basic Information**

<table>
<thead>
<tr>
<th></th>
<th>Model One</th>
<th>Model Two</th>
<th>Model Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Sizes Worn</td>
<td>34A, 34B</td>
<td>30D</td>
<td>34C, 34D</td>
</tr>
<tr>
<td>Last Bra Fitting</td>
<td>Never</td>
<td>January 2013</td>
<td>2012</td>
</tr>
<tr>
<td>Location of last fitting</td>
<td>N/A</td>
<td>Nordstrom</td>
<td>JC Penny</td>
</tr>
</tbody>
</table>

- Fit Information

**Table 2. Model One, Two, and Three’s Fit Information**

<table>
<thead>
<tr>
<th>Signs of ill-fitting bra</th>
<th>Model One</th>
<th>Model Two</th>
<th>Model Three</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hooks on tightest setting; bra slides up over breasts; wires sit on breast tissue; tissue escapes into armpits; top edge of cup cuts in; straps dig in</td>
<td>Band riding up; band is really stretchy; hooks on tightest setting; bra slides up over breasts; wires sit on breast tissue; tissue escapes into armpits; straps dig in</td>
<td>Band is riding up; band is really stretchy; wires sit on breast tissue; tissue escapes bra into armpits; wires sit on breast tissue; center “floats” from body</td>
</tr>
<tr>
<td>Band sits in back</td>
<td>It sits straight</td>
<td>It rides up</td>
<td>It rides up</td>
</tr>
<tr>
<td>Band stretch</td>
<td>2-3” from back [on tightest hook]</td>
<td>3.5-4.75” from back [on tightest hook]</td>
<td>5-6” from back</td>
</tr>
<tr>
<td>Wires sit in front</td>
<td>They sit flat</td>
<td>They dig in</td>
<td>There’s a gap</td>
</tr>
<tr>
<td>Bulging</td>
<td>Yes, slightly</td>
<td>Yes, in some bras</td>
<td>No</td>
</tr>
<tr>
<td>Any pain</td>
<td>Shoulder straps dig in; band digs in sides</td>
<td>Wires leave uncomfortable marks; wires dig into sternum; shoulder straps dig in; sore breasts from jiggling</td>
<td>Caused by bouncing with quick walking &amp; using stairs; neck ache from hunching to prevent bra from sliding around</td>
</tr>
</tbody>
</table>
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- Measurements

In this section, I had the models use a soft tape-measure to take their own measurements and fill out a table with their breast-related body dimensions, while remaining bare-chested. In There was an illustration provided for a visual aid in where to take the measurements, which can be viewed in Appendix A.

**Table 3. Model One, Two, and Three’s Measurements (Unit: Inches)**

<table>
<thead>
<tr>
<th></th>
<th>Model One</th>
<th>Model Two</th>
<th>Model Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ribcage circumference, relaxed</td>
<td>28</td>
<td>27.75</td>
<td>29</td>
</tr>
<tr>
<td>Ribcage circumference, tight</td>
<td>26.5</td>
<td>25.75</td>
<td>27</td>
</tr>
<tr>
<td>Bust circumference, standing</td>
<td>32</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>Bust circumference, leaning</td>
<td>34.75</td>
<td>35.5</td>
<td>36.75</td>
</tr>
<tr>
<td>Bust circumference, lying</td>
<td>32.75</td>
<td>34.25</td>
<td>35.5</td>
</tr>
<tr>
<td>Breast horizontal perimeter, leaning</td>
<td>8</td>
<td>8.25</td>
<td>9.25</td>
</tr>
<tr>
<td>Breast vertical perimeter, leaning</td>
<td>6</td>
<td>8.25</td>
<td>7.5</td>
</tr>
<tr>
<td>Breast horizontal perimeter, lying</td>
<td>8.25</td>
<td>8.25</td>
<td>9.75</td>
</tr>
<tr>
<td>Neck to nipple</td>
<td>8.5</td>
<td>7.75</td>
<td>8.5</td>
</tr>
<tr>
<td>Breast base height</td>
<td>10</td>
<td>7.5</td>
<td>7.875</td>
</tr>
<tr>
<td>Frame width</td>
<td>10.5</td>
<td>10.75</td>
<td>11.5</td>
</tr>
</tbody>
</table>

- Shapes

The Shapes section held more illustrations of breasts, this time all from the front view, and the models were instructed to circle the shapes that best matched their own breasts. The models’ choices are below.

**Table 4. Model One, Two, and Three’s Breast Shapes**

<table>
<thead>
<tr>
<th></th>
<th>Model One</th>
<th>Model Two</th>
<th>Model Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round vs. Pointy</td>
<td>Pointy</td>
<td>In the middle</td>
<td>Round</td>
</tr>
<tr>
<td>Full-on-top vs. Full-on-bottom</td>
<td>Full-on-bottom</td>
<td>Full-on-top</td>
<td>In the middle</td>
</tr>
<tr>
<td>Wide vs. Narrow root</td>
<td>Wide</td>
<td>Wide</td>
<td>Wide</td>
</tr>
<tr>
<td>Wide vs. Narrow breasts</td>
<td>Wide</td>
<td>Wide</td>
<td>Wide</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>High vs. Low nipples</th>
<th>Low</th>
<th>Slightly low</th>
<th>In the middle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close vs. Separate Breasts</td>
<td>Separate</td>
<td>Separate</td>
<td>Separate</td>
</tr>
<tr>
<td>Broad vs. Narrow shoulders</td>
<td>Narrow</td>
<td>Narrow</td>
<td>In the middle</td>
</tr>
<tr>
<td>Low vs. High breasts</td>
<td>In the middle</td>
<td>In the middle</td>
<td>In the middle</td>
</tr>
</tbody>
</table>

After choosing front-view drawings, I had the models choose between exaggerating drawings of looking down at their breasts from an aerial view.

Table 5. Model One, Two, and Three’s Breast Root and Projection

<table>
<thead>
<tr>
<th>Breast Root &amp; Projection</th>
<th>Model One</th>
<th>Model Two</th>
<th>Model Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shallow breast projection, relatively wide root</td>
<td>Medium projection, relatively wide root</td>
<td>Strong projection, very wide root</td>
<td></td>
</tr>
</tbody>
</table>

The final section of “Shapes,” models ranked their breast tissue density from one to five. One was very soft, which meant there is little to no defined shape to the breasts, they might sag greatly, and they take the shape of a bra. Three was equally in the middle, meaning that the breasts have some mould-ability to a bra, and a bit of squishiness, but still holds their shape well. Five meant “Extremely Firm,” so breasts that have a very defined shape that stay in place, with no squish-ability, and the breasts tend to fill the center of a bra with empty gaps in the bra surrounding the breasts.

Table 6. Model One, Two, and Three’s Breast Tissue Density

<table>
<thead>
<tr>
<th>Breast Tissue Density</th>
<th>Model One</th>
<th>Model Two</th>
<th>Model Three</th>
</tr>
</thead>
</table>

- Bra Styles

Table 7. Model One, Two, and Three’s Preferred Bra Styles

<table>
<thead>
<tr>
<th>Bra Styles</th>
<th>Model One</th>
<th>Model Two</th>
<th>Model Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>No preference</td>
<td>Moulded cup balconette; unlined</td>
<td>Moulded balconette; lined balconette;</td>
<td></td>
</tr>
</tbody>
</table>
• Comments on the Profiles

At first, I was confused as to why Model One had said that her band and straps were digging in, when in her photos she was wearing the straps loosely and she knew her band was too big. She later explained that the straps and band were both too thin, with the elastic along the band edges even thinner, so they caused discomfort, which is in turn why she wears the straps as loosely as possible. I was also surprised that she said she could only pull her band a few inches away from her back. I later realized that she had her bras on the tightest hooks, and if the hooks were clasped looser, the band would have stretched further.

After evaluating Model Two’s bra fit issues and profile, she seems to know her breasts quite well and what type of bras she needs. Based on her measurements, she is almost in the correct size, but it appears that she has yet to find the perfect fit or a supportive-enough bra. Of Model Three’s evaluation, I can understand each selection she made. I could definitely see all of the fit issues she had with her bra when I took her “before” photos.

c) Bra Designs for the Models

After reviewing the three model profiles, I designed the appearance of each bra, which would ultimately lead to the drafting of the patterns. Each bra was designed to best support the breast shapes that the models identified. Model One’s breasts were small, soft, and pointy, so a bra with cups that have less coverage and a rounded shape would best fit her breast tissue. This led me to make Model One a plunge bra, which has low-cut cups in the center front of the bra.
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Model Two’s Bra was a convertible strapless half-cup bra. Model Two’s breasts have more tissue above the apex, so she needs a bra that has cups that are open on the top edge, rather than cut back sharply towards the chest. Half-cup bras fit this profile. Model Three has breasts that are round and projected with tissue located over a large area of the chest wall, so she needed a bra that had more support and coverage. This led me to design a full-cup bra for Model Three, which provides that support and coverage.

The three styles were fairly similar, with vertical seams in all of the bras and horizontal seams in at least two. There would be slight variations in the band height. Since Model One’s breasts were the smallest and needed the least support, her band was the shortest in height, but yet had more substance than her previously too-thin bands. Model Three’s full-cup bra was designed to have a medium height in the band since she needs more support holding up the weight of her breasts than Model One. Finally, Model Two’s strapless band was the thickest. Since strapless bras don’t have straps and all of the breast weight support must come from the band, strapless bands usually have thicker height to them to distribute the breast support over a larger surface area of the back and chest.

Below are the original drawings. Due to an eventual lack of resources for the strapless bra, it was made without the removable straps. Other than that, the designs stayed true to their original design.

![Figure 1. Bra Design 1](image1)

![Figure 2. Bra Design 2](image2)
**d) Drafting Process**

In order to draft the bra patterns, I found a four-part tutorial online that would guide me in making custom bras from scratch. The tutorial I used as my design resource was titled How to Make a Bra and was found online, at a website called *Foundations Revealed*. Part 1 was an introduction, with instructions on how to determine the cup and back size for the purpose of the tutorial, among other bra fitting and sizing facts (Garbarczyk, 2012). This introduction was invaluable for getting started in determining the cup and back sizes of each individual model.

Part 2 moved on to the actual drafting of the bra. It started by stating the importance of measurement accuracy, and listed the materials the drafter will need for drawing the pattern pieces, which I gathered before continuing the tutorial. The first part of drafting was the creation of the bra cup block. From there, I used a provided chart to grade the block pattern up to the desired cup size. To create the cups, I mainly used a straight ruler and a spring bow compass. Once the cups were graded to the proper size, the basic one-piece pattern was altered to have the desired number of pieces while still resulting in a rounded cup that held and supported the wearers’ breasts. With cup alterations, I was able to create the unique style lines of each bra as designed.
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After the cups were made, the bands were drafted. The band comes in two parts: the cradle, which is the front half where the cups attach; and the wings, which make up the elastic back half of the bra. To make the cradle, the desired underwire size must be known. The underwire was then traced to create the inner curve of the cradle, which is where the cups will attach to the bra. The width of the cradle and length of the wings were calculated with percentages using the previously-measured back circumference of each model.

I drafted Model Three’s pattern first. Combining her measurements with the supplied size charts, I determined that I needed to scale up the base cup size-4 up to a cup size-8. In turn, I took the basic cup size-4 block and scaled up to a cup size-6 for Model Two and to cup size-5 for Model One. After having my first set of basic paper patterns for the cups, I taped the pieces together where I would sew them together in fabric, and had each model hold the paper pattern up to her breast. Modifications were made to each cup to customize fit for each model. Once the correct cup size was found, I could move on to changing the shape and moving the seams to where I wanted them to be.

Before I drafted the cradle of the band, I determined the underwire size of each model. All three of the models had the wires of their current bras sitting on sensitive breast tissue, so getting the underwire the correct size to sit comfortably around the breast root was of paramount importance. In order to do this, I searched through several online bra material suppliers to find sizing charts for the underwires. I used the product chart from *Sweet Cups Bra Supply*, which had the outline of each underwire size that could be ordered from the website. The chart was printed out to scale on paper and each paper “underwire” was cut out. Then, to find the correct wire for each model, I had the models, one by one, place each underwire cut-out directly under their breast until they found one that fully encompassed all of their breast tissue, and followed their
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breast root the best, without sitting on their breasts or sitting too far outside of the breast root.

After each model had her determined underwire size, I was able to order the wires and use the paper cut-outs to trace for the pattern making while waiting for the supplies to arrive. The completed patterns for each model can be viewed below.

Figure 4. Bra One Pattern

Figure 5. Bra Two Pattern. The original size-6 block can be seen above the altered cup pattern pieces.
This drafting process allowed me to determine the amount of fabric and other materials required. After drafting, I gathered enough resources to complete the three bras the most cost-efficiently and with the least amount of fabric waste.

**e) Gathering Resources**

Once there was a set plan, and I knew the amount of fabric, trimmings, and findings I would need to create three bras, I searched for material suppliers. The supplies needed included: thin foam for lining the bra cups; non-stretch fabric for the exterior of the bra, front part of the band, and front half of the straps; low-stretch fabric mesh for the wings of the band; elastics for the straps, upper edge of cups, top edge of band, and bottom edge of band; hooks and eyes for the back closure; sliding rings for adjustable straps; underwire casing; and of course, underwires to fit each individual model. I purchased the foam that lined the bra cups from a UK online store, *Bra-makers Supply*, and the other supplies from a U.S. online store, *Sweet Cups Bra Supply*.

Below is a list of the products that I used for the creation of this project:

- Poly Laminate Foam Padding, FF-3 – Beige, ½ yard
- Single Bra Kit – Small, in Lilac
• Single Bra Kit – Small, in Turquoise
• Single Bra Kit – Large, in fuchsia
• Underwires – size WS – 36, WR – 38, WR – 44 (S stands for “short” length and W stands for “regular length)

f) Sewing Process

Before I made the bras in their final fashion fabrics, I created prototype bras out of muslin for the models to try on for one last fit check. After construction, a few more adjustments were made to the pattern pieces. I found the most common problem was that the bands were too large because the tutorial did not account for the use of stretchy band fabric, so the band pattern pieces needed to be shortened. A bra band needs to be smaller than the ribcage measurement so that it can stretch and grip on the ribcage through tension, otherwise there is no support and the bra just falls down. Figure 7 through 9 show the prototypes.

Figure 7. Bra One Mock-Up
I took the finalized pattern pieces, transferred them to the fabrics, cut out the bra pieces, and sewed the bras together. Following are some images I took throughout the sewing process of Model Three’s bra, with the figures in chronological order from when I first cut the fabric pieces out to when I had the bra nearly completed. While each bra was unique, and some pieces were sewn together differently in the cups, the steps happened in the same order.
In Figure 10, I have laid out the pattern pieces to Model Three’s bra to show roughly where they will go in relation to each other. Figure 11 shows the outside view of the two lower cup pieces on the left, and shows the inside seam of the other cup on the right. This was the first stitch made. Then the seam was pressed open and top-stitched in place on either side.

![Figure 12. Foam cup construction](image1)

![Figure 13. Bra cradle construction](image2)

The third image, Figure 12, has the fabric and foam cup on the left, with the other cup fabric sewn to surface of the foam on right. The three-dimensional aspect is beginning to take shape. The top part of the cup was sewn to the two lower pieces, and then the seam was pressed up and top-stitched in place. The steps for sewing the foam together were slightly different. Rather than overlap a seam allowance, the foam pieces were cut to size, the edges pressed together, and then zig-zag stitched across their edges. After that was completed, the fabric cup was placed over the foam cup, pulled taunt, and stitched together.

Figure 13 shows a layout of how the pieces will connect. In the image, both cups are completed, with their top edges finished by turning the raw edge toward the inside of the cups and elastic sewn to cover the raw edge. Also in the image, the left and right cradles are sewn together, the wings are ready to be sewn to the cradle, and the cups are ready to be sewn to cradle.
Figure 14. Bra mostly completed

Figure 15. Close-up of strap

Figure 14 shows the wings, cradle, and cups sewn together. The seam between the wings and cradle were pressed towards the center front of the bra, and seam tape sewn to the inside seam to cover the raw edge. The bottom edge of the bra was pressed up, and elastic added to cover the raw edge. The image shows one strap completed and sewn to the right bra cup. The strap was created by making the front half out of non-stretch fabric, with right sides sewn together, turned inside out, and elastic sewn to the top edge.

Figure 15 shows a close-up of the strap elastic being sewn around the metal slider. Strap elastic was added to the back top edge of the bra, and sewn in a loop around a metal circle. Then the elastic from the strap sewn to the front was woven through a metal slider, looped through the metal circle, woven back up through the metal slider, and sewn in place. (More close-up images of the strap construction are in the detail photos under the “Final Products” section of this paper.)

Figure 16. Bra near completion exterior

Figure 17. Bra near completion interior
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Figure 16 shows the bra nearly complete with all pieces sewn together. Top and bottom elastics were sewn in place; both straps were looped; hooks and eyes attached; and the underwire casing was sewn to the inside edge of the cup and cradle. Figure 17 is at the same construction state as in Figure 16, but shows the bra from an interior perspective. In both figures, the bra simply needs the underwires to be inserted into their casing to give the bra more shape and support for the wearer.

Figure 18. Bra fully completed excluding bow detail

In the final image, Figure 18, everything is complete except for the small bow detail to be placed on the center front of the bra.

Along the way, there were some challenges. The most difficult part was sewing the underwire casing to the bottom edge of the cup without actually stitching through the cup, and stitching only through the cradle. Another issue was sewing the bra straps around the metal hook and slider. The space to sew in was extremely tight and small, which can be seen in Figure 12. An overall challenge was how thick the all the elastics were.

**g) Fitting & Fixing**

Once the bras were finally sewn together, each model tried on her respective bra to evaluate the fit and assess if there were any minor adjustments were needed. Since Model Three’s bra was made first, hers had the most technical difficulties. First, the top elastic of the cups wasn’t tight enough, so the cups gapped about 3/8 inch from her chest. To my chagrin, the
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bra was at a point where the elastic couldn’t be tightened without tearing apart the top edge of the bra, so we accepted the miniscule gapping at the top edge of the cups and moved on. The biggest issue was unequal tension between the top and bottom elastic of the band. The upper elastic had been pulled much tighter while sewing than the bottom which caused the very back of the bra to curve up once on the model’s body. This effect was emphasized by the model’s V-shaped ribcage. The bottom the band was disassembled and shortened, and the bottom elastic was sewn more taunt. Model Three tried on the bra again, and the curvature was smaller, but still there. The band didn’t shift around, and could only stretch about two inches from her back, so her bra was deemed supportive enough.

As with Model Three’s bra, Model One’s bra was too loose in the band. The band was shortened and elastics tightened, which made the band between one-and-a-half and two inches shorter. The band was tighter and secure after alteration. It stayed level in the back, not having the same unbalanced curve that Model Three’s bra had.

Since I made Model Two’s bra last, I tried to prevent the repetition of the band being too big. This ended up with the opposite problem; the band was too tight. Since it’s impossible to add fabric when it’s already been cut away, there was nothing I could do about it being too short. The model can wear the bra with an extender accessory until the band gains a bit of slack to achieve satisfactory fit.

Another desire was to make the cups more centered for Model Two. While the cups followed the shape of her breasts perfectly, since her breasts are very wide-set, the bra also was wide-set. While this isn’t a major problem, clothing is designed for breasts that are closer together and point straight forward, not outward, so the fit of the bra under clothing might not be
the most aesthetically pleasing. The bra easily could have been made to pull the breast tissue front and center, rather than just sit around where the breasts are.

**h) The Completed Bras**

After sewing the three bras and doing the final fittings, I deemed my bras complete and took dimensional measurements of the bras. These measurements helped me to determine how I could theoretically make the bra fit better if I did the bras over again, and what common manufactured size the models should be wearing. I followed the guide for measuring from Bratabase, and a visual guide for how to measure a bra can be found in Appendix C. Following is a table of the bra measurements.

**Table 8.** Model One, Two, and Three’s bra dimensions (Unit: Inches)

<table>
<thead>
<tr>
<th></th>
<th>Model One</th>
<th>Model Two</th>
<th>Model Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band Length</td>
<td>25</td>
<td>23.75</td>
<td>27.5</td>
</tr>
<tr>
<td>Band Length Stretched</td>
<td>31</td>
<td>29</td>
<td>35</td>
</tr>
<tr>
<td>Wing Height</td>
<td>3</td>
<td>4</td>
<td>4.5</td>
</tr>
<tr>
<td>Gore Height</td>
<td>2</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Gore Width</td>
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<td>1</td>
<td>0.75</td>
</tr>
<tr>
<td>Cup Depth</td>
<td>6.25</td>
<td>8.5</td>
<td>8.75</td>
</tr>
<tr>
<td>Wire Width</td>
<td>5</td>
<td>5.25</td>
<td>6.5</td>
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<tr>
<td>Wire Length</td>
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<td>9.25</td>
<td>10.5</td>
</tr>
<tr>
<td>Strap Width</td>
<td>0.625</td>
<td>N/A</td>
<td>0.625</td>
</tr>
<tr>
<td>Number of Hooks</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

After measuring, I took photos of the bras. The photos for Bra One, Two, and Three are as follows.
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Model One's Bra:

Figure 19. Bra One Front

Figure 20. Bra One Back

Figure 21. Bra One Exterior

Figure 22. Bra One Interior
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Figure 23. Bra One Bow Detail

Figure 24. Bra One Hook Detail

Figure 25. Bra One Strap Detail

Figure 26. Bra One Strap Detail

Figure 27. Bra One Wing Detail

Figure 28. Bra One Cup Detail
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Model Two’s Bra:

Figure 29. Bra Two Front

Figure 30. Bra Two Back

Figure 31. Bra Two Interior

Figure 32. Bra Two Bow Detail

Figure 33. Bra Two Wing Detail
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Model Three’s Bra:

**Figure 34.** Bra Three Front

**Figure 35.** Bra Three Back

**Figure 36.** Bra Three Exterior

**Figure 37.** Bra Three Interior
Figure 38. Bra Three Interior Detail

Figure 39. Bra Three Bow Detail

Figure 40. Bra Three Strap Detail

Figure 41. Bra Three Strap Detail

Figure 42. Bra Three Hook Detail

Figure 43. Bra Three Hook Detail
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i) Informational Brochure

The final part of my creative project was the creation of an informational brochure (Appendix B) that I could hand out to women in need of bra help. The brochure was made in a tri-fold style, and titled, “An Informational Brochure That Defies Stereotyping of Bras, Breasts, and Sizes While Promoting the Importance of How to Find Proper Fit.” (Appnedix B) Also on the front page is a photo collection of the bra designer Ewa Michalak’s models and their respective bra sizes.

When you first open the front flap, on the left is an introduction to why so many women are wearing the wrong bra size, and why the reader should care. The right exterior flap holds common myths, some terminology, and bra care instructions. When you open the right flap, in the middle is a guide to recognizing an ill-fitting bra. The final section, on the inner right side, has step-by-step instructions on how a woman can fit herself into a good bra. On the center back is a list of online informational resources, a fun comic about bra sizing, and citations for the two images used within the brochure. I would hand this brochure out to my friends, acquaintances, and family, and ask them to spread some more around to people they know. The first step to knowing about a problem is becoming aware, and I hope that this brochure (Appendix B) will raise awareness which in turn will lead to more women caring for themselves, their breasts, and their bras.
III. Final Analysis & Comparisons

a) Photo Evaluations

After completing the final modifications for fit of the bras, I did two things to evaluate the final bras. I first had the models wear their respective bra and took photographs of the front, three-quarter, side, and back views, as was done with their original bras. With these photos, I evaluated how the fit appeared, looking for where it fit well and where it needed improvement. While some points were obvious, it was especially helpful to place the new photos side-by-side the photos of the original bras to see the fit differences.

Below I have placed photos with the areas I am interested in circled. There is a side-by-side comparison of the “before” photo on left and “after” photo on the right I took of each model, first in a bra she was wearing before the project, and second the model in the completed project bra. The areas circled are problem areas and will be described and discussed

![Figure 44](image_url)

**Figure 44.** Model One’s Front Before and After Comparison

Figure 44 is the front-view comparison for Model One. From this diagram, on the left we can see in red that there is a significant amount of breast tissue not encompassed within the bra cups. This is due to the cups being too small and the wires being narrower than the breast root.
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Circled in orange is a shadow beneath the edge of the bra. The model’s breasts are pushing the bra out and away from her chest, again due to the cups being too small, as well as the band being too big. This would also explain why she said her bras would come up over her breasts if she raised her arms.

On the right, we can see that the new bra fits much better. The wires were still a bit too narrow, so circled in red is a small amount of breast tissue being cut into by the edge of the cup. The model’s right cup is wrinkling a bit, so we can tell that the cup is not fully filled. She reported that her right breast is a bit larger than the left, but the tissue is spread out in a wider area with less projecting, which causes the wires to dig into the side of her breast and the apex of the cup to not be filled all the way. While it’s possible to make two separate cups in custom-made bras, in the mass-produced bra industry, it’s not realistic. The current solution, which works very well, is sizing the bra to the larger breast, and either ignoring the difference if it’s so small it’s not noticeable, or using what are called “cookies,” which are little padded foam inserts, to place in the bra cup with the smaller breast to fill in any empty volume.

Continuing with the evaluation, we can see along the top edge of the right cup that the elastic is slightly too tight and presses into the tissue ever so gently, and should have been made a bit looser. This again was due to the model’s right breast being a bit larger and more spread-out over her chest, including vertical spread. The gore lies flat, and the straps are adjusted to a comfortable tightness, and do not dig into the shoulders or back.
In Figure 45, similarly to the front view, on the left in red we can see that the cup doesn’t sit far back enough towards the armpit to fully encompass the side of her breast tissue. From this view, we can better see the wire circled in orange sticking out from her chest. In yellow, we can also see here how her breast tissue is pushing the cups away from her chest, causing a gap between where the straps are and where they should lie on her chest. On the right, there is no problem with the wires or straps resting against her ribcage. Again, the wire has been circled where we can see it pressing into her breast tissue, and that it isn’t sitting as close to the armpit as it should be.
From the side view in Figure 46, we can see that the band in her old bra is slightly angled upward near the back. Again, we can see the gap between the straps and her chest in her old bra. While I do believe that the underwire in the new bra is still a bit too narrow and still is sitting on some side breast tissue, it does sit further back than in her original bra, and the model says she feels no discomfort. In the future, I would remake her bra pattern to have wider wires.

In Figure 47, the back views of the old and new bra are compared. On the left, circled in red, is the hook-and-eye closure being hooked on the tightest hook. A bra should only be used on
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the tightest setting as a last resort if it getting old and is about to be replaced, not when you first wear the bra or on a regular basis like the model always says she has to in order to feel the most supported (Busty Resources, 2015). In the orange circle, her straps are worn completely loosened. The model claims that the straps dig into her skin if tightened, because they’re so thin, so she doesn’t adjust them.

In opposition, on the right, the bra band lays flat and parallel to the floor, and while the band presses in to the skin slightly, this is simply due to skin tissue being soft. According to the model, the band does not dig in uncomfortably, and the band can be stretched about two inches from the back with ease. The band is neither too loose nor too tight, the hooks are on the loosest setting, and the straps are adjusted comfortably without digging into the skin. Overall, the bra has an excellent fit and the wearer was satisfied.

Figure 48, 49, 50, and 51 are for Model Two. Again, I have circled areas of concern and will explain how it fits well and the areas that may not fit perfectly.

Figure 48. Model Two’s Front Before and After Comparison

In Figure 48, on the left are both the wires and the straps biting into the skin. The wires are circled in orange, and according to the model, are pressing uncomfortably tight into the breast tissue in the center front. By the shadows of her interior breast edges, it is apparent that the
wire edges are too far apart for the breast roots. While Model Two’s breast apexes are far apart, the roots still touch together at the sternum, so Model Two needs to have wires that sit very close together to prevent them from sitting on the breast tissue. The yellow circle in figure 48 show the strap digging into the shoulder. This is difficult to avoid when straps are made of such thin, stretchy elastic. In comparison, the bra on the right has underwires that are set close enough together and higher to prevent them from digging in, and the cups appear to follow the shape of the breasts well. The only major concern is that the band is visibly too tight (circled in orange on the right).

Figure 49 is a three-quarter view of Model Two that shows more fit issues. Circled in red is the back edge of the cup of her old bra. It’s circled because the underwire stops too short, which allows her wide-set breast tissue to slide out of the cups and into her armpits with movement throughout the day. In comparison, on the right we can see that while the cup height is a little bit lower near the armpit, the wire ends higher, which prevents the breast tissue from sliding out of the cups. Also on the left is the strap circled in orange again, because it is clearly too tight, pressing small valleys into the skin.
On the right in Figure 49, the band has been circled again because we can clearly see that the adipose tissue on Model Two’s ribs is being squished and pushed down uncomfortably. The other small concern with the new bra is circled in yellow. The left cup top edge elastic was sewn a bit too loosely, so it has a very tiny gap between the top edge of the bra and the model’s left breast.

![Figure 50. Model Two’s Side Before and After Comparison](image)

From the side view in Figure 50, the old bra is not fitting correctly in the band. It is too loose and stretchy, which in combination with the too-tight straps, has caused it to ride up throughout the day. For the best support, the band should stay parallel to the floor (Busty Resources, 2015). If a band is riding up, that means the straps slide forward as well, allowing the cups to collapse down under the weight of the breasts. Since Model Two’s breasts aren’t very large, the lack of support isn’t as visible as it would on a woman with larger, heavier, more pendulous breasts. On the right, there isn’t anything new that hasn’t been addressed already. The band is remaining level, though cutting in, and the wires are sitting back far enough and high enough to capture all of the breast tissue. The drag lines on the side of the cup are due to the band being too tight, which in turn pulls the wire too taunt, causing the fabric to strain as well.
In Figure 51 are the before and after back photos of Model Three’s bra. As before, the strap has been circled because it is improperly tightened and pressing into the skin too deeply. Also, like with Model One, Model Two has her bra on the tightest hook. As we could see from the side view, even the tightest hook didn’t make the band short enough to prevent it from sliding up and not supporting the breasts properly. The band is definitely too large. On the right, the bulge of skin created by the too-tight band has been circled again. It is definitely obvious from the back view that the band is not the correct size either. It appears that the bra before was too loose, and the new one was too tight, so a band measurement taken in between would fit perfectly.

The final four comparison photos, Figure 52, 53, 54, and 55, are for Model Three. The visual evaluation is the same as it was for the previous two models, with the problem areas being circled and described.
Figure 52. Model Three’s Front Before and After Comparison

For the final model, circled in orange in Figure 52 is the center front of the bra, which is fitting poorly. The shadows are difficult to see under the center gore ribbons, but the center of the bra is definitely being pushed away from the chest. The cups are also sitting too low. The outline of her breasts has been drawn continuing from the cleavage in the front. This drawn outline shows that the underwires are sitting between a quarter of an inch and half an inch lower than the bottom of her breast roots. This is probably due to the cups being too small, and the weight of her breasts pushing the bra down. Circled in red is the side edge of the cup, which is gapping away from her body, causing the sides of her breast tissue to escape the cup. On the right of Figure 52, none of these problems persist with the newer bra. The one visible problem is the puckering beneath her left breast, which means that the wire isn’t sitting directly under her breast root. This is not a concern since the model has a flat spot on the underside of her right breast, so underwire curves wouldn’t match her breast root perfectly.
Model Three’s three-quarter view can be seen in Figure 53. The shadows under the gore (circled in orange) are more prominent than in Figure 52 and it is clear that the wire ends are not making contact with the sternum. The large area circled in red is the side-breast tissue also mentioned previously in Figure 52. The breasts are not being supported since the bra cups are too small and the underwires do not go back towards the armpit far enough.

On the right in Figure 53, the new bra has a minor issue. The top edge of the cups slightly gap. This could have been solved easily by pulling the top cup edge elastic more taut when sewing. Other than that, the cups appear to be fully encompassing Model Three’s breast tissue, especially with the wire being much higher under her arm than in her old bra.
Figure 54. Model Three’s Side Before and After Comparison

From the side view of the bra in figure 54, the bra band is arching up towards the back on the left (circled in orange). Again, the side-breast tissue has been circled to show how much is not being supported by the cups. On the right, the new bra looks much more supportive in comparison. The two small negative things include the cups being slightly less projected, meaning that the model might be having the apex of her breasts pressed back towards her chest, and the band is slightly curving up near the back.

Figure 55. Model Three’s Back Before and After Comparison

In Figure 55, the orange circle on the left highlights a red mark on Model Three’s back. This mark is from where her bra was previously sitting, meaning that the old bra has slid up her
back from where it was previously sitting. This sliding up is due to the band being too large and stretchy. The orange circle on the right calls attention to the band curving up due to the incorrect tension between the top and bottom band elastics. The top was tighter than the bottom elastic, which is why the band is pulling upward, creating the bulges under the shoulder blades.

b) Model Reviews

In the second step of evaluation, each model wrote a short review. After having the models wear their bras every two to three days for about a week, they wrote reviews addressing different aspects of fit and comfort. Each model indicated how she felt about her new bra; compared the size, fit, and comfort to her original bra; and if her posture was different when wearing the new bra.

Model One’s review:

“When I first put the bra on I had a little bit of difficulty since I am not used to low-stretch shoulder straps. Once it was on however, the combination of low-stretch shoulder straps and the wide band made the bra very stable. Like [Model 3], I have become used to constantly adjusting my bras, pulling the shoulder straps in place, adjusting the cups, and basically just fiddling with the entire placement of my bras. I felt a lot more comfortable and secure when I was wearing this bra since I didn’t have to worry about it shifting so that was definitely one of its greatest features!

The fit of the bra overall was quite excellent. The only issue I had was the right cup was a little too small. I later discovered, thanks to the fact that my boobs
weren’t being squished to the side, that this was due to the fact that I had originally chosen the wrong breast when I was measuring which one was the largest. That means that the minor fit issue was due to my mistake. The side that I gave [Savannah] the measurements for fit perfectly when I put it on. Great job there!!

The one thing I definitely noticed was that the bra really encouraged good posture. With my other bras, slouching was probably easier than it should have been. With this bra, I felt like I was wearing a posture bra which I loved.

The overall design of the bra was wonderful and it was in purple, so I hereby give this bra five stars!!”

Model Two’s Review

“I have been researching proper bra fit for about a year, and I think I knew my correct size (calculated at 28DD), but I could never find any [bras in that size] in store, so I had to choose the next best size (30D; same cup volume, larger band). My previous bras were quite stretchy, and became too large pretty quickly, starting to ride up my back and forcing me to use the tightest hook earlier than I would have liked.

This means it came as a surprise to feel how tight this new band was. The bra was a bit too snug, digging in uncomfortably. I have a V-shaped rib cage, so the back of the bra would slip down to a narrower part of my back, especially if I slouched. It stayed in place in the front, which was strange, so that meant I didn’t have to pull the bra up too often. If it were to have silicon/something tacky along
the band edges like most strapless bras do, and the band was a little bit bigger (like ½ an inch), it would be stay in place.

Other than being too tight, it fit really well in the cups. I felt like the top edge might have needed to be taller or tighter, especially on the left, but I’m used to having straps and haven’t worn a strapless bra in years, so that might be why it felt a bit unsecure. I’m surprised at how much larger these cups are in comparison to my other bras, but they encompass all of my breast tissue perfectly, so my previous cups must have been too small.

With a bra extender, I could see myself making use of this bra for all my strapless needs!”

Model Three’s Review

“Wearing this bra felt like I was wearing a boob holster. It was a really different feeling, and at first it almost felt like it was too tight, but after the first day of wearing it I got used to the fact that the band was actually snug and not so stretchy. Having so much more of my boobs covered by the bra, despite it not being like a full-coverage minimizing bra, was surprisingly nice! One of the biggest things I noticed was that I wasn’t constantly fiddling with my bra all day like I do with my 34C’s and D’s. With those, my bra seems to kind of migrate left and right a little bit and even slides down so that the underwire is quite a bit below my boobs, and I would have to go into the bathroom sometimes to adjust things, or try to get away with it when I figured not too many people were looking. Oh, and it was nice to be able to go up and down stairs quickly without
feeling like the girls were making a run for it. Overall, this bra just made me feel like my boobs were more secure, and it was a comfortable feeling after I got used to being so ‘aware’ of having a bra on all the time (with my looser bras I can always tell they’re on, I guess because they’re probably not doing a whole lot of supporting).”

c) Comments on Results

The actual results were slightly different than my expectations. I was correct in my prediction that at least two out of three models would be wearing the incorrect size, with all three actually wearing a poorly fitting bra. Model One had never been sized before, but she knew that she was probably wearing the wrong sized bra. She didn’t know how to find a better bra, and hasn’t had the money to buy new bras for several years. Model Two had been doing a bit of bra fitting research herself, but also didn’t have the resources or money to buy better fitting bras. Model Three didn’t know at all that she was wearing the incorrect size, and had always been uncomfortable with how projected her breasts were since they drew attention, so she shied away from researching her bra size. Despite any setbacks, each model was grateful in the end to have a bra that fit better than ever before. They all understood the purpose behind my project, and all eventually took an interest in attempting to look for better fitting bras on their own after I was done measuring and fitting them.

Every bra turned out to be better quality than I could have hoped, and each model let me know that she thought her bra looked like it could have been purchased from a boutique, which makes me very proud of my hard work. Still, there were some fit issues which were discussed in the “Fitting & Fixing” and “Photo Evaluations” sections above. From elastics not having even
tension, to top cup edge elastic either being too tight or not tight enough, each bra had its own little flaws.

In the end, Model One would have fared better with a bra that had wider wires and shallower cups. The wires still sat slightly on her breast tissue on the sides, but much less than with her previous bras. Her right cup wasn’t the correct size for her spread-out breast tissue, with the elastic too tight along the top cup edge, the cup depth being too projected, and the wire not being wide enough. After wearing her new bra a few times, though, she let me know that it was the most comfortable bra she had ever been in. This is encouraging, and she definitely feels like she deserves more bras that fit well.

Model Two had a good fit, besides the slight gapping of the left cup and the band being too tight. The shape of the cups fit her breast tissue perfectly, and the underwire followed the shape of her breast root very well, keeping all of her breast tissue in place. Model Three ended up with a good fit as well, but the right cup gapped a little bit at the top. The biggest issue was the band elastics being unbalanced between the top and bottom, which caused the very back of the bra to curve upwards. The width and depth fit well, but I feel like the bra flattened her breast a slight bit. Since she has firm breasts, I feel like a more-projected shape would have fit her better.

In the end, I wanted to be able to give my models suggestions for what bra sizes they should be looking for now that they know their current sizes are incorrect. I am basing these suggestions on the measurements that the models provided on the questionnaire (Appendix A), the shapes they claim their breasts have, how their previous bras fit, the dimensions of the new bras, and how the new bras fit. For Model One, who was wearing 34As and 34Bs, with her ribcage measurement of 28 inches and average bust measurement of 33 inches, I would suggest
that she looks wide and shallow bras in the sizes 28DD, 28E, 30D, and 30DD. Some 28 bands can be very tight, so that is why I also suggested she try 30 bands. All the sizes are “sister sizes,” which means that they either have the same cup volume but different bands, or they are the next size up or down in relation to each other.

Next, the sizes I would recommend for Model Two to try are 28E, 28F, and 28FF. The variety, again, depends on how the cups fit and how one company’s bras compare to another’s. The model should look for wide wires and shallow cups in 28FF bras, wide wires and medium cup projection in 28F bras, and wide wires with deeper projection in 28E bras. She was previous wearing the size 30D with a ribcage of 27.75 inches and average bust of 34.5 inches. A 30D has the same cup volume as a 28DD, so she would definitely be going up in cup size as well as wearing a tighter band.

Model Three reported an underbust measurement of 28 inches, with an average bust measurement of 35.75 inches. She was previously wearing 34C and 34D bras, which were definitely too large in the band. With her measurements and before-and-after comparisons, I would recommend either a 28G, 28GG, 30FF, or a 30G bra size with wide wires and medium to deep projection, depending on how they fit. 34D has the same cup volume as a 30E or 28F, so she was definitely in too small a cup size.

I hope that my models will now take these sizes that I have suggested to them and try many bras until they find ones that perfectly fit, and start an arsenal of their own full of fun and sophisticated, unique and diverse, well-fitting bras.
IV. Conclusion and Recommendations

I was very pleased with how easy it was to work with each model; they in turn were very grateful for a free, custom-made bra. They actively participated when I needed them to fill out the questionnaire (Appendix A), and made time in their schedule for the photo shoots and fit sessions. From the positive attitude that I received from each model after she was wearing a better-fitting bra, I can conceive that they were all much happier than before I asked them to be a part of this project.

One thing I learned throughout my research is that all breasts are different, so companies shouldn’t have a limited size range or limited shapes. Someone might be a narrow and projected 34G, and someone else might be a wide and shallow 34G. The size labels are the same, but the shape of the bra cups would have to be different to accommodate the different breast shapes. Another thing I learned is that material-sourcing for products is time consuming. Trying to be the most cost-effective and waste-efficient is difficult, so I applaud apparel manufacturers who are able to do this well. I also learned how to be more comfortable with my own body and around other women’s bodies.

Despite being comfortable with my own body, being an introverted individual, I was nervous at first to be working directly with another woman’s breasts. I have lectured about proper bra fit and have instructed many women on how to measure themselves before, but never have been so up close and personal when it comes to measuring and photographing. This project definitely helped me become more comfortable like I believe we should be around almost-nude bodies. Being nude in a casual setting and being nude in a sexual setting is completely different, and sometimes I think we forget that.
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Since all three of my models had relatively small and somewhat bony backs, it would be wise to further expand my bra making to larger or squishier backs. I would also like to explore supporting much larger bust sizes. Through images from brands like Ewa Michalak and her website’s front page heading photo (Ewa Michalak), there is plenty of proof that larger sizes can be supported, and every woman correctly fitted is much more confident and has less discomfort. (S. H., B. L., 2014, M.S., 2014) In the future, I might also write another research project that expands on the background behind this project.

By the end of my project, I have concluded that I was successful in reaching my goals. I raised awareness of the bra fitting issues in the U.S., even if it was to a small audience; I compared how a bad bra and good bra looks and fits; I helped three women find a range of more-supportive bras than what they were wearing previously and understand what to look for in a better-fitting bra; and I have shown that wearing a good bra creates better posture, a more positive attitude towards bras and breasts, and an overall better wellbeing. Hopefully I can spread my informational brochure (Appendix B) around to my friends and family, and possibly to the internet, which will in turn create a wave of raising awareness on bra stigmas, body shaming, and how to get beyond the negativity and into the perfect bra.
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VI. Appendices

Appendix A - Bra Fit Questionnaire

Bra Fit Questionnaire

Basic Information

- What size, or sizes, do you currently wear?

- About how many weeks/months/years ago was your last bra fitting?

- Where did you have your last fitting?

Fit

For this section, please wear your best-fitting bra.

- The following images show different signs of an ill-fitting bra:

<table>
<thead>
<tr>
<th>Band riding up, not parallel to floor</th>
<th>Band is really stretchy</th>
<th>Hook on tightest setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bra slides up over breasts when arms are raised</td>
<td>Wires sit on breast tissue on side, or tissue escapes bra into armpits</td>
<td>Wires sit on breast tissue in the center, center “floats” from body</td>
</tr>
<tr>
<td>(Home, 2012)</td>
<td>(Brastop, 2015)</td>
<td>(Braless in Brasil, 2014)</td>
</tr>
<tr>
<td>Breast tissue spills from center of bra</td>
<td>Cups gap</td>
<td>Straps dig in</td>
</tr>
<tr>
<td>(Sian &amp; Charlie, 2014)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top edge of cups cut into tissue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Do your bras show any of the above signs? If so, please circle any or all that apply.
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- Do you have any pain, i.e., wires pinching, shoulder straps digging, back aches, neck aches, or anything else? Feel free to list any in the space provided below. Leave the space blank if the question is not applicable.

- This question section is similar yet more specific than the previous, to aid in calculating the difference between your current bra and bra you should be wearing. Looking at the images below, answer by marking in the box below which one best represents your current bra.

![Images showing various back problems with bras](image)

**Q. How does your underband look at the back?**

- It’s riding up
- It’s riding down
- It sits straight
- It’s digging in
- It’s breaking the skin

(Figleaves, 2015)

**Q. Fastened on the loosest hook, how far can you comfortably stretch your underband out?**

- 0-4cm
- 5-8cm
- 9-12cm
- 13-16cm
- 17+cm

(Figleaves, 2015)
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Q. How do the wires look at the centre front of your bra?

They sit flat
There is a gap
They dig in

(Figleaves, 2015)

Q. Is there any bulging at the top of your cups?

Yes
No

(Figleaves, 2015)

Q. Can you pinch any excess fabric at the top of the cups?

Yes
No

(Figleaves, 2015)
**Measurements**

In this section, you will use a soft tape-measure on your bare breasts and chest to fill out the chart below for your breast-related body dimensions. Measure to the nearest quarter-inch, and make sure that the tape measure remains level at all times. (It helps to stand in front of a mirror while measuring.) I have provided picture guides below for more clarification.

<table>
<thead>
<tr>
<th>Measurement Description</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ribcage circumference, taken directly below breast roots – relaxed</td>
<td>![Image]</td>
</tr>
<tr>
<td>2. Ribcage circumference, taken directly below breast roots – super tight</td>
<td>![Image]</td>
</tr>
<tr>
<td>3. Bust circumference, taken over the apex (fullest part) of bust – standing up</td>
<td>![Image]</td>
</tr>
<tr>
<td>4. Bust circumference, taken over the apex (fullest part) of bust – bending over 90°</td>
<td>![Image]</td>
</tr>
<tr>
<td>5. Bust circumference, taken over the apex (fullest part) of bust – laying down</td>
<td>![Image]</td>
</tr>
<tr>
<td>6. Breast horizontal perimeter – measure your larger breast (if one is larger) from the sternum, around your breast through the nipple, up to your outer ribs.</td>
<td>![Image]</td>
</tr>
<tr>
<td>7. Breast vertical perimeter – lean over, and measure the perimeter of your breast from the under edge, up and over the apex, to the top edge of your breast tissue.</td>
<td>![Image]</td>
</tr>
<tr>
<td>8. Breast horizontal perimeter - lie down and measure your bigger breast perimeter again, from sternum to side ribcage.</td>
<td>![Image]</td>
</tr>
<tr>
<td>9. Neck to nipple - measure the distance from the center of your clavicles to your nipple (the lowest).</td>
<td>![Image]</td>
</tr>
<tr>
<td>10. Breast base height – measure from the center of your clavicles straight down to your underbust line.</td>
<td>![Image]</td>
</tr>
<tr>
<td>11. Frame width – Distance where your neck muscle meets your shoulder on both sides. (Equal of armpit to armpit.)</td>
<td>![Image]</td>
</tr>
</tbody>
</table>

(chromecoat, 2015; Bratabase, 2014)
Shapes

Which shapes do you best associate your breasts with? Please circle any or all that apply:

- Wide busts
- Narrow busts
- High nipples
- Low nipples
- Close boobs
- Separate boobs
- Big boobs
- Pancake
- Broad shoulders
- Narrow shoulders
- Low on chest
- High on chest

The below image is an exaggerated illustration looking down at breasts from above. Please circle the one that best matches the width and depth of your breast root and tissue projection:

- Omega shape: round with narrow root, breasts wider than root
- Medium projection: medium width, transitional
- Strong projection: narrow width
- Shallow breasts with relatively wide root
- Small shallow breasts; narrow root in relation to ribcage, need wide wires in relation to cup size
- Strong projection, very wide root

On a scale of 1 to 5, circle: how do you feel about your breast tissue density?

1=very soft ------ 2=soft ------ 3=equal ------ 4=firm ------ 5=extremely firm

- Very soft = little to no defined shape to breasts, they might sag greatly, and they take the shape of any bra. A very supportive bra is needed to hold them in place and to keep a defined shape.
- Equal = breasts have some mould-ability to bra, and a bit of squish-ability, but still holds shape well.
- Extremely firm = breasts have a very defined shape that stays in place, with no squish-ability. Breasts tend to fill out center of bras with gaps below and to the side of the tissue within the bra.
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**Styles**
- Which style of bra do you prefer? Please circle any or all that apply.

<table>
<thead>
<tr>
<th>Moulded-cup plunge</th>
<th>3-part-cup lined plunge</th>
<th>3-part-cup unlined plunge</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Cleo by Panache, 2015)</td>
<td>(Freya, 2015)</td>
<td>(Freya, 2015)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moulded-cup balconette</th>
<th>3-part-cup lined balconette</th>
<th>3-part-cup unlined balconette</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Cleo by Panache, 2015)</td>
<td>(Curvy Kate, 2015)</td>
<td>(Cleo by Panache, 2015)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moulded-cup balcony</th>
<th>2-part-cup lined balcony</th>
<th>2-part-cup unlined balcony</th>
</tr>
</thead>
<tbody>
<tr>
<td>(HerRoom, 2015)</td>
<td>(Curvy Kate, 2015)</td>
<td>(Freya, 2015)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moulded full-cup</th>
<th>3-part-cup lined full-cup</th>
<th>3-part-cup unlined full-cup</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>3-part-cup balcony</th>
<th>4-part balconette</th>
<th>Sports/Active</th>
</tr>
</thead>
</table>
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Appendix C – Bra Measuring Guide

Bra Measuring Guide

These are the instructions for properly measuring a bra (Bratabase, 2015).

**Figure 1.** Band length. Lay your bra on a flat surface and measure from hook to hook.

**Figure 2.** Stretched band. Measure the maximum stretched length of the band of the bra. Don't pull too hard as to hurt the underwires or your bra.

**Figure 3.** Wing height. Height of the band's wing near the cup.

**Figure 4.** Center gore height. How tall is the center gore? Please include from edge to edge of the fabric.

**Figure 5.** Gore width. Measure the distance of the cups from their closest point. Include underwires' width if any.

**Figure 6.** Cup depth. Measure the inner perimeter of the bra cup across the deepest line from side to side. Tip: For soft fabric cups you can use your knee.

**Figure 7.** Cup width. Measure the straight distance across the cup, from end to end of the underwire. Don't include the wire channels.

**Figure 8.** Wire length. Measure the length of the bra's underwire around the cup.

**Figure 9.** Strap width. How thick are the straps?

**Figure 10.** Number of hooks per column. How many hooks are on each column?
References