

TRANSITIONS: A Collection of Maternity Apparel for Elite Endurance Athletes

Jessie Silbert
Capstone: 2020
December 12, 2019
REVISED December 16, 2019
FINAL June 5, 2020



TRANSITIONS: A Collection of Maternity Apparel for Elite Endurance Athletes

Jessie Silbert

Capstone: 2020

December 12, 2019

REVISED December 16, 2019

Final June 5, 2020

The global maternity wear market is valued at \$18.3 billion, a number predicted to rise to \$24.5 billion in the year 2025. ("Maternity Wear Market Size Worth \$24.5 Billion By 2025," 2019). Physical changes to the pregnant body over the course of 9 months into post-partum requires many women to purchase a completely new and temporary wardrobe. The birthrate for women in their thirties and early forties rose from 2015 to 2016, up 1% for women aged 30–34 at 102.7 births per 1,000 women, 2% for women aged 35–39 at 52.7 births per 1,000, and 4% for women aged 40–44 to 11.4 per 1,000. Since 2007, the rate has risen 19% for women in their early forties, 2% for women in their early thirties, and 11% for women in their late thirties. (Martin, 2017.) This data supports the emergence of a trend where women are waiting to have children.

Culturally, it seems that within the last decade, more high-profile women have gone through pregnancies, from royals like Kate Middleton and Meghan Markle to Beyoncé and Kim Kardashian. Elite athletes at the height of their careers are also choosing to have babies. Gwen Jorgensen won a gold medal in triathlon at the Rio Olympics. She left the sport to have her first child and then made a return to the sporting world as an elite track runner and marathoner.

Mirinda Carfrae, three-time Ironman World Champion, became a mother in 2018 and was back racing and winning at the grueling distance just a year later. Allyson Felix the only woman to win six gold Olympic track and field medals, gave birth in November and was racing on the winning women's relay team less than a year later at the Doha World Athletic



Figure 1 Allyson Felix with her child from Allyson Felix. (n.d.). Retrieved from <https://www.teamusa.org/usa-track-and-field/athletes/allyson-felix>. Accessed 9, Dec. 2019.

Championships (Allyson Felix [TeamUSA], n.d.).

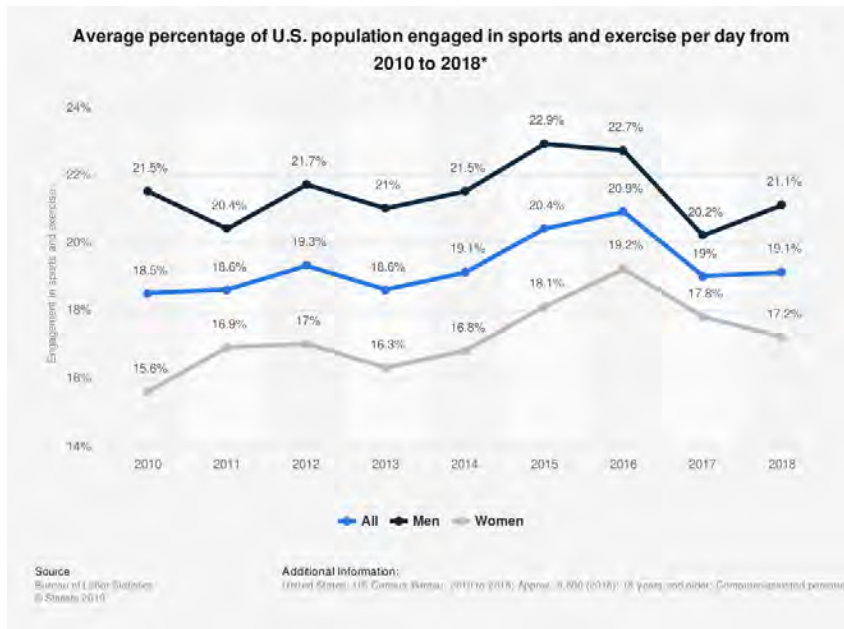


Figure 2 from Bureau of Labor Statistics. (June 19, 2019). Average percentage of U.S. population engaged in sports and exercise per day from 2010 to 2018* [Graph]. In Statista. Retrieved December 04, 2019, from <https://www.statista.com/statistics/189562/daily-engagement-of-the-us-population-in-sports-and-exercise/>.

Outdated stigmas that boys play sports and girls become mothers are being thrown out; now women can do both. The gap between women and men in the US population who exercise every day is closing. In 2010, the percentage of men who exercised everyday was estimated at 21.5% while the percent of women was 15.6%. In 2016, we see that number jump to 19.2% for women (Figure 2) (Bureau of Labor Statistics, 2019). The country is also seeing more

women succeed at the elite sport level. Take marathon running for example. The women's record for marathon running was set by Deena Kastor in 2006 with a blazing time of 2:19:36. Of the top 10 women's times, four of those were run by women within 13 months of each other from 2017 to 2018. There are more competitive female athletes, and they are getting faster. In Deena's words, "There's no room for complacency right now in American distance running "There are so many women every single weekend in half marathons and marathons just crushing it. It's a synergy—a competition within this competition. You're taking competitive women who are all rising to the top at the same time." (Butler, 2018, p. 7).

Women got into the sport later than men and are now catching up. Additionally, the sports industry is becoming more supportive of women's sport and giving athletes more opportunities and resources to train at a high level.

With more women having babies in their 30's and more female athletes succeeding at the elite level, what does this mean for the industry with regard to athletic maternity apparel? Is there a viable market and need for apparel for pregnant athletes, and if so, what does this look like? For her capstone, Jessie intends to explore this space and focus on the performance needs the elite endurance athlete in particular might have as they transition from trimester to trimester and through post-partum. It is assumed that these athletes who exercise on a daily basis will need to reduce intensity and duration of training during pregnancy but not eliminate

activity altogether, and that they would intend to get back to their post pregnancy routine as soon as it is deemed safe. The intended outcome of this capstone is to create a line of athletic maternity garments that will address woman's needs as both athlete and mother throughout her pregnancy. With the current state of the environment, it is also crucial to address the issue of sustainability and try to reduce waste created by a maternity market that depends on the customer outgrowing her wardrobe, replacing it, and responding to the cultural pressure to return to her pre-pregnancy size. Why not have clothing that is stylish and convertible and that can be worn throughout the pregnancy and well after?

PREGNANCY & EXERCISE

The American College of Obstetricians and Gynecologists recommends at least 150 minutes of moderate intensity aerobic exercise a week. It is important to mention, supported by extensive research, that physical activity does not increase the risk of a miscarriage, a low birth weight or an early delivery as some "old wives' tales" suggest. In fact, it is safe to continue and even start regular exercise while pregnant when under the care of an obstetrician. Regular activity has been shown to reduce back pain, ease constipation, decrease the risk of gestational diabetes and preeclampsia and reduce the need for a cesarean delivery. Mothers-to-be are more apt to gain a healthy amount of weight during the pregnancy and have better overall fitness that promotes the health and strength of the heart and blood vessels. And, one might add, many mothers who exercise find it easier to lose the baby weight afterwards (Women's Health Care Physicians, 2019).

Aerobic exercise is any activity that moves large muscles of the body such as the legs, in a rhythmic way at a rate at which the heart rate is increased enough to induce sweating. Jogging, swimming and cycling immediately come to mind, but brisk walking, even gardening can be considered aerobic activity (Women's Health Care Physicians, 2019).

The baby bump is the most noticeable change the body undergoes during pregnancy, but there are other changes that occur in the body that can result in a need to decrease or moderate exercise. For example, an influx of hormones produced by the body causes the ligaments in the joints to become relaxed in anticipation of the pelvis needing to flex during the birthing process. The relaxing of the ligaments gives joints more mobility, and intense or sudden movements or high-impact activities could increase the risk of injury. Balance is another factor that could affect the type of activity and amount of exercise one is able to perform while pregnant. The baby's weight carried in the front of

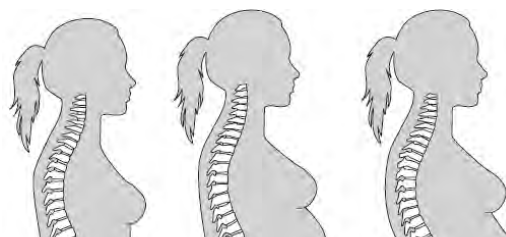


Figure 3 Spine Changes During Pregnancy from Zheng, P. Z., & Kennedy, D. J. (n.d.). Spine. Retrieved December 4, 2019, from http://www.demosmedical.com/media/samplechapters/9781620700754/mobile/9781620700754_Chapter1.html.

the woman's body moves the regular center of gravity anterior to the body, shifting the point of balance off the central line. As the body tries to adapt to this new distribution of weight, the result might be a curvature of the spine which puts more stress and strain on the lower body. Which is in turn experienced as pain or discomfort in the pelvis and back (Zheng [demosmedical], n.d.). With the change in balance, the chance of instability and a fall increases. Thus, activities such as cycling that may result in a loss of balance could be dangerous.

A popular saying is "eating for two", and this is true, but a mom to be is also breathing for two and she requires more oxygen. Exercise, particularly strenuous activity, also requires a greater intake of oxygen as blood flow is increased to the muscles. The pregnant body's need for more oxygen coupled with vigorous exercise might lead to feeling more fatigued with less endurance. The effects of added weight might require additional support, particularly of the breast, back and belly. A sports bra can help, as well as a belly support belt, should walking or running become uncomfortable (Women's Health Care Physicians, 2019).

Other precautions must be taken when exercising while pregnant. In particular, it is very important to avoid becoming overheated, especially in the first trimester. Hyperthermia may lead to an increased risk of birth defects in the neural tubes which is linked to spina bifida (Rettner, 2018). To prevent becoming overheated, it is important to stay well hydrated, wear loose-fitting clothes and not exercise in excessive heat or humidity.

Specific postures or positions should be avoided. Standing still for prolonged periods of time can lead to high blood pressure which may lead to preeclampsia, placental abruption and even stroke. The baby is at a higher risk of preterm delivery and low weight as a result of reduced oxygen and nutrients (High Blood Pressure During Pregnancy, 2019). Other issues might include lower back, pelvic and leg pain, edema (swelling of the feet) with more serious conditions such as premature labor and birth also of concern. Compression stockings are helpful with promoting blood flow and can support the soft tissues, increasing comfort and reducing swelling (Nair, 2018). Any heavy lifting or bending should be avoided as these might increase the risk of miscarriage, preterm birth or injury

(CDC - Reproductive Health - Physical Demands - NIOSH Workplace Safety and Health Topic, 2019).

Safe exercises recommended by The American College of Obstetricians and Gynecologists include walking, which, like running, is a total body workout but is lower impact on the joints and muscles. Swimming and water jogging are aerobic, and the high density of water supports the body weight, reducing the chance of injury or muscle strain. Stationary cycling is a better choice than outdoor cycling as it eliminates the risk of a crash caused by a loss of balance. Yoga and Pilates with modified poses help improve flexibility, focused breathing and stretching (Women's Health Care Physicians, 2019).

Once the baby is born it is important to continue exercise to increase and promote blood circulation to prevent blood clots. Deep vein thrombosis has a tendency to occur more often in

the weeks after the child is born, as hormones cause the blood to clot more easily to prevent blood loss during the birthing process. The end of the pregnancy is also marked by reduced circulation in the legs and pelvis caused by the pressure the weight of the baby puts on the blood vessels of the lower body (Prevent Blood Clots During Pregnancy: Top Exercises to Improve Circulation, 2017).

PREGNANCY & ELITE ATHLETES

Endurance athletes are defined as individuals who work key muscles at submaximal intensity for a prolonged time period. These athletes include marathon and ultra-distance runners, race walkers, cross country skiers, distance swimmers, long course triathletes and cyclists (Endurance Sport, 2019).

An elite athlete as defined by the International Olympic Committee (IOC) is "a person who is a member of any national team or other high-level representative team in any sport organized by a National Sports Federation" (Bø, 2016, p. 572). Success for these athletes means going a set distance for a specific discipline whether it be running, swimming or cycling faster than the competition. It requires targeted training, proper nutrition and pushing the limits of their bodies without injury or other detrimental results.

There are currently no specific guidelines for pregnant elite endurance athletes, who may often meet or exceed the general exercise guidelines recommended. It is undetermined which activities they can or cannot perform and the duration of high intensity training that might lead to complications. In a response to more women in their 30's competing at the elite level, some of whom wished to become pregnant and or return to competition after childbirth, the International Olympic Committee put together a committee to determine and review the amounts of physical exercise appropriate during pregnancy and post-partum to promote high-level performance while being committed to life-long health of the athlete (Bø, 2016).

Increasing age is associated with decreased fertility and higher rates of chromosomal abnormalities in the fetus.

Research has shown that in order to optimize fertility, couples should start considering getting pregnant before the age of 32 for a single child family. If more children are desired, they recommend conceiving the first child at the age of 27. In vitro fertilization can add on 3 to 5 years, but due to the high costs and not being covered by health

| Rank | Time | Athlete | D.O.B | Date of P.B | AGE at P.B |
|------|---------|------------------------|-------------|-------------|------------|
| 1 | 2:15:25 | Paula RADCLIFFE | 17 DEC 1973 | 13 APR 2003 | 29 |
| 2 | 2:17:01 | Mary Jepkosgei KEITANY | 18 JAN 1982 | 23 APR 2017 | 35 |
| 3 | 2:17:56 | Tirunesh DIBABA | 01 JUN 1985 | 23 APR 2017 | 32 |
| 4 | 2:18:47 | Catherine NDEREBA | 21 JUL 1972 | 07 OCT 2001 | 28 |
| 5 | 2:18:58 | Tiki GELANA | 22 OCT 1987 | 15 APR 2012 | 24 |
| 6 | 2:19:12 | Mizuki NOGUCHI | 3 JUL 1978 | 25 SEP 2005 | 27 |
| 7 | 2:19:19 | Irina MIKITENKO | 23 AUG 1972 | 28 SEP 2008 | 36 |
| 8 | 2:19:25 | Gladys Cheron KIPRONO | 12 MAY 1983 | 27 SEP 2015 | 32 |
| 9 | 2:19:31 | Aselefech MERGIA | 23 JAN 1985 | 27 JAN 2012 | 27 |
| 10 | 2:19:34 | Lucy Wangui KABUU | 24 MAR 1984 | 27 JAN 2012 | 27 |

Figure 4 Top 10 Marathon Times Run By Females from At What Age do International Female Marathon Runners Peak? (2017, July 21). Retrieved December 6, 2019, from <https://www.runnerstribe.com/features/at-what-age-do-international-female-marathon-runners-peak/>.

insurance, this method is often not an option (Bø, 2016). Peak fertility coincidentally coincides directly with the peak performance age of many athletes. Examining the top 10 marathon times run by females we see the ages at which they ran these times ranging from 24 to 36 (At What Age do International Female Marathon Runners Peak?, 2017). A study done in 2011 looking at best performances by 2,000 top runners and swimmers over three decades found that the greater the distance the older the age at which the athlete peaked (Lebetkin, 2013). At the marathon distance women see their peak performances around age 30 (Lebetkin, 2013). A study done by the University of Zurich looking at elite athletes competing at the Ironman distance, a long course triathlon consisting of a 2.4 mile swim, 112 mile bike, 26 mile run, and found women's performances peaking at 36 (Knechtle, 2012). This same team looked at 100 mile races between the years of 1998 and 2011 with over 36,000 finishes and found that the women finishing in the top ten were at the average age of 39 (Lebetkin, 2013). The "biologically optimal" time for a woman to conceive a child is between the age of 20-35 beyond that age the pregnancy is considered high risk with an increased chance of high blood pressure, gestational diabetes and fetal abnormalities (Laurance, 2006). This age demographic, where women are seeing their peak performances is the same demographic most women must decide whether or not they want to have a biological child or it might be too late.

A shifted center of gravity was mentioned earlier as a result of how the pregnant body carries the added weight. In order to avoid falling forward, many women, including athletes, display lumbar lordosis and anterior rotation of the pelvis. This causes anterior flexion of the cervical spine and abduction of the shoulders which can in turn affect how one performs in specific sports. Take running for example: in a pregnant athlete, the stride length tends to shorten, the support time on each foot increases to almost double and the step width is wider, all of which equate to a decrease in speed (Bø, 2016).

As early as the fifth week after conception, changes occur in the mother's cardiovascular system to start supplying blood and nutrients to the developing fetus. When pregnant, the cardiovascular output is 50% higher when in a resting state. The heart itself increases in size, and resting heartrate tends to be 15-20 beats per minute more with 10% more stroke volume than non-pregnant values. Changes to the respiratory system include the expansion of the rib cage and raising of the diaphragm to make room for the baby. The result is a decrease in residual volume, the amount of air left in the lungs after completely exhaling, as well as a reduction in the amount of air that is expired. That means less lung capacity, and for an endurance athlete, that can greatly affect performance. In recreational athletes, it was observed that there was no difference in absolute VO₂max tested during the past two months while pregnant and again 6-8 weeks post-partum. Conditioned athletes who had exercised at a moderate to high level prior to becoming pregnant actually saw an increase in VO₂max of 5-10% after pregnancy. In elite athletes, a study found that fitness will either stay the same or

even slightly improve during pregnancy if she continues to exercise through the pregnancy at the highest levels her body will allow (Bø, 2016).

Most athletes are going to want to return to training as soon as possible. The first six weeks after giving birth most women are advised not to exercise aside from pelvic floor strengthening. It is noted that many elite athletes will start to return to training around this time, but there is currently very little research data on the effect of the elite athlete's returning to exercise after childbirth. Generally, it is recommended that one refrain for several months postpartum from strenuous physical activity, heavy lifting or heavy load bearing activities to give the pelvic floor muscles time to recover and heal. In the case of caesarean birth, patients tend to experience more abdominal pain, but many recover quickly and can return to training four to six weeks after surgery. After this initial healing period, athletes can participate in both aerobic and strength training, building up duration and intensity gradually (Bø, 2017).

In general, there is very little research done specifically on elite athletes who become pregnant and thus there are no standard recommendations on how to best proceed with training before, during and after giving birth. Athletes are advised to work closely with doctors, their obstetricians, coaches, and physical therapists to determine what is appropriate and safe. What can be confirmed, based on individualized accounts, is that many elite athletes who become mothers have remained active throughout their pregnancies and through postpartum.

BASICS OF BREAST FEEDING

Many women choose to breast feed and the World Health Organization (WHO) recommends breast feeding for at least the first six months. In a study of long-distance runners, it was found that 84.1% were running competitively at the time they were breast feeding. No studies have found that exercise negatively affects the ability to breast feed. A personally fitted sports bra that is supportive, rather than compressive is recommended, as well as pumping prior to training as these provide a more comfortable experience (Bø, 2017).

Similar to athletic performance maternity apparel products the market for products that "aid" nursing mothers is inadequate. When asked, mothers revealed the products were not as easy to use as advertised and many do not consider breast or nipple pain and the fact that women these days live multidimensional lives and need to breast feed at work, in public places, and on the athletic field (Gorgon, 2015).

Breast feeding benefits both mother and baby. Antibodies contained in the mother's milk protects against infections of the digestive, respiratory, and urinary systems and studies have found that breast feeding is associated with a reduced risk of childhood asthma, allergies and obesity (Gordon, 2015). The act of nursing releases hormones that helps the mother's body heal faster from childbirth, promotes weight loss, reduces the likelihood of experiences

post-partum depression and strengthens the bonds between mother and baby. In fact, not breast feeding has drawn a link between future health problems including osteoporosis and breast and ovarian cancer (Gordon, 2015).

This is a difficult product category to design for as the item needs to fulfill a list of requirements including: ease of wear, ease of use, accommodate changing breast size, and be supportive while not constricting. Some existing methods of solving these problems include clips and straps that can be unfastened to allow access to the breast and stretchy fabrics. Due to the specificity of the product's use the colors are limited and are often only available in neutrals. "The most readily available nursing apparel, online and in retail stores, is a single color (white, nude, and black), made of stretch material with minimal detailing." (Gordon, 2015, p. 16).

The most important feature of bras as mentioned by nursing mothers was comfort and fit. Complaints in regard to existing bras include issues with the fabric's hand feel or content as well as physical rubbing that contributes to or exasperates already sore nipples as well as not absorbing perspiration or leaked milk (Gordon, 2015). Ease of use was another required feature as mothers must breastfeed multiple times sometimes up to 18 times a day and removing layers or tricky fasteners that can't be operated with one hand just add to the frustration of the process (Gordon, 2015).

Breast engorgement and breast mastitis may be caused by ill-fitting bras that are too tight or restrictive. This medical condition refers to when the breasts become hard, lumpy and painful accompanied with fever and flu-like symptoms. It is believed it is caused by milk stasis when milk is not properly drained from the breast and leads to milk ducts becoming blocked (Gordon, 2015). Another health issue includes candidiasis which is a fungal infection that can cause sore and inflamed nipples and pain in the breast. A common cause of this is leaving breast pads (used to absorb excess milk) in place too long after they become wet.

Another aspect of nursing that must be considered in the design of product includes the physical act. Skin to skin contact is crucial to facilitate bonding between mother and baby. A good bond has a calming effect on the baby, stabilizing body temperature, heart rate and blood pressure and improves the likelihood of the baby to latch on well (Gordon, 2015). The baby must also be held in the arms throughout the 10 to 45 long process (Kuhn, 2018). In summary, new products worn during nursing should allow for skin to skin contact, consider the physicality of holding a child while still protecting the mother's modesty.

GOALS FOR THE PREGNANT ELITE ATHLETE

An elite athlete is an individual that is competing at the national, international or



Figure 5 Gwen completes a run during her pregnancy from Jorgensen, G. (2017, May 28). Baby Update Part III. Retrieved December 16, 2019, from <http://www.gwenjorgensen.com/blog/baby-update-part-iii>.

professional levels (M.S., P., 2015). These special few are achieving success at their given sport at a level well above their peers. They are the athletes that make the Olympic Team, win World and National Championships, finish at the top of their age groups and have the opportunity to “go pro”.

As mentioned earlier, there are no predetermined standards for the type of training an elite athlete should be doing during their pregnancy. It is up to the individual and their team of coaches, doctors and family to determine what is best for them. What is known is that they will most likely exceed the recommended 150 minutes of exercise a week, a baseline standard established by The American College of Obstetricians and Gynecologists (Women's Health Care Physicians, 2019). This works out to approximately 20 minutes a day for an average healthy pregnant female. Compare that to Gwen Jorgensen, at the age of 30 and the 2016 Triathlon gold

medalist who was still running an average 70 miles a week in her second trimester (Lauretta, 2017). Feeling her best running, she was logging one to two hour runs a day and two workouts a day, down from her regular three (Staff, S. I., 2017). Gwen generously shared her pregnancy experience with the running and triathlon community on her blog. She also points out how personal the experience is and how everyone is different, so what feels right for her may not work for someone else. Her most important tip, “go with the flow and listen to (her) body” (Jorgensen, 2017, p. 2).

What is clear is that expectations need to change, and pre-pregnancy workouts will need to be modified. For Gwen that meant changing her focus. The first priority was to have a healthy baby and that meant having a flexible training plan. Some days she could run a 7 minute mile pace and other days she could only do a 10 minute pace. Bending was difficult so this led to modifying her weight training routine and reducing abdominal exercises. Swimming caused cramping so that meant no flip turns and slower paces. Although still averaging 10,000 meters in the pool a week! While no longer comfortable on her road bike she did occasional rides on her mountain bike feeling more secure in the upright position on wider tires (Jorgensen, 2017). Even

with the revisions to her training schedule, Gwen, at 28 weeks pregnant was running higher mileage than she did training for the Olympics.

“I did three weeks where I did 100 miles a week, which is more than double what I was doing when I was training”. “The first trimester I actually wasn’t doing much because I was so tired and exhausted, so I would work out once a day instead of [my usual] three times a day. After I started feeling better and having a little more energy, I’m back to two workouts a day. I’m doing a lot of running right now because that’s when I feel best.” (Staff, S. I., 2017, p. 2).

After delivering a healthy baby Gwen’s focus was on returning to competition and regaining her fitness. With the hopes of running three days after giving birth, instead she found the recovery time “took months and months, it’s a very long process,” (Xu, 2019, p. 22). That process included working with a pelvic floor physical therapist to regain strength, reactivate muscles and help with healing (Xu, 2019).

Gwen’s baby was born in August 2017 (Jorgensen, 2017). In February, six months later she ran a 15:15:64 5K on the track, good enough for 9th fastest time run by a U.S. woman that year. Followed by a first place finish at the 10K Stanford Invitational a month later and a fourth place finish at the USA Track and Field Half Marathon Championships in May. In October she raced her first marathon after giving birth (Beresini, 2019). Post pregnancy workouts now consist of 120 miles a week. A routine day is comprised of one to one and a half hours of running in the morning, an hour to an hour and a half in the gym for strength training and another run in the evening. Alternating short speed workouts with tempo runs and long slower runs. Rest days will involve a walk, bike ride or swim (Xu, 2019).

Whereas an average pregnant woman might feel comfortable in sweats for a brisk 10 minute walk around the block, the apparel needs for an elite athlete like Gwen, executing two workouts a day is much more specific. Temperature management is crucial, support and comfort to prevent pain and injury is also needed. She was also active throughout her entire pregnancy and thus accommodating the baby’s growth would also need to be taken into account as well as providing garments that make nursing more efficient and easier. Gwen returned to training 18 days post pregnancy with an easy session on the elliptical (Xu, 2019) and as a mom who decided to breast feed, she was fitting in feedings around her gym schedule.



Figure 6 Gwen running with the ReCOREfitness fitsplint from Jorgensen, G. (2018, April 13) Retrieved December 16, 2019, from <https://twitter.com/gwenjorgensen/status/984811416329728000>.

HISTORY OF WOMEN'S SPORT

The history of women's sport is not an equal one. Dating back to Ancient Greece, Aristotle believed women to be ruled by their reproductive systems and had only a limited amount of "energy" in their bodies that was exhausted by monthly hormonal activity. With their energy levels dangerously low from maintaining their reproductivity they couldn't possibly participate in any other activities requiring exertion that would completely deplete it (Morris, 2016).

In America during the Ninetieth century when a woman's etiquette required conducting herself with modesty and virtue, sports were considered indecent and threatened a woman's fertility. When men fought wars there was a cultural belief that women had a lower tolerance for pain, injury and manual labor. The woman's primary role as child bearer also meant participating in risky physical activities were considered selfish and foolish (Morris, 2016).

The first modern Olympics was in 1896, but women were not allowed to participate until 1900 when out of 997 athletes only 22 were female and could only compete in tennis, croquet, equestrian and golf, sports considered ladylike (Flynn, 2016). The following Olympics saw miniscule improvements with 2.4% of the participants at the 1920's Olympics in Antwerp being female. By 1952 of the 286 athletes that made of the United States Team, 41 were female and took home gold medals in track and diving (Flynn, 2016).

As late as 1967 Boston Marathon Officials declared women not physically capable of running 26 miles when Katherine Switzer proved that a woman's uterus didn't actually fall out when she became the first woman to complete the race (Frye, 2019). Even Katherine's coach didn't believe she could do it when she expressed interest. Doctors actually believed that doing something as arduous as a marathon would turn a woman into a man and destroy their ability to have children (Frye, 2019).

The major turning point in women gaining equality in sports came in 1972 with the passing of Title IX by the U.S. Department of Education's Office for Civil Rights.

No person in the United States shall, on the basis of sex, be excluded from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance (Flynn, 2016, p. 13).

Now women finally protected under the law were able to participate, pursue opportunities and realize their potential in sport to the equal extent that men had.

HISTORY OF MATERNITY WEAR

The purpose of maternity clothing is to cover and, most often, conceal the baby bump. During the Renaissance, women would wear the clothing they already owned, which conveniently was full in silhouette with a high bust line. Girls married early, between the ages of 13 and 17, spending the majority of their marriage bearing children as the culture's expectation of women during this time was for them to be in a constant state of expecting (Eagles, 2018).

In the 1500's women often would wear aprons over their clothing to hide their shape (Lindig, 2019).



Figure 7 Portrait of a Couple by Jan van Eyck from Eagles, L., & Eagles, L. (2018, August 26). The question of pregnancy in Jan van Eyck's Arnolfini Portrait. Retrieved December 8, 2019, from <https://smarthistory.org/arnolfini-pregnancy/>.

Figure 8 Apron as Maternity Wear from Lindig, S. (2019, December 6). The Evolution of Maternity Style. Retrieved December 8, 2019, from <https://www.elle.com/fashion/personal-style/g28423/maternity-style-evolution/?slide=4>.



Figure 9 Empire Waist during the Elizabethan Era from Mannering, L. (2017, December 7). Accessed 8, Dec. 2019.



Figure 10 Detachable Front for Breast Feeding from Mannering, L. (2017, December 7). A Brief History Of Maternity Clothes. Retrieved December 8, 2019, from https://www.huffpost.com/entry/a-brief-history-of-matern_b_156618?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAA DHIKRO-g9zql03iV0-1AeojnczM-72lwXBbF9s515z0xCEHs9NfWMhg0UoGdHd0ef-KD1945Znt8Xs3yIpBXOQ4cRS3772Acm-zxTzyXyRxoRkHho2x2r79TeiOusW8B/pFRc7W6I565gT7U3FE2OhPBI3ownDD7YbnOiadAlWu



Figure 11 Maternity Corset from Lindig, S. (2019, December 6). Accessed 8, Dec. 2019.

The first known dress created specifically for pregnant women was during the period between 1600-1750. Known as the Adrienne dress, it featured an empire waist and pleated fabric that could expand with the baby's growth. During the early 1800's, some dresses were designed with a detachable front or bib to allow for breast feeding (Mannering, 2017)

Oddly enough, in the mid-1700's through the Victorian era and into the early 1900's, the corset, a staple of women's fashion was worn throughout the pregnancy (Lindig, 2019).

Lane Bryant, known for its plus size offerings, started as a maternity brand in 1904. Dresses were created with drawstrings at the waist that were "designed to grow with your figure" (Plante, 2018, p, 9).

Maternity wear continued to follow fashion trends and with the 1920's, drop waist silhouette clothing for mothers-to-be loosened up. The overwhelming attitude that surrounded pregnancy was to conceal the appearance of the pregnant belly as much as possible. "Be

entirely free from embarrassment of a noticeable appearance during a trying period," appeared in an ad from 1923 for maternity clothing in Good Housekeeping Magazine (Lindig, 2019, p. 23). The 30's and 40's and 50' continued along this trend, with styles that were loose without a defined waist. Separates became popular, such as tunics, trapeze tops and pleated jackets to cover the midsection. These voluminous styles could be worn through multiple trimesters



Figure 12. Maternity Styles of the 30's, 40's and 50's from Lindig, S. (2019, Dec. 6). Accessed 8, Dec. 2019.

(Lindig, 2019).

The 60's saw the start of different clothes for the different trimesters. Through this time and into the present, women started to look to famous figures to get cues of how to dress their baby bump (Lindig, 2019).



Figure 13 Pregnant Celebrities of the 60s, 70's and 80's from Lindig, S. (2019, Dec. 6). Accessed 8, Dec. 2019.

The 1990's ushered in a new way of dressing for mothers to be. Instead of hiding the body and the baby bump women started to embrace their shape. Coupled with the "casualification" as people started dressing down, maternity sportswear such as jeans created by Juicy Couture took off (Lindig, 2019). Travis Jeans "for the baby in you" which featured an inserted Lycra band at the midsection to accommodate the growing midsection were sold at an upscale Los Angeles department store, Fred Segal, for \$89.00 (Plante, 2018).

Maternity wear was not chic at the end of the 20th century heading into the 21st. Often hidden in the basement of department stores, they featured loose silhouettes with elastic tabs and stretchy inserts that



Figure 15 Pregnant Kim K in body conscious clothing from Fahy, C. (2015, August 19). Kim Kardashian bares baby bump as Khloe and Kourtney take a fully-clothed dip. December 8, 2019, from <https://www.dailymail.co.uk/tvshowbiz/article-3203230/Glowing-Kim-Kardashian-bares-burgeoning-baby-bump-sisters-Khloe-Kourtney-fully-clothed-dip-intense-beach-workout.html>.

many considered unflattering, dumpy and dowdy. That all changed with the influence of bodycon fashion epitomized by high profile celebrities like Kim Kardashian (Fahy, 2015). With the growing trend of "athleisure," it suddenly became cool and fashionable to wear workout clothes not just to work out, and this trend filtered into maternity.

ATHLETIC MATERNITY APPAREL

The multibillion-dollar maternity market is dominated by big-box retailers Kohl's, Walmart and Target who offer affordable but not necessarily desirable maternity options including workout attire. (Plante, 2018). Destination Maternity, with corporate offices in New Jersey, is the world's largest maternity retailer, making over \$500 million in annual sales (Destination Maternity, n.d.). Women on average spend \$500 per pregnancy on maternity clothes as estimated by Fortune magazine. Many women will hold off purchasing any maternity wear until they really start to show in the second trimester, and then it is new jeans, new



Figure 14 Demi Moore wears Travis Jeans from Lindig, S. (2019, Dec. 6). Accessed 8, Dec. 2019.

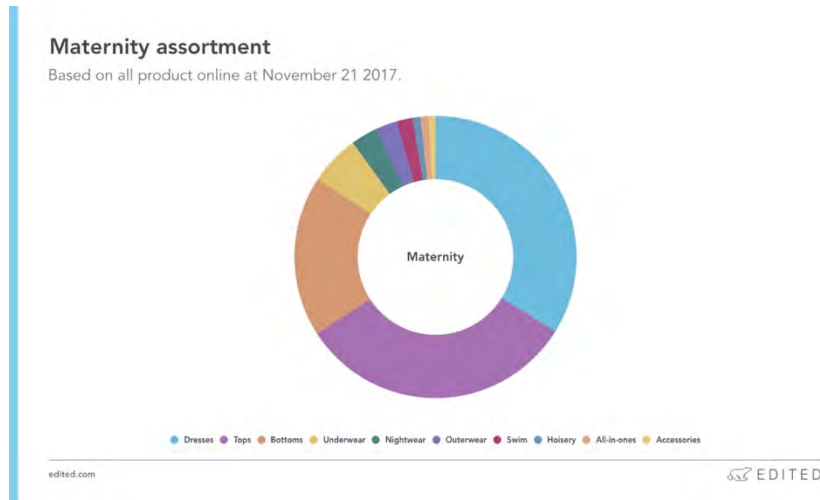


Figure 16 Distribution of Maternity Apparel from Plante, S. G. (2018, January 30). *What to Expect to Wear When You're Expecting*. Retrieved December 8, 2019, from <https://www.vox.com/2018/1/30/16928328/maternity-clothes-pregnancy-miscarriage>.

outerwear, and new underwear...all the basics need to be covered. Rather than what was once dreaded and purchased out of necessity, new boutique stores such as Hatch and PinkBlush offer clothing that women actually want, "making maternity clothes for women who hate maternity clothes" (Plante, 2018, p. 39).

These two brands also encourage women to wear their items well past giving birth which, considering their prices at \$200-\$300, would be considered out of range for many for a temporary investment (Plante, 2018).

With the maternity market steadily growing (see graph of market growth from 2014-2017), it appears as if maternity athletic wear is an overlooked opportunity (Smith, 2017). Even with the trendiness of athleisure, the rise in popularity of pregnancy-friendly activities such as yoga and Pilates and an "Instagram-able" culture of celebrities and influencers who promote wellness and body positivity more than ever,



Figure 17 Hatch, Changing the Aesthetic of Maternity from Plante, S.G. (2018, January 30). Accessed 8, Dec. 2019.

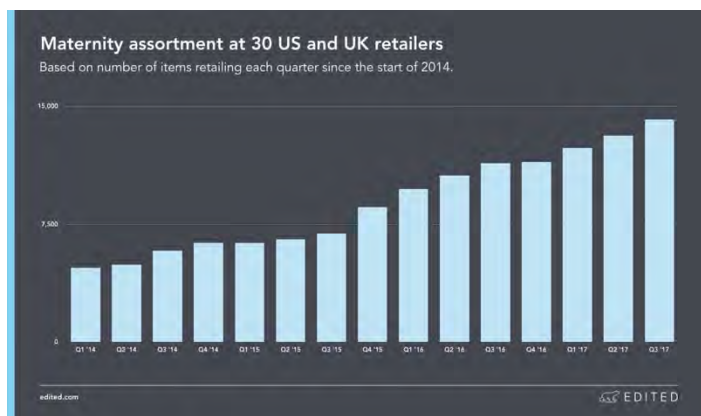


Figure 18 Maternity Market Growth 2014-17 from Smith, K. (2017, November 23). *Expecting opportunity: The growing maternity market*. Retrieved December 8, 2019, from <https://edited.com/resources/maternity-retail/>.

the growth of athletic maternity apparel has lagged behind the growth of other maternity categories.

CURRENT PRODUCT LANDSCAPE

Most of the retailers that have a maternity category offer products for exercise including swim options. Swimming is an activity recommended during pregnancy as it offers aerobic benefits while being low impact. Typically, a body-hugging garment requiring a close fit, a swimsuit would be among the items that would need to be purchased to fit the pregnant body. A maternity swimsuit at the disposable price point of under \$25.00 is sold by Target, a mass market brand. Made of nylon and Spandex, the style is touted as offering plenty of coverage while not sacrificing "your flirty style" (Maternity High Waist Swim Bottoms - Sea Angel - Black, n.d.). Boutique brands such as Hatch appeal to a more well-off, fashionable customer at a higher price point with the promise that the garment is a good investment as it can be worn throughout the pregnancy and after (The Zanzibar Bikini, n.d.). Activewear brands such as Nike, Adidas, Under Armour and Lululemon, do not offer a maternity specific category, while Speedo offered the only maternity suit that was advertised as having performance benefits (Essential Maternity Contour Back, n.d.). It is interesting to see that all brands feature the same design element of ruching on the sides but describe its function as entirely different. Target's suit offers coverage and comfort, Hatch's stretches and expands so it can be worn through the duration of the pregnancy and Speedo's reasoning is to reduce "sagging and bagging" to keep the suit fitted swim after swim.

Figure 19 Maternity High Waist Swim Bottoms - Sea Angel - Black. (n.d.). Retrieved December 9, 2019, from <https://www.target.com>



Target
\$24.99
nylon/Spandex

Figure 20 The Zanzibar Bikini. (n.d.). Retrieved December 8, 2019, from <https://www.hatchcollection.com>



Hatch
\$208.00
Polyester/Spandex

Figure 21 Essential Maternity Contour Back. (n.d.). Retrieved December 9, 2019, from <https://www.speedousa.com>



Speedo
\$72.00
Polyester/Spandex

FEATURES & BENEFITS: SWIMWEAR

| PRODUCT | FEATURES | BENEFITS |
|---|--|--|
| TARGET Maternity High Waist Swim Bottoms (Target, n.d.) | -High waisted silhouette -Ruching at seams -Low Cost | -Coverage -Comfort -Disposable price tag |
| HATCH Zanzibar Bikini (Hatch, n.d.) | -High waisted silhouette -Ruching at seams -Color blocking | -Flattering & fashionable -Fits throughout the entire pregnancy and beyond -On trend |
| SPEEDO Essential Maternity Contour Back (Speedo, n.d.) | -Under bust seam -Ruching at seams -Contour back | -Bust support -Resists sagging & bagging -Doesn't restrict mobility |

SWOT ANALYSIS: SWIMWEAR

| PRODUCT | STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS |
|--|--|--|--|--|
| TARGET Maternity High Waist Swim Bottoms | The inexpensive price tag means no huge financial burden especially on a product that might never be worn again -Able to cover the baby bump while not being baggy and still allowing room to grow (Target, n.d.) | The inexpensive price means less high-quality materials which might lack durability -Only one color choice -Only sold as a bottom which means finding a top that compliments might be tricky | Target has an enormous customer base of loyal followers and the financial means to reach new ones through advertising, marketing, etc. | Target might be considered by some to be "cheap" and disposable. |
| HATCH Zanzibar Bikini | A high end, designer look that doesn't look like maternity wear and can be worn even when not pregnant -convertible style where waist can be worn up high or pushed down low on the hips for multiple style options (Hatch, n.d.) | The high price tag might discourage average consumers looking to buy an item that might only get worn once -not machine washable, requires hand washing, line dry (Hatch, n.d.) | Attracts the women who are stylish, want to celebrate their figures and are turned off by the regular maternity offerings | Niche market, appealing only to those with a disposable income |
| SPEEDO Essential Maternity Contour Back | Offers performance benefits for pregnant women | Still has a very matronly look to it and shares the same design | Capitalize on the athlete client base that already knows the Speedo brand | Need to tread the fine line between fashion and the athletic aesthetic |

| | | | | |
|--|---|--|---|---|
| | who might already be swimmers -easy to get into and “has performed well while swimming” (Speedo, n.d.) | features as other maternity styles from other brands -no extra material inside bust (Speedo, n.d.) -no color choices, also extraneous detail of bow at bust (Speedo, n.d.) -unflattering leg opening style, cut be higher (Speed, n.d.) | and its commitment to creating product that performs Real swimmers get pregnant too and would look to their regular brand supplier for a maternity alternative | Challenge of making a performance suit that still has room to grow, baggy fabric is slow! |
|--|---|--|---|---|

Running leggings or tights have become a staple in most women's workout wardrobes. The selection of leggings offered by Nike, the leader in athletic apparel, stresses weather proofing properties, compression, sculpting, wicking, warmth, but no maternity styles (Nike Pro Women's Tights. Nike.com, n.d.). With some of the other fashion brands mentioned earlier, such as Target (Maternity Moto Leggings - Isabel Maternity by Ingrid & Isabel™ Black, n.d.) and Hatch (The Before, During and After Legging, n.d.), the focus is fashion and fitting the pregnant body with no performance benefits. Leggings make sense for a lot of women as they are stretchy, accommodating and currently in fashion for not only exercising but also everyday wear. Niche brands such as Blanqi, offer maternity specific support, patented as SPORTSUPPORT™, a 3D-engineered sweat-wicking knit with seamless built-in support and compression for the belly which helps to redistribute the weight and reduce the pressure on the abdominal and lower back muscles. Stretchy microfiber is able to recover so that the garment can be worn throughout the pregnancy without losing its shape (Blanqi, n.d.). On the other end of the spectrum are hospital grade compression hose, designed to help reduce swelling and improve blood circulation TRUFORM Classic Medical 20-30 mmHg Maternity Pantyhose, n.d.).

Figure 22 Nike Pro Women's Tights. Nike.com. (n.d.). Retrieved December 9, 2019, from <https://www.nike.com>



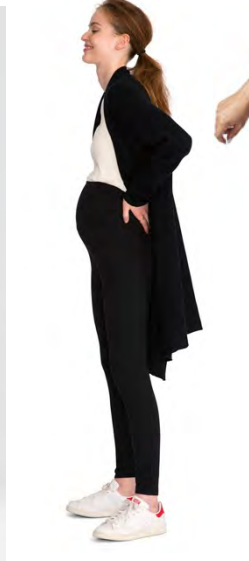
Nike
\$50.00
Polyester/Spandex

Figure 23 Maternity Moto Leggings - Isabel Maternity by Ingrid & Isabel™ Black. (n.d.). Retrieved December 9, 2019, from <https://www.target>.



Target
\$34.99
Nylon/Spandex

Figure 24 The Before, During and After Legging. (n.d.). Retrieved December 9, 2019, from <https://www.hatchcollection.com>.



Hatch
\$98.00
Modal/Spandex

Figure 25 Blanqi. (n.d.). SportSupport™ Hipster Cuffed Leggings. Retrieved December 9, 2019, from <https://www.blanqi.com>



Blanqi
\$64.00
no fabric information

Figure 26 TRUFORM Classic Medical 20-30 mmHg Maternity Pantyhose. (n.d.). Retrieved December 9, 2019, from <https://www.compressionsale.com>



TruForm
\$34.99
Nylon/Spandex

FEATURES & BENEFITS: LEGGINGS/TIGHTS

| PRODUCT | FEATURES | BENEFITS |
|--|---|---|
| NIKE Pro Tight (Nike, n.d.) | -Sport Compression -Sweat wicking | -Sleek, streamlined feel & silhouette -Stay dry & cool while working out |
| TARGET Maternity Moto Legging (Target, n.d.) | -Piecing & seaming -Back crossover panel -Low cost | -Flattering & fashionable -Gives back support -Disposable price tag |
| HATCH Before, During & After Legging (Hatch, n.d.) | -easy fit (not compression fit) -Fold down waistband -Modal Spandex composition | -Can be worn before, during & after pregnant -Waistband can be worn up or down to accommodate the baby bump -Super soft hand feel |
| BLANQI SportSupport Hipster Cuffed Leggings (Blanqi, n.d.) | -Seamless -Compressive fit -Sweat wicking | -No chaffing, or discomfort created by seams |

| | | |
|---|----------------------------|---|
| | | -Gives support and distributes weight -Stay dry & cool |
| TRUFORM Classic Medical 20-30 mmHg Maternity Pantyhose (Compressionusa, n.d.) | -Medical grade compression | -Improves circulation -Reduces swelling in feet and lower limbs -Gives strong support to tissues of lower limbs |

SWOT ANALYSIS: LEGGINGS/TIGHTS

| PRODUCT | STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS |
|---|--|--|--|--|
| NIKE Pro Tight | Performance tights for high performing athletes -customers impressed with the high quality look & feel of the fabric (Nike, n.d.) | No maternity options -tendency for the garment to fit on the small side, also complaints about the elastic waistband as not being in proportion to the rest of the pant (Nike, n.d.) | Loyal customer and fan base of elite, sponsored and recreational athletes | Recent events that may have tarnished Nike's reputation as not supportive of female athletes |
| TARGET Maternity Moto Legging | Affordable -Customers felt the product was true to size and fit well (Target, n.d.) | No performance benefits -in comparison to other leggings on the market these are one of the less expensive ones, yet a customer complained they were still too expensive (Target, n.d.) | Target's vast reach over the mass fashion market and loyal customer base | Product might be seen as disposable & low quality |
| HATCH Before, During & After Legging | High quality, soft comfortable materials -only review for this legging was that it was "comfy" (Hatch, n.d.) | A very high price for basic black leggings with no real performance value | Could be seen as more high value compared to competition due to price & material | Niche market, appealing only to those with a disposable income |
| BLANQI SportSupport Hipster Cuffed Leggings | Specifically engineered, designed & developed for pregnant women -many women were very pleased | Reads as a maternity tight, probably won't be worn post-partum -main complaint is in regards to fit. Many women found them | Capitalize on patented technology unique to this product | Might find it difficult to market to women who aren't pregnant |

| | | | | |
|--|--|---|--|--|
| | with the light, breathable, super soft and comfortable fabric (Amazon.com, n.d.) | too long (Amazon.com, n.d.) -also some women found the material to be transparent (Amazon.com, n.d.) | | |
| TRUFORM Classic Medical 20-30 mmHg Maternity Pantyhose | Health benefits of improved circulation, reduced swelling and tissue support | Overall appearance and fit as well as putting them on is a challenge -Very tight fit where the waistband digs in and leaves a line in the skin (Compressionsusa.com, n.d.) | Medical looking, unappealing, unattractive | Could be seen as only for “sick” people and not for athletes who are young, healthy active women |

Active apparel specific for indoor cycling is limited, which seems like a missed opportunity with the popularity of spin classes at gyms and at-home programs like Peloton. Indoor cycling is considered a safe exercise for expecting mothers as it reduces the risk of balance related injuries present with road cycling and is easier on the legs than jogging or walking. Shelia Moon, a San Francisco based company, was the only known carrier of maternity apparel for cyclists, and they have since shuttered their doors in 2016 (Kristen, & CycleSprog, K., 2019). The only other specialized performance short specific for maternity that has a built in chamois is made by Lucille (Maternity - Lucille Bike Short (\$15.00, reg. \$60.00), n.d.).

Figure 27 Blanqi. (n.d.). BLANQI EVERYDAY™ Maternity Belly Support Girlshort. Retrieved December 8, 2019, from <https://www.blanqi.com>



Blanqi
\$38.00
No fabric information

Figure 28 Maternity - Lucille Bike Short (\$15.00, reg. \$60.00). (n.d.). Retrieved December 9, 2019, from <http://shop.bornfit.com/womens-fitness/maternity-fitness/maternity-lucille-bike-short-15-00-reg-60-00/>.



Lucille
\$60.00
Polyester/Spandex

Figure 29 Women UPF 50 3D Padded Cycling Underwear. (n.d.). Retrieved December 11, 2019, from <https://www.naviskin.com>



Naviskin
\$16.99
Polyester/Elastane

Figure 30 Kristen, & CycleSprog, K. @. (2019, November 20). The Best Maternity Cycling Clothes. Retrieved December 9, 2019, from <https://rascalrides.com/the-best-maternity-cycling-clothes/>.



Sheila Moon
No price information
Polyester

FEATURES & BENEFITS: CYCLING

| PRODUCT | FEATURES | BENEFITS |
|--|--|---|
| BLANQI EVERYDAY Maternity Belly Support Girlshort (Blanqi, n.d.) | -Compression -Moisture wicking -Expanding belly panel -X back feature | -Overall support and weight distribution -Feel cool & dry -Accommodates baby's growth -Additional back support |
| LUCILLE Maternity Bike Short (shop.bornfit.com, n.d.) | -2" waistband -Chamois | -Supports belly while low waist fit is comfortable & doesn't constrict -Comfort that cyclists are familiar with |
| NAVISKIN Padded Cycling Underwear (Naviskin, n.d.) | -Stretchy -Moisture-wicking fabric | -Comfortable & not restrictive -Can be worn under clothing -Feel cool & comfortable |
| SHEILA MOON Cycling Jersey (Kristen, 2019) | -Ruching at sides -Fitted silhouette | -Fits over baby bump -Silhouette cyclists are familiar with |

SWOT ANALYSIS: CYCLING

| PRODUCT | STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS |
|---|---|--|--|--|
| BLANQI EVERYDAY Maternity Belly Support Girlshort | <p>Designed specifically with the pregnant woman's needs in mind</p> <p>-prevents chaffing, easy to wear under clothing for additional support (Amazon.com, n.d.)</p> <p>-fabric is light and thin and cool enough to wear in the summer (Amazon.com, n.d.)</p> | <p>Not made specifically for exercise, more of an everyday wear garment</p> <p>-No padding in the crotch area (Amazon.com, n.d.)</p> <p>-Fabric is very delicate and snags easily (Amazon.com, n.d.)</p> | Capitalize on patented technology unique to this product | Might find it difficult to market to women who aren't pregnant |
| LUCILLE Maternity Bike Short | The only maternity cycling shorts on the market with performance benefits | Unlikely these would be worn outside of pregnancy | Would appeal to true cyclist and the spin crowd | Currently only being marketed on cycling specific websites |
| NAVISKIN Padded Cycling Underwear | Versatile as they can be worn under regular maternity workout apparel that doesn't have a chamois | <p>Not maternity specific so fit might be an issue for some</p> <p>-Reviewers complained of odd fit where the waist was too small and the legs were too big (Amazon.com, n.d.)</p> | Not a huge financial investment compared to buying cycling shorts | Could have a diaper look and feel |
| SHEILA MOON Cycling Jersey | Specifically designed for cyclists | Was unable to reach a large audience and went out of business | Would appeal to athletes who take performance and looking professional seriously | Not a very large market appeal |

Most women do not invest in an outerwear piece. Reasons include the higher price of coats or jackets as well as the fact that the silhouette of most coats is roomy enough that they can be worn for the entirety of the pregnancy. Other women improvise, wearing their partner's parkas or layering up sweaters and other oversized items. When it comes to running, however where heavy layers make you feel slow and cumbersome, not to mention all the excess fabric flapping around, mothers living in cooler temperatures or who work out outdoors might require a maternity athletic jacket. Yet, the product offerings are very limited. Target and Hatch offer

exercise staples but do not offer an active outerwear option and neither does Blanqi. Destination Maternity, the largest retailer of maternity apparel has one active jacket, but it is just a standard knit jersey front- zip layering piece with no actual performance benefits. Athleta has an interesting approach; they don't actually have a maternity specific section or pregnant models, but when "maternity," is searched a section titled "expecting moms" and "new moms" shows up with items the company considers pregnancy compatible, including stretch tops and bottoms and roomier layering pieces (Maternity Workout Clothes, n.d.). The most performance appealing option is made by a maternity brand, Ingrid & Isabel, with a 4 way stretch fabric with sweat-wicking properties in a fitted silhouette that can accommodate a baby's growth by expanding zipper panels on the sides (Zip Front Maternity Active Jacket, n.d.).

Figure 31 Zip Front Maternity Active Jacket. (n.d.). Retrieved December 9, 2019, from <https://www.destinationmaternity.com>



Destination Maternity
\$29.98
Cotton/Spandex

Figure 32 Maternity Workout Clothes. (n.d.). Retrieved December 9, 2019, from <https://athleta.gap.com>



Athleta
\$108.00
Recycled Polyester

Figure 33 Active Side Zip Maternity Jacket. (n.d.). Retrieved December 11, 2019, from <https://www.ingridandisabel.com>



Ingrid & Isabel
\$88.00
Polyester

FEATURES & BENEFITS: ACTIVE OUTERWEAR

| PRODUCT | FEATURES | BENEFITS |
|---|---|---|
| DESTINATION MATERNITY Zip Front Maternity Active Jacket (Destination Maternity, n.d.) | -Cotton Spandex blend -Front Zipper | -Soft, comfortable fabric stretches to fit over the belly -Easy layering piece |
| ATHLETA Recycled Polyester Fleece Jacket (Athleta, n.d.) | -Recycled Polyester -Roomy Fit -Soft fleece | -Sustainable -Easy silhouette would fit over the belly -cozy, warm material |
| INGRID & ISABEL Active Side Zip Maternity Jacket (Ingrid and Isabel, n.d.) | -4 way stretch -Antimicrobial -Side zippers | -Stretch in all directions makes for a comfortable fit -Would not hold odors -Zippers open up to give the garment a roomier fit |

SWOT ANALYSIS: ACTIVE OUTERWEAR

| PRODUCT | STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS |
|---|---|---|--|---|
| DESTINATION MATERNITY Zip Front Maternity Active Jacket | Designed specifically for maternity -Customers really responded to the comfortable fit and soft fabric (Destination Maternity, n.d.) | No real athletic performance benefits, cotton would hold moisture -Limited detail, major complaint being no pockets (Destination Maternity, n.d.) | Produced by the largest retailer of maternity & would have a wide & diverse audience | Would not appeal to an athlete looking for a jacket to exercise & sweat in |
| ATHLETA Recycled Polyester Fleece Jacket | Sporty style -Comfortable fabric, great for outdoor activities like hiking (Athleta, n.d.) | Not actually a maternity style, only a roomier fit | Loyal customer base of fashionable athletes | For a company that is supportive of the success of females athletes and only offers women's athletic apparel this seems like a big miss |
| INGRID & ISABEL Active Side Zip Maternity Jacket | Cute style with functional zippers that can be interpreted as fashionable & functional -“the concept of the jacket is amazing, and I wish more | Very minimal, almost boring in appearance -Concerns about the quality, especially the zippers which were described as “cheap” and get caught on the fabric | Actually, really addresses a lot of the pregnant athletes' needs and would appeal to them for the style & performance benefits | Might miss the target audience by being made by a maternity only company not known for offering athletic styles |

| | | | | |
|--|--|---------------------------|--|--|
| | items could be like this.” (Ingrid and Isabel, n.d.) | (Ingrid and Isabel, n.d.) | | |
|--|--|---------------------------|--|--|

The maternity apparel category also covers the mother's needs post-childbirth. It is widely recommended to breast feed, as mother's milk it contains hormones and antibodies that can help protect the baby from illness. Research also shows that babies who are breast fed have lower rates of asthma, leukemia, obesity, infections, and eczema (Making the Decision to Breastfeed, 2019). Newborns need to be feed every 1 1/2 to 3 hours, even through the night. These frequent feedings, lasting on average 20 minutes, help stimulate more milk production. After the first month, feedings will decrease to 7-9 times a day (Littleton, 2019). The demanding schedule of breast feeding, and pumping has led to products that help to ease the burden, the most obvious being nursing bras.

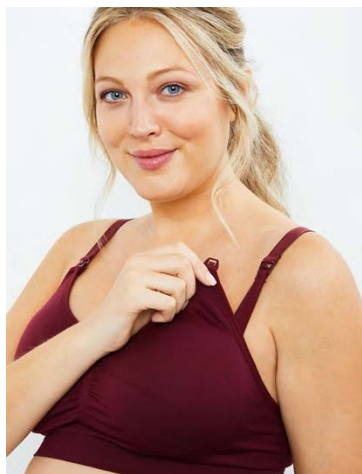
The recommended time for the length of breast feeding is 6 months and many mothers opt to continue for longer. The baby at this point still needs to be fed every 4 to 5 hours and the mothers must pump to continue to produce milk. This time coincides with the time the athlete has started or is thinking about returning to training. As the breasts tend to be swollen, sore and heavy from milk production compressive sports bras can be uncomfortable and not offer enough support. They are also difficult to get in and out of. Many companies offer a sports bra with a nursing feature for this reason. The Fiona bra made by Brooks is not touted as a maternity bra but many runners who have breast fed recommend it for its medium impact support, front facing adjustable straps and back closure (Fiona, n.d.). Another bra that offers this fully adjustable front strap feature as well as the convenience of a front opening is the SheFit Sports Bra (SheFit, n.d.). A similar design of a drop down front but in this case fully advertised as conducive for nursing is the Cake sports bra (Zest Maternity & Nursing Sports Bra, n.d.). Other bras in this space tend to be soft and unstructured with the easy to open front but with no real built up support, as can be seen in the bra offered by Hatch (The Bra, n.d.) and Destination Maternity's self-proclaimed top-rated seamless bra. (Full Busted Seamless Maternity and Nursing Bra (Cup Sizes D),n.d.).

Figure 34 Fiona. (n.d.). Retrieved December 9, 2019, from <https://www.brooksrunning.com>



Brooks
\$50.00
Drilayer Polyester/Spandex
Adjustable, Back closure, easy on and off, molded cups, sweat-wicking, supportive

Figure 37 Full Busted Seamless Maternity and Nursing Bra (Cup Sizes D). (n.d.). Retrieved December 9, 2019, from <https://www.destinationmaternity.com>



Destination Maternity
\$24.98
Nylon/Spandex
Clip down function, soft and supportive, engineered for separation, back closure, adjustable straps

Figure 35 G, P., M, A., P, M., H, A., Moni, & B, K. (2019, November 10). Zest Maternity & Nursing Sports Bra. Retrieved December 9, 2019, from <https://www.cakematernity.com/zest-nursing-sports-bra>.



Cake Maternity
\$80.00
Polyester/Elastane
Drop down cups, can convert into racer back, wide padded straps, flexible wire for support, molded cups

Figure 38 The Bra. (n.d.). Retrieved December 9, 2019, from <https://www.hatchcollection.com>



Hatch
\$48.00
Rayon/Spandex
Soft, comfortable, no width adjustment, limited support, no easy drop-down option for nursing, might not offer enough support

Figure 36 Shefit. (n.d.). Ultimate Sports Bra® - Black. Retrieved December 9, 2019, from <https://shefit.com>



SheFit
\$65.00
Nylon/Spandex
Fully adjustable straps, front closure, lined, wireless cups with contoured seams and removable padding, not a maternity bra

Figure 39 Bravado Designs USA. (n.d.). Clip and Pump™ Hands-Free Nursing Bra Accessory. Retrieved December 11, 2019, from <https://bravadodesigns.com>



Bravado
\$30.00
Cotton/Modal
Soft, breathable, adjustable, drop down front, also feature for hands free pumping

FEATURES & BENEFITS: NURSING BRA

| PRODUCT | FEATURES | BENEFITS |
|---|--|--|
| BROOKS Fiona Sports Bra (Brooks, n.d.) | <ul style="list-style-type: none"> -Velcro straps -Back closure -Molded cups -Drilayer Polyester | <ul style="list-style-type: none"> -Adjustable to give more support & lift, also entire front can drop down for nursing -Adjustable fit, easy on and off, no need to take off over the head -Bust support, smooth silhouette -Sweat wicking to stay cool & comfortable |
| CAKE Maternity Sports Bra (Cake, n.d.) | <ul style="list-style-type: none"> -Convertible Straps -Wide padded straps -Flexible wire & molded cups -Drop down cups | <ul style="list-style-type: none"> -Adjustable to make racer back -Supportive & comfortable, won't cut into shoulders -Additional bust support -Allows for easy, efficient nursing |
| SHEFIT Sports Bra (Shefit, n.d.) | <ul style="list-style-type: none"> -Velcro straps -Front closure -wireless, cups with removable padding | <ul style="list-style-type: none"> -Adjustable to give more support & lift, also entire front can drop down for nursing -Easy to put on and off -Determine how much additional support is required |
| DESTINY MATERNITY Maternity & Nursing Bra (Destiny Maternity, n.d.) | <ul style="list-style-type: none"> -Soft -Drop down front -Back closure -Sliders on straps | <ul style="list-style-type: none"> -Comfortable, not constrictive -Easy to nurse -No need to pull over head, adjustable fit -Adjustable support |
| HATCH The Bra (Hatch, n.d.) | <ul style="list-style-type: none"> -Soft construction -Drop down feature | <ul style="list-style-type: none"> -Comfortable, not constrictive -Easy nursing option |
| BRAVADO Clip & Pump Bra (Bravado Designs, n.d.) | <ul style="list-style-type: none"> -Cotton/modal -Dual front with drop down feature -Outerlayer with "keyhole" -Sliders on straps -Back closure | <ul style="list-style-type: none"> -Soft, breathable fabric -Nursing feature -Option for hands free pumping -Adjustable support -Easy on and off |

SWOT ANALYSIS: NURSING BRA

| PRODUCT | STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS |
|-------------------------|---|--|--|--|
| BROOKS Fiona Sports Bra | <p>Designed for athletes</p> <p>-Brooks claims it to be "one of our most-loved sports</p> | <p>While accommodates breast feeding, is not designed specifically for nursing</p> | <p>Appeals to athletes who trust Brooks as a performance brand</p> | <p>Could alienate non-pregnant athletes who don't want to purchase a "nursing" bra</p> |

| | | | | |
|---|--|--|--|--|
| | <p>bra styles” (Brooks, n.d.)</p> <p>-63% 5 star rating with comments such as “best sports bra ever”, “my favorite sports bra” (Brooks, n.d.)</p> | <p>-Quality might have gone down according to some consumers (Brooks, n.d.)</p> | | |
| CAKE Maternity Sports Bra | <p>Colorful design made specifically for nursing athletes</p> | <p>Looks more like a regular bra than a sports bra, also has wire which although supportive might be uncomfortable for sports</p> <p>-multiple complaints that it did not provide enough support (Amazon.com, n.d.)</p> | <p>Could bridge the crossover between athlete and mother</p> | <p>Unfamiliar brand that athletes might not know of or trust</p> |
| SHEFIT Sports Bra | <p>Very supportive, designed for fuller bustlines</p> <p>-“Your bra, your way. Easy as 1.2.3” (Shefit, n.d.)</p> <p>-fully adjustable that allows for control over level of support (Shefit, n.d.)</p> | <p>While accommodates breast feeding, is not designed specifically for nursing</p> <p>-Complaints that the neckline is too low and straps too thin (Amazon.com, n.d.)</p> <p>-“felt like wearing a device, not a bra” (Amazon.com, n.d.)</p> | <p>Designed with comfort and support in mind for a fuller bustline and has a strong following of consumers who swear by its benefits and performance</p> | <p>Might be too technical and excessive for most athletes who are used to simpler compression styles</p> |
| DESTINY MATERNITY Maternity & Nursing Bra | <p>Easy, soft, comfortable, easy, efficient nursing</p> | <p>May not have enough support</p> | <p>Designed by the largest retailer of maternity wear and described as “award winning” and a “favorite” so must be a popular style</p> | <p>May not appeal to elite athletes who require more performance</p> |
| HATCH The Bra | <p>Minimal, simple style</p> | <p>May not have enough support</p> | <p>The “bralette” style is very popular and on trend right now, doesn’t look like a nursing bra</p> | <p>Does not offer any exercise performance benefits</p> |
| BRAVADO Clip & Pump Bra | <p>Dual features, versatile nursing options for breast</p> | <p>Not a sports bra</p> | <p>Interesting design that blends fashion & function</p> | <p>Wouldn’t appeal to athletes looking for a sports specific bra</p> |

| | | | | |
|--|----------------------------|--|--|--|
| | feeding as well as pumping | -padding is not well thought out and actually needs to be removed prior to nursing or pumping (buybuyBaby, n.d.) | | |
|--|----------------------------|--|--|--|

MATERIALS & MANUFACTURING

Current women's cut & sew as well as fully fashioned clothing sizes use an outdated system based off the hourglass silhouette. In 1939 the US Department of Agriculture (USDA) working with the Bureau of Home Economics under a federal grant, launched the Women's Measurements for Garment and Pattern Construction, to determine a standard sizing system. The data from the start was skewed and not representative of the population as it recorded only the measurements of white women. This system determined a woman's size based off her weight and height and her bust, waist and hip girth. The report was analyzed by the National Institute of Standards and Technology to create body size standards and published as the Commercial Standard (CS) 215-58 in 1958 (Robinson, 2016). To further complicate sizing many retailers developed their own standards, many adopting vanity sizing because customers felt better about purchasing a smaller size. (Robinson, 2016). What was once a size 6 became a size 4, then a size 2 and so on. Customers that fit into one size in one brand could easily be another size in another brand. Now add in the equation of maternity garment sizing.

Pregnant women are not an hourglass shape as the baby bump results in the loss of waist definition. Also, every women is going to gain and carry weight differently. Retail stores often don't have floor space for maternity clothing and the pregnant shopper is left to make the majority of her purchases online which means ordering without the ability to try on (Narins, 2019).

Maternity sizing according to most companies is the same as regular sizing. If a size small fits pre-pregnancy, a size small should fit while pregnant (Deyette, n.d). How the company works this out is a mystery as each company determines for themselves how to design and grade the garment to accommodate someone in their first, second or third trimester. Often times this is just a roomier or waistless silhouette or a stretchy panel sewn into the top of pants.

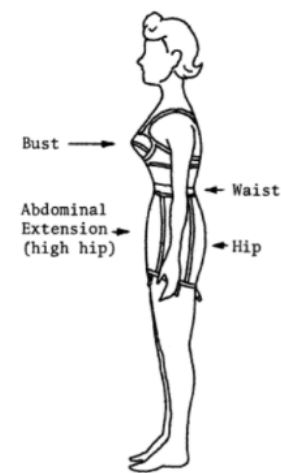


Figure 40 Body Measurements Used for Standard Sizes from Body measurements for the sizing of womens patterns and apparel. (1971) (Vol. 13). Retrieved from <https://books.google.com/books?id=WNmZY-yvG38C&pg=PA14&lpg=PA14&dq=CS 215-58&source=bl&ots=hW--KNp9uX&sig=ACfU3U3y4sZ-vx6L6ZRpAmeDSsfyyBPplg&hl=en&sa=X&ved=2ahUKEwjCpKDNkbvmAhVrJTQIHxWlCu0Q6AEwB3oECAkQAQ#v=onepage&q=CS 215-58&f=false>

The majority of maternity wear is made of stretchy fabric, especially knits due to the variability of the pregnant body. Being made of stretch fabric, especially synthetic kinds is a characteristic maternity clothing shares with exercise apparel. Active apparel needs to stretch to be form fitting and aerodynamic, not restrict mobility and allow for performance features such as wicking sweat. Synthetic materials, polyester in particular is inexpensive, has good abrasion resistance and resiliency (Watkins, 2015). Maternity wear tends to be stretchy because it is just more forgiving, can accommodate fluctuations in weight and it's comfortable and unrestrictive. Construction tends to be flat seam, coverstitch and overlock to allow the fabric to stretch. Clothing that doesn't stretch might incorporate seamed in stretch panels or elastic straps or fasteners to adjust the size.

Most moms pay very close attention to their diets when they are pregnant, because everything the mother consumes is shared with the baby and chemicals and toxins can have a detrimental effect on development. But what about what you put on your body? The skin is considered the largest organ and absorbs contaminants from the environment. For that reason, active mommy bloggers often advise to stick to organic, natural fabrics and to avoid synthetic ones. Some fabrics contain harsh chemicals and treatments like permanent press or wrinkle free which can be harmful to the skin (Lipton, 2019). Whether or not this is based in truth is yet to be proven although a study done on dogs that wore various materials showed otherwise. The dogs that wore cotton, wool and 50% poly/50% cotton garments had normal serum estradiol and progesterone during pregnancy and gave birth to normal offspring. The dogs wearing pure polyester had low serum progesterone levels and had spontaneous abortions (Shafik, 2007). No other studies were found that verified these results. Even if this is just a myth, fabric composition of maternity clothing is worth considering for other reasons due to the temporality of the category and to find more sustainable options.

Consumer awareness about the future of the environment has led to an initiative to develop a bio-based economy identifying natural, renewable materials to replace ones made using fossil fuels or mineral resources. Approximately 60% of the clothing made today contains plastic microfiber or synthetic materials like polyester and or nylon. The fibers leach out of the fabric and enter the air and water during laundering. A 2016 study suggested that over 700,000 fibers enter the water supply from an average wash load (Berman, 2019). Plastics are manufactured to be durable making them very difficult or impossible to get rid of completely. Once in the oceans they are consumed by fish, birds and other sea creatures and then find their way into humans. Relatively new to research it is unknown what effects microplastics have on humans (Feilberg, 2018). It is in our best interest and the environment's to consider other material options than synthetic ones and to address issues with ill-fitting sizing that makes maternity clothes so disposable.

BACKGROUND - WOOL

All fabrics are made of fibers which can be classified as either natural or synthetic. Natural fibers originate from plants and animals and include cotton, silk, flax, linen and wool. Synthetic fibers are made from chemical compounds, many of which are derived from petroleum and include polyester and nylon (Masterclass, 2019). Although petroleum is originally a natural product it must undergo rigorous processing and treatment to create the end product (Clairenstein, 2018).

Sustainability is defined as "policies and strategies that meet society's present needs without compromising the ability of future generations to meet their own needs" as defined by the Environmental Protection Agency (Clairenstein, 2018, p. 5). Synthetic fabrics rely on the



Figure 41 Different types of fibers as seen under the microscope from DeeZknitz. (2015, February 20). deeZknitz. Retrieved February 25, 2020, from <https://deezknitz.tumblr.com/post/111509987832/enfiber-this-this-is-the-absolute-secret-of-why>

production and refinement of oil, which is a limited natural resource. Sustainable materials, on the other hand, come from sources that are renewable such as crops like bamboo or cotton that can be farmed easily and grown without damaging the environment or

utilizing too many natural resources. Animal fibers can also be considered sustainable as the animal hair is grown, sheared and regrown again (Clairenstein, 2018). Different types of wool include cashmere, angora, mohair, and originates from the hair of animals including sheep, goats, alpacas, llamas and other animals (Masterclass, 2019) and is 100% natural, renewable and biodegradable (The Woolmark Company, n.d).

Wool is one of the oldest fibers used by humans to make textiles. Sheep were domesticated in Central Asia over 10,000 years ago and were used for their meat, milk and hides. These early herders soon found they could twist



Figure 42 Oldest existing wool garment from Harvey, I. (2016, July 25). Some of the oldest garments in the World. Retrieved February 25, 2020, from <https://www.thevintagenews.com/2016/08/05/priority-oldest-garments-world/>

the hairs together to form a continuous yarn and these yarns could be interlaced together to make a fabric. Using just the hair of the animal also meant not having to kill the animal to provide clothing. (Braaten, n.d). The oldest surviving wool garment is a pair of socks dating from 350 to 420 AD excavated from a tomb in Osyrhynchus, Egypt. They are considered Romano-Egyptian and were made using a rare stitch called Nalbinding a type of knitting using only one needle (Harvey, 2016).

A sheep's coat contains both an undercoat of fine, soft fiber and a protective outer coat of coarse, straight guard hairs. Over time sheep with better-quality fiber were selectively bred to produce sheep that produced more undercoat hairs and less guard hairs (Braaten, n.d). The chemical structure of a wool fiber includes the innermost medulla surrounded by a larger cortex, protected on the exterior side by the cuticle, composed of overlapping scales. The cortex makes up 90% of the fiber and contains 2 different cell types that behave differently creating the natural crimp (Braaten, n.d).

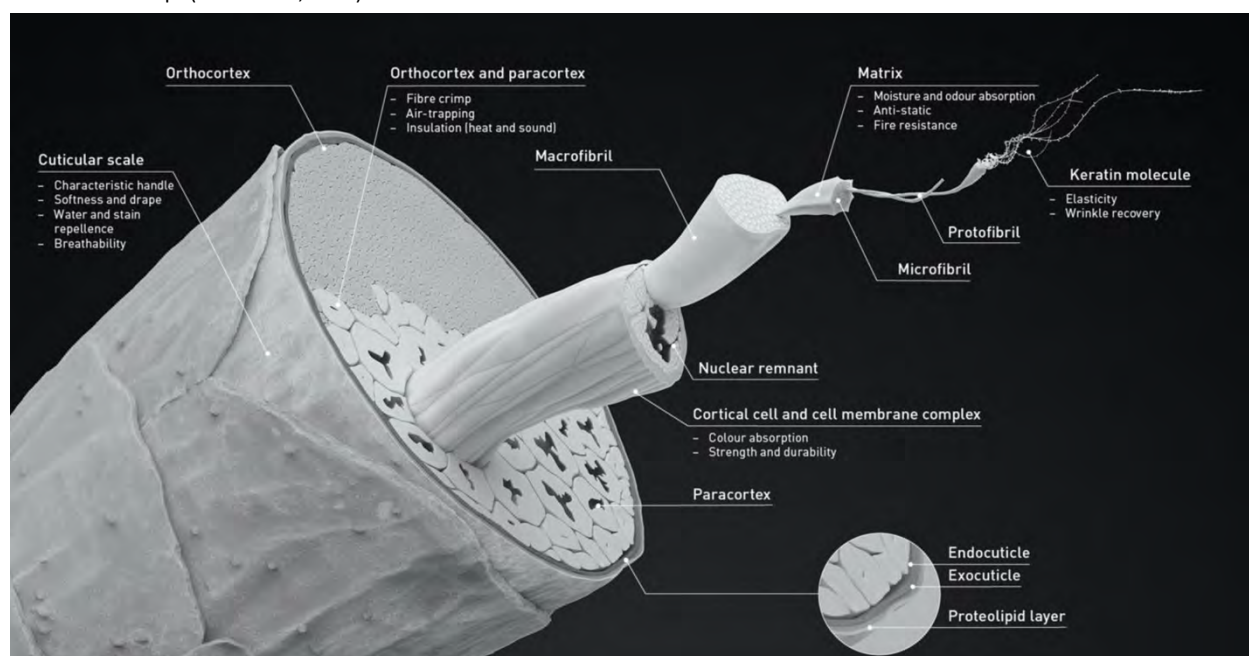


Figure 43 The chemical structure of a wool fiber from Wool Fibre - Properties, Facts & Benefits: The Woolmark Company. (n.d). Retrieved February 18, 2020, from <https://www.woolmark.com/about-wool/wool-fibre/>

All fleece is graded by the following characteristics: diameter, the fiber's fineness; crimp, the fiber's waviness; natural color; kemp, thick fibers that don't take dye well; strength and elasticity. The finest wool can be between 10 to 20 microns in diameter where one micron equals 1/20,000 of an inch. Merino wool is a luxurious yarn known for its soft hand feel due to the fineness of its fibers which have a diameter of 22 microns (The Woolmark Company, n.d).

Merino sheep originated in Spain and were introduced to Australia in 1797. The sheep were further bred to produce larger coats with even finer wool (The Woolmark Company, n.d). There are over 60,000 Australian farmers that currently produce 81% of the world's merino wool

many of which are family owned and operated passing down trade secrets from one generation to the next (The Woolmark Company, n.d).

THE PROPERTIES OF WOOL

Wool has a number of characteristics that positions it as an ideal material for manufacturing an athletic maternity apparel collection. The fashion industry has been criticized for its excessive waste and responsible brands have made it a priority to examine their methods, materials and manufacturing to choose the options that will have less impact on the environment when it comes to global warming and depleting limited natural resources. Merino wool fibers are made of keratin, the same protein that composes human hair and is biodegradable and will naturally decompose in approximately six months. Bacteria and fungi are able to digest the wool fibers with enzymes. Compare that to synthetic materials that can take 30 to 40 years to degrade (Biodegradability, n.d.). Due to its high composition of nitrogen, wool is a great fertilizer and as it decomposes it will release nutrients back into the soil. Synthetics have been found to leach microplastics as they are washed which pollute and accumulate in aquatic ecosystems. The extent of damage these microplastics cause is still relatively unknown as it's a relatively new research topic (Biodegradability, n.d.). Unlike petroleum, wool is a renewable source as sheep grow a new coat each year. Petroleum is a fossil fuel that is non-renewable. These resources will run out, requiring many lifetimes to be replenished. Fossil fuels are formed from decomposed organic material mostly containing carbon and formed over 360 to 300 million years ago when subjected to incredible pressure and heat underground (Morse, 2013).

Wool has natural properties that enable it to help with the wearer's temperature management. It has the ability to act as an insulator to keep the wearer warm it also is naturally wicking to keep the wearer cool in warmer temperatures or during exercise. These properties are possible due to the fiber's cellular structure that allows it to both absorb water vapor and also repel liquid droplets. The scaly cuticle keeps liquids on the surface of the wool and in inclement conditions water droplets take longer to soak through to the inside of the garment keeping the wearer feeling dryer longer. Wool also releases heat when it becomes wet reducing the chance of the wearer becoming chilled. The fiber has the ability to absorb a large amount of water vapor, up to 30% of its own weight before it feels wet. This ability to absorb moisture leaves the body feeling cooler as perspiration is wicked off the skin and held in the fibers (Braaten, n.d.). The naturally occurring crimp in the fiber has the ability to trap air which when worn against the body can keep the wearer warm while the fiber's high absorbency enables the fabric to absorb sweat and move it to the surface keeping the wearer feeling cool and dry. Lanolin, an oil found in wool is antibacterial which means odor causing bacteria in sweat doesn't have a chance to grow (The Woolmark Company, n.d). Polyester fibers tend to hold on to smells because of instead of hindering the growth of bacteria it actually facilitates it. Micrococcus, a bacteria, was found to flourish on polyester garments after exercise. What was unusual was that

this type of bacteria is not found in the armpits and also not found on sweaty cotton shirts. It's still being researched where these bacteria actually originate from (Shute, 2014).

Synthetic materials are often chosen because they are more durable than natural ones or easier to care for. Wool has a great deal of strength and resilience and can stretch up to 30% its natural length before breaking (The Woolmark Company, n.d). That means it can bend 30,000 times without snapping or being damaged. The strength is due to the cortex cells that form the crimp and acts like a coil that springs back once it's stretched (Braaten, n.d.). This gives the apparel products it is used in an elastic quality that stretches to form to the body and then springs back to its original shape. Many merino wool garments are also machine washable and can be tumbled dry. The outer cuticle of the wool fiber also makes it stain resistant as stains cannot be absorbed into the fiber (The Woolmark Company, n.d).

Wool is a remarkable resource that has a long history but fell out of favor when synthetic fabrics came on the market. It is often forgotten about all the inherent characteristics in the material that other materials require special coatings and sprays to possess.

MANUFACTURING - WHOLE GARMENT

"Wholegarment" is a type of knitting technology developed by Shima Seiki to create seam-free knitwear (WHOLEGARMENT. (n.d.)). Traditionally garments are knit in separate pieces and then sewn or linked together at seams. What is unique about an item made on a Wholegarment machine is that the item is created in three dimensions and wraps around the body eliminating seams that might interfere with athletic performance or comfort. The garment being knit in its entirety completely eliminates wasted materials. Additionally, the fact that the garment does not need to be cut and sewn reduces manufacturing steps and labor which cuts costs (WHOLEGARMENT. (n.d.)). A new and necessary focus on protecting the environment has brought attention to the amount of waste produced by the fashion industry and the method of Wholegarment knitting is a novel way of approaching the production of garments that offers a way of reducing over production and over consumption. These 3D knitted products can be made to measure, or customized to the user which increases the value and appeal of item to the consumer. Additionally, these pieces can be made on demand. They do not have to be put into work months and months in advanced and then sit in a warehouse waiting for purchase. Hayato Nishi, senior business development at [Shima Seiki](#) USA points out that "this means that retailers no longer have to forecast demand, order excess inventories in advance, manage warehouse inventories, produce cut waste and discount to get rid of the excess inventories at the end of each season," (Editorial, S. J. G. (2019)).

GRAPHIC, LOGO, COLOR APPLICATION

The current product landscape of maternity clothing has some reoccurring similarities across brands and categories. If branding is present it is discreet. Small scale, tonal to the garment, logos are not the main focus of the product. Apparel colors tend to be more basic in color with a lot of black. One can assume this can be due to the sliming properties of black, it's versatility and ease of care. Moms might be sleep deprived and caught up in multi-tasking and black hides stains and has the ability to go with everything to keep outfits neat and coordinated.

Many women desire to look fashionable and attractive while pregnant as well as maintain their pre pregnancy identity (Rodriguez, 2017). According to Rodriguez in her study on women and their perspective of maternity wear, "...the majority of expecting women, with no linkage to their BMI, prefer minimalistic and stylish garments, as well as practical rather than decorative and embellished garments. Maternity wear should look like non-maternity, but still be extremely functional for pregnancy." (Rodriguez, 2017, p. 23).

PATENT LANDSCAPE

The majority of work in this space focuses on support of the breasts and or belly. Many are strange, complicated and even comical in appearance. All rely on elastic and straps to provide the support with varying degrees of adjustability.

Features an abdominal and breast support band of double thickness elastic material

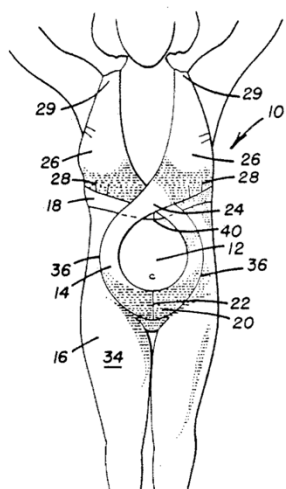


Figure 44 Maternity Exercise Garment from Moyer, N. C. (1988). 4746318. Retrieved December 10, 2019 from Moyer, <https://patentimages.storage.googleapis.com/d1/79/ae/f00d954cd96b39/US4746318.pdf>

Brassiere with an inner and outer layer with the breast cuts overlapping the front portion

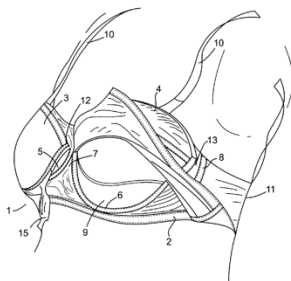


Figure 45 Nursing Bra from McCall, R. (2013). US 2013/0122780 A1. Retrieved Dec. 10, 2019 from <https://patentimages.storage.googleapis.com/45/d0/de/2a64abc0e62737/US20130122780A1.pdf>

A system of elastic straps to support the bust, belly/lower abdomen and back

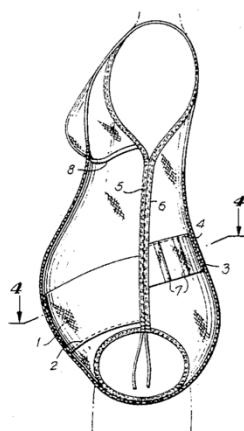


Figure 46 Maternity Bathing Suit from Steinman, N. (1985). 4494546. Retrieved Dec. 10, 2019 from <https://patentimages.storage.googleapis.com/e7/3b/40/cbd4a62486aaeb/US4494546.pdf>

A belly band, contoured seams and elastic in stretch material offers support

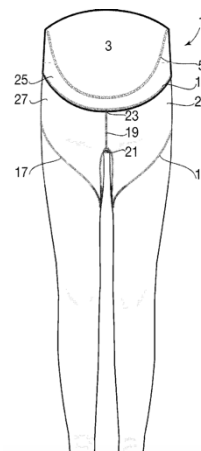
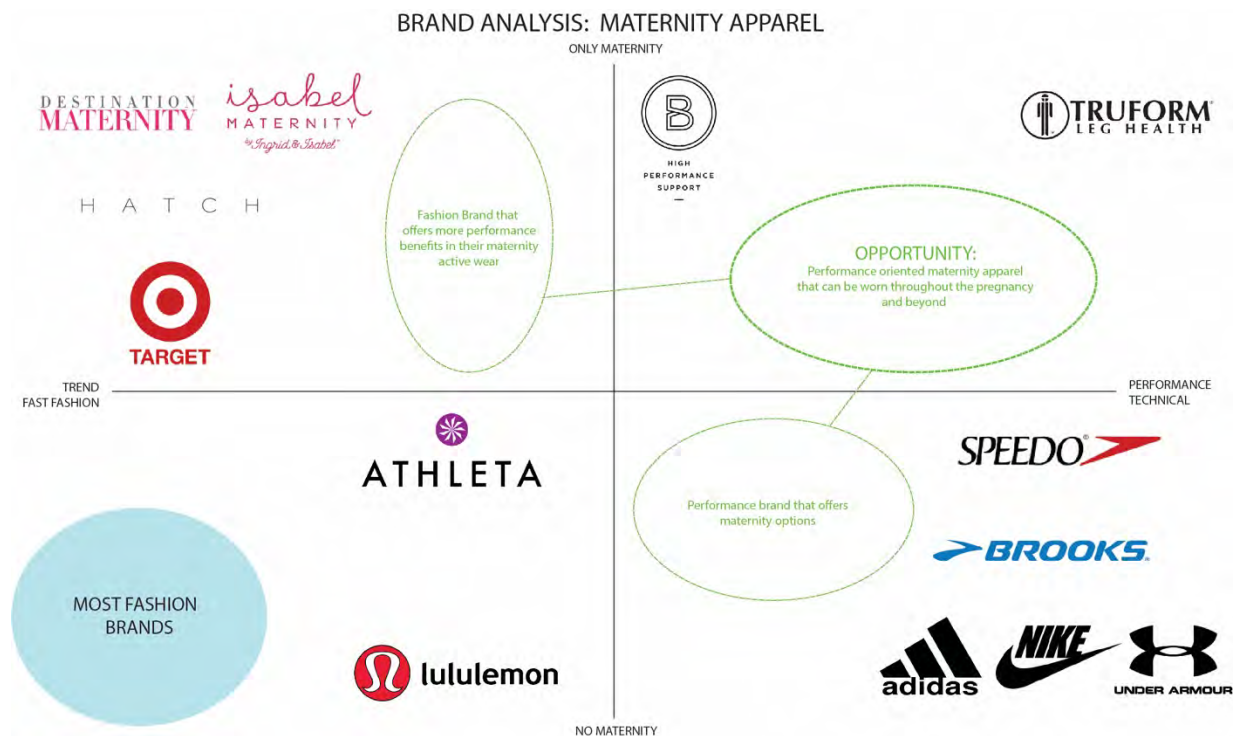


Figure 47 No Leak Maternity Active Legging from Kiuchi, G., Dutt, J. (2019). US 2019/0320737 A1. Retrieved Dec. 10, 2019 from <https://patentimages.storage.googleapis.com/fb/95/1f/811e00be1de588/US20190320737A1.pdf>

In examining the existing patents much can be improved by making less conspicuous product for pregnant women. The focus should be on providing the proper fit and comfort but in a way that doesn't make the garment tricky, confusing or one note. These items all seem very specific and would not be worn outside of pregnancy.

INITIAL PRODUCT PITCH & CONCLUSION

There is a gap in the maternity market for authentic performance apparel. Currently, the big players in performance products are not even offering maternity attire while the brands that own the maternity market, although offering some athletic silhouettes, aren't functioning at the level that elite athlete requires.





Recent events have put Nike in the spotlight, requiring them to readdress their maternity policy surrounding sponsored female athletes. For years it was understood that if any athlete should become pregnant, they would automatically lose their sponsorship, but athletes led by Allyson Felix, Kara Goucher, and Alysia Montano are challenging this. In Felix's words, "Alysia speaking, Kara speaking, the women's soccer team. It's just such a pivotal time right now in women's sports, and we're seeing change happen" (Top female US track stars fight to remove pregnancy sponsorship penalty, 2019, p.5). In response, Nike announced they would not be applying pay reductions for pregnant athletes for a consecutive 18 months. (Top female US track stars fight to remove pregnancy sponsorship penalty, 2019).

There is an opportunity to really explore silhouette and how to address the growing and changing pregnant form in novel ways. Ideally, these garments would be able to transition from trimester to trimester to address the issues surrounding sustainability and reduce the waste in purchasing a temporary wardrobe. Jessie's ability to create fresh and unusual silhouettes that function in the real world as displayed by her past work will hopefully result in a beautifully thought out, well-executed and cohesive collection. Design solutions founded in research will result in a collection of training apparel for the elite pregnant endurance athlete that will accommodate growth, offer tissue support, regulate heat, provide comfort, and that can be worn throughout the pregnancy and beyond. Her interest and work into identifying and addressing the needs of underserved demographics will call attention to how design solutions can bring change to issues surrounding gender, equality and the female athletic experience. On

a personal level as an endurance athlete in the same age demographic being discussed, who has and is considering how to time having a family with meeting athletic and career goals, would be able to relate to this customer.

The collection will be presented in 4 looks each addressing a different activity. Each activity is one recommended as safe to participate in while pregnant and includes jogging/walking, stationary cycling, and swimming. The pieces will transition from the first trimester to the second, the third, through to post-partum. The items that will be developed include an active jacket for rain or slightly chillier weather, cycling shorts, a bathing suit and a nursing bra. Other function pieces would be a supportive top for cycling or jogging, as well as a bottoms option. All tops should allow for the option of nursing to give the garment more functionality. The goal of the collection will be to take the athlete through the transitions of pregnancy from conception to birth, supporting all her training needs to stay active throughout and beyond.

FIELD WORK - INSIGHTS

The retail market is a crowded space and the first step in developing a new product was to identify an area that was being neglected. Through researching the history of maternity apparel as well as looking at the current maternity apparel offerings it was apparent that there was a lack of focus on athletic apparel with performance benefits. There is a lot of stretch product on the market, but they are for comfort and convenience, not competition. In the past maybe it would not have made sense to target elite athletes as consumers in the maternity department because they were far and in between, but times have changed. Pioneers such as Paula Radcliff, Alysia Montano and Allyson Felix proved that not only could athletes have healthy babies, they could also have healthy careers. In order to confirm an appetite for this type of product the target consumer would need to be approached. As the collection, Transitions, is meant to target high performing athletes the mothers contacted were runners and triathletes competing at the national or international level.

These women included:

Gwen Jorgensen, Olympic gold medalist in triathlon, Bowerman Track Team member

Julia Webb, Bowerman Track Team member

Tara Welling, Bowerman Track Team member

Sara Gross, Pro Triathlete

Juliet Hochman, Olympic rower and long course triathlete and cyclist

Bridget Pickett, ultra trail runner

Sara Headley, road & cyclocross cyclist



Figure 48 Gwen & Stanley from Jorgensen, G. (2018, August 19). My weekly blog #8 (it is early!!). Retrieved March 13, 2020, from <http://athleticliving.blogspot.com/2018/08/my-weekly-blog-8-it-is-early.html>



Figure 49 Julia Webb racing pushing her son from Butler, S. L. (2019, June 11). Famous Running Mom and Her 9-Month-Old Smash Stroller Half Marathon Record. Retrieved March 13, 2020, from <https://www.runnersworld.com/news/a20810253/famous-running-mom-and-her-9-month-old-smash-stroller-half-marathon-record/>



Figure 50 Tara Welling & Family from Welling, T. (2019, July 4). Tara (@tara_welling) • Instagram photos and videos. Retrieved March 13, 2020, from https://www.instagram.com/tara_welling/?hl=en



Figure 51 Bridgit Pickett with her children from Irvine, H. M. (2019, April 23). She Ran With That Badass Bump All the Way to Her Due Date. Retrieved March 13, 2020, from <https://www.runnersworld.com/runners-stories/a25726127/she-ran-through-pregnancy/>



Figure 52 Sara Gross & her daughter from Gross, S. (2016, June 5). Sara Gross on Instagram: "Sunday. #daughter #thebest #sunday #sunshine". Retrieved March 13, 2020, from <https://www.instagram.com/p/BGSL-1Xy-cC/>



Figure 53 Juliet Hochman pregnant with her first son from email correspondence with Jessie Silbert, January 10, 2020.



Figure 54 Sarah Headley during her pregnancy from email correspondence with Jessie Silbert, January 11, 2020.

The athletes that were contacted were asked 10 questions to gain insight into their apparel needs when pregnant and their experiences with buying, wearing, and purchasing apparel during this time. They were instructed to only consider their experiences with exercise apparel and were told if they felt uncomfortable answering any of the questions to leave it blank.

1. What kind of exercise , if any, did you do while you were pregnant? Please include brief details regarding duration and intensity.

The first question was to confirm if the three sports, swimming, indoor cycling and running and or walking were the most popular choices of these athletes as was concluded from research and indeed, this was the case. A member of the Olympic rowing team turned triathlete responded, "...running, walking. I was not a triathlete yet and did not own a bike" (J. Hochman, email correspondence, January 10, 2020). A competitive runner confessed that she "ran a lot...averaged 40-45 miles a week. I did two interval workouts per week which were typically three to five miles of intervals (until due date) at a higher intensity (half marathon mile pace). On non-interval days I did shorter runs (5 miles typically) and included weights 2 times per week (heavy squats, dead lifts etc.) and general strength exercises another two days" (J. Webb, email correspondence, January 21, 2020). While the runners tended to prefer running heavy routines the triathletes as one would expect, more often incorporated other activities. "I did mostly

swimming and running and I did ride my bike outside up until about 5 months. I swam two to three kilometers three times a week up until the day before she (the baby) was born. Ran up until week 32. I ran more for pleasure for 30 minutes to an hour. At 32 weeks (running) started to get uncomfortable. I biked outside a little bit and rode the trainer a bit too. I put my trainer front wheel on a crate and took the saddle and tilted it down just because my belly was in the way" (S. Gross, phone conversation, January 27, 2020). Others although remaining active did need to modify their pre pregnancy routines reducing pace, duration and or distance. "I ran while I was pregnant (mostly trail running). I am an ultra-runner, but I dialed intensity and mileage back during pregnancy. I ran about 3 times each week. Runs were anywhere from 40 minutes – 90 minutes long but were occasionally shorter or longer" (B. Pickett, email correspondence, January 14, 2020). If running had to be reduced or stopped due to pain or injury athletes still remained active replacing running with other aerobic activities. "I had to stop running at four and a half months pregnant. I did mostly cross training instead. I basically trained up until the day I gave birth. My activities included spin class, power walking, lifting and yoga" (T. Welling, phone conversation, January 15, 2020).

The next five questions were to determine if these women were purchasing maternity apparel, were familiar with the department and if they were able to fulfill their needs with what was available in the current market.

2. Did you decide to purchase or wear maternity specific clothes for exercising during your pregnancy?



Figure 55 Maternity FITsplint™. (2019, September 30). Retrieved March 12, 2020, from <https://www.recorefitness.com/store/maternity-fitsplint>

It was interesting to see that the majority of the women questioned did not purchase from the maternity department. The main reasons for this was that athletic maternity apparel was just not available and from what was available there were issues with the fit. "It (maternity exercise apparel) didn't exist. I just bought men's basketball shorts and stretched out the waistband" (J. Hochman, email correspondence, January 10, 2020). Many women mentioned just wearing larger sizes, "I just wore a couple larger sized Lululemon pant hand-me-downs. They worked decently, but near the end of my pregnancy, the band would always roll down below my belly which was a minor annoyance." (S. Headley, email correspondence, January 11, 2020). Wearing a spouses clothing or just larger items in their own wardrobe was also mentioned. "I fit in the same shorts/ tights, and sport bras the entire duration. During summer it wasn't a problem for tops - just wore loose tank tops which still fit (from non-pregnancy) -

stayed away from super tight fitting stuff. By mid-3rd trimester started to outgrow any long

sleeve options (it was winter) so I started wearing my husbands (men's medium) which looked terrible and didn't fit great". (J. Webb, email correspondence, January 21, 2020). One women expressed frustration with not only the inability to find appropriate apparel but also issues with price and fit as well as feeling like what she was able to wear wasn't flattering either. "I didn't buy clothing that was specifically for maternity. First off it is very hard to find active wear. Do you really want to buy expensive maternity wear when it's not going to last that long? I was small enough I could just go up sizes. But nothing really actually fit right. Just stomach got bigger, but other parts didn't. A maternity line specifically for athletes would be way more comfortable. You feel like you don't look that great. It fits over your belly but it's big everywhere else and no one wants to feel large. Hard to find comfortable clothes. Not restrictive in stomach but not baggy elsewhere. You want to work out and feel good and look good rather than just go up sizes or wear your husband's stuff." (B. Pickett, email correspondence, January 14, 2020).

As mentioned earlier a woman's body undergoes many physical changes over the course of the pregnancy , some of which can result in lower back and pelvic pain. The most common being sacroiliac pain in the lower back (SI join pain) and pubic symphysis dysfunction in the joint around the pubic bones. Maternity "belly bands" can sometimes help alleviate this pain as they stabilize the core and distribute weight more evenly (Ro, 2018). Lindsey Vestal, a Pelvic-floor therapist explains: (Ro, L.,2018, p2).

"These belts are a way to provide stability in a joint base that normally could do its job, but because it's getting ready for baby, now that joint is moving too much and is causing discomfort," (Ro, 2018, p2).

Belly bands aesthetically resemble braces used for injured knees or wrists only that they fit around the midsection.



Figure 56 Gabriella Elastic Maternity Belt from Ro, L. (2018, October 2). The Best Maternity Belts, According to Pre- and Postnatal Experts. Retrieved March 12, 2020, from <https://nymag.com/strategist/article/best-maternity-belts-belly-bands.html>

Figure 57 Cabea Baby Belly Band from Ro, L. (2018, October 2). The Best Maternity Belts, According to Pre- and Postnatal Experts. Retrieved March 12, 2020, from <https://nymag.com/strategist/article/best-maternity-belts-belly-bands.html>



Figure 58 Baby Belly Pelvic Support by Diane Lee from Ro, L. (2018, October 2). The Best Maternity Belts, According to Pre- and Postnatal Experts. Retrieved March 12, 2020, from <https://nymag.com/strategist/article/best-maternity-belts-belly-bands.html>

Figure 59 NEOtech Care Pregnancy Support Brace from Ro, L. (2018, October 2). The Best Maternity Belts, According to Pre- and Postnatal Experts. Retrieved March 12, 2020, from <https://nymag.com/strategist/article/best-maternity-belts-belly-bands.html>

Figure 60 Serola Sacroiliac Hip Belt from Ro, L. (2018, October 2). The Best Maternity Belts, According to Pre- and Postnatal Experts. Retrieved March 12, 2020, from <https://nymag.com/strategist/article/best-maternity-belts-belly-bands.html>

Figure 61 Belly Bandit Upsie Belly Pregnancy Support Band from Ro, L. (2018, October 2). The Best Maternity Belts, According to Pre- and Postnatal Experts. Retrieved March 12, 2020, from <https://nymag.com/strategist/article/best-maternity-belts-belly-bands.html>

The following questions tried to determine if there was a need for maternity apparel. According to the answers received it seems athletes do not want maternity clothes in the traditional sense and the reason for that is that they gain weight differently during their pregnancy than the majority.

3. If so, at what point (trimester) did you start wearing maternity clothes?

A common theme amongst these women was that they saw the most weight gain in the stomach region with the most body changes coming in the last trimester. "I probably wore real maternity clothes in my last trimester. I was lucky in that I only gained 26 pounds and it was all in my belly" (J.Hochman, email correspondence, January 10, 2020). The majority of these women even said they didn't gain weight anywhere else. "In the last trimester. My baby was small and I carried all in the front so I could wear a lot of my regular jeans just with the top button undone and tied with an elastic band." (S. Headley, email correspondence, January 11, 2020).

4. If you did purchase maternity apparel, what items did you need/have to purchase?

When it came to purchasing new apparel these women just bought what fit. "Something that covered my belly but wasn't huge elsewhere" (G.Jorgensen, email correspondence, January 12, 2020). Many choose to purchase the same items they usually exercised in but in a larger size. "I did not purchase any maternity specific exercise clothes, but I did buy a few new pieces of exercise clothing & sports bras in a size up. Most of the new clothes were the C9 brand by Target & the bras were from Brooks. I did get a belly band to wear while running (the brand was Gabriella and I ordered it on Amazon). The running clothes I wore were typically leggings & a

tank top. The leggings had a wide and stretchy waistband that sat just below my bump. I liked wearing leggings because they had stretch and continued to fit as my body changed and my bump grew over the duration of pregnancy. I wore mostly tank tops because I ran during the spring and summer in Arizona. I wore a mix of form fitting and loose-fitting tops, but both types were stretchy and breathable. They were also long and continued to provide coverage for my belly as it grew. I had a C9 Target running skirt that I loved because it was comfortable and stretchy. The built-in shorts were light and breathable (B. Pickett, email correspondence, January 14, 2020).

Question five was to determine if there were any common features across maternity apparel that would make it valuable to the consumer. These details might be useful to incorporate into future products in this space.

5. Of the things you purchased (apparel) what did you like?

There were no specific details that were identified, but it seemed that any item that enabled the athlete to continue to exercise by giving comfort, support or easing pain or discomfort was considered valuable. "I'm not sure if a belly band counts as apparel, but that was definitely my most valuable piece of maternity running gear! It provided support for my growing belly and took pressure off of my lower back. The support it provided helped to reduce the strain on my belly, hips, and back during the high impact movement of running. It helped to lift and secure my growing belly so there was less jostling. It was basically a sports bra for my belly" (B. Pickett, email correspondence, January 14, 2020).

Question six was to determine what features should be avoided when creating new product in this space.

6. If you didn't like them, what were you unhappy with?

Dislikes focused on any aspect of the item that caused discomfort. Some found this to be items that were constricting, choosing "anything that didn't bind around my belly" (J. Hochman, email correspondence, January 10, 2020). Others mentioned pants that didn't stay in place, "the workout pants with a low-V and the jeans would slip down and I'd have to pull them up often" (S. Headley, email correspondence, January 11, 2020). "I tried to wear a pair of maternity athletic leggings from my previous pregnancy, but I didn't like them because the material was too thick (hot) and the panel of material that covered my belly slid down as I ran" (B. Pickett, email correspondence, January 14, 2020)

Question seven focused on how items worn during pregnancy fit and if this was something these women struggled with. Fit is a big issue in womens' apparel across many categories so one would assume it would be particularly challenging when it comes to maternity apparel. Each pregnancy is unique, and no one gains weight or carries the pregnancy in the same way.

7. Was it easy or difficult to figure out sizing and was fit an issue? If fit was a problem, what about fit didn't work? Example: If the waistband fit, the hips did not.

Answers were very specific and focused on specific garments or areas of the body. "Size was a major issue for swimsuits. I hate two pieces but was forced to wear them" (G. Jorgensen, January 12, 2020). "I have a pretty straight waist, not curvy. The material at the hips generally puckered out at the sides" (S. Headley, email correspondence, January 11, 2020).

Question eight was to find out the longevity of the items bought and if they were kept after the pregnancy was over. The apparel industry is well known for the amount of waste it generates. The fear is that many women do discard these items which they can only use for a couple of months which just end up contributing to landfills.

8. Did you keep any of the maternity clothes you bought after giving birth? why/why not?

Many women returned to the same size they were pre pregnancy and chose not to keep any of the items they purchased while pregnant. "Nope, gave them all away to the next woman" (J. Hochman, email correspondence, January 10, 2020). While others did keep some specific items that transitioned easily into their post partum routine, "I kept all of my sports bras. The Brooks bras have Velcro adjustable straps that work really well for having to breastfeed. The adjustability is also very helpful as your chest changes sizes through pregnancy and post-pregnancy. (I have the Juno and the Rebound Racer bras.)" (J. Webb, email correspondence, January 21, 2020).

The final two questions focused on trying to identify any apparel needs these women might have had that were not properly addressed as well as find any opportunities for creating new products or improving upon existing one.

9. When you returned to exercising (after appropriate recovery time) Did you purchase any specific apparel in order to exercise? Ex. back brace, nursing sports bra, etc.

One of the biggest concerns as these women returned to exercise was finding the right sports bra. Many were breast feeding which increases the size and weight of the breasts as a result of milk production. "I was back to jogging about 3 weeks later. The sports bra was most important thing because your boobs are SO big and heavy. (Went from an AA to an E)." (J. Hochman, email correspondence, January 10, 2020).

10. Was there any items that you were not able to find or any garments you might have purchased if they were available?

The women had some interesting insights to offer further proving how limited the current offering is. "I was working out indoors. I can imagine it would be hard to find the right things to run in for certain conditions like if it's cold outside." Also lacking were "nursing options" and anything "that would hold your stomach in place while you're working out, you need the support you get from a sports bra but for your stomach. And of course, you just don't want to feel big" (T. Welling, phone conversation, January 15, 2020). Women were weary of price as well as the fact that these were not investment purchases. "I don't think I bought any maternity exercise gear for 2 reasons. The first was because I didn't want to spend a lot of money on clothing that I only needed for a month or 2. Most of my current leggings and tanks

were stretchy and long enough to still fit until the end of the 3rd trimester. And the second reason is probably because there weren't any quality and affordable maternity exercise clothing options available in any stores near me." (J. Webb, email correspondence, January 21, 2020). Only one woman touched on how hard it was to recover from giving birth and features to consider when designing post partum apparel. "I was surprised that I needed to wear my maternity clothes after (giving birth), that the body doesn't go back right away. When I stopped running I would walk instead. But then you literally can't move after. You need to recover, you will have some sort of ripping and wound. Can't swim. You're stuck at home and can't move. Something easy to put on and not feel so sloppy. Can't bend, things you take for granted like not being able to pull your pants up. It's really important to feel good about what you are wearing. The last thing you want to wear is something that makes you feel bigger." (S. Gross, phone conversation, January 27, 2020).

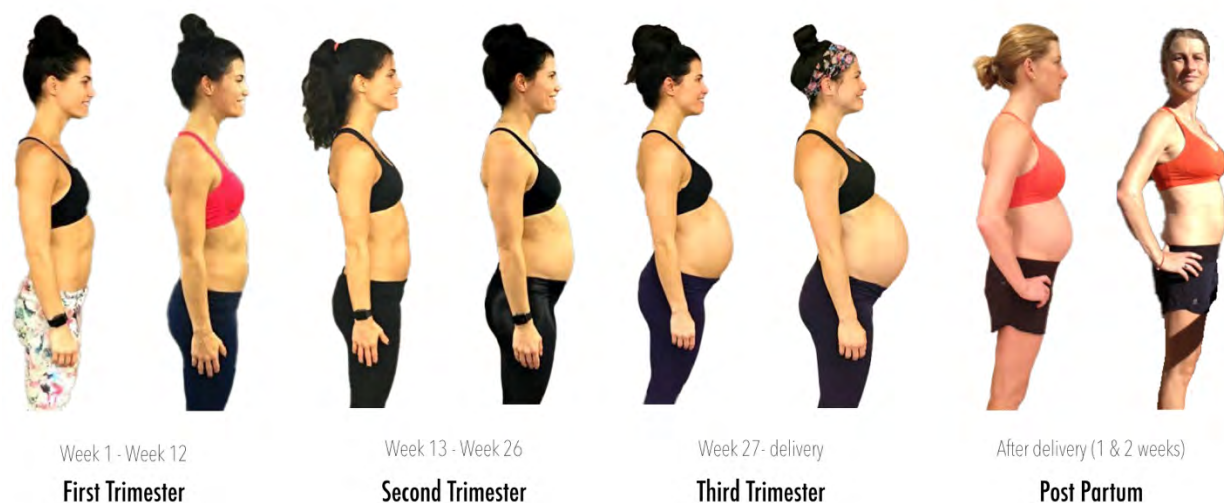


Figure 62 Athletes document how their body changes during pregnancy. The biggest change is in the bust & belly region. From Eddins, J. (2020, March 12). Peanut Butter Runner. Retrieved March 14, 2020, from <https://www.peanutbutterrunner.com/> and Fleshman, L. (2013, July 8). One Month Later. Retrieved March 14, 2020, from <http://asklaurenfleshman.com/2013/07/one-month-later/>

For additional insight and in the anticipation of identifying other opportunities to inform the new product physical therapists were contacted in the field specializing in pelvic floor disfunction and rehabilitation.

The therapists interviewed included:

Corey Silbert Hazama, PT, DPT, OCS, CFMT
 Johanna Lee Hess, PT, DPT, PRX, WCS
 Kendall Lynch PT, DPT, OCS, PMA-CPT

Dr. Hazama was able to give insights about apparel needs her patients had as well as make recommendations for characteristics that could improve upon existing product. Below are the questions and responses from the email interview.



Figure 63 Dr. Hazama treating a patient from Hazama, Corey S. (2020, January 10). Email correspondence with Jessie Silbert.

1. When do your patients start wearing maternity clothes? "People start wearing the pants pretty early, like even in the first trimester. You can usually get away with regular shirts and non-fitted dresses for the entire pregnancy. I would say when you start to show, which would be in the second trimester may transition to the pants." (C. Hazama, email correspondence, January 10, 2020)

2. Do you recommend exercise during pregnancy? What do you recommend?

"Absolutely, you can find actual recommendations online about what your heart rate should get to. I would say it is ok to do any exercise as long as there is no risk for a fall or overheating. if you were exercising before pregnancy, most women can keep that activity up, pregnancy is not the time to start a new exercise (like running) if you never did it before." (C. Hazama, email correspondence, January 10, 2020)

3. Do you come across similar complaints from multiple patients about specific areas that need support, padding, etc? For example: when I walk /jog I get pain in my lower back that is eased when I wear a belly support brace.

"They definitely need breast support, lower back, even pelvic floor, so crotch support, some women get swelling in the labia. Ankles too tend to get swollen" (C. Hazama, email correspondence, January 10, 2020).

4. Do you recommend any kind of clothing to your patients?

"A baby belly belt if lots of weight from baby bump" (Hazama, C, email correspondence, January 10, 2020).

5. Of what you recommend is there any aspect of those products that aren't quite perfect? If so, what?

"Bras can be too constrictive they cut off circulation when they (the patients) lie down" (C. Hazama, email correspondence, January 10, 2020)

6. Do you wish there was a product out there that doesn't exist that might solve all your patients' problems? If so, what?

"Something that helps with promoting circulation from the feet up to the trunk and incorporates pelvic floor support but does not restrict the ability to breathe through the lower back and ribs" (C. Hazama, email correspondence, January 10, 2020).

Dr. Hess is a physical therapist at Beyond Basics, a practice that focuses on treating and rehabilitating pelvic floor health and also is currently pregnant. She was able to speak about her patients' needs as well as from her own experiences.

3. Do you come across similar complaints from multiple patients about specific areas that need support, padding, etc?

"I don't get a lot of these complaints that directly link pain and support. However, myself and a lot of patients have problems finding pants that are high and compressive enough to support the abdomen without pinching. And same with the bra area. Because the milk ducts go all the way into the axilla, the pressure has to be widely distributed and adjustable to hold up the milk boobs without compressing the ducts leading to mastitis. It would also be cool to have something like the Thinx pads for women with some residual lochia or incontinence (gasp!). Also, great to have tanks that have the option for discreet breastfeeding clips. Nothing like having to peel a sweaty tank off and getting your arm stuck in a hole to nurse a sobbing baby." (J. Hess, email correspondence, January 14, 2020).

4. Do you recommend any kind of clothing to your patients?

"Yes, compression tanks or high waisted pants (Blanqi, babies, etc.) Just helps boost the self-esteem. Focus on wide distribution of pressure." (J. Hess, email correspondence, January 14, 2020).

5. Of what you recommend is there any aspect of those products that aren't quite perfect? If so, what?

"They are ugly and not fun. I mean, I've adopted the New York black for ease, stain hiding, slimming, and timelessness. But postpartum stuff is so mumsy. For looser fitting garment, it's this balance of having things loose around the stomach so it's easy to feed and you don't have to suck in your stomach without the tendency to have that pregnant, dewey fairy look. And for the tighter compression garments, the compression needs to be well distributed otherwise the abdominal stuff shows up hanging over your pants, on the side, and pushed into your boobs. In a world of athleisure and maternity leave... I would love to put something on in the morning, do errands, a jog, make dinner, put the kids to sleep, then take a shower and change into PJ's. This means, these clothes have to keep up—silver for odor (so hot when breastfeeding and baby carrying), pants don't sag and slip down when wearing a baby carrier. This is more a note for athleisure, less for performance wear." (J. Hess, email correspondence, January 14, 2020).

6. Do you wish there was a product out there that doesn't exist that might solve all your patients problems? If so, what?

"No way. I'd be out of a job. Haha. But serious, one product is hard because everyone has different needs. I do think a set of high waisted light compression bottoms with protective perineal padding for bleeding or urine (because Thinx give horrible lines), a bra that had access to boobs for breastfeeding and a wide band to not smoosh the milk ducts while still giving support to huge boobs, and looser tops that are optically flatter and practically forgiving... and BINGO! you have your line. Oh, make sure it's produced in a place that isn't sketchy. Poor child

working conditions stories are a real sob for postpartum moms." (J. Hess, email correspondence, January 14, 2020).



Figure 64 Joanna training with her therapist from Hess, J. (2018, June 26). Beyond Basics Physical Therapy We go Above and Beyond the Basics. Retrieved March 13, 2020, from <https://beyondbasicsptblog.com/2018/06/26/lace-up-or-feet-up-running-during-pregnancy/>

Kendall Lynch, a therapist and mother had the same recommendations. Primarily supporting the belly to help with lower back pain. She also recommended compression products developed specifically for pregnant women but mentioned that fabric was a big issue as these products were not made for hot weather or athletic activities.

3. Do you come across similar complaints from multiple patients about specific areas that need support, padding, etc?

"Yes. I would say the main categories are low back pain, heaviness of the belly (like they want to hold up the baby), and SIJ pain." (K. Lynch, email correspondence, January 16, 2020)

4. Do you recommend any kind of clothing to your patients?

"I recommend either BaoBei maternity or Blanqi; graduated compression that either is in short/pant form and/or briefs that covers the belly" (K. Lynch, email correspondence, January 16, 2020).

5. Of what you recommend is there any aspect of those products that aren't quite perfect? If so, what?

"I think in general the breathability of the fabric is tough. In order to provide adequate support, the fabric tends to be thicker and that's tough in the summer." (K. Lynch, email correspondence, January 16, 2020)

6. Do you wish there was a product out there that doesn't exist that might solve all your patients problems? If so, what?

"I think there has been new technology in sports clothing (especially for runners and endurance athletes) that has different textures in the fabric to "provide specific support" in certain areas: e.g. a thicker band that makes an x across the sacroiliac region. I wonder if we could apply the breathability of athletic clothing to pregnancy related clothing. I'm thinking mesh where the support needs to be less. I also think that this support, like a Spanx, should be able to be worn under everyday clothes. So much of the athletic specific clothing can be applied to everyday support for our pregnant women." (K. Lynch, email correspondence, January 16, 2020)

MENTOR UPDATE:

Nicole Monte is a design director at Old Navy currently over women's knits, maternity and plus. She was introduced to Jessie to offer guidance and insights into the maternity market and consumer.

The Old Navy customer, "whether she is regular size, plus or pregnant she is the same customer just at a different stage of her life" (N. Monte, phone conversation, February 3, 2020). "In maternity Old Navy does not treat trend differently than designing for any woman. The consumer wants to be current and feel and look her best. All around function, affordability, and longevity are most important. She doesn't want to buy a lot throughout the pregnancy. There isn't a lot of cold weather options available because a lot of women don't even buy outerwear. They just wear what they already own and keep it open. She just doesn't spend her dollars there. Pants and denim are first and foremost. We see them spend their dollars on nursing, which is predominantly a post-partum need but anything with built in functionality does well. Versatility is important. She needs something she could wear multiple times in a week. An item that works hard in her wardrobe." (N. Monte, phone conversation, February 3, 2020)

Old Navy has very strict standards for items designed for the newborn and maternity line. Materials that are allowed in the regular line are not allowed in these lines, particularly synthetic materials or fabrics with coatings such as water repellency or wrinkle resistance.

As far as fabrics are concerned, it is important to note that the pregnant woman's skin is incredibly itchy and sensitive. "Your skin is stretching and pulling and morphing into different shapes. These consumers really like to comment on the feel of materials. A lot of pregnant women have an association with natural fibers being better and are disappointed if something is synthetic. They have a hypersensitivity to that. There is an association of natural being healthier and better for us and garment dying, pigment dying, doesn't really do that. We can't do any of that in the maternity line." (N. Monte, phone conversation, February 3, 2020)

There are certain aspects of designing maternity apparel that differ from designing for the regular line. One such aspect is that "having a nursing component to anything is a game changer. Having that functionality. Another huge issue we try to trouble shoot is pants falling down. Really hard to get things to stay up. It is a huge complaint for women. We want to make women feel comfortable and not having to fuss with it, it needs to be easy. Throw it on, look good and feel good and it functions." (N. Monte, phone conversation, February 3, 2020)

A lot of women have issues with or confusion around the sizing systems used in maternity apparel. Nicole explains the maternity sizing at Old Navy: "if you are a size 0 you should buy a size 0 in maternity. Although there are others that become pregnant and gain weight everywhere. You have to size up because you grow everywhere. We keep our fit the same she would experience in the mainline. Her waist will be different. The waist and the hip are where you see the change and there is a big different in rises. Back rise may be longer to get the pitch and your front rise is lower accommodating for the maternity panel. Old Navy uses a

size 8 fit model, one that does tops and dresses and one that does bottoms and we use the same fit model for maternity and then strap an Alvanon belly on. We also try to get it (the item being fit) on as many people as possible. We are looking to create clothing for people who don't want to spend a lot or don't have a lot of money but want to have accessible fashion on." (N. Monte, phone conversation, February 3, 2020)

Old Navy offers exercise apparel in both regular sizes and maternity sizes. Is there a difference in the fit required for the customer purchasing this product vs regular clothing? Was a different fit model with a more athletic build used to fit the product? The answer was no, they "use the same fit model for exercise apparel. The active line is a smaller line." (N. Monte, phone conversation, February 3, 2020) While Old Navy tries to give the consumer a more functional jogging compression option it is not high performance and the cotton-based product is more appropriate for low impact activity such as yoga. Nicole explained that their consumer just isn't interested in high performing product and while they try to "give her a piece for each activity that we are trying to focus on it isn't so much sport, but more of an end use. She isn't looking for high function, it's more of an athleisure point of view." (N. Monte, phone conversation, February 3, 2020)

Nicole was extremely helpful in explaining the mindset of the pregnant consumer. That this customer is very price sensitive and looking for versatility, functionality and longevity in the items she does purchase.

FIELD WORK - MANUFACTURING & MATERIALS

Wool was mentioned earlier as an ideal material for manufacturing a maternity athletic apparel collection and the manufacturing method of Wholegarment knitting was introduced. Wool yarns, seamless construction, engineered areas of stitch tension, compression and structure would be ideal for creating the Transitions Collection. In order to pursue this mills and factories would have to be located, contacted and consulted to create the knit pieces.

Knit Illustrated in New York City is a knit factory owned and operated by Peter Tam.

Peter Tam

Peter@knitillustrated.com

247 W 37th Street, 3F, New York, NY 10018

212-268-9054

Early stage concepts and sketches were sent, and the factory agreed that they would be able to help develop the items. They even have an in-house supply of merino wool that could be utilized if that was the yarn that was chosen. After completion of tech packs, the factory reached back out to notify the designer that these styles were not possible in the New York sample room and would have to be manufactured overseas in China, however those factories were closed due to the developing situation with the Corona virus, COVID-19. Another factory would need to be sourced.

A visit to the Shima Seiki showroom in New York City enabled the designer to become more familiar with the knit technology and the capabilities of the machines. A senior sales and business development associate, Hayato Nishi presented samples and knit headers and helped to identify possible techniques to consider as well as what types of yarns might work best for the garment designs.

hayato@shimaseikiusa.com

501 7th Ave, Suite 412, New York, NY 10018

609-332-0890, 212-391-4020 x 412

There are 2 methods of knitting, 2D and Wholegarment. or 3D. 2D knitting uses a program to create flat shaped knit pieces that will later be put together by either sewing or linking at the seams. Wholegarment knitting creates the front and the back of the garment at the same time and does not require any finishing. The technology used to program the knitting machines is called Apex. This is a hardware program and can't be purchased to use on a personal computer. Hayato suggested the following steps in approaching the development of the three intended knit styles, a sports bra, swimsuit and leggings:

1. Learn the limitations of each vendor
2. identify and purchase yarns
3. Create tech packs

Limitations of Wholegarment manufacturing:

The garment can only be knitted in two layers (front and back), no parts can overlap.

The machine cannot do a true jacquard or intarsia and can only simulate a faux jacquard through a two color float.

The front and back must be a similar size and shape.

The technology does allow for stitch details to differ on the front to back.

The garment's front and back hems must finish at similar heights only a differential at a maximum of six inches can be accommodated.

When considering yarns, natural materials tend to have more drape than synthetic ones. Also found that the wool knit swatches had a fuzzier, warmer hand.

Some machines can feed in elastic to make the garment feel more substantial, but this would need to be confirmed with the vendor.

All garments are knit horizontally and are limited by the width of the needle bed. Very wide garments might need to be knit side to side, rather than top to bottom.

These limitations must be considered when designing the garments or another method of make might be a better option.

Examples of Knit Stitches:



Figure 65, 66, 67 Example of double layer garment knitted in one piece and folded over at waistband. Shima Seiki style Y4713W009 with faux jacquard technique with 2 color float.



Figure 68, 69, 70 Shima Seiki sport bra sample with knit opening for pad. Shima Seiki style Y5536W009



Figure 71, 72, 73 Nike Sample created by Shima Seiki showing a combination of links links and rib stitches



Figure 74 North Face Japan sample showing an articulated elbow
Figure 75, 76 Shima Seiki garment showing a technique using 2 ends in different colors



Figure 77, 78, 79, 80, 81, 82, 83, 84 (left to right, top to bottom) Interesting mixture of stitches including links with picot and combo woven body. Shima Seiki style Y5559W00M



Figure 85, 86, 87 Interesting way of plating a bright colored yarn behind another color yarn so that it is revealed when stretched.

YARN:

Reviewing wool yarn headers with Hayato led to the realization that most of the yarns were not substantial enough for sports apparel especially garments that were being developed to support parts of the body. Even adding Lycra would not give enough stability. After sifting through the entire collection, a quality from Nikke, article Axio, a blend of 79% wool and 21% nylon, combined the content of wool with nylon for strength and durability and had a sturdier hand feel, good recovery and was not fuzzy to the touch. Shima Seiki was able to provide contact information for Nikke to inquiry into yarn availability.

Fortunately, Axio is a stock quality



Figure 89 Nikke color card for article Axio



Figure 88 Nikke Yarn article Axio identified to develop the styles in.

and is available in a variety of beautiful colors ready to ship.

4 kilos of 99Nero and 4 kilos Ty7204 were purchased along with the remaining stock of color AX006, a neon green for tipping. Shima Seiki recommend that the yarn be 2 ply, twisted in a z because it helps stabilize the garment, if single ply the garment will twist.

With Knit Illustrated not possessing the capabilities to proceed with the development of the three knit styles for the Transitions collection Shima Seiki was able to connect the designer to a factory in LA, BNG Knits. BNG Knits has multiple machines including a Wholegarment machine and the capabilities to produce more complex garments domestically than Knit Illustrated. After reviewing the designs and the tech packs

BNG Knits advised that the styles were quite complex and would take over 20 hours to program for Wholegarment knitting. At a steep price of \$200/hour for programming, this was not an option. After a phone conversation with Julio Lee, the owner of BNG Knits, it was determined that one garment would be programmed for 2D Knitting, requiring one seam. The other two styles would proceed as knit yardage which would be sent back to Portland for cut and sew. Yarn will ship from Japan on March 14th and once the yarn is received by the factory it will be clearer what can be accomplished. They will proceed to knit downs which will be reviewed for approval prior to proceeding with the samples. As it stands the yarn is not stable for 2x1 or 3x1 rib and any stitch speed as such in the tech packs will need to be changed to even ribs, for example 2x2, 1x1, 3x3, etc.

UPDATE 6/5/2020:

BNG Knits was required to close their factory for three weeks starting at the end of February due to Covid-19. Once they reopened, they were working at a reduced capacity. Julio was only working 2-3 days each week and would alternate his employees so there were days that went by where the machines the samples were being knit on were not in use as that technician was not working. All the programming was done by an employee that worked at home. Knit swatches were sent to the designer's home in Oregon for approval and took 2-3 days to ship. An additional set back was the factory ran out of lycra which needed to be purchased and shipped from Japan. All of these conditions combined to stretch out the time needed to complete the items. Jessie put a hard stop on everything for May 15. If items weren't completed at that point she would make them using cut and sew.

This is exactly what happened. Unable to complete the leggings in time the factory sent just 3D knitted leg panels. They were not able to complete or provide finishing for the rest of the garment or the bra and swimsuit. Jessie worked with the factory to request large knit panels to complete the rest of the garment in her apartment. This was extremely challenging as many of the machines had restrictions on the width that could be knitted. For example, 2 by 2 rib could only be 16" in width. For this reason, some of the original specifications of the garments were changed. The designer was able to complete the three styles but not in the intended make. For future iterations more time would be needed as well as actually traveling to the factory to see things up close and trouble shoot in the moment.

As far as the knit panels, they worked out well enough for the first prototypes but felt very heavy. Going forward the yarn count would need to be decreased. The decision was made to go with 2 ends of each color, black and grey (for a marled effect), 4 ends total to avoid transparency with the addition of one end of lycra for stability and elasticity. It would be interesting to introduce areas where more lycra was inserted to provide areas with more compression.

DESIGN DIRECTION:

DESIGN INSPIRATION:

Research identified the types of exercise considered safe and appropriate for pregnant women and athlete insights confirmed this. Expecting mothers will be running, jogging or walking, swimming and if they are comfortable on a bike, indoor cycling as outdoor cycling might put the athlete in danger of a fall.



Swimming

Water supports body weight reducing impact on joints & muscles



Indoor Cycling

A stationary trainer reduces the risk of falling from loss of balance



Walking & Jogging

Some reduction in duration & intensity may be required

A pregnancy lasts 9 months, that's almost a full year and one would assume the pregnant athlete would most likely experience the temperature and weather changes that accompany the different seasons, summer, fall, winter and spring.



Fall

US average: 53.9 °F
Marked by less daylight & cooler temperatures



Winter

US average: 37 °F
The coldest & darkest season of the year



Spring

US average: 69.9 °F
The season of "rebirth" when plants & trees spring back to life

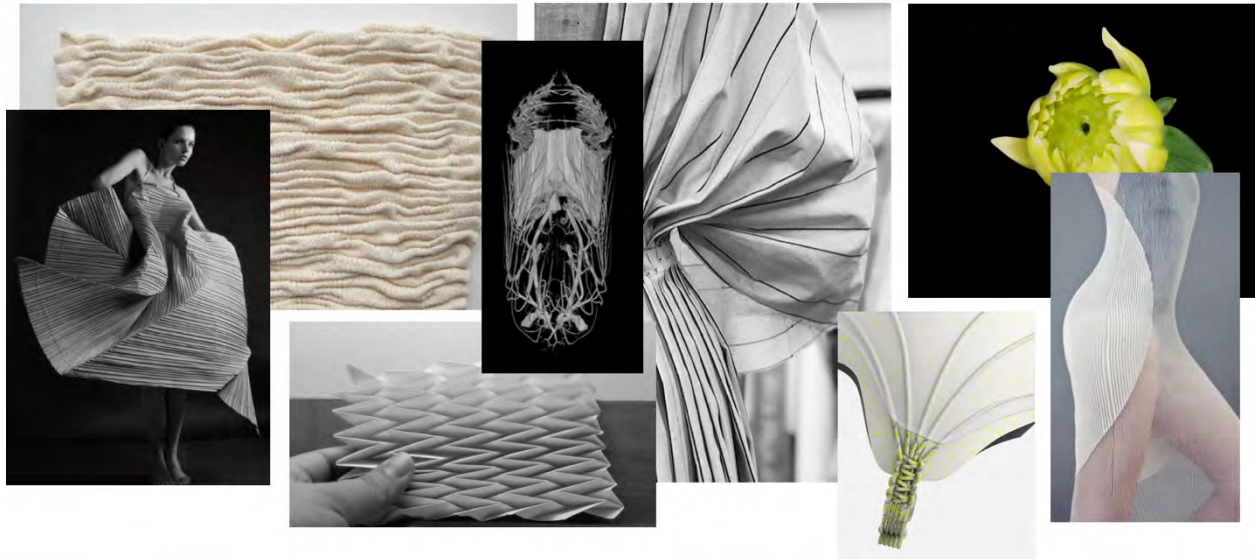


Summer

US average: 81.1 °F
Warmest months of the year marked by longer days of sunlight

In addition to designing for different activities, the differing environmental conditions will need to be considered.

For intersection in inspiring innovative ideas and silhouettes that transform shape the designer looked to nature, in particular how a flower blooms and how a caterpillar turns into a butterfly. Additionally, the designer analyzed how two-dimensional objects such as a piece of paper or fabric were manipulated to become three dimensional objects through folding or pleating as seen in origami and furoshiki, the Japanese art of wrapping gifts with fabric. It was extremely important to establish a language of structural support and details in each garment that was not only functional, but also aesthetically pleasing. These common design elements would also tie the different items together as a cohesive collection.



UPDATED MOOD BOARD and COLOR DIRECTION 6/5/2020:

The initial mood board set the tone of the collection but as the spring semester kicked off it was necessary to further define the aesthetics of the collection and how this would tie together not only the pieces of the collection but also the branding promise, logos, product messaging and packaging.

Below are the additional mood boards that were created. The circle emerged as a reoccurring symbol to be incorporated into the logo that could be used in packaging such as shopping bags and hangtags. Color was considered early on but looked unsophisticated and not aligned with the collection and the minimal color pallet. The new direction was taken to strip the logo down. A minimal palette was chosen in black and ivory.



INSPIRATION: undulating lines & organic shapes where structural support forms its own aesthetic language



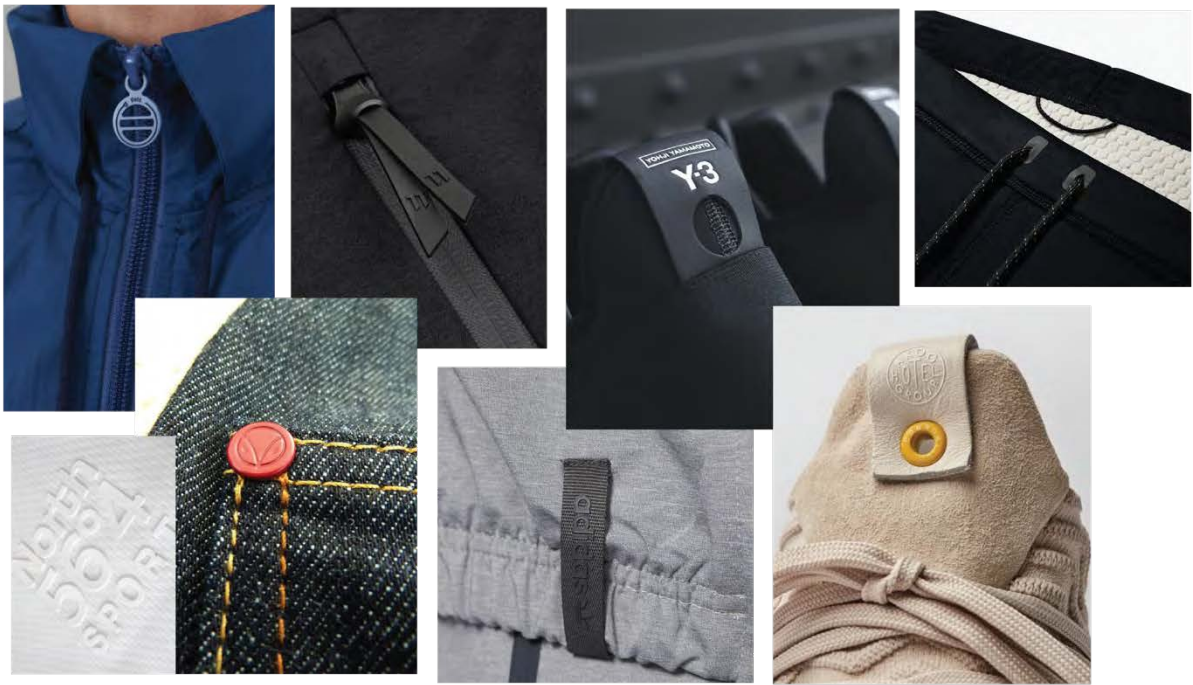
COLOR: subtle, cool, calming neutrals are accented by pops of citrus for (seasonal offering)



COLOR: neutrals - core palette (year round offering)



MATERIALS/MAKE: wrapping, pleating, folding create structure & support, seamless knitting is easy & comfortable



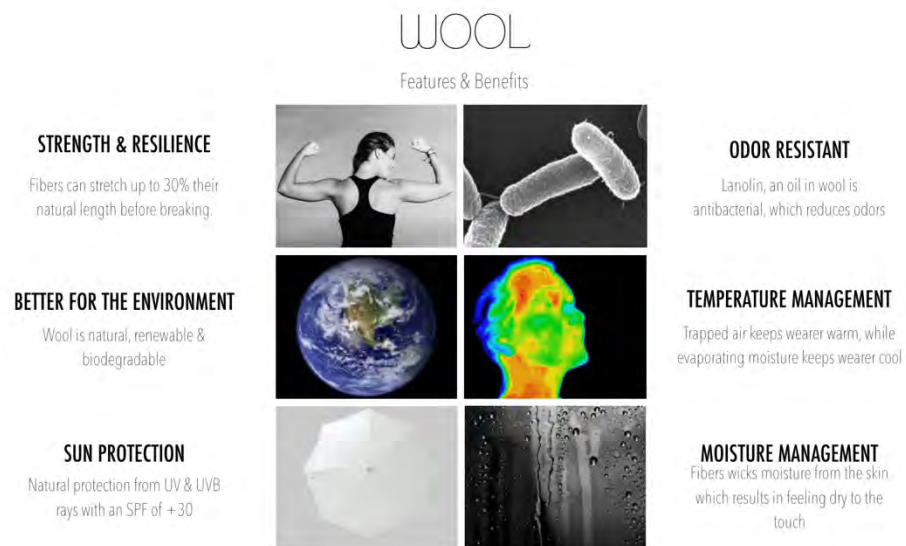
BRANDING ELEMENTS INSPIRATION: hardware, trims, finishing, etc.



DESIGN PRIORITIES:

Prior to designing the collection, the problems to solve for were ranked. Below in order of importance are the design priorities:

1. Fit/Silhouette - The item must fit the pregnant form (example, pants don't fall down)
2. Adaptability/Adjustability - The item can transition through the various stages of pregnancy & be wearable even when not pregnant to increase the value and longevity of the item
3. Functionality/Performance - The item must function for the activity it is designed for (example: The swimsuit must be able to get wet and not bag out and stay in place while swimming laps in a pool) The item must have features and benefits that enable for successful athletic performance (example: sweat wicking to stay cool, supporting body tissue to prevent pain or distraction during exercise)
4. Versatility - The item has multiple uses and functions (example: Sports bra can be used for exercise as well as nursing)
5. Natural Materials - focus on using wool as much as possible for its inherent qualities that would make it ideal for athletic apparel such as its ability to regulate body temperature as well as being antimicrobial and having built in sun protection. Additionally, wool is better for the environment as it's renewable, sustainable and biodegradable. Natural materials are better for moms & babies as wool is not derived from or contains chemicals.



DESIGN BRIEFS:

The following briefs were developed identifying apparel items that would solve for a particular activity and season. For example a swimsuit would be developed for swimming in the summer for pool temperatures in the high 70's to low 80's degrees F.



SEASON: Summer 2025
 PRICE: \$55.00 Retail, \$13.75 FOB
 CONSUMER: The Pregnant Athlete
 ENVIRONMENT: Pool, 77-82 degrees F

WOOL:
 - fast drying - UV & UVB protection
 ADJUSTABLE:
 - adapts to body shape & size changes
 COVERAGE:
 - covers the belly - bust support - feels like 1 pc

T1 - SWIM



SEASON: Winter 2025
 PRICE: (Bottom) \$65.00 Retail, \$16.25 FOB
 (Top) \$40.00 Retail, \$10.00 FOB
 CONSUMER: The Pregnant Athlete
 ENVIRONMENT: Indoors 70 degrees F

WOOL:
 - sweat wicking - feels dry
 ASUPPORTIVE:
 - engineered support - reduces back strain
 COMFORTABLE:
 - stretch & compression - straps for secure & adjustable fit

T2 - CYCLING

Stylish cycling shorts & jersey for training through pregnancy.



SEASON: Fall 2025
 PRICE: (jacket) \$85.00 Retail, \$21.25 FOB
 (tights) \$75.00 Retail, \$18.75 FOB
 CONSUMER: The Pregnant Athlete
 ENVIRONMENT: Mid 50's to low 60's degrees F

WOOL:
 - insulating to stay warm - sweat wicking to feel dry
 ADJUSTABLE:
 - adapts to body shape & size changes
 MODERN SILHOUETTE:
 - not your "traditional" maternity apparel

T3 - RUNNING/WALKING

Convertible tights & jacket that adjust to body changes during pregnancy for exercising in cooler temperatures.



SEASON: Spring 2026
 PRICE: (bra) \$65.00 Retail, \$16.25 FOB
 (pants) \$55.00 Retail, \$13.75 FOB
 CONSUMER: The Pregnant Athlete
 ENVIRONMENT: Ambient temperatures 70 degrees F

WOOL:
 - natural materials - reduces exposure to chemicals
 COMFORT:
 - soft, cozy fabrics feel good on the body - not constrictive
 CONVENIENT:
 - allows for breast feeding without having to remove garment

RECOVERY

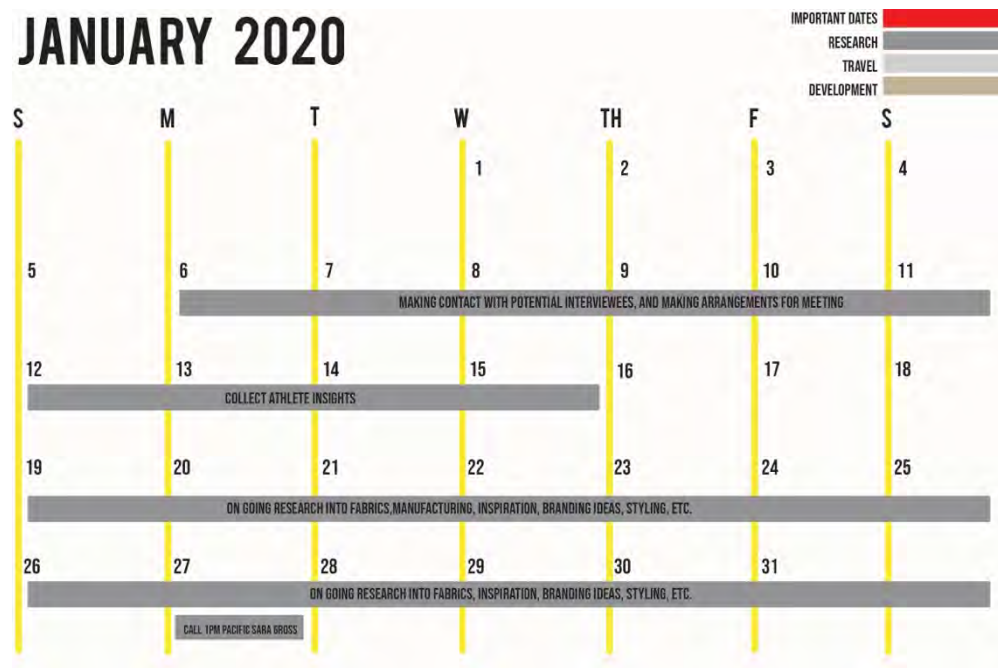
Take care of baby's & mom's needs while providing ease & comfort

IDEATION PROCESS

OVERVIEW:

In order to stay on task especially as some of the knit items would need to be manufactured by a third party and might require more lead time, a working calendar was created outlining deadlines, travel and deliverables.

The entire winter semester was laid out week to week see below:



FEBRUARY 2020

IMPORTANT DATES

- RESEARCH
- TRAVEL
- DEVELOPMENT

| S | M | T | W | TH | F | S |
|---------------------------------|-------------------------------------|---|------------------------|------------------------|--|----|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | CROQUIS DONE | | MID TERM | | | |
| | | START SKETCHING, MATERIAL EXPLORATION | | | | |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| SKETCHING, MATERIAL EXPLORATION | | | | | | |
| | SKETCH REVIEW 1 10+ OF EACH SILD | | 5+ ADDITIONAL SKETCHES | | SET UP LOOM, MAKE BASIC SWATCHES | |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| | PROTOTYPING | | | PERSONAL TRAVEL TO NYC | | |
| | SKETCH REVIEW 3 FINAL SKETCHES | | | | VISIT TO KNIT FACTORY SHIMA SEIKI SHOWROOM | |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| TRAVEL TO NYC | | PROTOTYPING: FINAL PALETTE, PURCHASE FABRIC/TRIMS | | | PROTOTYPING: MAKE FINAL PHOTOS TO FIT OF KNIT GARMENTS | |

MARCH 2020

IMPORTANT DATES

RESEARCH

TRAVEL

DEVELOPMENT

S

M

T

W

TH

F

S

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

FINAL PHOTOS KNITS

REVIEW W/MENTOR/ATHLETES

FINAL KNIT TECH PACKS

1/2 DRAPE OTHER GARMENTS

COLLECT IDEATION, PROCESS NOTES FOR PAPER

FIRST DRAFT PAPER

FITTING WITH ATHLETE: STEPHANIE GO

FITTING ON SZ SM W/ BELLY

FINISHED MUSLINS

FINAL PAPER

TECH PACKS TO FACTORIES

FINAL SLIDES

SEND OUT REF. SAMPLES, YARNSTO KNIT FACTORIES

WOMEN IN SPORTS: CARING FOR THE FEMALE ATHLETE CONFERENCE

KNIT SWATCHES, DEVELOPMENT ON KNIT STYLES

HAVE ALL FINAL FABRICS

SHIMA SEIKI CLASS IN LA

KNIT SWATCHES, DEVELOPMENT ON KNIT STYLES - ONGOING AT FACTORY

PAPER DUE

FINALS

The month of January was devoted to topic research, collecting imagery, fabric research and speaking to athletes, physical therapists and coaches to gather insights into the apparel needs of a pregnant athlete. All work was focused on gaining an in-depth and detailed picture of how these women navigated their pregnancies, what they purchased, items they liked, didn't like and if there was anything they felt was missing from the current marketplace. It was at this point that briefs were created that identified the products to be designed and what features they would possess to benefit the wearer.

In mid-February following the midterm presentation the designer began ideating. This included sketching in depth into the products detailed in the briefs to try to solve for how to fit the garment on the pregnant body. Draping and patternmaking followed sketching. More sketching was done to flush out details, and style lines within each silhouette. This process was completed with 3 prototypes for the fully-fashioned knit styles and a half drape of the woven jacket style. Further prototyping will continue through March after the winter term finals and conclude in April for the remaining 3 styles: cycling jersey, cycling shorts and lounge recovery pants.

The beginning of March centered around validating the product that was made and preparing to present the semester's work to faculty on March 11th.

KEY DATES:

February 5th - Midterm: At this point all relevant research around the topic of pregnant athletes and creating a maternity collection must be completed and presented to prove it was a valid topic area to focus on and worth pursuing. The presentation was well received, and the designer was given the go ahead to continue to ideation and prototyping.

February 20-24 - Travel to NYC: Focus for this trip was to make contacts and lock down manufacturers and materials especially yarn and a factory that could produce the 2D or 3D knitted garments. This trip was successful, and the designer learned a great deal about the technology of knitting on machines. Through Shima Seiki the designer was able to identify a yarn to use for the collection as well as make an introduction to a knitting factory in LA to prototype the garments. Utilizing the availability and abundance of high-end fabric stores the designer was able to acquire 80% of the fabric needed to complete the final garments that will be cut & sew knit. The woven outerwear materials were supplied by Gortex but the wool to bond to the interior side of these fabrics to ensure that natural materials would be worn against the body was purchased in New York.

March 1st - Complete First Round of Prototypes: Upon returning from New York it was crucial to complete prototypes, final patterns and tech packs if 3D knitting was to be used for the final products. These styles will require programing and knit downs to test tensions and stitches. Also, these styles would need to be tried on the fit model for validation purposes. The designer was able to create three prototypes in cut and sew knit to later be interpreted as fully fashioned styles.

March 4th - Complete Tech Packs: The factory manufacturing the fully-fashioned styles needed more information and specs related to the styles they would produce. The tech packs must be completed with measurements to figure out what machines the items could be manufactured on as there are limitations due to the size of needle beds, the types of stitches requested, and the gauge of the yarn purchased. A full copy of each pattern was made and sent to the factories to assist with programing.

March 11 - Finals: The full concept and progress thus far was presented to faculty in a slide show, on boards and three prototypes on dress forms.

SKETCHING:

The first step of sketching was to generate lots of ideas around silhouette. It was crucial to explore every idea even if it was outlandish and then scale back to identify the more feasible concepts. Was the silhouette going to be on the body or away from the body? Would it offer full or minimal coverage? These decisions would have to be made before style lines could be drawn. Ideas that were of interest were highlighted in green.

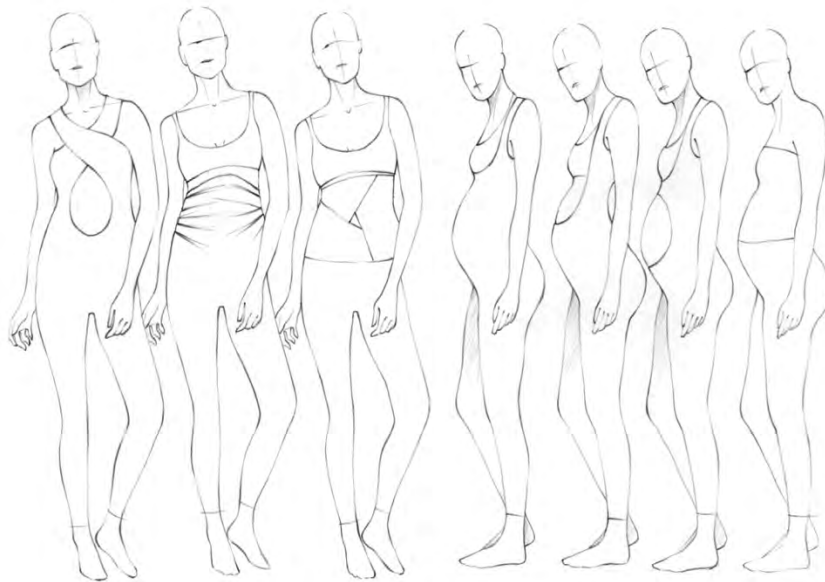


Figure 90 Concepts for leggings with and without straps as well as how to accommodate the belly shape.



Figure 91 Legging concepts that are slim through the leg but have more fullness over the belly

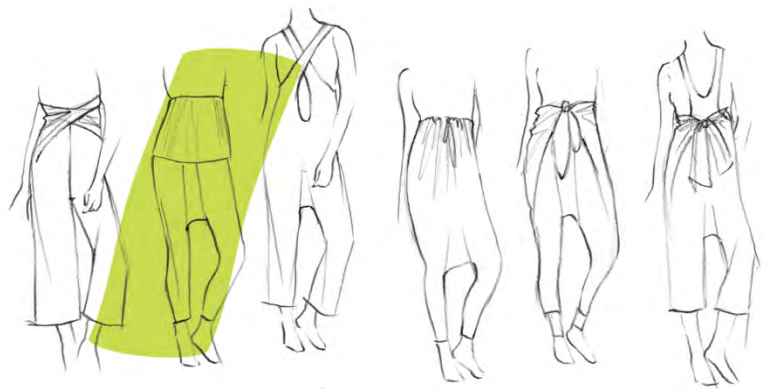


Figure 92 Fuller leg concepts for a recovery pant that doesn't constrict the belly post delivery

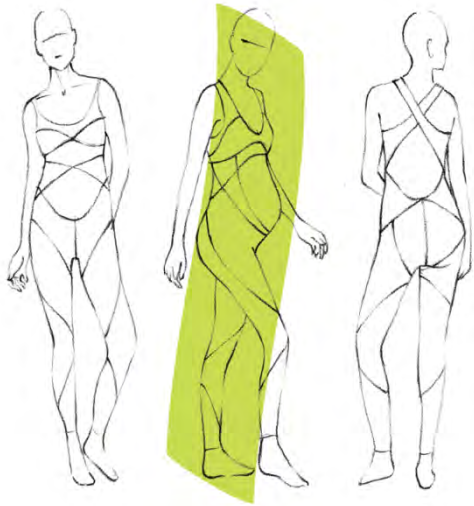


Figure 93 Design lines for both style and support.

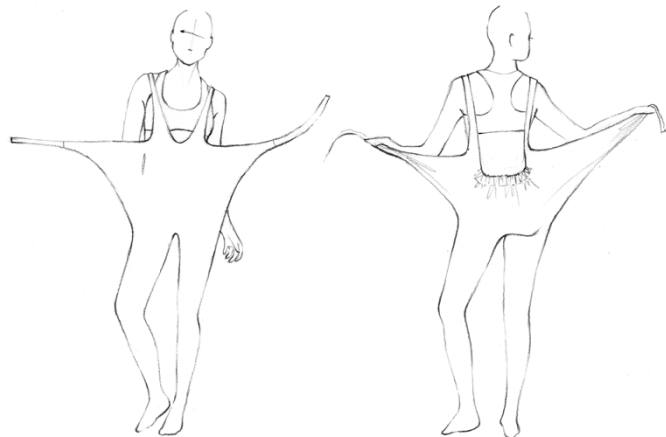


Figure 94 Detail of how the wrap closure works

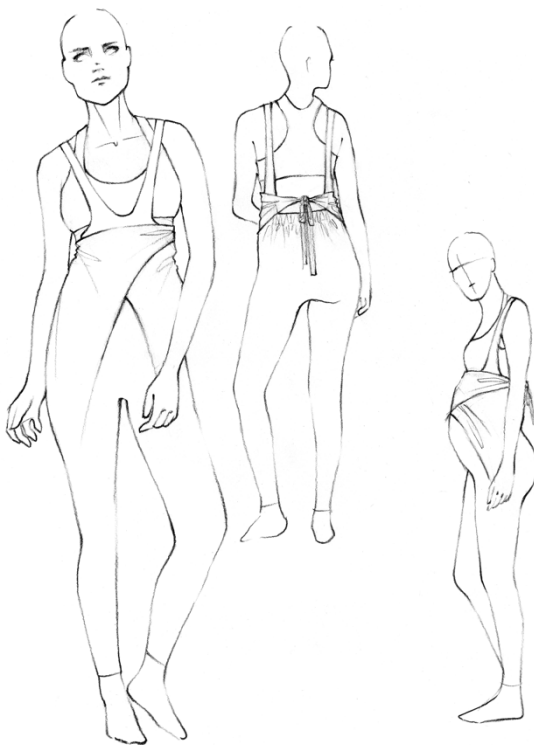


Figure 95 Second sketch of leggings with wrap closure

The same approach was taken with the other styles. Start with broad ideas and narrow down to the ones that fit the brief. An interesting problem to address with the sports bra was figuring out the most feasible way to offer support as well as a nursing option. Some of the big limitations around this style were: Not having to take the entire bra off to nurse, try to offer some coverage for modesty, easy to open to nurse, front closure if possible, not look like a typical nursing bra. See on the following page some of the ideas generated given these boundaries:

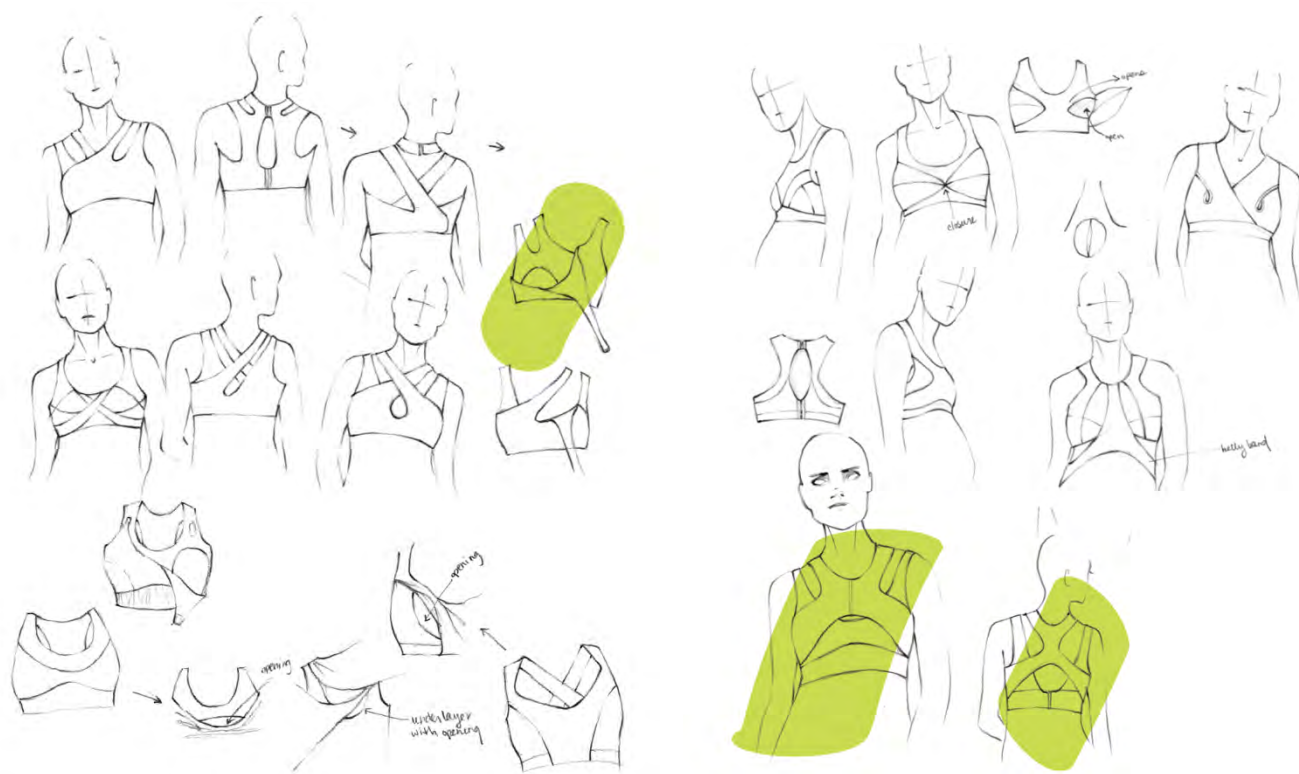


Figure 96 First round of bra sketches with nursing options

The ideas that seemed most interesting and also aligned with the leggings style were the ones that wrapped around the body with two separate layers and a double support strap system and multiple closures. This idea was further flushed out in a second round of sketching which resulted in the design on the right.

The swimsuit further explored this wrapping concept. The original intent was to make a one-piece style as this is what is preferred by high performing elite athletes, but many have to switch to a two-piece option once they really start showing. The issue is that the belly just starts to steal fabric from the rest of the body leading to discomfort and reduced

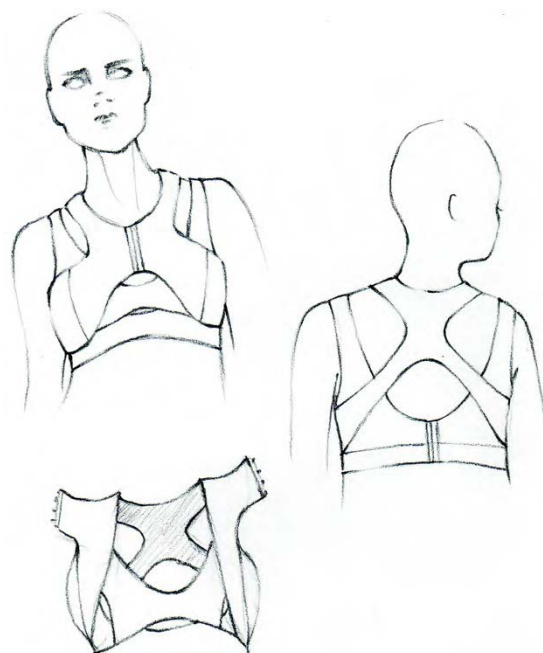


Figure 97 Second sketch round of the bra two layers with the nursing option on the bottom layer

coverage. The measurement in question is the 360 degree measurement over the shoulders to the crotch.

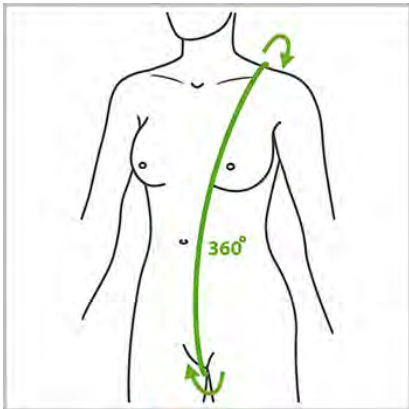


Figure 98 Standard measurement specifically for jumpsuits & rompers from New Designers & Styles Monthly. (n.d.). Retrieved March 15, 2020, from <https://www.balodana.com/customer-service/measurement-guide>



Figure 99 First round of sketching swimsuits solving for covering the baby bump

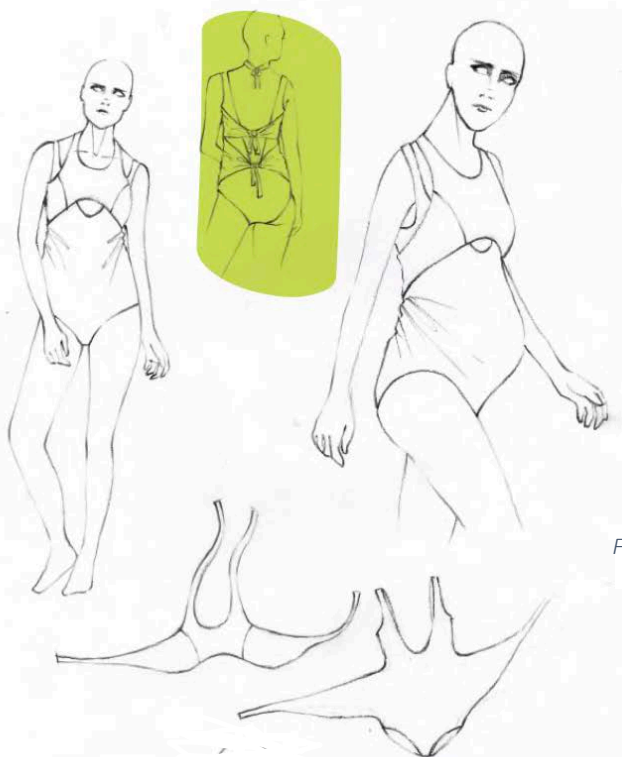


Figure 101 Result of second round of sketching moved to prototyping



Figure 100 This idea was further explored in the second round of sketching using the same concept used in the sports bra

The leggings, swimsuit and bra were intended for fully fashioned knit and were prioritized over the other styles. After these three styles were fully prototyped and tech packs were created did the designer move on to sketching into the final styles. Again, the initial step was to get lots of ideas down on paper. The cycling shorts and cycling top will probably go through a few more revisions as they enter the prototyping phase in mid March. The early concept for the cycling short is a bib style which would eliminate the need for a waistband that would be

constricting and also present fit issues. The straps of the bib will also be able to offer support as they can help to hoist up the belly, take strain off the lower back and help distribute weight.

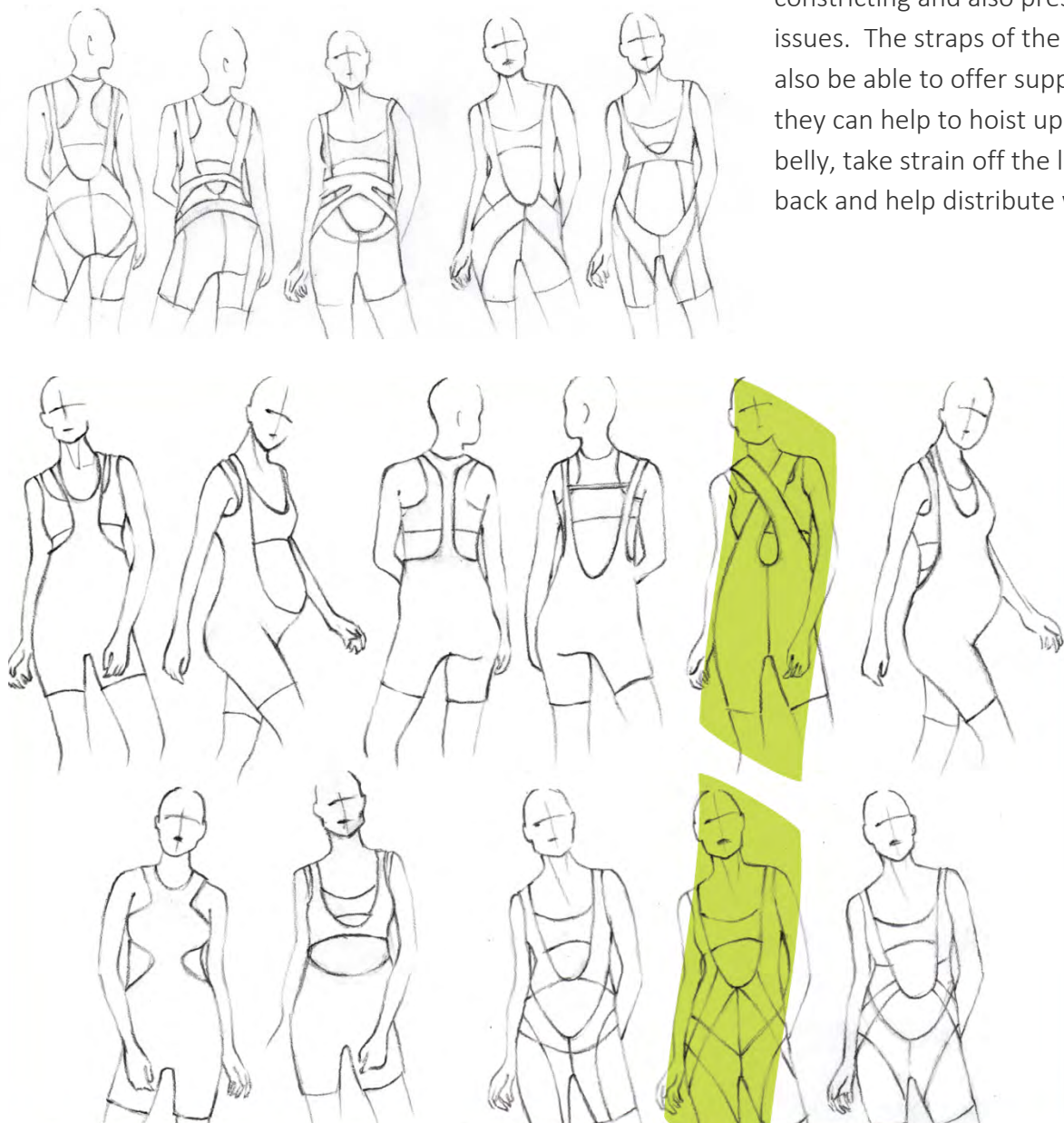


Figure 102 First round of sketching for the cycling shorts featuring a bib style

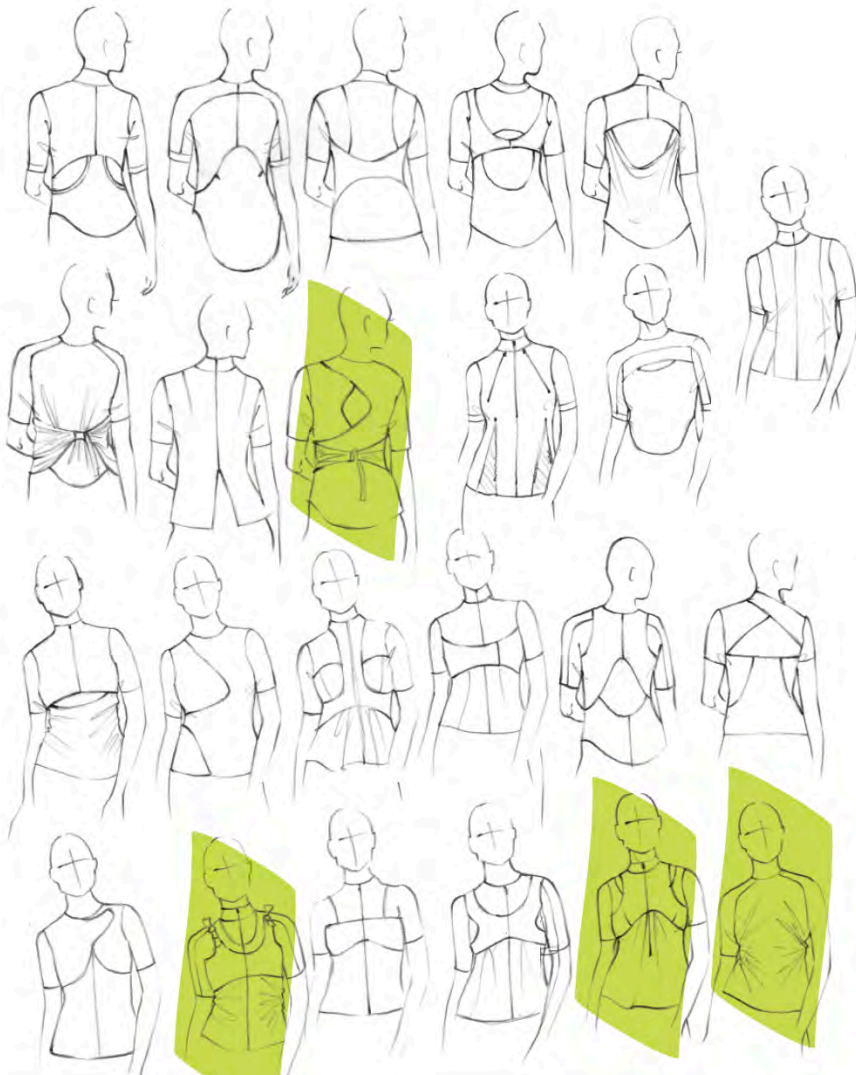


Figure 103 Sketches of the cycling top incorporating design elements from the bra and swimsuit

The initiative around the cycling top was to make sure the style incorporated elements from other styles in the collection in particular the bra and swimsuit and also included a nursing option. The challenge of this piece is that it needs to work back to the cycling shorts as well as separately and be able to transition into the athlete's regular rotation of cycling attire.

The jacket would be a higher priced item, so it was crucial that it transition from pregnancy to post-partum and beyond as an investment

piece. Not only would the jacket need to adapt to the athlete's body changes it should also be much more versatile than the other pieces especially as many women do not purchase an outerwear item during pregnancy. It would be ideal if this jacket could also be more high fashion in silhouette so that it could be worn outside of athletic activities paired with jeans or over regular everyday attire.

Features of the jacket that will add to its value is functionality. Many of the pregnant athletes actually avoided exercising outdoors or in inclement weather during the fall and winter because they didn't have any appropriate clothing that would keep them warm or dry but still remain breathable and prevent moisture buildup against the skin. Gortex kindly donated fabric for the student's capstone. The water repellant fabric called *ShakeDry* was engineered specifically for running in rain as it's light weight, wind proof and water can't penetrate the top layer while the Gortex membrane allows for water vapor to escape. The design for the jacket features a double

layer, the bottom layer a vest style with a top layer that incorporates the sleeves and storm flap. This would allow coverage from the elements but also keep the garment light and airy allowing for air circulation.

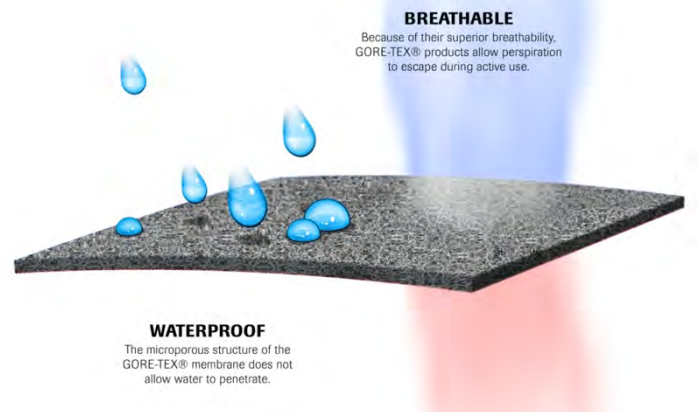


Figure 104 How the Gortex membrane works from Gore, T. (n.d.). The GORE-TEX Membrane: What it is, how it works and why you need it. Retrieved March 15, 2020, from <https://www.gore-tex.com/blog/the-gore-tex-membrane-what-it-is-how-it-works-and-why-you-need-it>

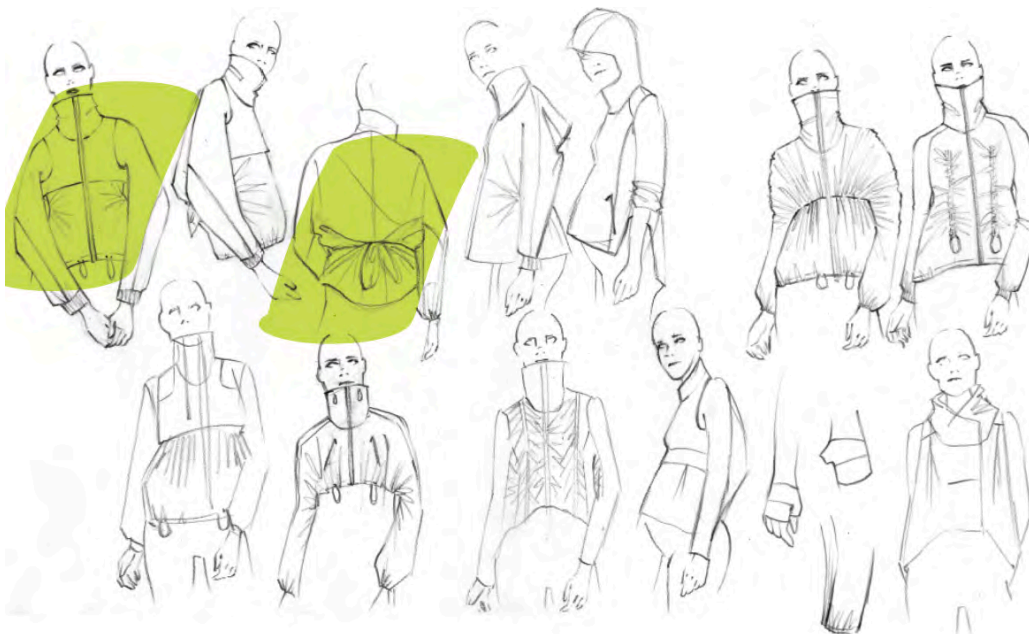


Figure 105 Sketches for the jacket featuring design elements appropriate for inclement weather

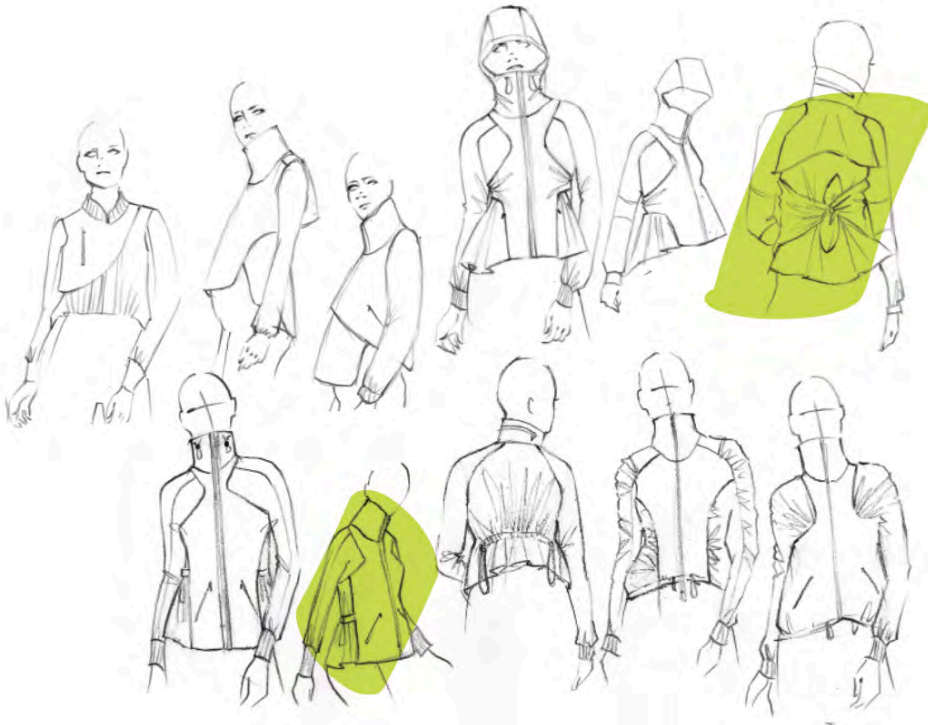


Figure 106 More jacket sketches including a version of the one proceeding into prototyping

UPDATE 6/5/2020:

The student designer had seven items planned to complete by the end of May. The one piece that was eliminated was the recovery pant. After discussion with the professor it was deemed unnecessary and the project would be better served by focusing on refining the pieces already completed and strengthening the brand messaging. Also, the project will only be presented digitally due to the pandemic and the pieces were thus more itemized rather than in "looks". The looks or separate outfits were created in anticipation of a thesis show at the school where the student was intending to show four mannequins and it would have been undesirable to have any that were not fully dressed.

PROTOTYPING:

The wrap pants (figure 90) was a particularly interesting idea and the designer decided to do a more detailed sketch and move to prototyping for this style first. If this design was able to accommodate the growing belly bump as well as flatter the non-pregnant body it might inform the other styles. It would also be a unique detail that could be carried across styles to connect the group. Below are process photos of developing the leggings style.

The first step was to build a base garment to start from and then use that to draft a first pattern. Grown on straps were added by marking style lines on the dress form and draping over them to connect the straps to the base garment. Then the sides were opened to increase the waist and belly area to accommodate the baby bump.

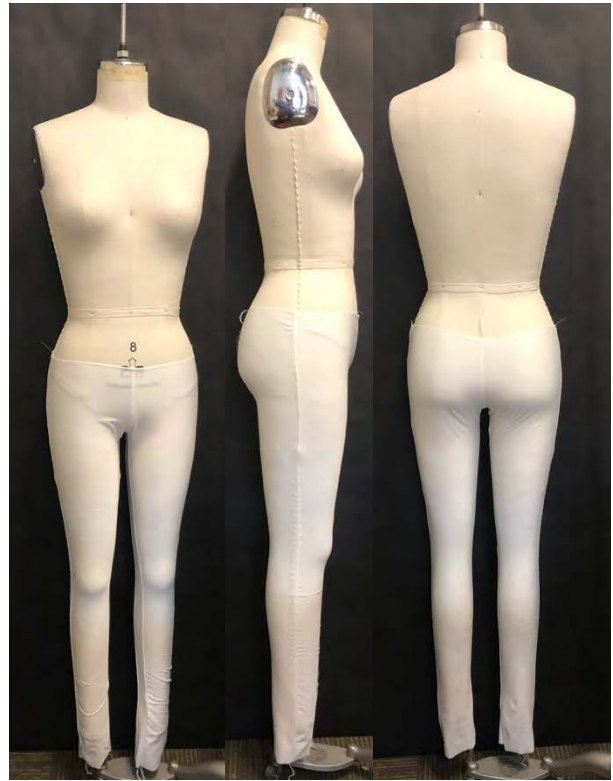


Figure 107 Base garment drape on dress form



Figure 108 Mark style lines on dress form



Figure 109 Draping by following the guidelines marked on the dress form



Figure 110 Opening the side of the garment to add the tie detail

The drape was removed from the dress form and transferred to pattern paper. Lines were cleaned up and seams were walked and a new prototype was cut and sewn resulting in the garment below. Front, side, back of the garment is shown both on a regular size 8 mannequin and the same mannequin wearing a maternity attachment pillow.



Figure 111 The attachment used on dressform from Maternity Attachment Belly pillow for female form. (n.d.). Retrieved March 15, 2020, from https://www.zingdisplay.com/product-p/DJFAC8R.htm?dfw_tracker=7943-DJFAC8R&qclid=EAlaIqobChMI85qe0J2d6AIVZyCtBh293wAfEAQYAIBEGKSA_D_BwE



Figure 112 First proto of wrap leggings shown on pregnant and regular dress forms

The original intent for the swimsuit was to try to make a one piece suit, however after a few prototypes which failed to fit properly on the pregnant dress form the designer decided to revise the design to a two piece but by incorporating drawstring straps that attached the bottom piece with the top piece the garment looked and felt like a one piece. The drawstring channel at the bottom allowed the fabric to increase and decrease over the belly where the excess fabric is needed without pulling down or affecting how the top piece fit.



Figure 113 One-piece proto that doesn't fit properly, not enough coverage on the pregnant dress form



Figure 114 Tw-piece revised design that uses straps to connect top and bottom (top not shown)



Figure 115 bra style lines marked on dress form and muslin

The process of making the bra prototype is shown above. This style did not start from a base garment and was draped from scratch. The first step was to mark the style lines on the dress form followed by draping over the lines onto fabric and then transferring these pieces to paper.



Figure 116 First pattern cut in fabric with pinned alterations for fit

FINAL PROTOS:

All the first prototypes were made quickly to test proof of concept: Did these styles work on a pregnant as well as non-pregnant body. A second round of pattern correcting was required to adjust fit and clean up style lines. Once this was completed the designer cut and sewed final prototypes which were fully finished with trims and working fasteners. These garments were not only made for a more compelling presentation at the end of the semester but also represented a more believable product that could be photographed and shown to athletes for feedback and more importantly could be fit on a real pregnant body that could interact and move in them.



Figure 117 Final Prototype of Wrap Leggings on a pregnant and non-pregnant size 8 dress form



Figure 118 Final Prototype of Wrap Swimsuit on a pregnant and non-pregnant size 8 dress form



Figure 119 Final Prototype of Nursing Bra

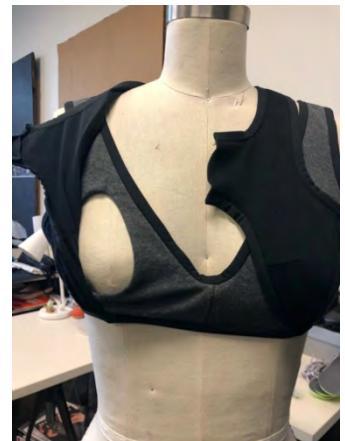


Figure 120 Nursing Bra shown open

WORK IN PROGRESS:

After prioritizing completion of the fully-fashioned knit styles, the designer started work on the jacket anticipating this style was probably the most technically challenging and would require the most manufacturing time entering the spring semester. Preferring to work out ideas on paper first the following sketch was produced as a starting point. This sketch might need to be modified as the prototype is further refined.

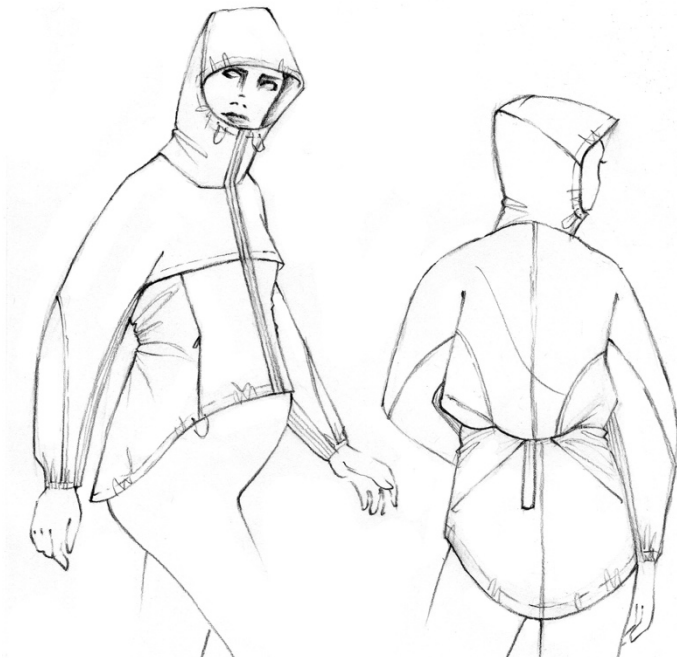


Figure 121 Final Drawing for Jacket Style

This style started on the draft table with patternmaking using the designer's cycling jacket pattern from her first year soft goods class as a starting block. The design needed to be opened up significantly through the waist and hip and the shoulders and across back which were designed extra roomy for comfort and mobility when the wearer is on a bike were reduced. A unique aspect of this proposed style is that the top and bottom of the garment are separate, only connected at the shoulder seams and center front zipper. The top garment gives coverage during inclement weather and the bottom layer while

allowing for ventilation across the back and underarms insulates the torso for colder temperatures.



Figure 122 Half Drape of Jacket Style

FINAL SKETCHES:

At the end of the semester these were the final sketches for the 7 intended styles for the collection: fully fashioned knit leggings, swimsuit and sports bra, a woven running jacket, cycling shorts with cycling top and recovery postpartum pants.

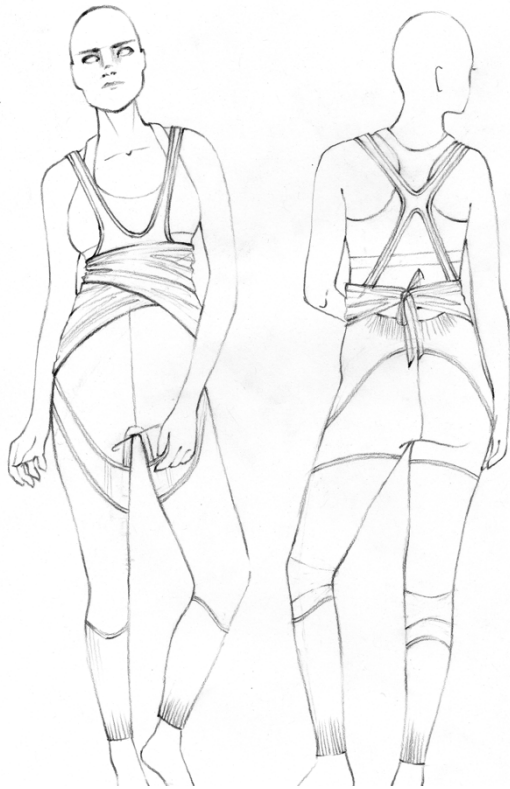


Figure 123 Fully Fashioned Knit Wrap Leggings

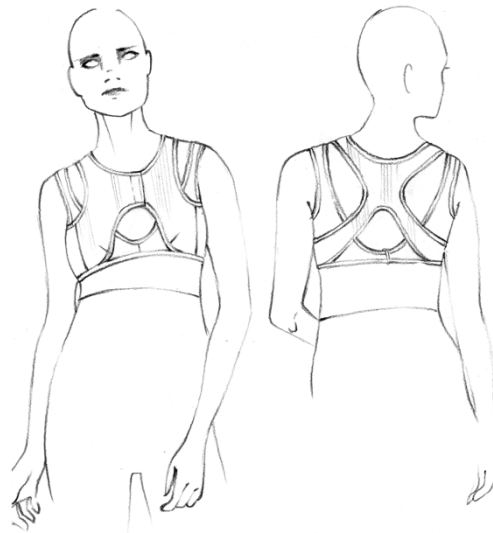


Figure 124 Fully Fashioned Knit Sports Nursing Bra

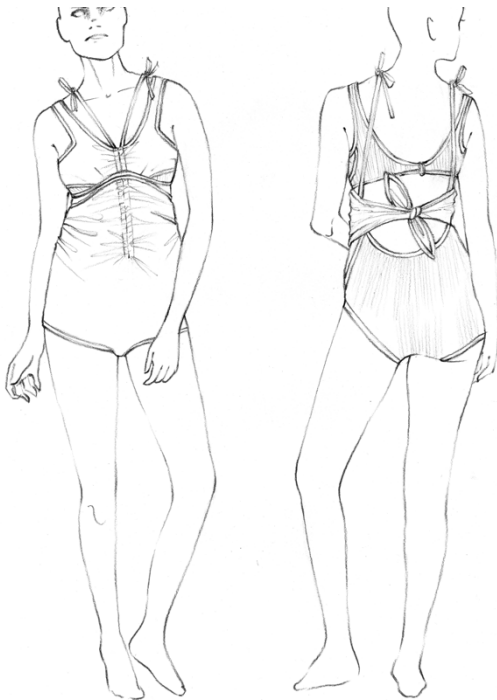


Figure 125 Fully Fashioned Knit Swimsuit

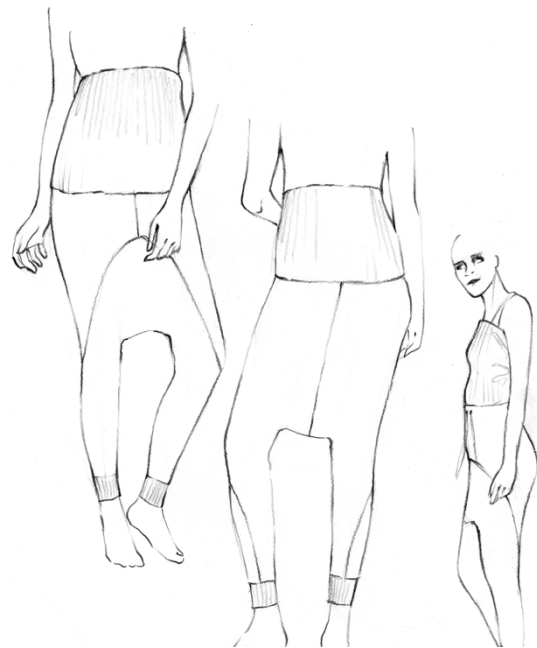


Figure 126 Cut & Sew Recovery Postpartum Pants
*CANCELLED

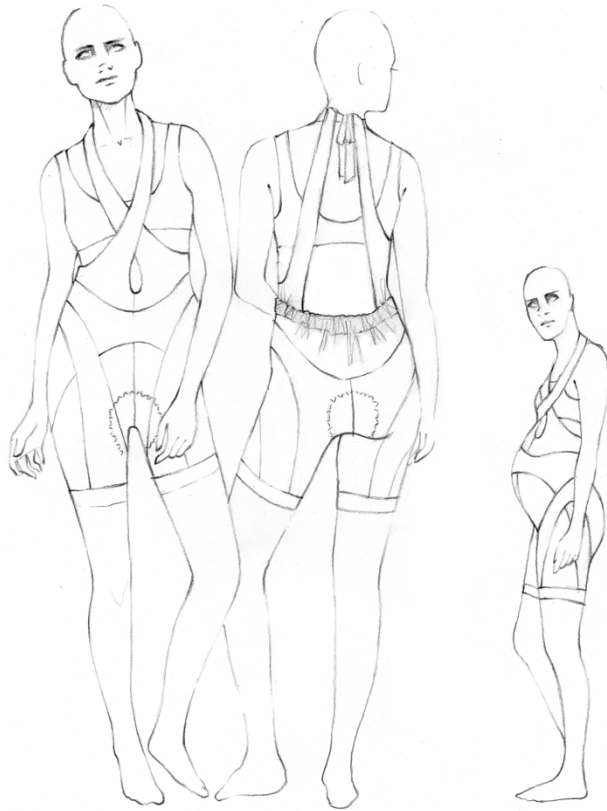


Figure 127 Cycling Bibs

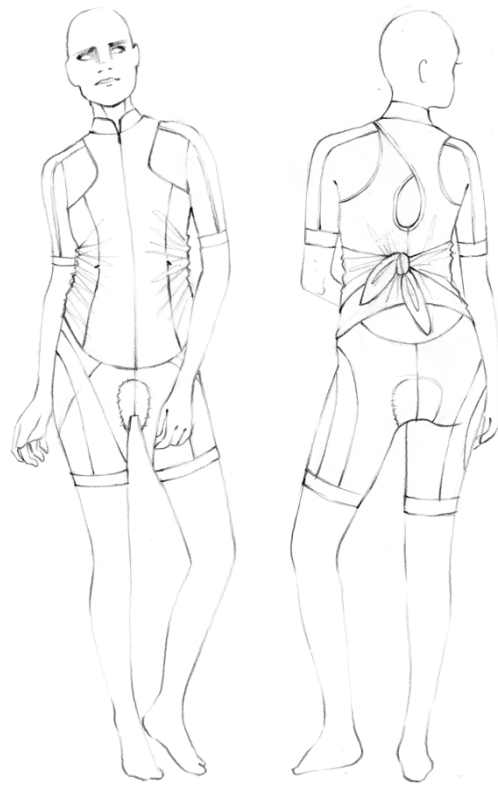
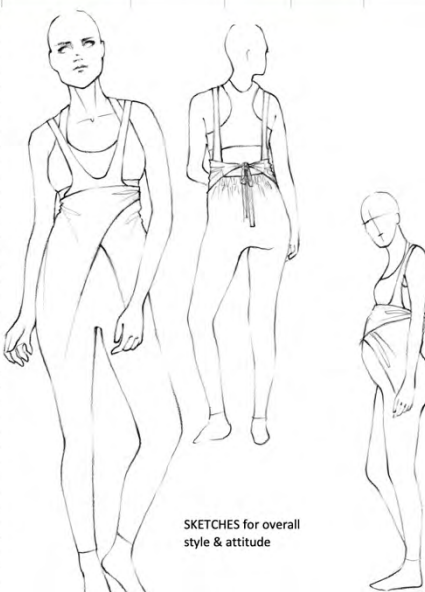




Figure 128 Cycling Top

TECH PACKS:

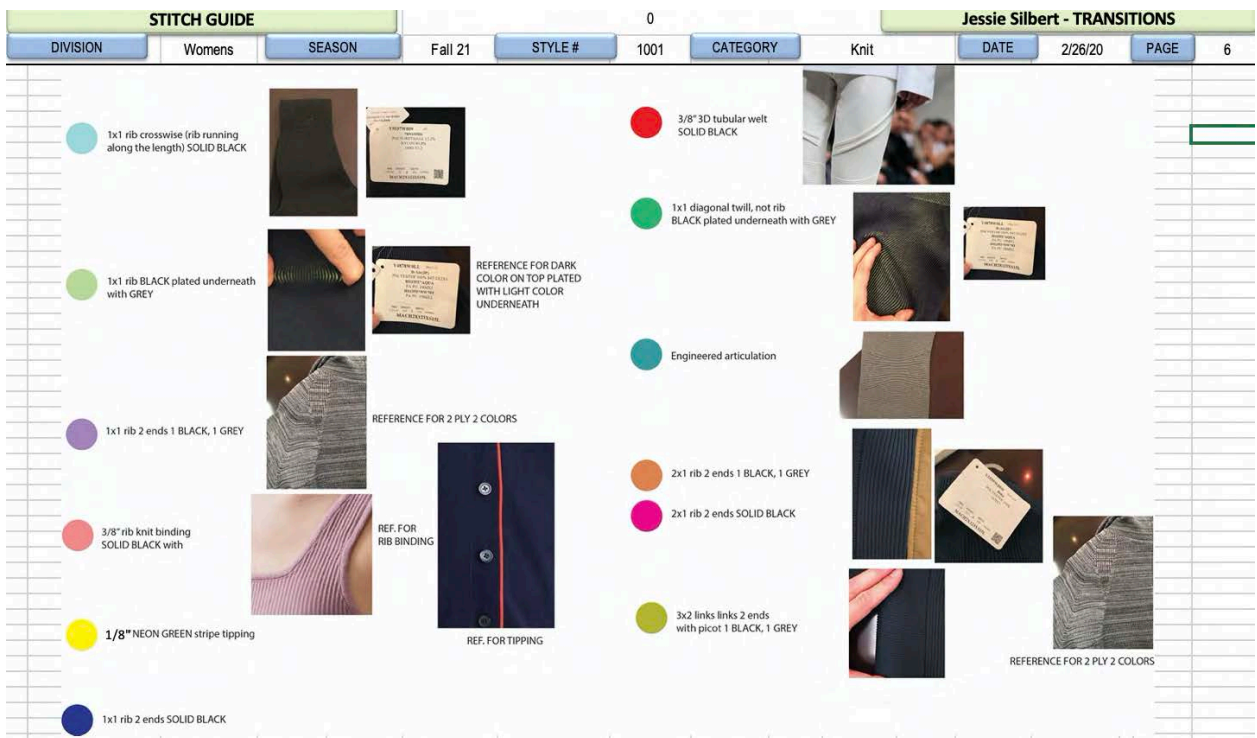
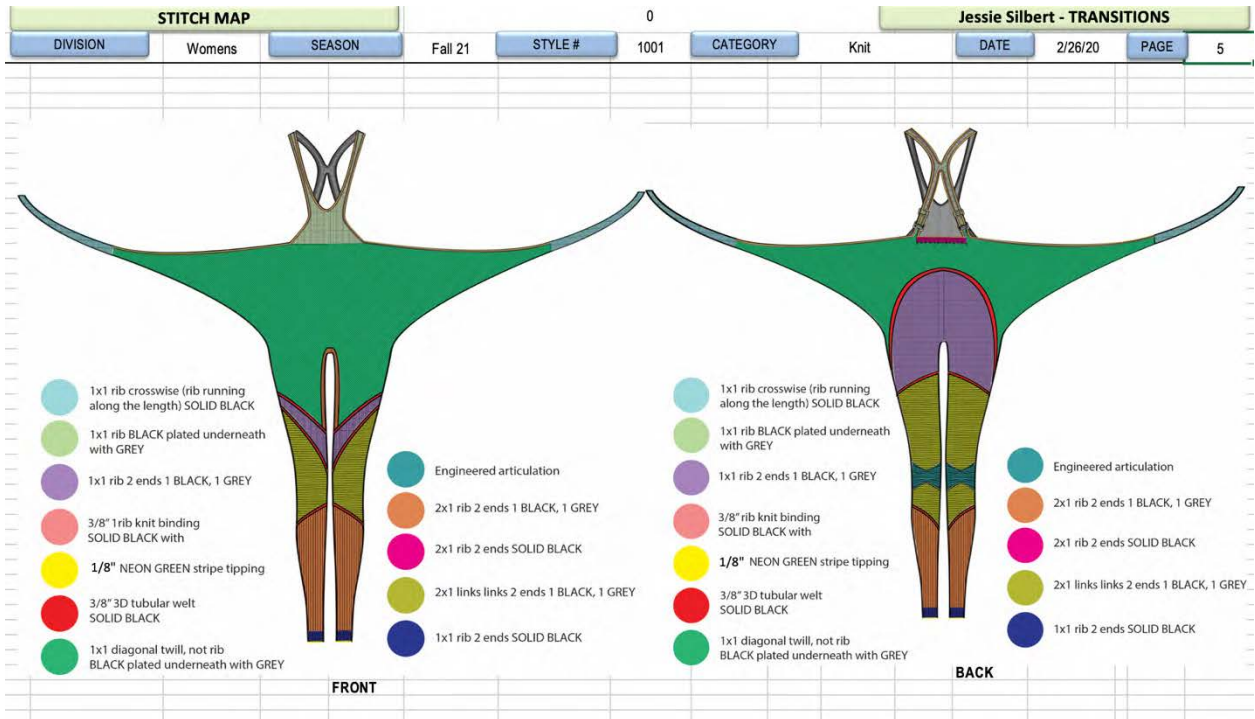
For the fully-fashioned styles tech packs were sent to the factory in LA as well as complete, final copies of each pattern. As much detail was enclosed as possible as a "blue sky" scenario. It is understood that these styles might need to be modified based on factory capabilities as well as budget limitations. The designer plans to work with the factory to achieve the best product possible and will address these issues as they present themselves. If possible, mock-ups will be requested for key areas of each garment such as the bra cup or chest band. The factory will start doing knit trials as soon as the yarn arrives which should be towards the end of March.

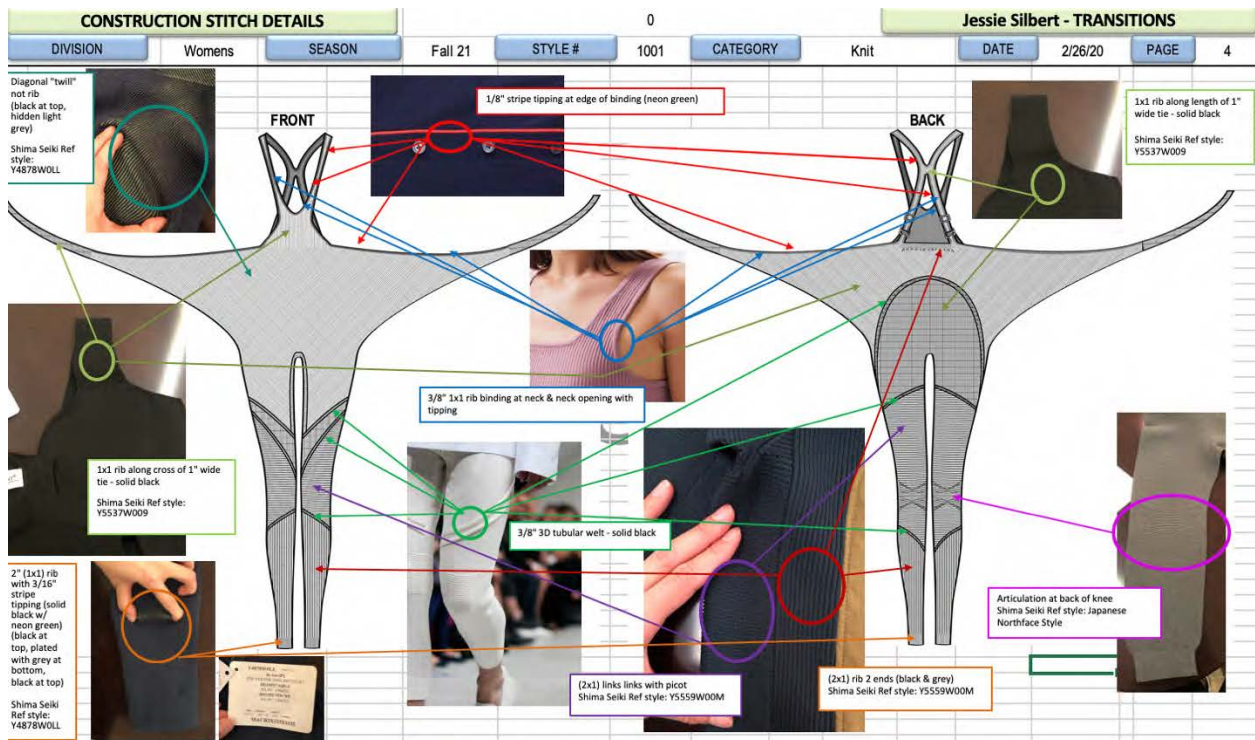
Pages from Tech Packs Following:

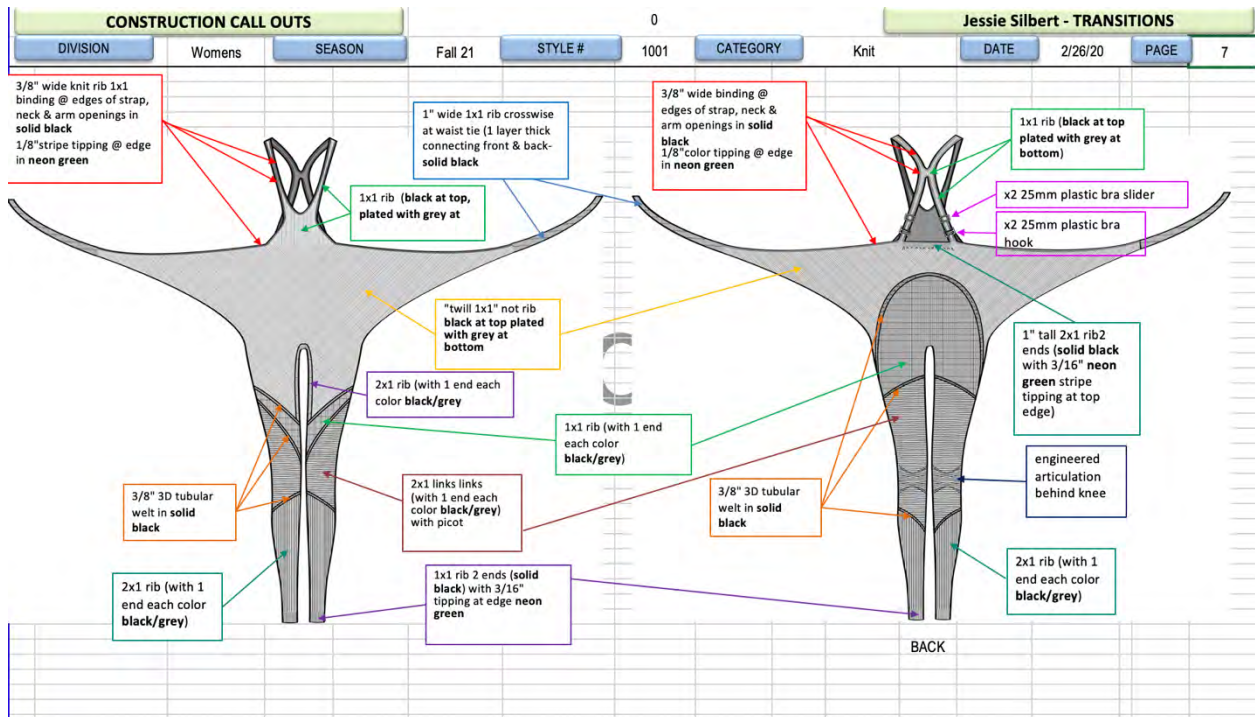
| 0 | | | | Jessie Silbert - TRANSITIONS | | | | | | | |
|--|--------|--------|---------|--|------|----------|------|---|---------|------|---|
| DIVISION | Womens | SEASON | Fall 21 | STYLE # | 1001 | CATEGORY | KNIT | DATE | 2/26/20 | PAGE | 1 |
|  <p>SKETCHES for overall style & attitude</p> | | | | <p>age 1</p> <p>STYLE FOR DEVELOPMENT</p> <ul style="list-style-type: none"> - Using Shima Seiki Whole Garment Machine - 18gg - This is a structured garment, please advise if garment can be plated with lycra for stability <p>ARTICLE INFORMATION:</p> <p>Mill: NIKKE</p> <p>Art: AXIO</p> <p>Yarn Count: 2/60</p> <p>Content: 79% wool, 21% nylon</p> | | | |  | | | |

| TRIMS & CONSTRUCTION DETAIL | | | | Jessie Silbert - TRANSITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---------|-----------------|------------|---|---------|----------|------|------|---------|------|---|--|--|--|--|--|--|-----------|-----|-----------------|------------|-----|-------------------|--|--|--|--|------------|--|--|--|--|-----------|--|--|--|--|---------------------|--|--|--|--|
| DIVISION | Womens | SEASON | Fall 21 | STYLE # | 1001 | CATEGORY | Knit | DATE | 2/26/20 | PAGE | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>SIZE RANGE: SAMPLE SIZE - WOMENS 8</p> <p>CONTENT: WHOLE GARMENT - SHIMA SEIKI</p> <p>CONSTRUCTION FINISH: WHOLE GARMENT - SHIMA SEIKI</p> <p>NECK & ARMHOLE: 3/8" knit rib binding with 1/8" neon green tipping</p> <p>LEGS: 3/8" 3D tubular (see reference image on separate page)</p> <p>LEG OPENING: 2" tall rib (3x2) with 3/16" neon green tipping</p> <p>WAIST TIES: 1" rib along length (1x1)</p> <p>CONSTRUCTION & STYLE NOTES</p> <p>Shima Seiki Wholegarment</p> <p>Sending reference sample for overall silhouette</p> <p>Overall garment should be knit with elastic for more structure</p> | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>LABEL #1: N/A</p> <p>LABEL #2: N/A</p> <p>LABEL PLACEMENT: N/A</p> <p>HANG TAG: N/A</p> <p>CARE INSTRUCTIONS</p> <p>PACKAGING INFO: N/A</p> <p>POLYBAG: N/A</p> <p>CARTON SIZE: N/A</p> <p>CARTON MARKINGS: N/A</p> <p>REVISION LOG</p> <table border="1"> <thead> <tr> <th>date:</th> <th>changes</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table> | | | | date: | changes | | | | | | | | | <p>ISO STITCHING INFORMATION</p> <table border="1"> <thead> <tr> <th>Operation</th> <th>ISO</th> <th>ISO Description</th> <th>Bite/Width</th> <th>SPI</th> </tr> </thead> <tbody> <tr> <td>Joining Operation</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Sleeve Hem</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Sweep Hem</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Join Neck Treatment</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | | | Operation | ISO | ISO Description | Bite/Width | SPI | Joining Operation | | | | | Sleeve Hem | | | | | Sweep Hem | | | | | Join Neck Treatment | | | | |
| date: | changes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operation | ISO | ISO Description | Bite/Width | SPI | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Joining Operation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sleeve Hem | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sweep Hem | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Join Neck Treatment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>SEE SEPARATE PAGE FOR REFERENCE</p> | | | | <p>COLOR REFERENCE</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

$$Z$$
90







BLACK/GREY

0

Jessie Silbert - TRANSITIONS

DIVISION: Womens SEASON: Fall 21 STYLE #: 1001 CATEGORY: Knit DATE: 2/26/20 PAGE: 9

BLACK/GREY/NEON GREEN

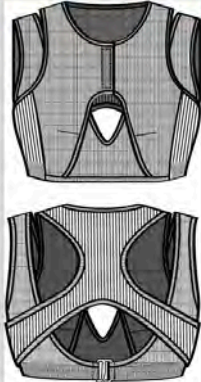
| Colors | | | | | | |
|---------------------------|--|---------|------------------|--------|---------|--------------|
| Trim Name | Description/Material | Picture | Color | Mill | Article | Color # |
| SLIDER | 25mm Bra Slider | | Black | Botoni | | |
| HOOK | 25mm Bra Hook | | Black | Botoni | | |
| 1/8" 1x1 KNIT RIB BINDING | Black with 1/8" neon green stripe tipping | | Black/Neon Green | Nikke | Axo | 99Nero/AX006 |
| 2" RIB (1x1) | Black with 3/16" neon green stripe tipping | | Black/Neon Green | Nikke | Axo | 99Nero/AX006 |
| 1" RIB (1x1) | Black | | Black | Nikke | Axo | 99Nero |
| 3/8" 3D Tubular Welt | Black | | Black | Nikke | Axo | 99Nero |

Application: adjustable at strap, connects front strap with back, arm & neck opening, leg opening, waist ties, 3/8" style lines on legs.

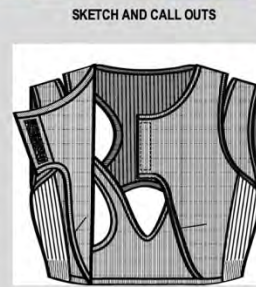
IMAGE ABOVE FOR TECHNIQUE

2 ply yarns in different colors: black and light grey

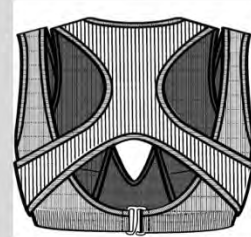
| JESSIE SILBERT - TRANSITIONS | | | | | | | | | | | |
|---|--------|--------|-----------|--|------|----------|------|---|--------|------|---|
| DIVISION | Womens | SEASON | Spring 22 | STYLE # | 1002 | CATEGORY | KNIT | DATE | 3/3/20 | PAGE | 1 |
|  | | | | <p>age 1</p> <p>STYLE FOR DEVELOPMENT</p> <ul style="list-style-type: none"> - Using Shima Seiki Whole Garment Machine - 18gg - This is a structured garment, please advise if garment can be plated with lycra for stability <p>ARTICLE INFORMATION:</p> <p>Mill: NIKKE</p> <p>Art: AXIO</p> <p>Yarn Count: 2/60</p> <p>Content: 79% wool, 21% nylon</p> | | | |  | | | |
| <p>SKETCHES for overall style & attitude</p> | | | | | | | | | | | |

| JESSIE SILBERT - TRANSITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------|-----------------|--------------|---|------|----------|------|------|--------|------|---|-----------|-----|-----------------|--------------|-----|-------------------|--|--|--|--|------------|--|--|--|--|-----------|--|--|--|--|---------------------|--|--|--|--|
| DIVISION | Womens | SEASON | Spring 22 | STYLE # | 1002 | CATEGORY | Knit | DATE | 3/3/20 | PAGE | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>TRIMS & CONSTRUCTION DETAIL</p> <p>SIZE RANGE SAMPLE SIZE - WOMEN'S S</p> <p>SAMPLE SIZE</p> <p>CONTENT</p> <p>CONSTRUCTION FINISH</p> <p>FABRIC INFORMATION</p> <p>WHOLE GARMENT - SHIMA SEIKI</p> <p>TRIMS INFORMATION</p> <p>BTM NECK & ARMHOLE 3/8" knit rib binding with 1/8" acid green tipping</p> <p>TOP AH NECK KEYHOLES 3/8" knit rib binding</p> <p>CHEST BAND 1" 1x1 rib - high tension, plate with lycra</p> <p>CB BOTTOM BRA 25mm Bra Hook</p> <p>CONSTRUCTION & STYLE NOTES</p> <p>Shima Seiki Wholegarment</p> <p>Sending reference sample for overall silhouette</p> <p>Overall garment should be knit with elastic for more structure</p> <p>LABEL #1 N/A</p> <p>LABEL #2 N/A</p> <p>LABEL PLACEMENT N/A</p> <p>HANG TAG N/A</p> <p>CARE INSTRUCTIONS</p> <p>PACKAGING INFO N/A</p> <p>POLYBAG N/A</p> <p>CARTON SIZE N/A</p> <p>CARTON MARKINGS N/A</p> <p>REVISION LOG</p> <p>date: changes</p> <p>date: changes</p> <p>date: changes</p> <p>date: changes</p> <p>SEE SEPARATE PAGE FOR REFERENCE</p> | | | | <p>Page 1</p>  <p>ISO STITCHING INFORMATION</p> <table border="1"> <thead> <tr> <th>Operation</th> <th>ISO</th> <th>ISO Description</th> <th>Stitch Width</th> <th>SPI</th> </tr> </thead> <tbody> <tr> <td>Joining Operation</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Sleeve Hem</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Sweep Hem</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Join Neck Treatment</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>COLOR REFERENCE</p> | | | | | | | | Operation | ISO | ISO Description | Stitch Width | SPI | Joining Operation | | | | | Sleeve Hem | | | | | Sweep Hem | | | | | Join Neck Treatment | | | | |
| Operation | ISO | ISO Description | Stitch Width | SPI | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Joining Operation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sleeve Hem | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sweep Hem | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Join Neck Treatment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Point of Measure & Grading Sheet | | | | | | | | | |
|--|---|--------|-----------|---------------|------|----------|------|------|---------|
| 0 | | | | | | | | | |
| Jessie Silbert - TRANSITIONS | | | | | | | | | |
| DIVISION | Womens | SEASON | Spring 22 | STYLE # | 1002 | CATEGORY | Knit | DATE | 3/3/20 |
| | | | | | | | | PAGE | 2 |
| All measurements are in inches | | | | | | | | | |
| # | POINT OF MEASURE | XS | S | M (base size) | L | XL | 2XL | 3XL | TOL +/- |
| 1 | Center Front - top layer | | | 2 3/4" | | | | | 1/2 |
| 2 | Center Front - bottom layer | | | 1 3/4" | | | | | 1/2 |
| 3 | Center Back - top layer | | | 4 3/4" | | | | | 1/2 |
| 4 | Center Back - bottom layer | | | 1" | | | | | 1/8 |
| 5 | Bottom opening (Flat) | | | 14 1/2" | | | | | 1/4 |
| 6 | Bust (Flat) - 1" below armhole | | | 16" | | | | | 1/4 |
| 7 | Strap width at shoulder - top layer | | | 1 1/4" | | | | | 1/4 |
| 8 | Strap width at shoulder - bottom layer | | | 1" | | | | | 1/4 |
| 9 | Chest band height | | | 1" | | | | | 1/4 |
| 10 | Neck width - top layer | | | 5 3/4" | | | | | 1/4 |
| 11 | Neck width - bottom layer | | | 11" | | | | | 1/2 |
| 12 | Front neck drop - top layer | | | 3 3/4" | | | | | 1/4 |
| 13 | Front neck drop - bottom layer | | | 8 1/2" | | | | | 1/8 |
| 14 | Back neck drop - top layer | | | 2 1/4" | | | | | 1/8 |
| 15 | Back neck drop - bottom layer | | | 9 1/2" | | | | | 1/8 |
| 16 | Across chest - top layer (5" down from HPS) | | | 12 3/4" | | | | | 1/4 |
| 17 | Across chest - bottom layer | | | 2" | | | | | 1/4 |
| 18 | Opening at bottom cup height | | | 3" | | | | | 1/8 |
| 19 | Opening at bottom cup width | | | 2 1/2" | | | | | |
| 20 | Across back - top layer (3" down @ CB) | | | 13" | | | | | |
| 21 | Across back - bottom layer (5" down from HPS) | | | 25 1/2" | | | | | |
| 22 | Armhole Circumference - top layer | | | 16 3/4" | | | | | |
| 23 | Armhole Circumference - bottom layer | | | 7 1/4" | | | | | |
| 24 | Opening at cup circumference | | | | | | | | |
| ** Vendor to grade | | | | | | | | | |
| * measurements are garment specific and will not be found in the "how to measure" manual | | | | | | | | | |













FRONT

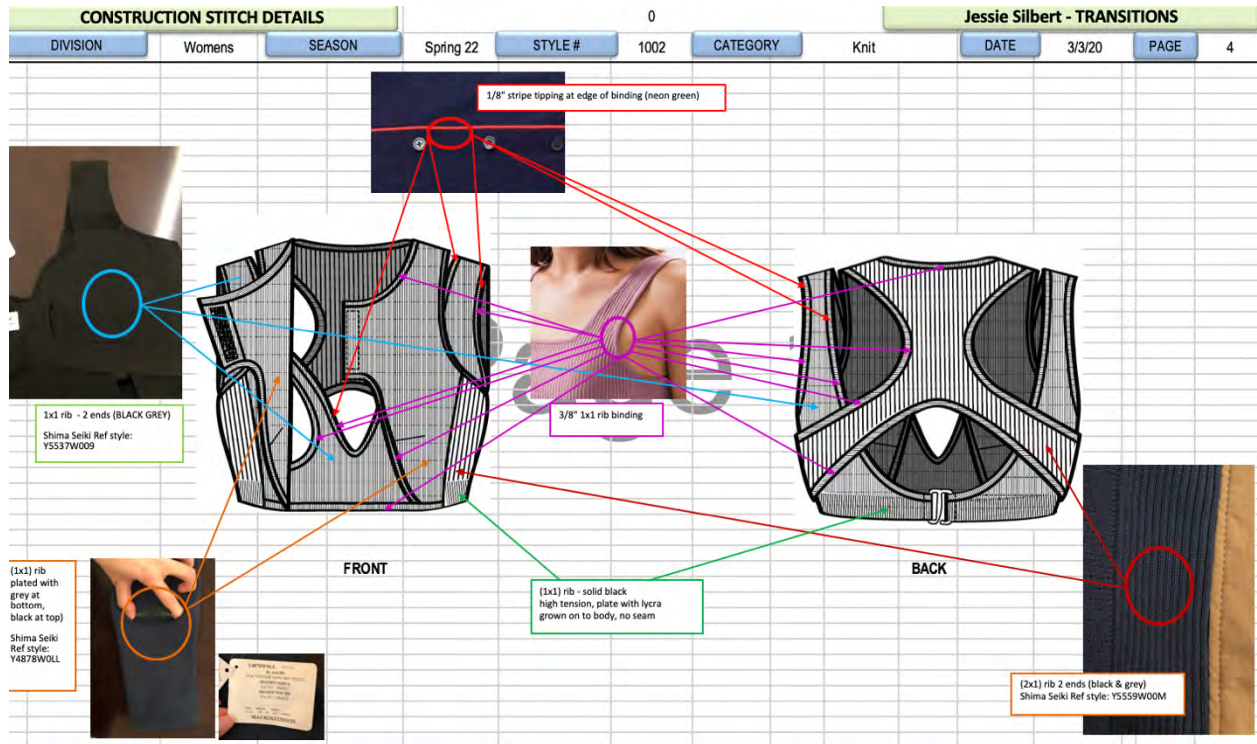


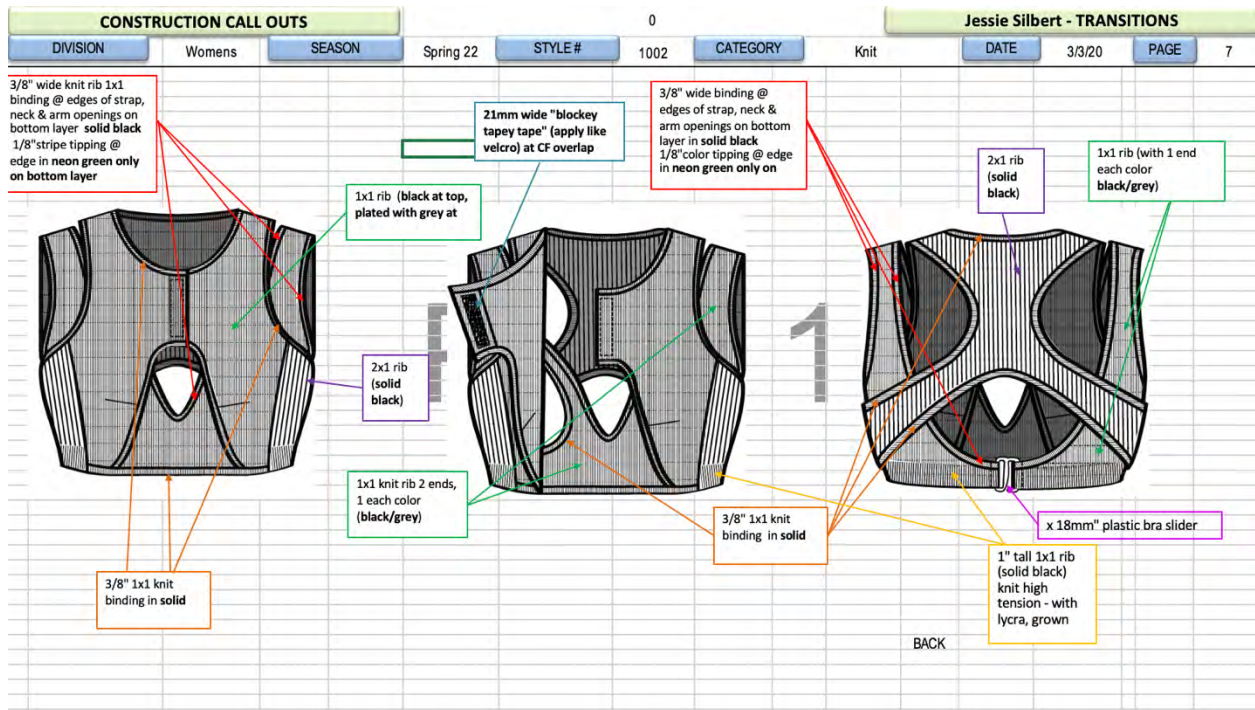
BACK

| MEASUREMENTS | | | | | | | | | |
|------------------------------|--------|--------|-----------|---------|------|----------|------|------|--------|
| 0 | | | | | | | | | |
| Jessie Silbert - TRANSITIONS | | | | | | | | | |
| DIVISION | Womens | SEASON | Spring 22 | STYLE # | 1002 | CATEGORY | Knit | DATE | 3/3/20 |
| | | | | | | | | PAGE | 3 |
| <p>FRONT</p> | | | | | | | | | |
| <p>FRONT OPEN</p> | | | | | | | | | |
| <p>BACK</p> | | | | | | | | | |

| STITCH MAP | | | | 0 | | | | Jessie Silbert - TRANSITIONS | | | |
|---|--------|--------|-----------|---------|------|--|------|------------------------------|--------|------|---|
| DIVISION | Womens | SEASON | Spring 22 | STYLE # | 1002 | CATEGORY | Knit | DATE | 3/3/20 | PAGE | 5 |
|  | | | | | |  | | | | | |
| FRONT | | | | | | BACK | | | | | |
| <ul style="list-style-type: none"> 1x1 rib BLACK plated underneath with GREY 1x1 rib 2 ends 1 BLACK, 1 GREY 3/8" 1x1 rib knit binding SOLID BLACK with 1/8" NEON GREEN stripe tipping | | | | | | <ul style="list-style-type: none"> 2x1 rib 2 ends SOLID BLACK 2x1 rib 2 ends SOLID BLACK | | | | | |

| STITCH GUIDE | | | | 0 | | | | Jessie Silbert - TRANSITIONS | | | |
|---|--------|--------|-----------|---------|------|----------|------|------------------------------|--------|------|---|
| DIVISION | Womens | SEASON | Spring 22 | STYLE # | 1002 | CATEGORY | Knit | DATE | 3/3/20 | PAGE | 6 |
| <ul style="list-style-type: none"> 1x1 rib BLACK plated underneath with GREY 1x1 rib 2 ends 1 BLACK, 1 GREY 3/8" rib knit binding SOLID BLACK with 1/8" NEON GREEN stripe tipping 1x1 rib 2 ends SOLID BLACK | | | | | | | | | | | |
|           | | | | | | | | | | | |





BLACK/GREY

DIVISION: Womens SEASON: Spring 22 STYLE #: 1002 CATEGORY: Knit DATE: 3/3/20 PAGE: 9

0

Jessie Silbert - TRANSITIONS

BLACK/GREY/NEON GREEN

| Colors | | | | | | | |
|-------------------------|---|-----------|------------------|--------|-------------------|--------------|--|
| Trim Name | Description/Material | Picture | Color | Mill | Article | Color # | Application |
| HOOK | 25mm Bra Hook | | Black | Botoni | | | at CB - bottom layer |
| 8" 1x1 KNIT RIB BINDING | Black no tipping | | Black | Nikke | Axio | 99Nero | at neck, armhole, front & back keyhole |
| 8" 1x1 KNIT RIB BINDING | Black with 1/8" neon green stripe tipping | | Black/Neon Green | Nikke | Axio | 99Nero/AX006 | at armhole & neckline - bottom layer |
| 1" RIB (1x1) | Black | | Black | Nikke | Axio | 99Nero | barish chest band |
| 11mm BlockyTapey Tape | Black | see below | Black | Monito | Type 3 108LK-IR21 | Black | at CF - top layer |

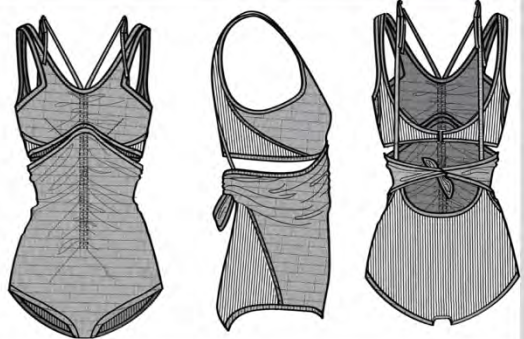
Page 1



REF: Blocky Tapey Tape

IMAGE ABOVE FOR TECHNIQUE:

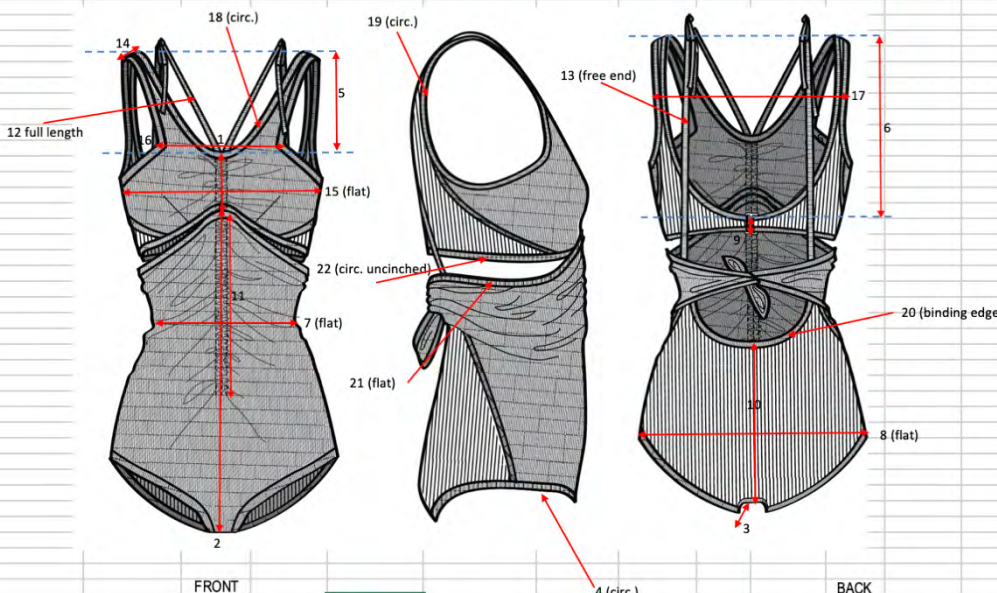
2 ply yarns in different colors: black and light grey

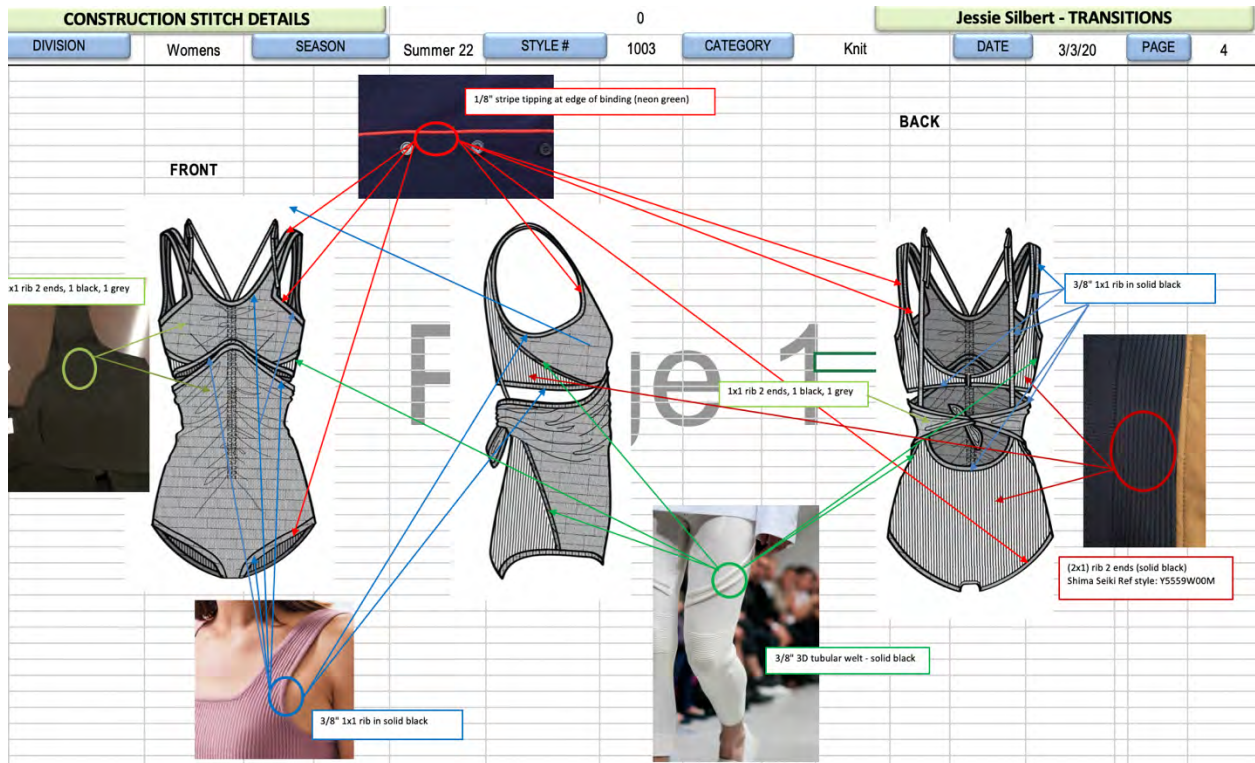
| DIVISION | | Womens | | SEASON | | Summer 22 | | STYLE # | | 1003 | | CATEGORY | | KNIT | | DATE | | 3/3/20 | | PAGE | | 1 | |
|---|--|--------|--|--------|--|-----------|--|---------|--|------|--|----------|--|------|--|------|--|--------|--|------|--|---|--|
| <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>SKETCHES for overall style & attitude</p> </div> <div style="text-align: center;">  </div> <div style="border: 1px solid black; padding: 5px;"> <p>STYLE FOR DEVELOPMENT</p> <ul style="list-style-type: none"> - Using Shima Seiki Whole Garment Machine - 18gg - This is a structured garment, please advise if garment can be plated with lycra for stability <p>ARTICLE INFORMATION:</p> <p>Mill: NIKKE</p> <p>Art: AXIO</p> <p>Yarn Count: 2/60</p> <p>Content: 79% wool, 21% nylon</p> </div> </div> | | | | | | | | | | | | | | | | | | | | | | | |

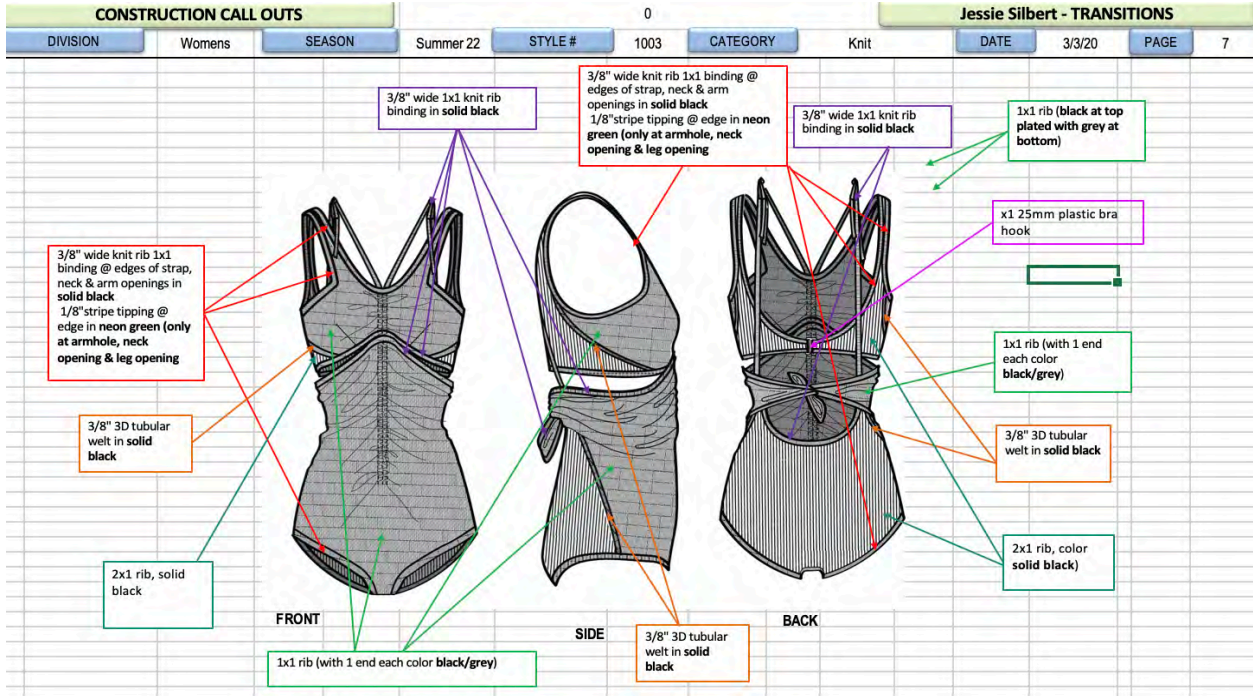
| TRIMS & CONSTRUCTION DETAIL | | | | Jessie Silbert - TRANSITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---------|-----------------|------------|------------------------------|--|-----------|--|---------|--|------|--|---|--|------|--|------|--|--------|--|------|--|---|--|-----------|---------|-----------------|------------|-----|-------------------|--|--|--|--|------------|--|--|--|--|-----------|--|--|--|--|---------------------|--|--|--|--|
| DIVISION | | Womens | | SEASON | | Summer 22 | | STYLE # | | 1003 | | CATEGORY | | Knit | | DATE | | 3/3/20 | | PAGE | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex;"> <div style="flex: 1;"> <p>SIZE INFORMATION</p> <p>SIZE RANGE: SAMPLE SIZE - WOMEN'S 8</p> <p>SAMPLE SIZE:</p> <p>FABRIC INFORMATION</p> <p>CONTENT: WHOLE GARMENT - SHIMA SEIKI</p> <p>CONSTRUCTION FINISH:</p> <p>TRIMS INFORMATION</p> <p>NECK & AH: 3/8" 1x1 knit rib binding with 1/8" acid green tipping</p> <p>LEG OPENING: 3/8" 1x1 knit rib binding with 1/8" acid green tipping</p> <p>STRAPS: 3/8" 1x1 knit rib tubular</p> <p>STYLE LINES & SS: 3/8" 3D tubular (see reference image on separate page)</p> <p>CONSTRUCTION & STYLE NOTES</p> <p>Shima Seiki Wholegarment</p> <p>Sending reference sample for overall silhouette</p> <p>Overall garment should be knit with elastic for more structure</p> <p>LABEL INFORMATION</p> <p>LABEL #1: N/A</p> <p>LABEL #2: N/A</p> <p>LABEL PLACEMENT: N/A</p> <p>HANG TAG: N/A</p> <p>CARE INSTRUCTIONS</p> <p>PACKAGING INFORMATION</p> <p>PACKAGING INFO: N/A</p> <p>POLYBAG: N/A</p> <p>CARTON SIZE: N/A</p> <p>CARTON MARKINGS: N/A</p> <p>REVISION LOG</p> <table border="1"> <thead> <tr> <th>date:</th> <th>changes</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> </div> <div style="flex: 1; text-align: center;">  </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | date: | changes | | | | | | | | | | | | | | | | | | | | | | | |
| date: | changes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | <p>ISO STITCHING INFORMATION</p> <table border="1"> <thead> <tr> <th>Operation</th> <th>ISO</th> <th>ISO Description</th> <th>Bite/Width</th> <th>SPI</th> </tr> </thead> <tbody> <tr><td>Joining Operation</td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td>Sleeve Hem</td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td>Waist Hem</td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td>Join Neck Treatment</td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> | | | | | | | | | | | | Operation | ISO | ISO Description | Bite/Width | SPI | Joining Operation | | | | | Sleeve Hem | | | | | Waist Hem | | | | | Join Neck Treatment | | | | |
| Operation | ISO | ISO Description | Bite/Width | SPI | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Joining Operation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sleeve Hem | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Waist Hem | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Join Neck Treatment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>SEE SEPARATE PAGE FOR REFERENCE</p> <p>COLOR REFERENCE</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Point of Measure & Grading Sheet | | | | 0 | | | | Jessie Silbert - TRANSITIONS | | | |
|----------------------------------|---------------------------------------|--------|-----------|---------------|------|----------|------|------------------------------|---------|---|---|
| DIVISION | Womens | SEASON | Summer 22 | STYLE # | 1003 | CATEGORY | Knit | DATE | 3/3/20 | PAGE | 2 |
| All measurements are in inches | | | | | | | | | | | |
| # | POINT OF MEASURE | XS | S | M (base size) | L | XL | 2XL | 3XL | TOL +/- | SKETCH AND CALL OUTS | |
| 1 | Center Front - top | | | 4" | | | | | 1/2 | | |
| 2 | Center Front - Bottom (uncinched) | | | 24 1/2" | | | | | 1/2 |  | |
| 3 | Crotch Seam | | | 3 1/2" | | | | | 1/2 | | |
| 4 | Leg Opening - circumference | | | 18" | | | | | 1/8 |  | |
| 5 | Front Neck Drop (Top) | | | 6" | | | | | 1/4 | | |
| 6 | Back Neck Drop (Top) | | | 12 3/4" | | | | | 1/4 | FRONT | |
| 7 | Waist (1/2 flat uncinched) | | | 15 1/2" | | | | | 1/4 | | |
| 8 | Hip (1/2 flat) | | | 15 3/4" | | | | | 1/4 | BACK | |
| 9 | CB Top | | | 1" | | | | | 1/4 | | |
| 10 | CB Bottom | | | 10 1/2" | | | | | 1/4 | | |
| 11 | Length of drawstring channel | | | 12" | | | | | 1/2 | | |
| 12 | Front spaghetti strap - full length | | | 25" | | | | | 1/4 | | |
| 13 | Back spaghetti strap - free end | | | 21" | | | | | 1/8 | | |
| 14 | Top strap width at shoulder | | | 1" | | | | | 1/8 | | |
| 15 | Bust (flat) 1" below armhole | | | 16" | | | | | 1/8 | | |
| 16 | Across chest front at narrowest point | | | 8 1/2" | | | | | 1/4 | | |
| 17 | Across back | | | 12 1/2" | | | | | 1/4 | | |
| 18 | Neck opening circumference | | | 21" | | | | | 1/4 | | |
| 19 | Armhole circumference | | | 21 1/4" | | | | | 1/4 | | |
| 20 | Back bottom opening | | | 13 1/2" | | | | | 1/8 | | |
| 21 | Top edge bottom front (Full Length) | | | 40" | | | | | | | |
| 22 | Top bottom opening (flat) | | | 14 3/4" | | | | | | | |

** Vendor to grade
* measurements are garment specific and will not be found in the "how to measure" manual

| MEASUREMENTS | | | | 0 | | | | Jessie Silbert - TRANSITIONS | | | |
|--|--------|--------|-----------|---------|------|----------|------|------------------------------|--------|------|---|
| DIVISION | Womens | SEASON | Summer 22 | STYLE # | 1003 | CATEGORY | Knit | DATE | 3/3/20 | PAGE | 3 |
|  | | | | | | | | | | | |
| FRONT | | | | | | | | | | | |
| BACK | | | | | | | | | | | |





| BLACK/GREY | | 0 | | Jessie Silbert - TRANSITIONS | |
|------------|--------|--------|-----------|------------------------------|------|
| DIVISION | Womens | SEASON | Summer 22 | STYLE # | 1003 |
| CATEGORY | Knit | DATE | 3/3/20 | PAGE | 9 |

BLACK/GREY/NEON GREEN

| Colors | | | | | | | |
|-------------------------|---|---------|------------------|--------|---------|--------------|------------------------------------|
| Trim Name | Description/Material | Picture | Color | Mill | Article | Color # | Application |
| HOOK | 25mm Bra Hook | | Black | Botoni | | Black | At CB bra closure |
| 8" 1x1 KNIT RIB BINDING | Black with 1/8" neon green stripe tipping | | Black/Neon Green | Nikke | Axio | 99Nero/AX006 | arm, neck, leg opening |
| 8" 1x1 KNIT RIB BINDING | Black no tipping | | Black | Nikke | Axio | 99Nero | Bottom & top opening edges of ties |
| 3/8" 1x1 KNIT RIB | Black | | Black | Nikke | Axio | 99Nero | Spaghetti straps |
| 3/8" 3D Tubular Welt | Black | | Black | Nikke | Axio | 99Nero | Side Seam, Top style lines |

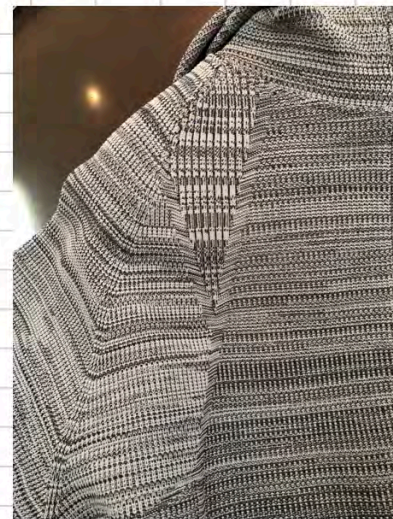


IMAGE ABOVE FOR TECHNIQUE:

2 ply yarns in different colors: black and light grey



VALIDATION PLAN - FITTING

The most important design priority to solve for with the Transitions collection is fit. The garments **MUST** fit on the pregnant body. The purpose of creating these garments is to fill a gap in the market that lacks high performing maternity apparel options for athletes as well as try to provide a more environmentally responsible product that can be worn after giving birth and won't need to be discarded. To validate the product the garments would need to be tried on a pregnant athlete.

Meet Stephanie Go, a competitive amateur athlete that is currently pregnant with her first child. At 34 years old, a triathlete, Ironman finisher and Boston marathon qualifier she is the consumer this collection would be targeting. She was contacted at 21 weeks pregnant and agreed to keep a log of her measurements, exercise regimen and apparel needs as well as take a photo each week.



Figure 130 Photos week 21-week 25



Figure 129 Stephanie competing in a triathlon before becoming pregnant

| DATE | WEEK | TRIMESTER | BUST (in inches) | Belly (in inches) | Hip (in inches) | Any training (in hours) | Any apparel needs | Any observations about fit, body changes, etc. |
|---------|----------|-----------|------------------|-------------------|-----------------|---|--|--|
| EXAMPLE | 15 | 2 | 32" | 30" | 35" | Running 3 hours (2x) Swimming 1 hour (2x) cycling 1 hour (2x) Interval 40 minutes intervals cycling 30 minutes intervals, 3 times | Sports bra Swimsuit Cycling shorts Cycling gloves Cycling shoes | Sports bra is chafing, starting to notice I could use some more support. Cycling shorts are constricting my waist. I would prefer to exercise in shorts but they don't offer enough support |
| | Baseline | 0 | 32.5" | waist was 27.5" | 36" | Usually 10-12 hours | Small in sports bras and tops; small in running shorts, medium in tri/bike shorts didn't even know I was pregnant yet - all my clothes still fit great | |
| | 4 | 1 | | | | | | |
| | 14 | | | | | | | |
| | 16 | | | | | | Need bigger sports bras - my boobs don't feel significantly bigger but my rib cage is expanding - getting chafing along the elastic of my usual favorite sports bras | Belly doesn't look all that big - people who don't know me well just think I over-ate around the holidays. My bike is set on a trainer at my house for the winter - riding at this point is very uncomfortable due to ergonomics and low back pain of being bent over <- see sports bra issues Hips starting to hurt/ round ligament pain with an easy 6 mi run that has been very doable up until this point in pregnancy. Thighs/hips feel bigger - even wearing shorts below my belly feels like fabric is pulling Normal running spandex is putting a lot of pressure on my stomach - wearing my pants below is do-able, but not very comfortable Bought "maternity" workout leggings that have extra material that you wear over the belly, but the crotch starts to fall down when I actually start running |

| | | | | | | | |
|-------------|----------|---|------|-------|---|---|--|
| | 18 | | | | | Need longer shirts to cover my whole stomach - unfortunately going up in size mostly just gets wider, but what I need right now is just longer. My normal one-piece swimsuits no longer fit me - have to size up. For better or worse, I'm pretty flat chested, but the extra fabric needed to accommodate my stomach is just pulling the neckline down on my chest. Nothing hangs out on me, but I can imagine this would be bad for bustier women.... | Legs are definitely swelling more throughout the day - will probably have to start wearing compression socks |
| February 2 | 20 21 | 2 | 35 | 37 | 38 1.5 hrs running; 45 mins tennis; 45 mins strength training; 45 mins swimming; 1.5 hrs hiking | | |
| February 9 | 22 | 2 | 36 | 37.25 | 38 2hrs running, 45 mins strength training, 75 mins swimming | Started wearing a belly band for running, which makes it so much less uncomfortable - cut down on the round ligament pain. Have started to shorten my stride and that helps the hip flexors. Despite sizing up from a 32 to a 34 in my swimsuit last week, it continues to pull pretty low in the front to accommodate the belly. I might have to switch to a 2 piece sooner than I thought. Couldn't zip my ski bibs, but that's not Tri related... Ordered a support top and bottoms from a company called Blanqi that's supposed to help. Haven't tried them yet - update: they came. They suck. I would hardly call them compressive/supportive | |
| February 16 | 23 | 2 | 36.5 | 37.5 | 38 1 hr high intensity interval training (HIIT), 1 hr running, 3 days skiing in Vail (so probably around 13-14 hrs of skiing) | Feeling like my center of gravity is really starting to change about now - more noticeably over the past week than before, though maybe skiing made me more sensitive to that. My rib cage feels like it keeps getting bigger at a faster rate than my boobs. My feet are swelling a lot more at the end of the day | |
| February 23 | 24 | 2 | 36.5 | 38 | 38 3.75 hrs of running | My balance is struggling a bit more - I almost missed the curb today. My proprioception definitely feels a bit off and I'm slowing down a bit more | |
| March 1 | 25 | 2 | 37 | 38.5 | 38 1.75 hrs of running; 2.5 hrs of elliptical; 1 hr of strength | | |
| March 8 | 26 | 2 | | | | | |
| March 15 | 27 | 2 | | | | | |
| March 22 | 28 | 2 | | | | | |
| March 29 | 29 | 2 | | | | | |
| April 5 | 30 | 2 | | | | | |
| April 12 | 31 | 2 | | | | | |
| April 19 | 32 | 3 | | | | | |
| April 26 | 33 | 3 | | | | | |
| May 3 | 34 | 3 | | | | | |

Figure 131 Stephanie's entries



Figure 72 Leggings Proto Fitting on Stephanie

At week 25 Stephanie agreed to try the 3 completed protos on and give feedback. The designer arrived at her house prepared with measuring tape, scissors and pins to correct the garments should they not fit properly. What was a complete surprise to both parties was that the garments fit Stephanie perfectly. She tried each garment on over regular underwear and a sports bra. Her comments in regards to the leggings were, "these straps are clutch". She liked how the straps were adjustable and it felt like she could really hoist her belly up. She also liked how they kept her pants in place. She had noticed with her regular leggings that

even though high waisted and designed for pregnant customers they had a tendency to sag at the crotch especially during running. This might have been a combination of the fabric not being high performance fabric, a cotton based material but also that the style was meant more for athleisure then actual athletics. The only revisions she suggested was that the inseam seemed long and that the ties around the waist might get in the way when running and to replace them with a clasp or clip that would be less distracting. Otherwise she loved the wrap style and found it very comfortable. She felt the bra felt very comfortable but couldn't speak to nursing as she



Figure 133 Swimsuit Proto Fitting on Stephanie

has no experience with it yet. Also the bra fit her perfectly right now and there is no way of telling if it would fit her the same way once she has started nursing as the size of the breasts change as they fill & empty over the course of the day.



Figure 134 Sports Bra Proto Fitting on Stephanie

Stephanie said she was not happy with her current swimsuit which was a one piece and felt she was getting to the point where she couldn't wear it anymore because the front was being pulled down too low as her belly expanded. She really liked the swimsuit proto because not only did it fit but also she didn't feel too revealed which was a concern she had about switching to the two piece. "The serious swimmers don't wear a bikini. It's not like you're soaking up the rays from a beach chair, I'm here to work out!"

Stephanie agreed to try any other styles as they are developed and to give feedback. She is due towards the end of May and will provide as much help as she can until then.

UPDATE 6/5/2020:

At 34 weeks pregnant right before the midterm of the Spring semester Stephanie was able to fit the final version of the jacket, the cycling jersey and the first proto of the cycling bibs. Due to the social distancing order and wanting to protect herself and her baby it was impossible to have an in-person fitting. The items were dropped off at her house and she tried them on in her own time. She had her husband take pictures and she provided the designer with detailed notes about her initial perception of the styles as well as how they fit and performed. In the future it would be necessary to get these items to multiple women to try on at different stages of their pregnancies and to do wear testing when running, cycling and swimming. Also, it would have been insightful to be able to connect with a mother who is or had experience with breast feeding to get her feedback on the nursing bra.

PRESENTATION PLANS FOR SPRING TERM



Figure 135, 136 Examples of mannequins in motion poses in a retail set up

Ideally the mannequins would be in motion poses to show that these garments are meant for action. The designer worked on branding and created a logo for the collection earlier in the winter semester and would like to get hang tags and labels manufactured. The significance of the logo is that as a circle it represents the continuous cycle of life and creation. The concentric circles also are

As the Spring term begins the designer will continue to prototype and refine the remaining styles. For the final presentation the intent is to have 4 full outfits on mannequins with a maternity belly as if they are in a retail setting.



suggestive of the ovaries, eggs, and the breasts as well as the symbol for female. Pink and blue are the culturally appropriated colors for babies but by melding and blending them together they come to represent the entire human race.



Figure 137 Transitions Brand Logo

Athleta. It wouldn't be too farfetched to see this concept incorporated into a renown sports brand such as Nike or Adidas especially as the initiative to target women is becoming a higher priority.

To complete the retail experience the mannequins would be accompanied by a printed look book and large scale printed

Whether this would be a stand-alone brand or a capsule collection for an existing brand is yet to be determined. It would make sense to see this brand offered at maternity specific retail sites like www.destinationmaternity.com or in collaboration with an established brand that supports women, for example Outdoor Voices, Coeur or

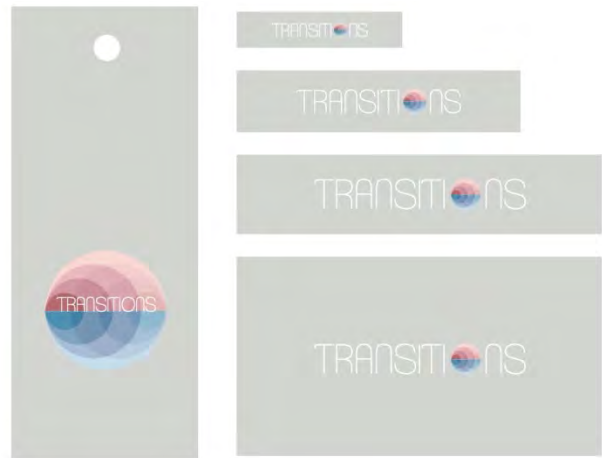


Figure 138 Mockups of the Transitions Logo on hangtag and labels of various sizes



Figure 139 Allyson Felix and Athleta Ad Campaign #PowerofShe from Allyson Felix. (n.d.). Retrieved March 15, 2020, from <https://www.allysonfelix.com/>



Figure 140 Nike Campaign from Smith, J. (2019, March 11). New Nike Commercial Celebrates Women in Sports Breaking Down Barriers. Retrieved March 15, 2020, from <https://www.runnersworld.com/news/a26514295/nike-commercial-dream-crazier-just-do-it/>

posters of an ad campaign showing strong, proud female athletes accompanied by inspirational, empowering messaging. See below the ad campaign for Athleta and Allyson. As well as other female centric messages to women athletes as seen in Nike.

Alternatively, an interesting but no less inspiring approach was taken by Sports England in a campaign to increase sports participation among women in their 50's and 60's. The inspiration behind the campaign,

"Most women still feel judged when they play sport or exercise. We feel guilty for stopping and starting, for hesitating, for not looking perfect. The women and girls in this campaign remind us that's normal and create some strong images that we hope millions of women will relate to." (Kemp, 2019, p2)

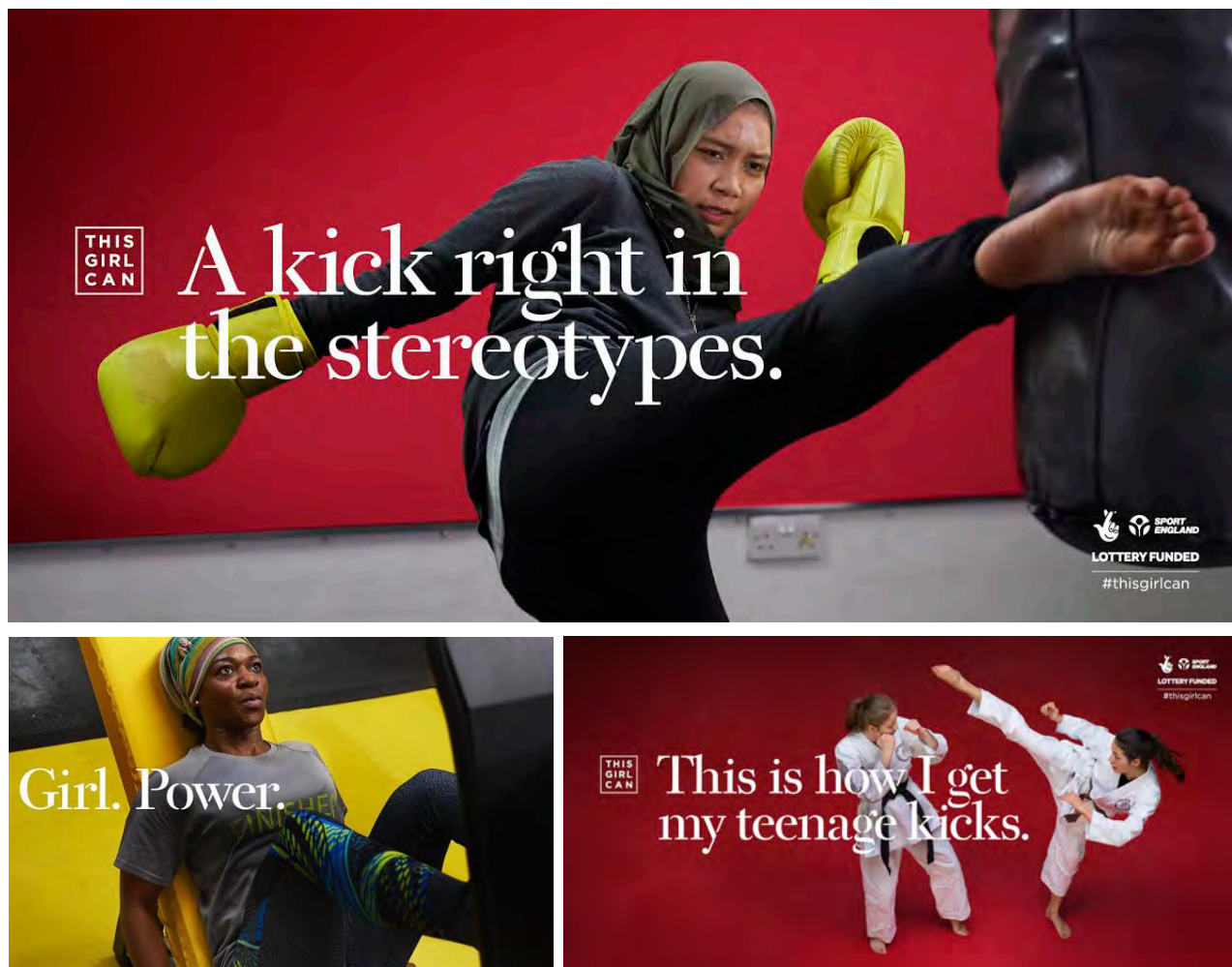


Figure 141, 142, 143, 144 All images from the This Girl Can campaign run by Sports England from (Kemp, 2019)



UPDATE 6/5/2020:

Due to the arrival of COVID-19 and the closure of schools nationwide the Spring term and final term of the program was moved online. The students were required to complete their projects in their homes without access to the school's studio spaces. Due to social distancing it became quite challenging to coordinate in person fittings and photoshoots. As mentioned earlier the student managed to fit her products on her athlete by dropping off garments at the athlete's doorstep and corresponding over email and phone to validate the product. To get around not being able to shoot on a model the student shot the garments on her own body and photoshopped them onto stock photos.

Instead of a retail experience in a brick and mortar store the consumer experience was moved online. A retail website was developed and can be accessed at www.jessiesilbert.wixsite.com/transitions

Below are a few screen shots from the store developed using wixsite.com

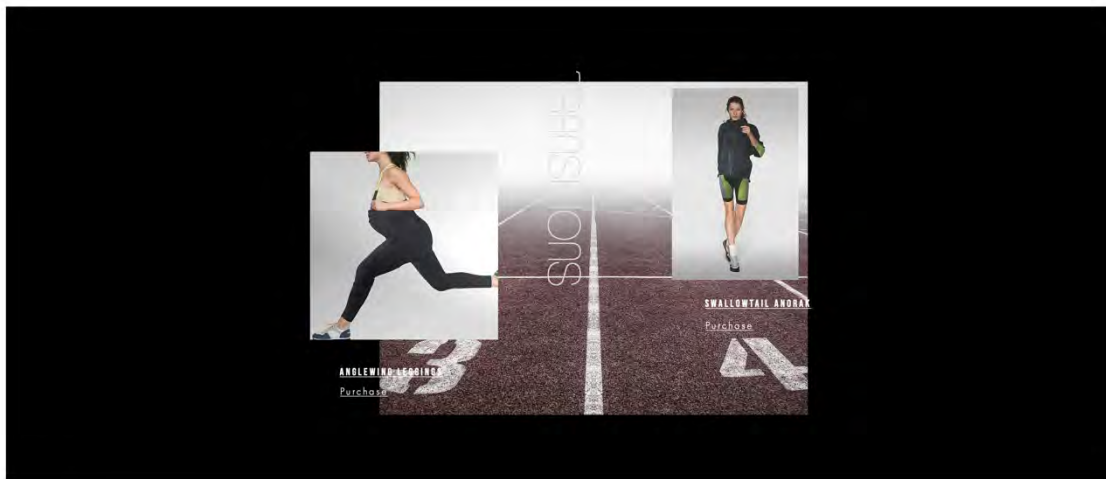
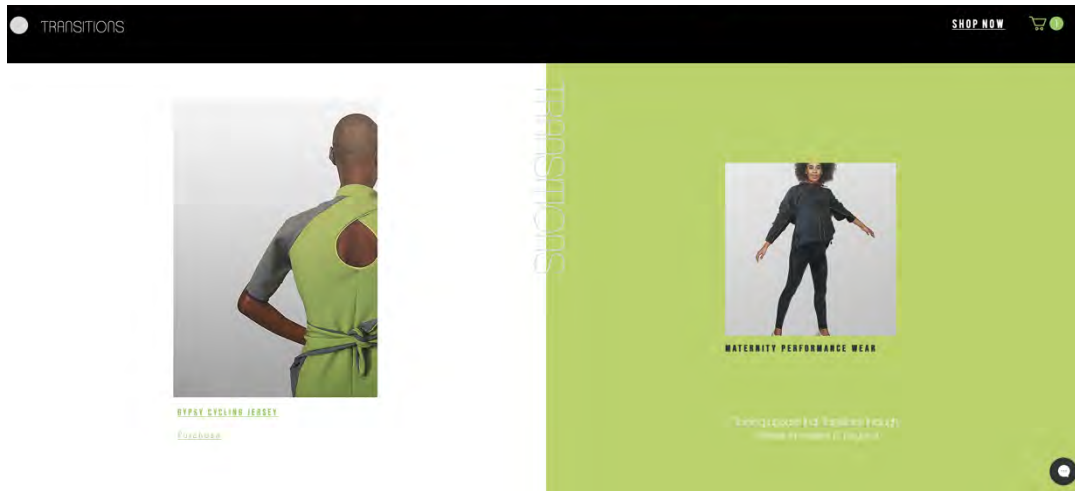


Figure 145, 146 Screen shots of the homepage

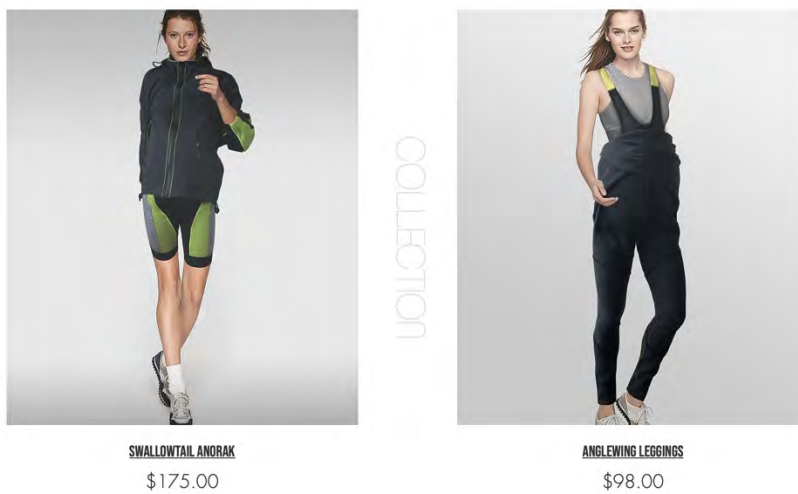
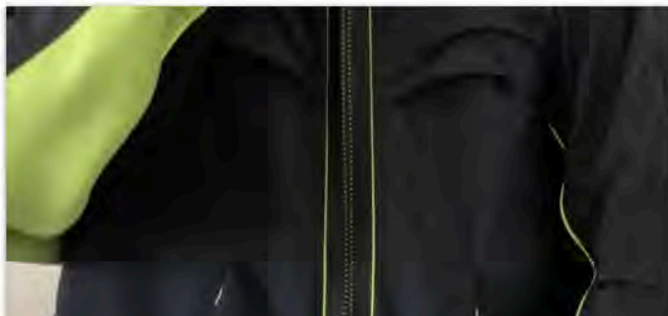


Figure 147 Screen capture of the first two items on the Store Page



SWALLOWTAIL ANORAK

\$175.00

ADD TO CART

BUY NOW



DESCRIPTION:

This water & wind repellant jacket is perfect for outdoor activities when the weather is less than agreeable. A low profile cord stopper with a concealed bungee cord can be pulled tighter to keep wind & water out of the hood and hem. The unique silhouette with a wrap around belt that fastens at the back keeps volume out of the way & maintains a smooth, streamlined appearance from the front. Concealed pockets at the waist keep essentials stored & within reach.

MATERIAL INFORMATION:

74% Wool / 17% Polyamide / 4% Polyurethane

Three layers combine a bi-stretch Merino wool jersey at the interior side with a light polyamide water & wind resistant exterior. The materials are bonded together with a polyurethane membrane that is permeable to perspiration keeping the wearer feeling dry & comfortable when exercising.

Figure 148 Screen Capture of Item Detail: with images of the garment from multiple views as well as a video of the garment's features in motion. Accompanied by a detailed written description, icons of the benefits and fabric content.

Additional changes that occurred in Spring term included the rebranding of the logo which was developed over winter. The color was eliminated and instead a stark palette of black and ivory was adopted that felt more aligned with the overall aesthetic. This became abundantly clear as the designer started developing her branded hardware and found that the logo was too complex. A happy accident was that by eliminating all the circles you are left with just the word "TRANSITIONS" which is underlined with a gradiated line gives the word movement almost as if it is in motion. It looks "fast" which is much more aligned with an athletic brand than the concentric circle icon.

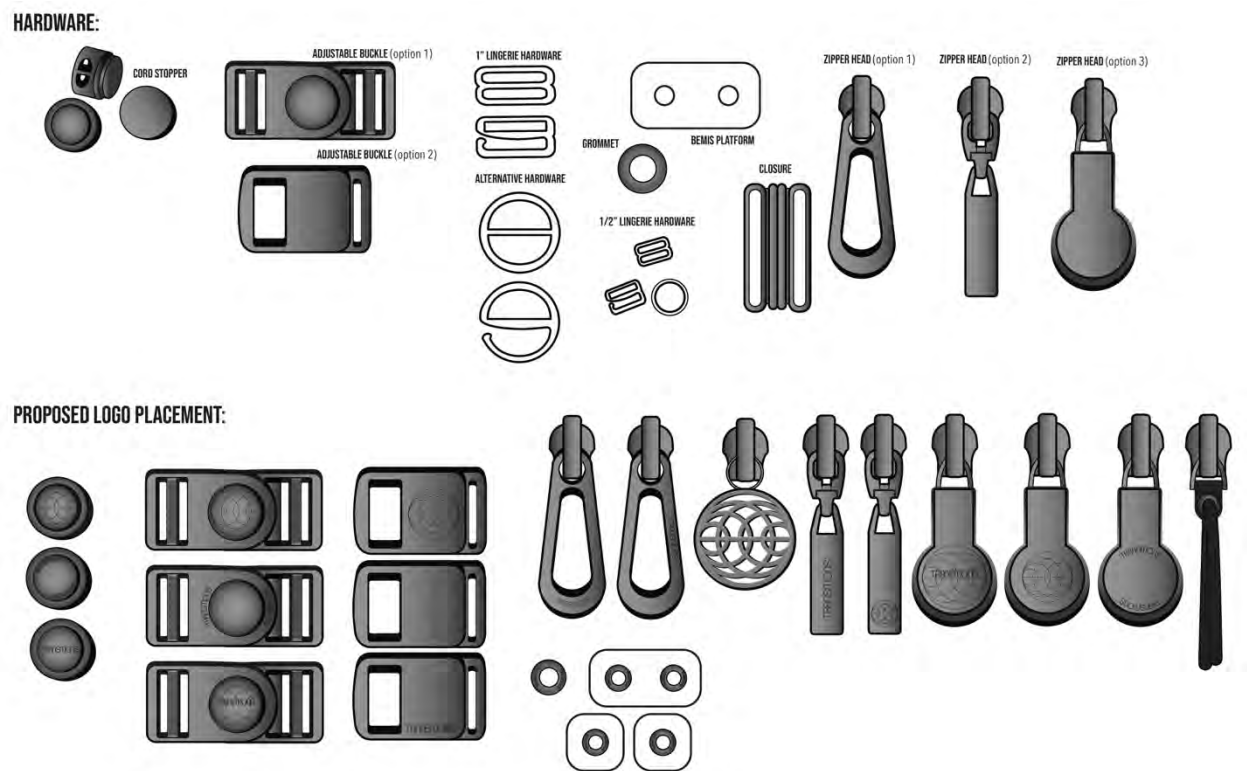


Figure 149 Hardware design development incorporating the logo

TRANSITIONS

Figure 150 The final logo that looks "fast" compared to the one featuring the concentric circles.

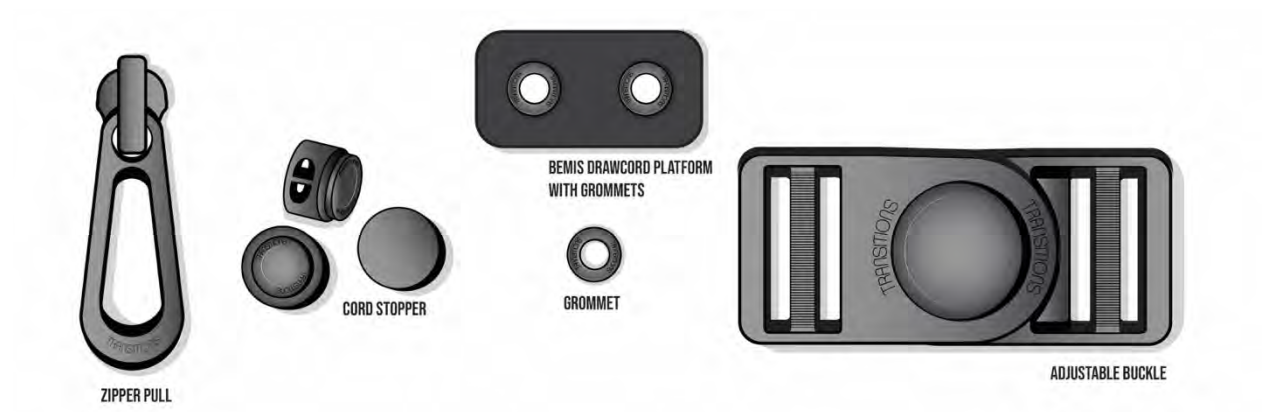


Figure 151 The final designs: Note how the logo was simplified and eliminated the multiple concentric circles

The circle was still present but in a much more minimal state as can be seen in the hang tags and shopping bag. The shopping bag shape was developed through paper folding ideation.

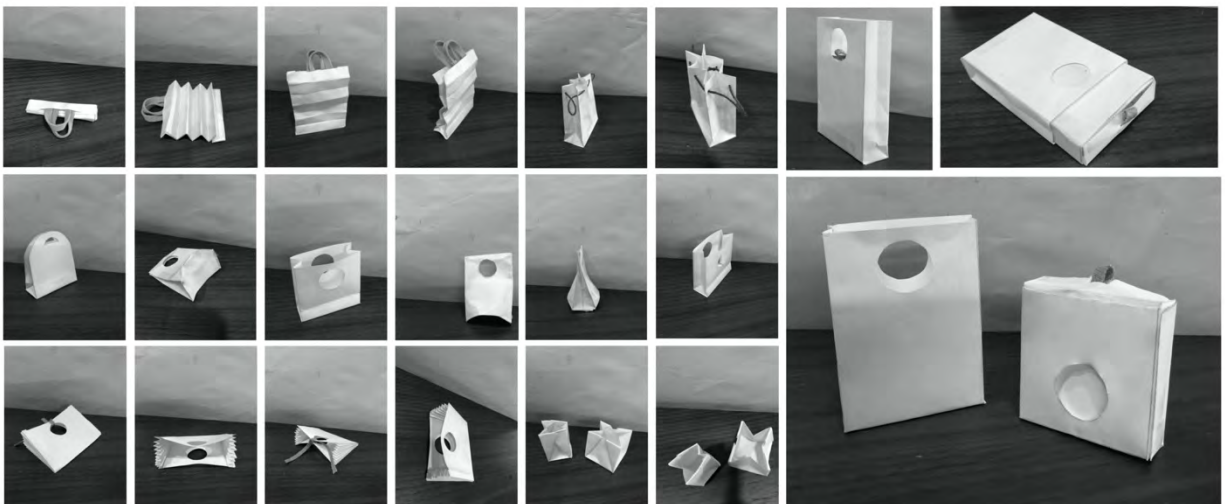


Figure 152 Packaging Paper Ideation

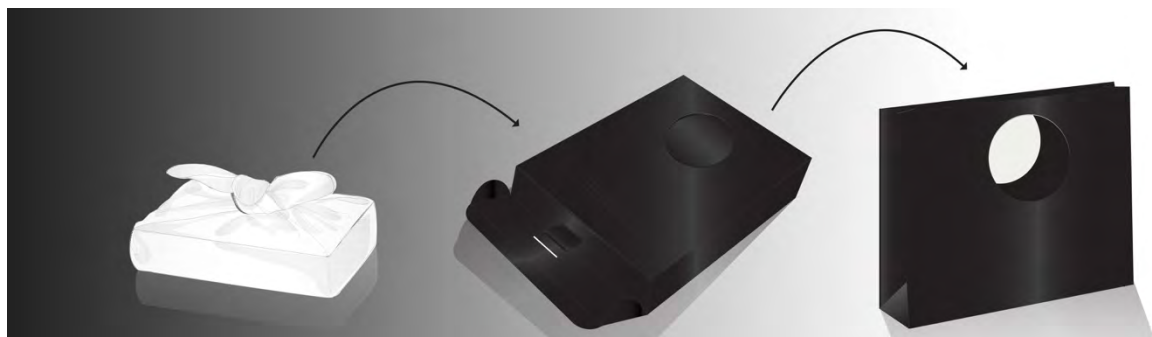


Figure 153 Final Design for Packaging

As the collection took so much inspiration from Furoshiki, the Japanese art of gift wrapping with fabric it seemed appropriate to incorporate this into the packaging concept. Each item purchased will be wrapped in a cotton/bamboo organic cloth that could then be used by the consumer as a washable reusable diaper. This shows the brand's commitment to cutting back on waste and brings the product "full circle" so to speak.

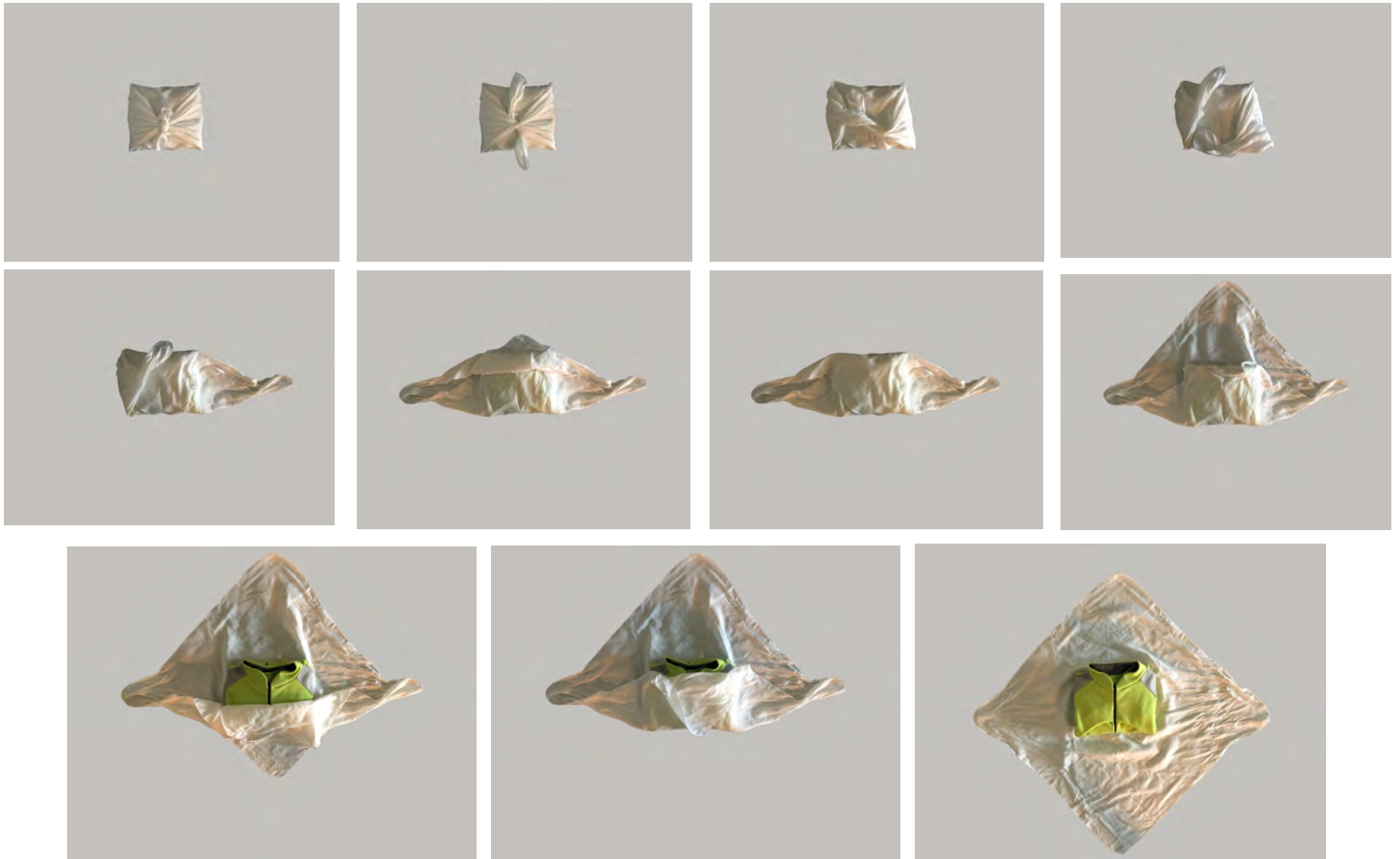


Figure 154 Stop Motion Images of the Cycling Jersey being unwrapped

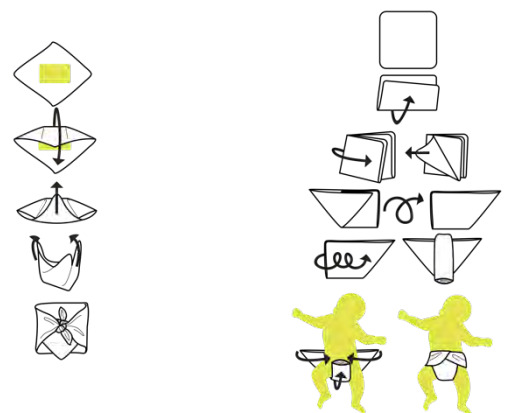


Figure 155 How to illustrations of Furoshiki wrapping & how to make a reusable diaper

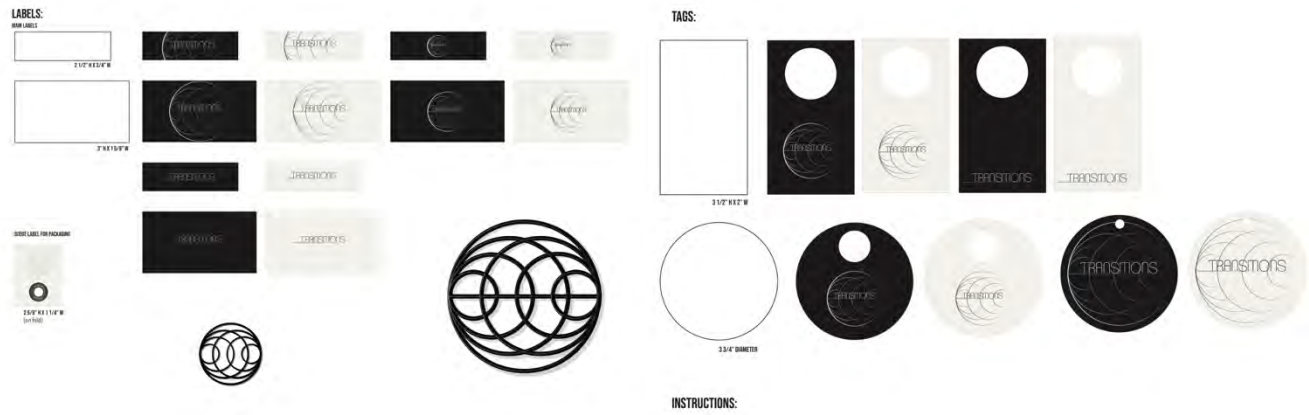


Figure 156 Label and Hangtag Development. At this point the designer was feeling that the concentric circles were becoming less and less harmonious with the overall aesthetic of the collection



Figure 157 Final Woven Label and Hang Tag Designs

SPRING TERM WORK PLAN

The focus of the Spring term is to bring the Transitions collection to completion. The following schedule is laid out for the months of April through June graduation. During spring break the designer had originally planned to take a trip to LA to visit the knit factory as well as take a course in Shima Seiki programming. However, due to the evolving situation with COVID-19 this trip will no longer be possible. The designer will work throughout the month of March and April with the factory remotely and approve swatches and knit downs through virtual communication. The current plan is to have one style created as planned in 2D knit and due to cost and lead time have yardage knitted to complete the other two styles in Portland as cut and sew.

The month of April will be a continuation of working with the factory in LA as well as sewing final samples in Portland. Ideally first knit prototypes would be completed by the end of April so that revisions can be made, and styles can be completed by mid-May.

Another key project to work on in April is to order tags and labels from outside contractors such as [Vistaprint.com](https://vistaprint.com) and dutchlabelshop.com. Lead time should be about a month and it would be ideal to have these completed before the end of May to put into garments.

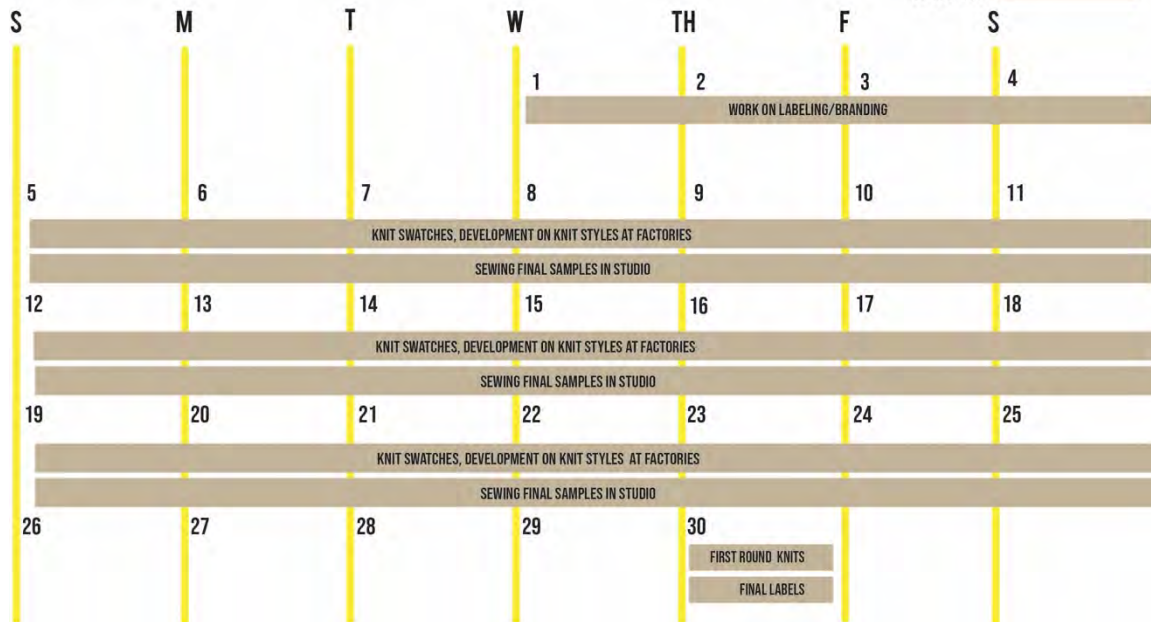
Validation by sending photos of final products to athlete contacts will take place in mid-May or as garments are completed. Fittings with Stephanie will take place around the same time.

The look book shoot will be done on a model wearing a baby bump and will take place the last week of May. Look books and marketing ads can be printed in the UofO output room and assembled in house. Any show rentals for the presentation will be booked well in advance for delivery the day before set up.

APRIL 2020

IMPORTANT DATES

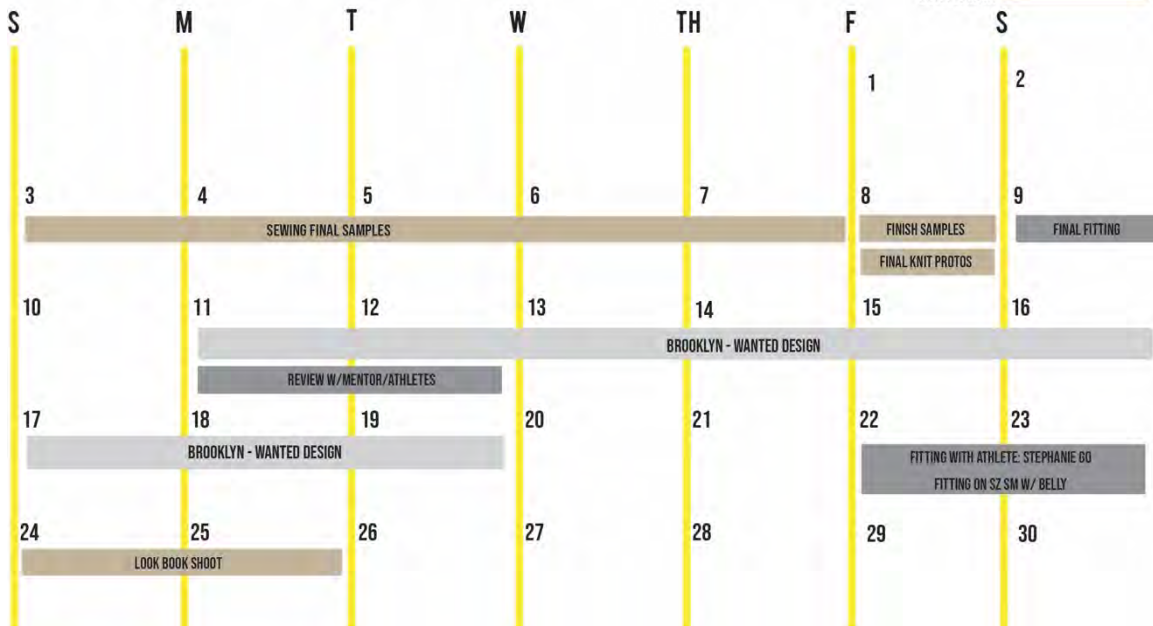
- RESEARCH
- TRAVEL
- DEVELOPMENT

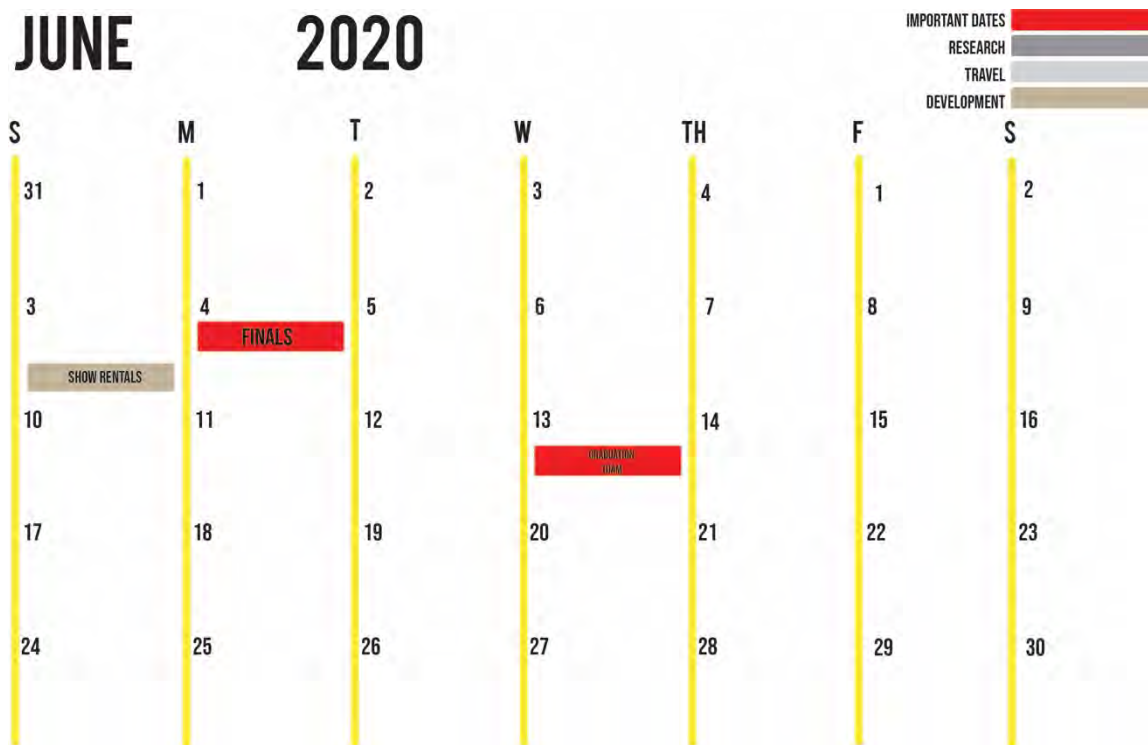


MAY 2020

IMPORTANT DATES

- RESEARCH
- TRAVEL
- DEVELOPMENT

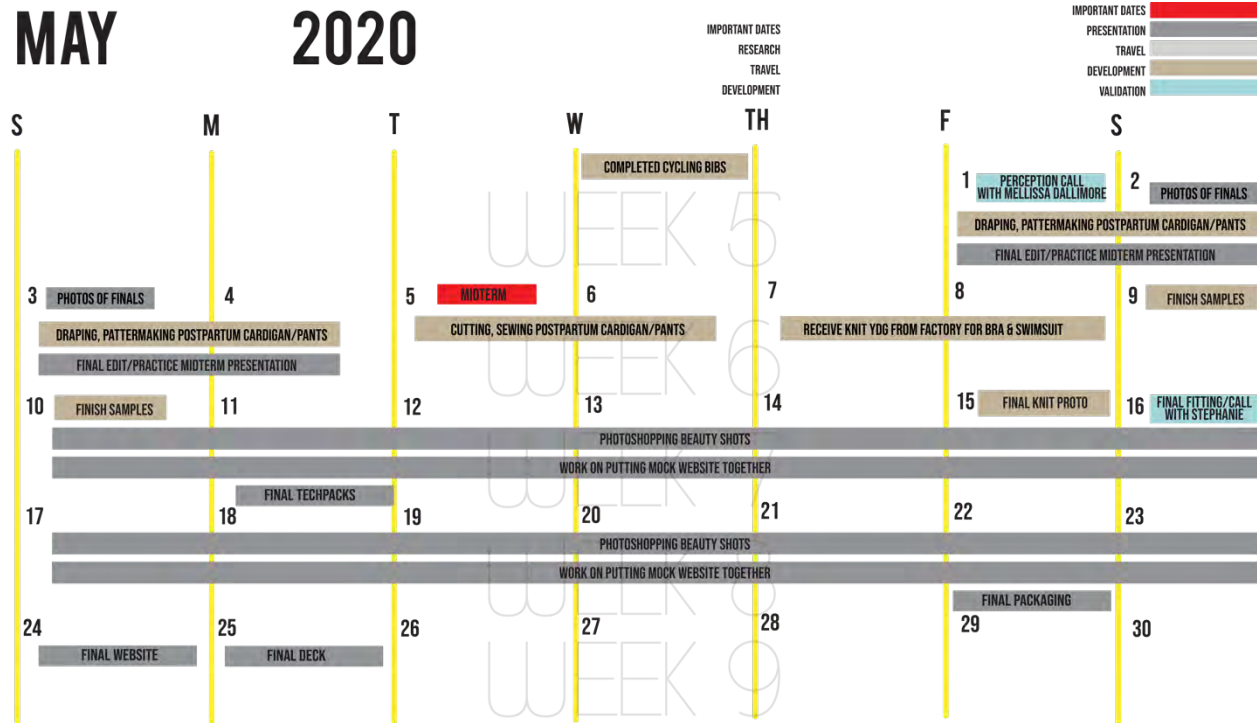




This has been an exciting and challenging project thus far and I am looking forward to its culmination in June.

The May calendar was affected most heavily by the closures. Below is the revised plan:

MAY 2020



I present the final pieces of the collection.
Thank you.



BIBLIOGRAPHY:

Active Side Zip Maternity Jacket. (n.d.). Retrieved December 11, 2019, from <https://www.ingridandisabel.com/products/side-zip-active-jacket>.

Allyson Felix. (n.d.). Retrieved March 15, 2020, from <https://www.allysonfelix.com/>

Allyson Felix. (n.d.). Retrieved from <https://www.teamusa.org/usa-track-and-field/athletes/allyson-felix>.

Associated Press. (2019, September 26). Top female US track stars fight to remove pregnancy sponsorship penalty. Retrieved December 9, 2019, from <https://nypost.com/2019/09/26/top-female-us-track-stars-fight-to-remove-pregnancy-sponsorship-penalty/>).

Body measurements for the sizing of womens patterns and apparel. (1971) (Vol. 13). Retrieved from <https://books.google.com/books?id=WNmZY-yvG38C&pg=PA14&lpg=PA14&dq=CS 215-58&source=bl&ots=hW--KNp9uX&sig=ACfU3U3y4sZ-vx6L6ZRpAmeDSsfyyBPpIg&hl=en&sa=X&ved=2ahUKewjCpKDNkbvmAhVrJTQIHxWICu0Q6AEwB3oECAkQAQ#v=onepage&q=CS 215-58&f=false>

Braaten, A. W. (n.d.). Wool. Retrieved February 21, 2020, from <https://fashion-history.lovetoknow.com/fabrics-fibers/wool>

Bravado Designs USA. (n.d.). Clip and Pump™ Hands-Free Nursing Bra Accessory. Retrieved December 11, 2019, from <https://bravadodesigns.com/products/clip-and-pump-hands-free-nursing-bra-accessory>.

Bravado Designs USA. (n.d.). Clip and Pump™ Hands-Free Nursing Bra Accessory. Retrieved December 17, 2019, from <https://www.buybuybaby.com/store/product/bravado-designs-clip-and-pump-hands-free-nursing-bra-accessory-in-black/3346109>

Bureau of Labor Statistics. (June 19, 2019). Average percentage of U.S. population engaged in sports and exercise per day from 2010 to 2018* [Graph]. In *Statista*. Retrieved December 04, 2019, from <https://www.statista.com/statistics/189562/daily-engagement-of-the-us-population-in-sports-and-exercise/>

Butler, S. L. (2019, June 11). Famous Running Mom and Her 9-Month-Old Smash Stroller Half Marathon Record. Retrieved March 13, 2020, from <https://www.runnersworld.com/news/a20810253/famous-running-mom-and-her-9-month-old-smash-stroller-half-marathon-record/>

Butler, S. L. (2018, March 22). Why U.S. Women Marathoners Are Having a Moment. Retrieved December 4, 2019, from <https://www.runnersworld.com/news/a20866363/u-s-women-marathoners-running-fast-times/>.

CDC - Reproductive Health - Physical Demands - NIOSH Workplace Safety and Health Topic. (2019, November 15). Retrieved December 5, 2019, from <https://www.cdc.gov/niosh/topics/repro/physicaldemands.html>.

Clairensstein, G. (2018, April 25). Differences Between Natural & Man-Made Materials. Retrieved February 18, 2020, from <https://sciencing.com/differences-between-natural-manmade-materials-8667607.html>

Deyette, A., Jarlais, J. D., Slaton, J., Largeman-Roth, F., Paturel, A., Robinson, L., & Motte, P. (n.d.). How do maternity clothing sizes work? Retrieved December 16, 2019, from https://www.babycenter.com/404_how-do-maternity-clothing-sizes-work_10337006.bc.

Deezknitz. (2015, February 20). deezknitz. Retrieved February 25, 2020, from <https://deezknitz.tumblr.com/post/111509987832/enfiber-this-this-is-the-absolute-secret-of-why>

Eagles, L., & Eagles, L. (2018, August 26). The question of pregnancy in Jan van Eyck's Arnolfini Portrait. Retrieved December 8, 2019, from <https://smarthistory.org/arnolfini-pregnancy/>.

Editorial, S. J. G. (2019, August 26). Why Just-in-Time Manufacturing is Having a Moment. Retrieved March 13, 2020, from <https://sourcingjournal.com/topics/technology/shima-seiki-on-demand-manufacturing-165112/>

Eddins, J. (2020, March 12). Peanut Butter Runner. Retrieved March 14, 2020, from <https://www.peanutbutterrunner.com/>

Endurance Sport. (n.d.). Retrieved December 7, 2019, from [https://medical-dictionary.thefreedictionary.com/Endurance Sport](https://medical-dictionary.thefreedictionary.com/Endurance+Sport).

Essential Maternity Contour Back. (n.d.). Retrieved December 9, 2019, from https://www.speedousa.com/essential-maternity-contour-back-style-7734157?Color=Black&Size=XS&CAWELAID=320010670002209760&s_kwcid=AL!6652!3!381768002046!!u!297414535428!&CATARGETID=320010670002246413&CADevice=c&gclid=EAlaIQobChMlo5Ot_s6n5gIVehx9Ch0QFA7TEAQYAiABEgLIif_D_BwE.

Fahy, C. (2015, August 19). Kim Kardashian bares baby bump as Khloe and Kourtney take a fully-clothed dip. Retrieved December 8, 2019, from <https://www.dailymail.co.uk/tvshowbiz/article-3203230/Glowing-Kim-Kardashian-bares-burgeoning-baby-bump-sisters-Khloe-Kourtney-fully-clothed-dip-intense-beach-workout.html>.

Feilberg, P., & Salaverria, I. (2018, May 16). Nine Things to Know About Microplastics. Retrieved December 16, 2019, from <https://www.maritime-executive.com/blog/nine-things-to-know-about-microplastics>.

Fiona. (n.d.). Retrieved December 9, 2019, from https://www.brooksrunning.com/en_us/brooks-fiona-sports-bra/350064.html.

Fleshman, L. (2013, July 8). One Month Later. Retrieved March 14, 2020, from <http://asklaurenfleshman.com/2013/07/one-month-later/>

Flynn, C. (2016, August 8). The History Of Women In The Olympics Is Inspiring. Retrieved December 16, 2019, from <https://www.bustle.com/articles/177302-the-history-of-women-in-the-olympics-is-inspiring>.

Frye, A. (2019, April 12). Kathrine Switzer Talks Boston Marathon, 1967 And Now. Retrieved December 16, 2019, from <https://www.forbes.com/sites/andyfrye/2019/04/02/kathrine-switzer-talks-boston-marathon/#5ce8ec3a35d8>.

Full Busted Seamless Maternity and Nursing Bra (Cup Sizes D). (n.d.). Retrieved December 9, 2019, from https://www.destinationmaternity.com/full-busted-seamless-nursing-bra-cup-sizes-d/006-99162-31.html?dwvar_006-99162-31_color=006-99162-31#q=nursing+bra&lang=default&start=1.

G, P., M, A., P, M., H, A., Moni, & B, K. (2019, November 10). Zest Maternity & Nursing Sports Bra. Retrieved December 9, 2019, from <https://www.cakematernity.com/zest-nursing-sports-bra>.

Gordon, L. A. (2015). The Development of Design Requirements for Breastfeeding Apparel: A User-Oriented Product Development Approach.

Gore, T. (n.d.). The GORE-TEX Membrane: What it is, how it works and why you need it. Retrieved March 15, 2020, from <https://www.gore-tex.com/blog/the-gore-tex-membrane-what-it-is-how-it-works-and-why-you-need-it>

Gross, S. (2016, June 5). Sara Gross on Instagram: "Sunday. #daughter #thebest #sunday #sunshine". Retrieved March 13, 2020, from <https://www.instagram.com/p/BGSL-1Xy-cC/>

Gross, Sara. (2020, January 27). Phone interview with Jessie Silbert.

Harvey, I. (2016, July 25). Some of the oldest garments in the World. Retrieved February 25, 2020, from <https://www.thevintagenews.com/2016/08/05/priority-oldest-garments-world/>

Hazama, Corey S. (2020, January 10). Email correspondence with Jessie Silbert.

Headley, Sarah T. (2020, January 11). Email correspondence with Jessie Silbert.

Hess, J. (2018, June 26). Beyond Basics Physical Therapy We go Above and Beyond the Basics. Retrieved March 13, 2020, from <https://beyondbasicsptblog.com/2018/06/26/lace-up-or-feet-up-running-during-pregnancy/>

Hess, Joanna L. (2020, January 14). Email correspondence with Jessie Silbert.

High Blood Pressure During Pregnancy. (2019, June 20). Retrieved from <https://www.cdc.gov/bloodpressure/pregnancy.htm>.

Jorgensen, G. (2017, July 10). My Prenatal Workout Routine. Retrieved December 16, 2019, from <https://www.teamusa.org/USA-Triathlon/News/Articles-and-Releases/2017/July/10/My-Prenatal-Workout-Routine>.

Hochman, Juliet. (2020, January 10). Email correspondence with Jessie Silbert

Irvine, H. M. (2019, April 23). She Ran With That Badass Bump All the Way to Her Due Date. Retrieved March 13, 2020, from <https://www.runnersworld.com/runners-stories/a25726127/she-ran-through-pregnancy/>

Jorgensen, G. (2020, January 12). Email correspondence with Jessie Silbert.

Jorgensen, G. (2017, May 28). Baby Update Part III. Retrieved December 16, 2019, from <http://www.gwenjorgensen.com/blog/baby-update-part-iii>.

Jorgensen, G. (2017, September 4). Stanley's Birth. Retrieved December 16, 2019, from <http://www.gwenjorgensen.com/blog/stanleys-birth>.

Jorgensen, G. (2018, August 19). My weekly blog #8 (it is early!!). Retrieved March 13, 2020, from <http://athleticliving.blogspot.com/2018/08/my-weekly-blog-8-it-is-early.html>

Kemp, N. (2019, October 24). 'This girl can' targets older women with new campaign. Retrieved March 15, 2020, from <https://www.campaignlive.co.uk/article/this-girl-can-targets-older-women-new-campaign/1422505>

Knechtle, B., Rüst, Knechtle, Rosemann, T., & Lepers, R. (2012). Age of peak performance in elite male and female Ironman triathletes competing in Ironman Switzerland, a qualifier for the Ironman world

championship, Ironman Hawaii, from 1995 to 2011. *Open Access Journal of Sports Medicine*, 3, 175. doi: 10.2147/oajsm.s37115

Kristen, & CycleSprog, K. @. (2019, November 20). The Best Maternity Cycling Clothes. Retrieved December 9, 2019, from <https://rascalrides.com/the-best-maternity-cycling-clothes/>.

Kuhn, K., & Wolf, D. (2018, September 19). Ask the lactation expert: What's a normal breastfeeding routine? Retrieved February 18, 2020, from <https://www.today.com/parents/breastfeeding-questions-feeding-schedules-how-long-breastfeed-more-t137728>

Laurance, J. (2006, October 26). The Big Question: So is there an optimum age for a woman to have a. Retrieved February 14, 2020, from <https://www.independent.co.uk/news/science/the-big-question-so-is-there-an-optimum-age-for-a-woman-to-have-a-baby-421597.html>

Lauretta, A. (2018, October 11). Olympian Gwen Jorgensen Is Still Running 70 Miles(!) Per Week While Pregnant. Retrieved December 16, 2019, from https://www.womensrunning.com/2017/04/get-inspired/gwen-jorgensen-70-miles-pregnant_74259.

Lebetkin, M. (2015, July 17). Endurance Athletes Peak Later Than You Think. Retrieved February 14, 2020, from <https://www.theactivetimes.com/why-middle-age-isn-t-past-your-prime>

Lindig, S. (2019, December 6). The Evolution of Maternity Style. Retrieved December 8, 2019, from <https://www.elle.com/fashion/personal-style/g28423/maternity-style-evolution/?slide=4>.

Lipton, E. (2019, March 11). What to Wear and What Not To Wear During Pregnancy. Retrieved December 16, 2019, from <https://www.momskids.net/what-to-wear-and-what-not-to-wear-during-pregnancy/>.

Littleton, K. (Ed.). (2019, November). Breastfeeding FAQs: How Much and How Often (for Parents) - Nemours KidsHealth. Retrieved December 9, 2019, from <https://kidshealth.org/en/parents/breastfeed-often.html>.

Lynch, Kendall. (2020, January 16). Email correspondence with Jessie Silbert.

Making the decision to breastfeed. (2019, March 14). Retrieved December 9, 2019, from <https://www.womenshealth.gov/breastfeeding/making-decision-breastfeed>.

Mannering, L. (2017, December 7). A Brief History of Maternity Clothes. Retrieved December 8, 2019, from https://www.huffpost.com/entry/a-brief-history-of-matern_b_156618?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2x1LnNvbS8&guce_referrer_sig=AQAAADHIKRO-g9zql03iV0-1AeojnczM-72lwXBbF9s515z0xCEHs9NfWMhg0UoGdHd0ef-KD1945Znt8Xs3yIpBX0Q4cRS3772Acm-zxTzyXyRxoRkHho2x2r79TeiOusW8BlpFRc7W6I565gT7U3FE2OhPBI3ownDD7YbnOiadAlWu.

Martin, J. A., Hamilton, B. E., & Osterman, M. J. K. (2017, September). PDF. Hyattsville. Retrieved December 5, 2019, from <https://www.cdc.gov/nchs/data/databriefs/db287.pdf>

MasterClass. (2019, October 31). Natural vs. Synthetic Fibers: What's the Difference? - 2020. Retrieved February 18, 2020, from <https://www.masterclass.com/articles/natural-vs-synthetic-fibers>

Maternity Attachment Belly pillow for female form. (n.d.). Retrieved March 15, 2020, from https://www.zingdisplay.com/product-p/DJFAC8R.htm?dfw_tracker=7943-DJFAC8R&gclid=EAIaIQobChMI85qeOJ2d6AIVZyCtBh293wAfeAQYAiABEgKSA_D_BwE

Maternity FITsplint™. (2019, September 30). Retrieved March 12, 2020, from <https://www.recorefitness.com/store/maternity-fitsplint>

Maternity High Waist Swim Bottoms - Sea Angel - Black. (n.d.). Retrieved December 9, 2019, from <https://www.target.com/p/maternity-high-waist-swim-bottoms-sea-angel-black/-/A-54187963?preselect=53812563#lnk=sametab>.

Maternity - Lucille Bike Short (\$15.00, reg. \$60.00). (n.d.). Retrieved December 9, 2019, from <http://shop.bornfit.com/womens-fitness/maternity-fitness/maternity-lucille-bike-short-15-00-reg-60-00/>.

Maternity Moto Leggings - Isabel Maternity by Ingrid & Isabel™ Black. (n.d.). Retrieved December 9, 2019, from <https://www.target.com/p/maternity-moto-leggings-isabel-maternity-by-ingrid-isabel-black/-/A-54587549?preselect=54522380#lnk=sametab>.

Maternity Wear Market Size Worth \$24.5 Billion By 2025: CAGR: 4.3%. (n.d.). Retrieved from <https://www.grandviewresearch.com/press-release/global-maternity-wear-market>.

Maternity Workout Clothes. (n.d.). Retrieved December 9, 2019, from <https://athleta.gap.com/products/maternity-workout-clothes.jsp>.

Monte, Nicole. (2020, February 3). Phone conversation with Jessie Silbert

Morris, B. (2016, August 4). Women's Sports History. Retrieved December 16, 2019, from <https://www.womenshistory.org/articles/womens-sports-history>.

Morse, E. (2013, February 14). non-renewable energy. Retrieved February 25, 2020, from <https://www.nationalgeographic.org/encyclopedia/non-renewable-energy/>

Moyer, N. C. (1988). US 4746318. Retrieved December 10, 2019 from Moyer, <https://patentimages.storage.googleapis.com/d1/79/ae/f00d954cd96b39/US4746318.pdf>
M.S., P. (2015, July 8). What is ELITE ATHLETE? definition of ELITE ATHLETE (Psychology Dictionary). Retrieved December 15, 2019, from <https://psychologydictionary.org/elite-athlete>.

Munatones, S. (2011, July 27). Men Vs. Women in Endurance Sports. Retrieved December 6, 2019, from <https://www.active.com/swimming/articles/men-vs-women-in-endurance-sports>.

Nair, A. (2018, August 20). Is It Safe to Stand Long Hours during Pregnancy? Retrieved December 5, 2019, from <https://parenting.firstcry.com/articles/prolonged-standing-during-pregnancy-impact-on-mother-and-fetus/>.

Narins, E. (2019, October 31). Attention Retailers: You're Not Size-Inclusive Until You Carry Maternity Clothes. Retrieved December 16, 2019, from <https://www.parents.com/pregnancy/my-life/maternity-fashion/attention-retailers-youre-not-size-inclusive-until-you-carry-maternity-clothes/>.

(n.d.). Retrieved December 8, 2019, from <http://www.destinationmaternitycorp.com/WhoAreWe.asp>.

New Designers & Styles Monthly. (n.d.). Retrieved March 15, 2020, from <https://www.balodana.com/customer-service/measurement-guide>

Nike Pro Women's Tights. Nike.com. (n.d.). Retrieved December 9, 2019, from <https://www.nike.com/t/pro-womens-tights-ZZVj1W/BV3089-347>.

Pickett, Brigid. (2020, January 14). Email correspondence with Jessie Silbert.

Plante, S. G. (2018, January 30). What to Expect to Wear When You're Expecting. Retrieved December 8, 2019, from <https://www.vox.com/2018/1/30/16928328/maternity-clothes-pregnancy-miscarriage>.

Prevent Blood Clots During Pregnancy: Top Exercises to Improve Circulation. (2017, April 13). Retrieved December 6, 2019, from <https://www.veinspecialists.com/blog/top-exercises-prevent-blood-clots/>.

Rettner, R. (2018, July 6). Are Hot Summer Days Risky for Pregnant Women? Retrieved December 5, 2019, from <https://www.livescience.com/63005-hot-summer-days-pregnancy-risks.html>.

Ro, L. (2018, October 2). The Best Maternity Belts, According to Pre- and Postnatal Experts. Retrieved March 12, 2020, from <https://nymag.com/strategist/article/best-maternity-belts-belly-bands.html>

Robinson, K. (2016, January). The Origins of Clothing Sizes. Retrieved December 16, 2019, from <https://www.seamwork.com/issues/2016/01/the-origins-of-clothing-sizes>.

Rodriguez, C. Q., Anisimova, A., Ryan, S., & Troynikov, O. (2017). Critical design aspects of maternity support-garments and its contemporary perspective. *KnE Engineering*, 2(2), 91. doi: 10.18502/keg.v2i2.600

Shafik, A. (2007). Effect of Different Types of Textiles on Pregnancy. *Clinical and Experimental Obstetrics & Gynecology*, 34(4), 244–246. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/18225689>

Shefit. (n.d.). Ultimate Sports Bra® - Black. Retrieved December 9, 2019, from https://shefit.com/products/ultimate-sports-bra-black?gclid=EAlaIqObChMI4cqFx92p5gIVCdVkCh3_FgO_EAAYAAAEgJqvD_BwE.

Shefit. (n.d.). Ultimate Sports Bra® - Black. Retrieved December 17, 2019, from <https://www.amazon.com/Shefit-Ultimate-Sports-1Luxe-Black/product-reviews/B013P4WEFG>

Shute, N. (2014, September 5). Stinky T-Shirt? Bacteria Love Polyester In A Special Way. Retrieved February 25, 2020, from <https://www.npr.org/sections/health-shots/2014/09/05/346055067/stinky-t-shirt-bacteria-love-polyester-in-a-special-way>

Smith, J. (2019, March 11). New Nike Commercial Celebrates Women in Sports Breaking Down Barriers. Retrieved March 15, 2020, from <https://www.runnersworld.com/news/a26514295/nike-commercial-dream-crazier-just-do-it/>

Smith, K. (2017, November 23). Expecting opportunity: The growing maternity market. Retrieved December 8, 2019, from <https://edited.com/resources/maternity-retail/>.

Staff, S. I. (2017, May 12). "I'd love to be able to run the day I give birth!". Retrieved December 16, 2019, from <https://www.si.com/edge/2017/05/12/triathlete-gwen-jorgensen-pregnancy-running-workouts>.

The Before, During and After Legging. (n.d.). Retrieved December 9, 2019, from <https://www.hatchcollection.com/collections/bottoms/products/the-before-during-after-maternity-legging?variant=30368776683629>.

The Bra. (n.d.). Retrieved December 9, 2019, from <https://www.hatchcollection.com/collections/hatchedit-nursing-essentials/products/the-bra?variant=48414720205>.

The Zanzibar Bikini. (n.d.). Retrieved December 8, 2019, from <https://www.hatchcollection.com/collections/swim/products/the-zanzibar-bikini-poppy?variant=8118412083309?color>.

TRUFORM Classic Medical 20-30 mmHg Maternity Pantyhose. (n.d.). Retrieved December 9, 2019, from https://www.compressionsale.com/truform-classic-medical-20-30-mmhg-maternity-pantyhose.html?gclid=EAlaIQobChMIqviEyKyp5glVQx-tBh1gPwjDEAQYBSABEgJFgvD_BwE.

Watkins, S. M., & Dunne, L. E. (2015). *Functional clothing design: from sportswear to spacesuits*. New York: Fairchild Books, an imprint of Bloomsbury Publishing Inc.

Webb, Julia. (2020, January 21). Email Correspondence with Jessie Silbert.

Welling, Tara. (2020, January 15). Phone interview with Jessie Silbert.

Welling, T. (2019, July 4). Tara (@tara_welling) • Instagram photos and videos. Retrieved March 13, 2020, from https://www.instagram.com/tara_welling/?hl=en

WHOLEGARMENT. (n.d.). Retrieved March 13, 2020, from <https://www.shimaseiki.com/wholegarment/>

Wool Fibre - Properties, Facts & Benefits: The Woolmark Company. (n.d.). Retrieved February 18, 2020, from <https://www.woolmark.com/about-wool/wool-fibre/>

Women's Health Care Physicians. (2019, July). Retrieved December 4, 2019, from <https://www.acog.org/Patients/FAQs/Exercise-During-Pregnancy?IsMobileSet=false>.

Women UPF 50 3D Padded Cycling Underwear. (n.d.). Retrieved December 11, 2019, from <https://www.naviskin.com/collections/women-cycling-bottoms/products/upf-50-cycling-underwear-women>.

Women UPF 50 3D Padded Cycling Underwear. (n.d.). Retrieved December 17, 2019, from https://www.amazon.com/NAVISKIN-Cycling-Underwear-Padded-Shorts/dp/B07WTZHL79/ref=sr_1_1?dchild=1&keywords=naviskin+padded+underwear&qid=1576595792&sr=8-1

Xu, J. (2019, April 3). You'll never believe how much this gold medalist trains and eats in a day. Retrieved December 16, 2019, from <https://www.bodyandsoul.com.au/fitness/running/youll-never-believe-how-much-this-olympic-gold-medalist-trains-and-eats-in-a-day/news-story/908a9df1bcfac3852eaf41878f76a83f>.

Zheng, P. Z., & Kennedy, D. J. (n.d.). Spine. Retrieved December 4, 2019, from http://www.demosmedical.com/media/samplechapters/9781620700754/mobile/9781620700754_Chapter1.html.

Zip Front Maternity Active Jacket. (n.d.). Retrieved December 9, 2019, from https://www.destinationmaternity.com/zip-front-maternity-active-jacket/006-90369-000-001.html?cgid=motherhood-jackets&dwvar_006-90369-000-001_color=006-90369-22#start=1.



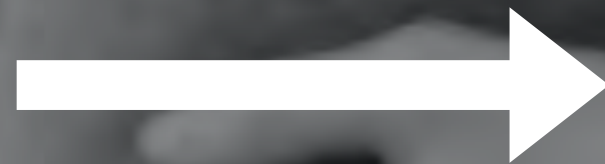
TRANSITIONS:

A Collection of Maternity Training Apparel for the Modern Elite Endurance Athlete

Jessie Silbert



Currently valued at
\$18.3 Billion



Predicted by 2025
\$24.5 billion

THE MATERNITY MARKET SIZE

Yet NONE of the major sports apparel companies offers a maternity option



↑ 19%

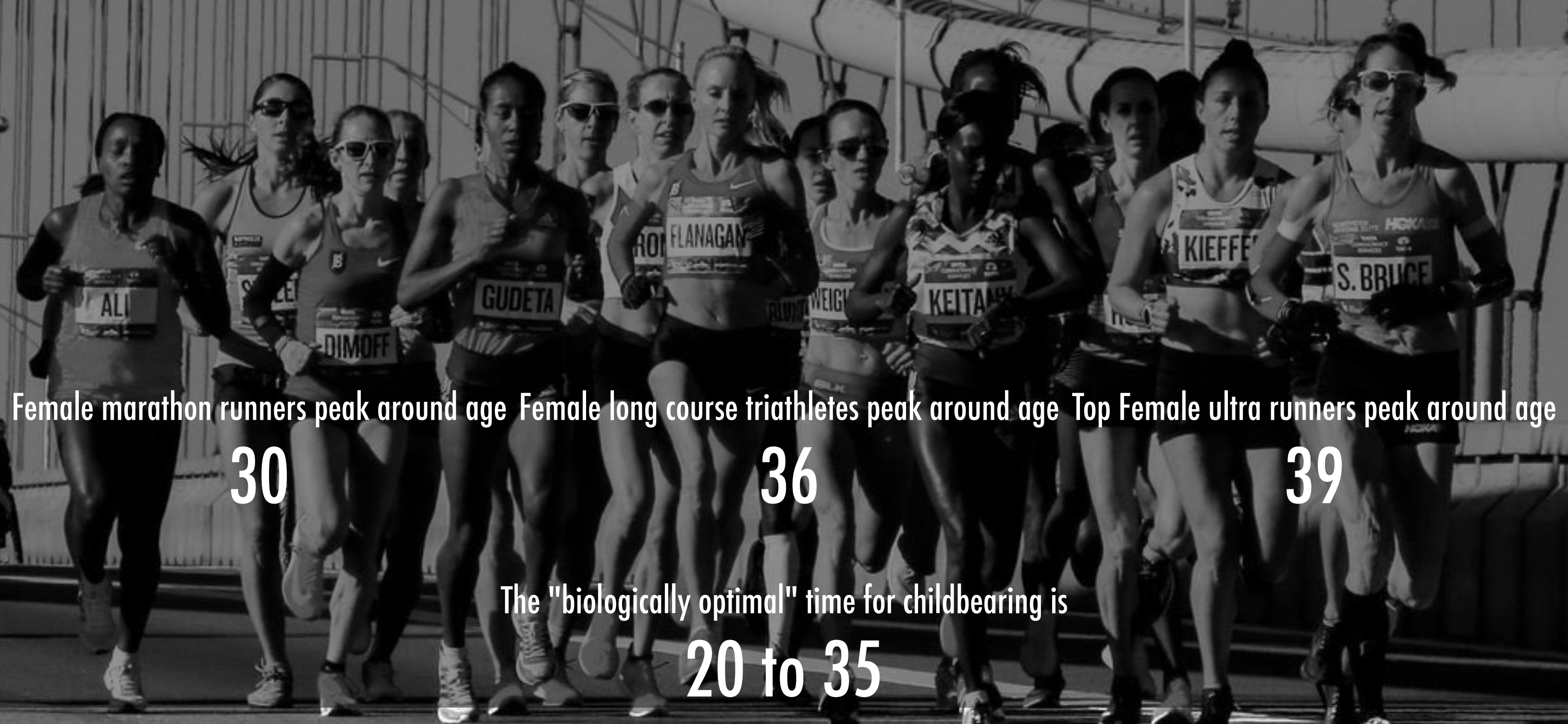
women in their early 40's

↑ 11%

for women in their late 30's

MATERNITY MARKET POTENTIAL

Birth rates are on the rise for women over 30. Women are waiting to have children



Female marathon runners peak around age 30 Female long course triathletes peak around age 36 Top Female ultra runners peak around age 39

30

36

39

The "biologically optimal" time for childbearing is

20 to 35

A DIFFICULT CHOICE

More women are choosing to start families at the height of their careers



THE CURRENT ENVIRONMENT: SUPPORT WOMEN

Global movements: Economic Equality, Equal Opportunity, Reproductive Rights

The Womens Soccer Team

"Equal Pay For Equal Pay!"



Allyson Felix

"Power of She"



Mary Cain

"Do The Right Thing"



THE CURRENT ENVIRONMENT IN SPORTS: EMPOWER WOMEN

Women are bringing attention to unfair treatment by sponsors, sports governing bodies, and coaches & demanding

Paula Radcliff

16 year Marathon World Record holder



Kristin Armstrong

Most decorated U.S. female cyclist of all time



Mary Keitany

One of Kenya's most accomplished runners



Marit Bjorgen

Most successful cross country skier



HAVING A BABY DOES NOT END CAREERS

Just ask these women

ATHLETE INSIGHTS

When it comes to performance maternity apparel there are just no good options.



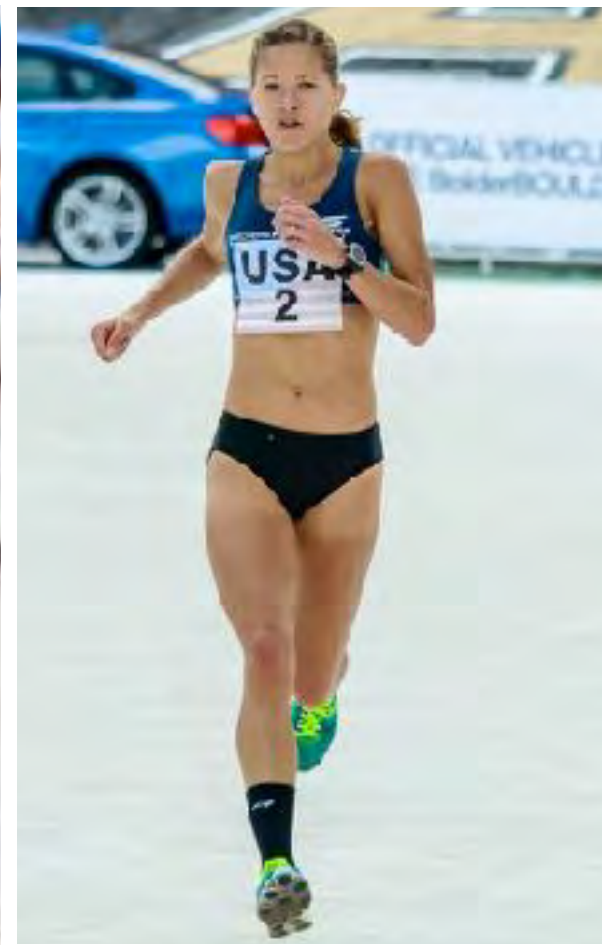
Gwen Jorgensen

"Size was a major issue for swim suits. I hate two pieces but was forced to wear them."



Julia Webb

"...started to outgrow any long sleeve options (it was winter) so I started wearing my husbands..."



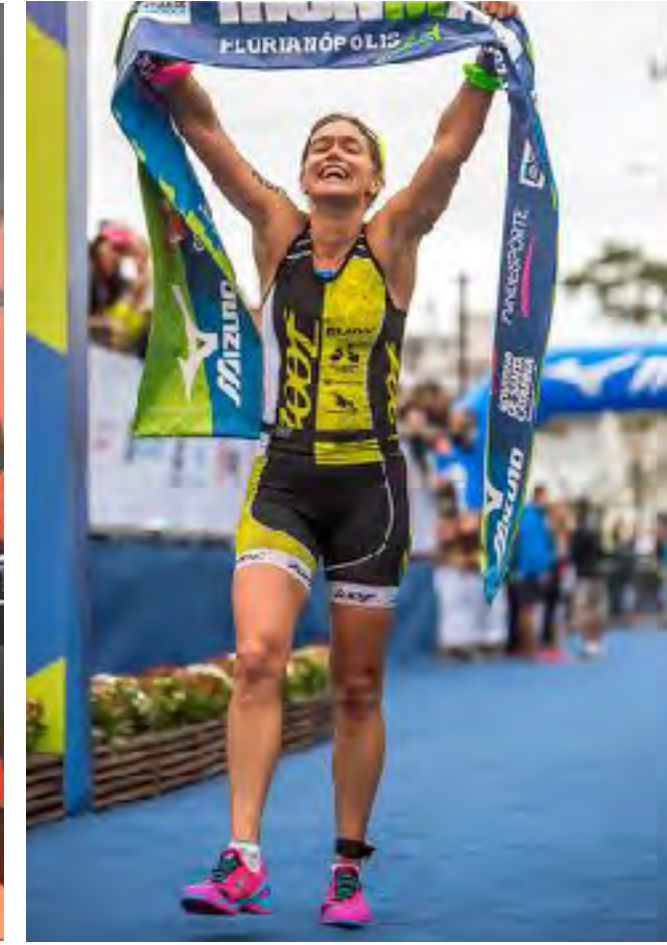
Tara Welling

"Maternity activewear is very hard To find." "I just sized up but then nothing ever fits right."



Lauren Goss

"I'm finding that I need a good bra with more support"



Sara Gross

"I wore a belly band but there is a lot of room for improvement, its very basic"

Athletes observe that they see the most dramatic change in their bust & belly region through the various stages of pregnancy.



Week 1 - Week 12

First Trimester

Week 13 - Week 26

Second Trimester

Week 27 - delivery

Third Trimester

After delivery (1 & 2 weeks)

Post Partum

HOW THE ATHLETE'S BODY CHANGES

Pregnancy is divided into 3 trimesters



STEPHANIE GO
Week 20
Recreational Athlete
34 years old



MY ATHLETE

tracking & recording measurements, observations, training & apparel needs

Week 21



Week 22



Week 23



Week 24



Week 25



CASE STUDY

Following pregnancy of amateur athlete from week 21



INTENTION

Develop a collection of performance maternity apparel that will accommodate growth, offer tissue support, regulate heat, provide comfort & transition from trimester to trimester & beyond.

Swimming

Summer 2025, Pool 77-82 degrees F



Cycling

Winter 2025, Indoors 70 degrees F



Running/Walking

Fall 2025, Outdoors 50-60 degrees F



Recovery

Spring 2026, Ambient 70's degrees F



THE BRIEFS

Apparel for the pregnant athlete for 4 seasons, 4 activities, offering coverage, support & adjustability



MATERIALS

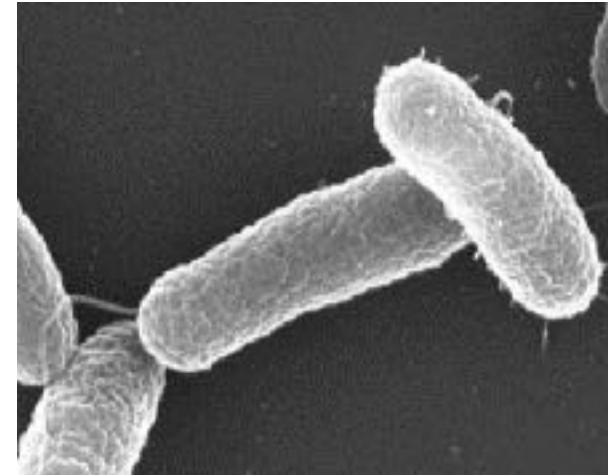
Pregnant women need to avoid exposure to chemicals, most athletic apparel is synthetic.
Focus on developing a collection using natural fibers.

WOOL

Features & Benefits

STRENGTH & RESILIENCE

Fibers can stretch up to 30% their natural length before breaking.

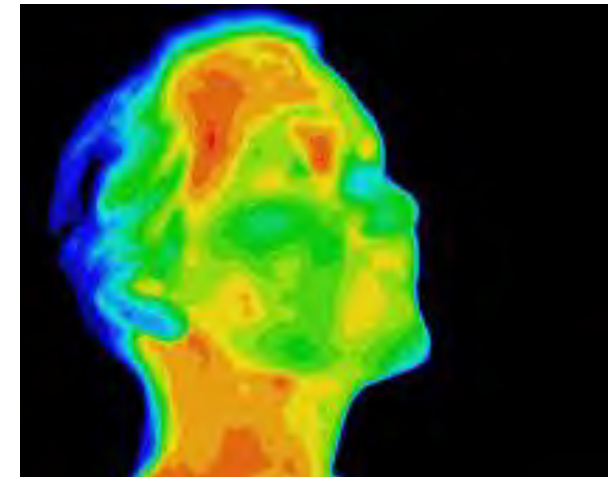


ODOR RESISTANT

Lanolin, an oil in wool is antibacterial, which reduces odors

BETTER FOR THE ENVIRONMENT

Wool is natural, renewable & biodegradable



TEMPERATURE MANAGEMENT

Trapped air keeps wearer warm, while evaporating moisture keeps wearer cool

SUN PROTECTION

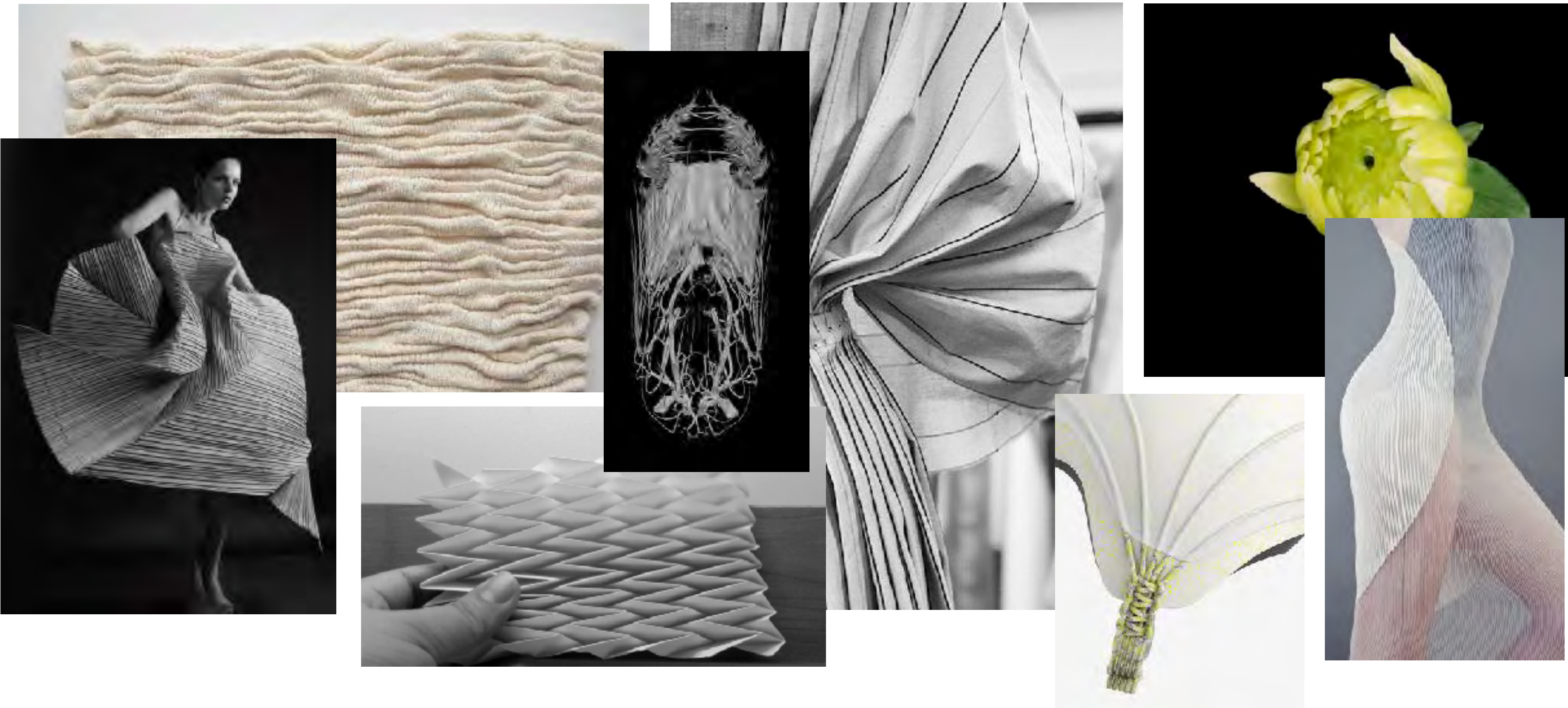
Natural protection from UV & UVB rays with an SPF of +30



MOISTURE MANAGEMENT

Fibers wicks moisture from the skin which results in feeling dry to the touch

INSPIRATION



PROBLEMS TO SOLVE FOR

THERMODYNAMICS

Regulate the body's temperature to keep the wearer from overheating during exercise.

NATURAL MATERIALS

Reduce exposure to chemicals by using natural fibers for layers worn close to the body.

FUNCTIONAL

Create garments that enable the wearer to successfully achieve their athletic goals during pregnancy.

ADJUSTABLE

Create silhouettes that grow with the wearer to transition through the trimesters & beyond.

COMFORTABLE

Use Shima Seiki technology to create seamless, soft, merino knit garments that feel good on the body.

SUPPORTIVE

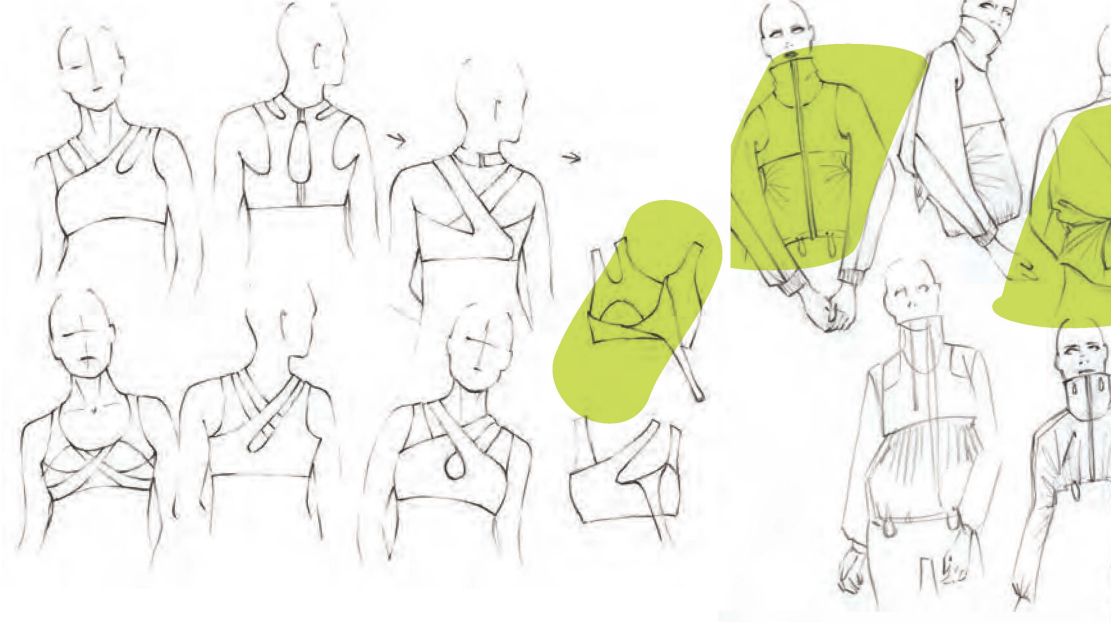
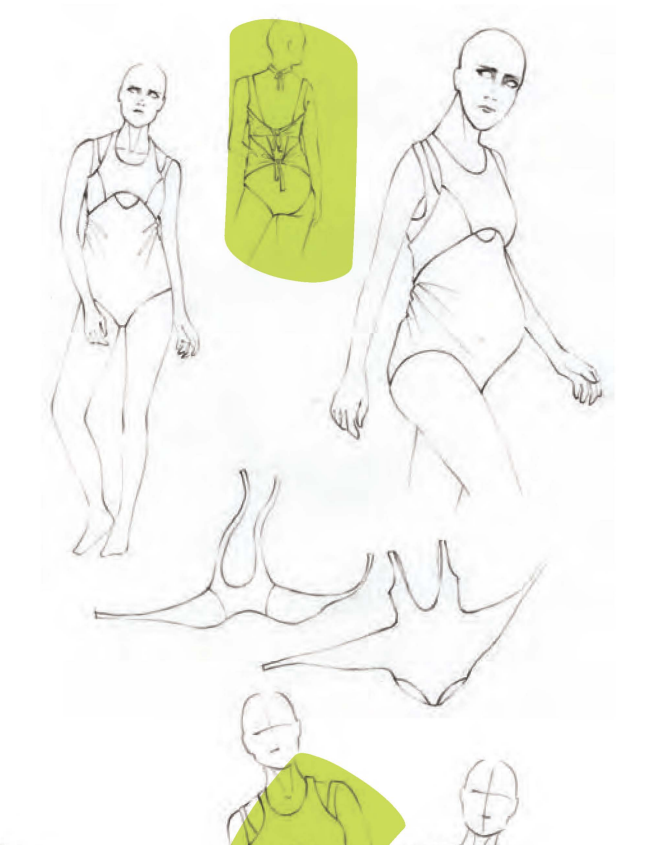
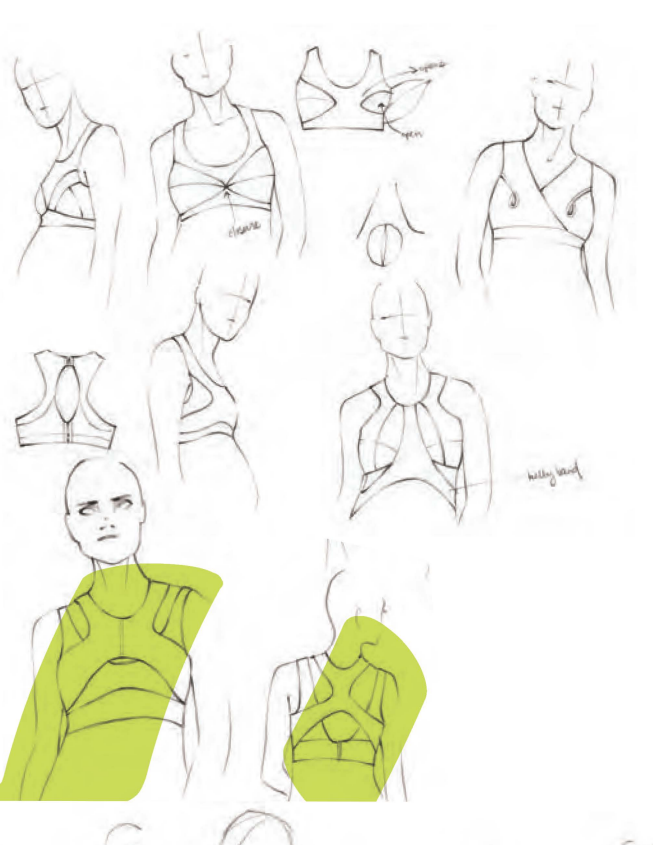
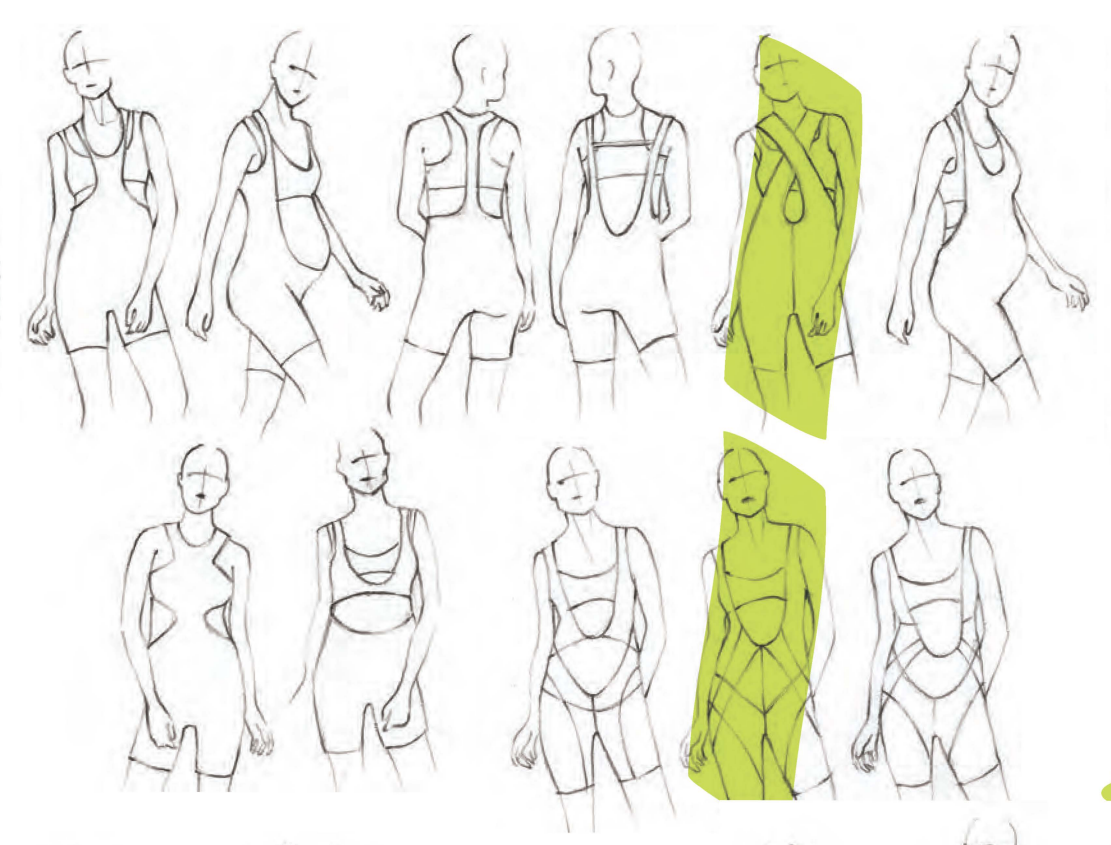
Build in internal support into each garment to give the wearer stability & comfort as the body grows & changes.

COHERENT

Find common details, features, aesthetics that connect the pieces of the collection together.

SILHOUETTE

Establish a language of new fashion forward silhouettes that can be worn separately or together.





IDEATION - Prototyping

First round of draping & pattern making



IDEATION - Sketching

Second round of sketching to determine details & style lines



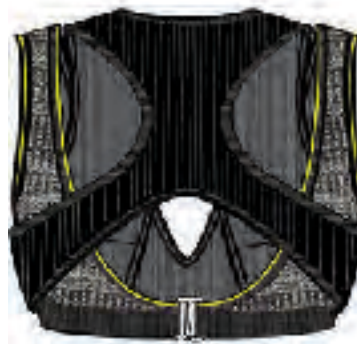
IDEATION - Final Prototypes

Corrected patterns & proceeded to second round of prototypes



VALIDATION - Fitting

On body fit session with athlete at 25 weeks



IDEATION - Tech Flats

Highly detail technical drawings for stitch & color placement



IDEATION - Final Sketches

Finalize ideas for final styles for cut & sew & woven

NEXT STEPS

IDEATION

Continue to prototype remaining
styles & finalize patterns

FACTORY TRIALS

Work with LA factory to confirm
Knit stitches & tensions

MANUFACTURE

Cut & sew all garments
Approve knit photos from factory

VALIDATE

Fit styles on model, review with
mentor & athletes to get feedback

BRAND

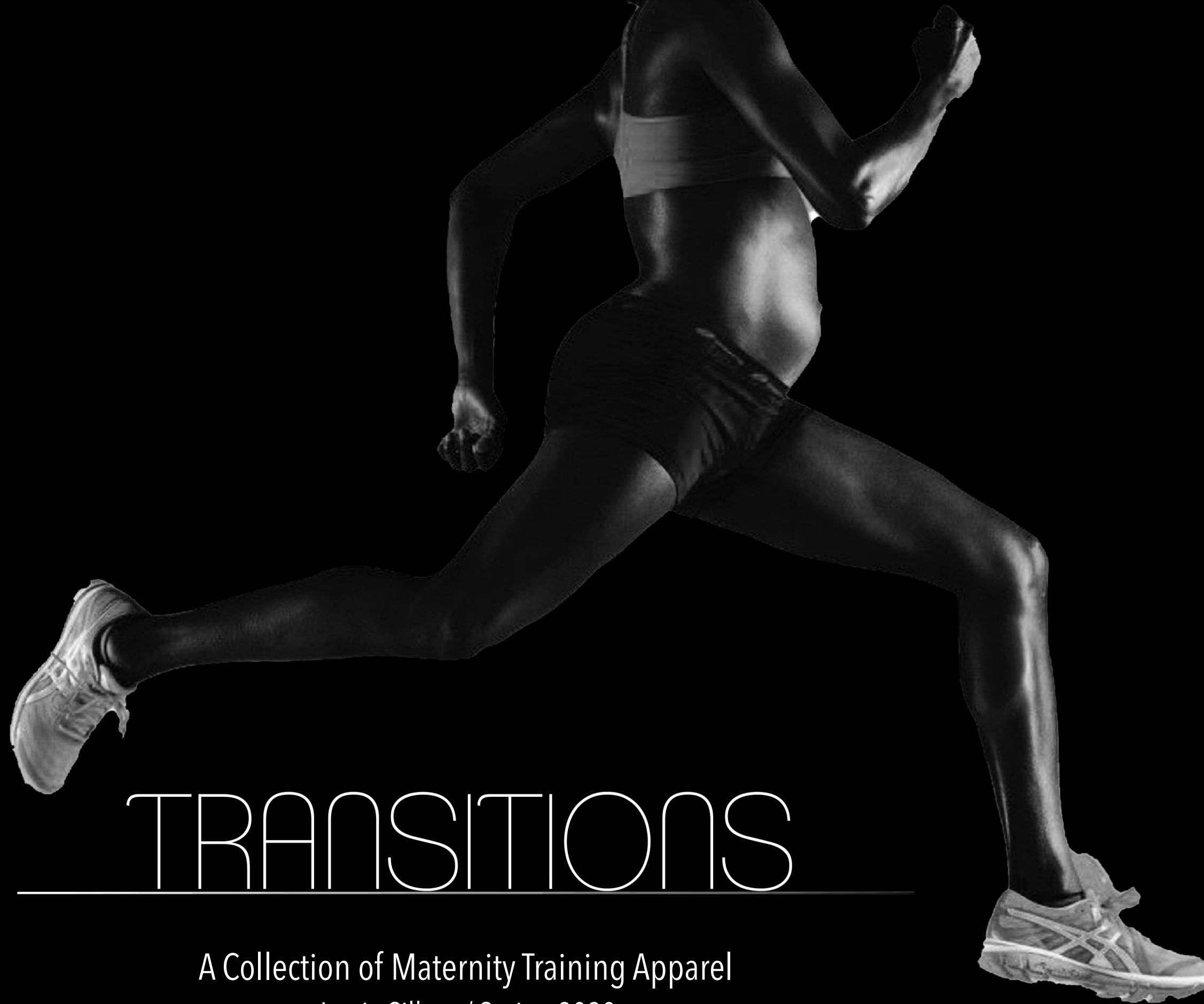
Get hang tags & labels
made & attached to garments

STYLIZE

Shoot looks on a model
& develop ad campaign

PRESENT

Set up retail experience
For final review



TRANSITIONS

A Collection of Maternity Training Apparel
Jessie Silbert / Spring 2020

| | |
|--|-----------|
| BIO - Designer's Background | 3 |
| RESEARCH - Setting the Scene | 4 |
| THE PROBLEM - Identifying the Problem To Solve | 10 |
| INTENTION - Brand Promise & Commitment To The Athlete | 11 |
| AESTHETICS - Mood Boards & Inspiration | 17 |
| IDEATION - Sketching | 25 |
| EXPLODED VIEWS - Parts & Purposes, Features & Benefits | 29 |
| PROTOTYPE SUMMARY - Athlete Feedback & Product Validation | 36 |
| BRANDING - Logo, Branding Elements, Packaging | 47 |
| FINAL PRODUCT - Look Book, Website | 65 |

CONTENTS



JESSIE SILBERT

I am an apparel designer.

I have over a decade of experience
working in the New York Fashion Industry
at luxury & better design studios.

I am an avid runner & triathlete with
an interest in advancing human potential
& performance through product.





GENDER INEQUALITY IN SPORTS

"The sports industry allows for men to
Have a full career & when women decide to
Have a baby it **pushes women out** at their prime."

Alysia Montana Middle Distance Runner Team USA

"There's so much risk involved with our jobs that I
Think it's just an automatic assumption that if you get
Pregnant you're not going to do what you do anymore."

Kimmy Fasani Professional Snowboarder



30

Peak age of female
marathon runners

36

Peak age of female
triathletes

39

Peak age of female
ultra runners

20-35

Biologically optimal
for child bearing

THE ATHLETE

More women are choosing to start families at the height of their careers

Paula Radcliff

16 year Marathon World Record holder



Kristin Armstrong

Most decorated U.S. female cyclist of all time



Mary Keitany

One of Kenya's most accomplished runners



Marit Bjorgen

Most successful cross country skier



HAVING A BABY DOES NOT END CAREERS

Just ask these women

ATHLETE INSIGHTS

When it comes to performance maternity apparel there are just no good options.



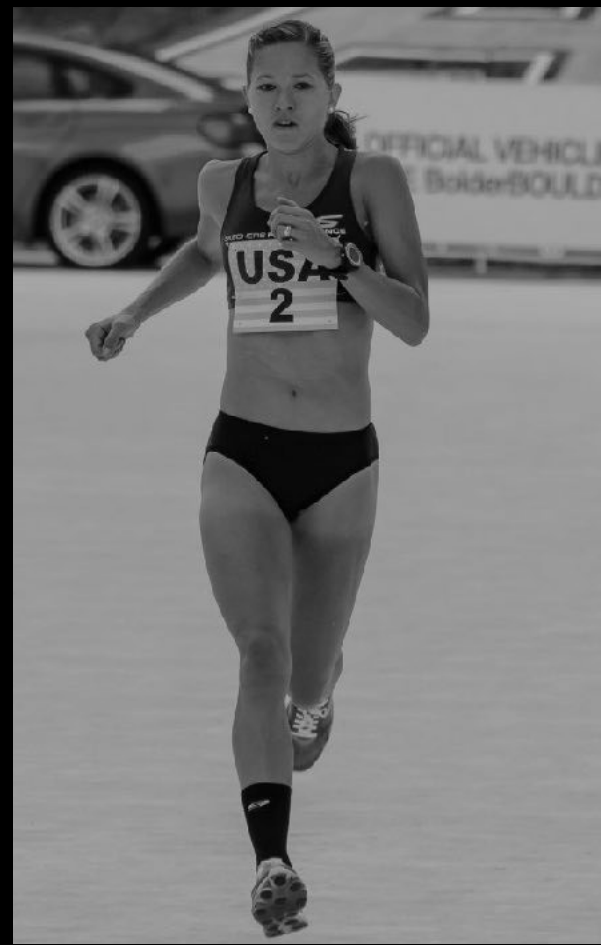
Gwen Jorgensen

"Size was a major issue for swim suits. I **hate** two pieces but was forced to wear them."



Julia Webb

"...started to **outgrow** any long sleeve options (it was winter) so I started wearing my husbands..."



Tara Welling

"Maternity activewear is very hard To find." "I just sized up but then **nothing ever fits right.**"



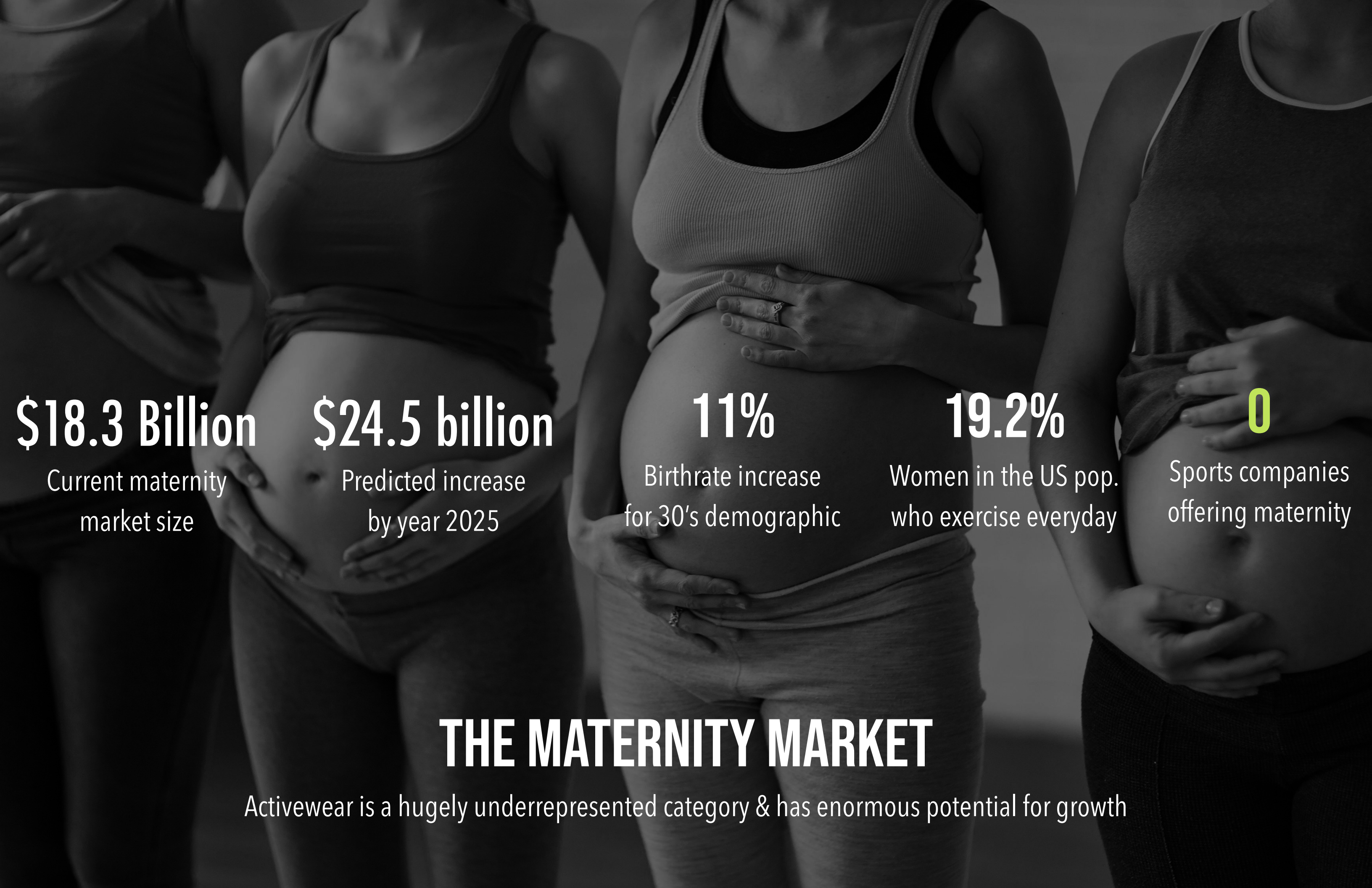
Lauren Goss

"I'm finding that I need a good bra with **more support**"



Sara Gross

"I wore a belly band but there is a lot of **room for improvement**, its very basic "



\$18.3 Billion

Current maternity
market size

\$24.5 billion

Predicted increase
by year 2025

11%

Birthrate increase
for 30's demographic

19.2%

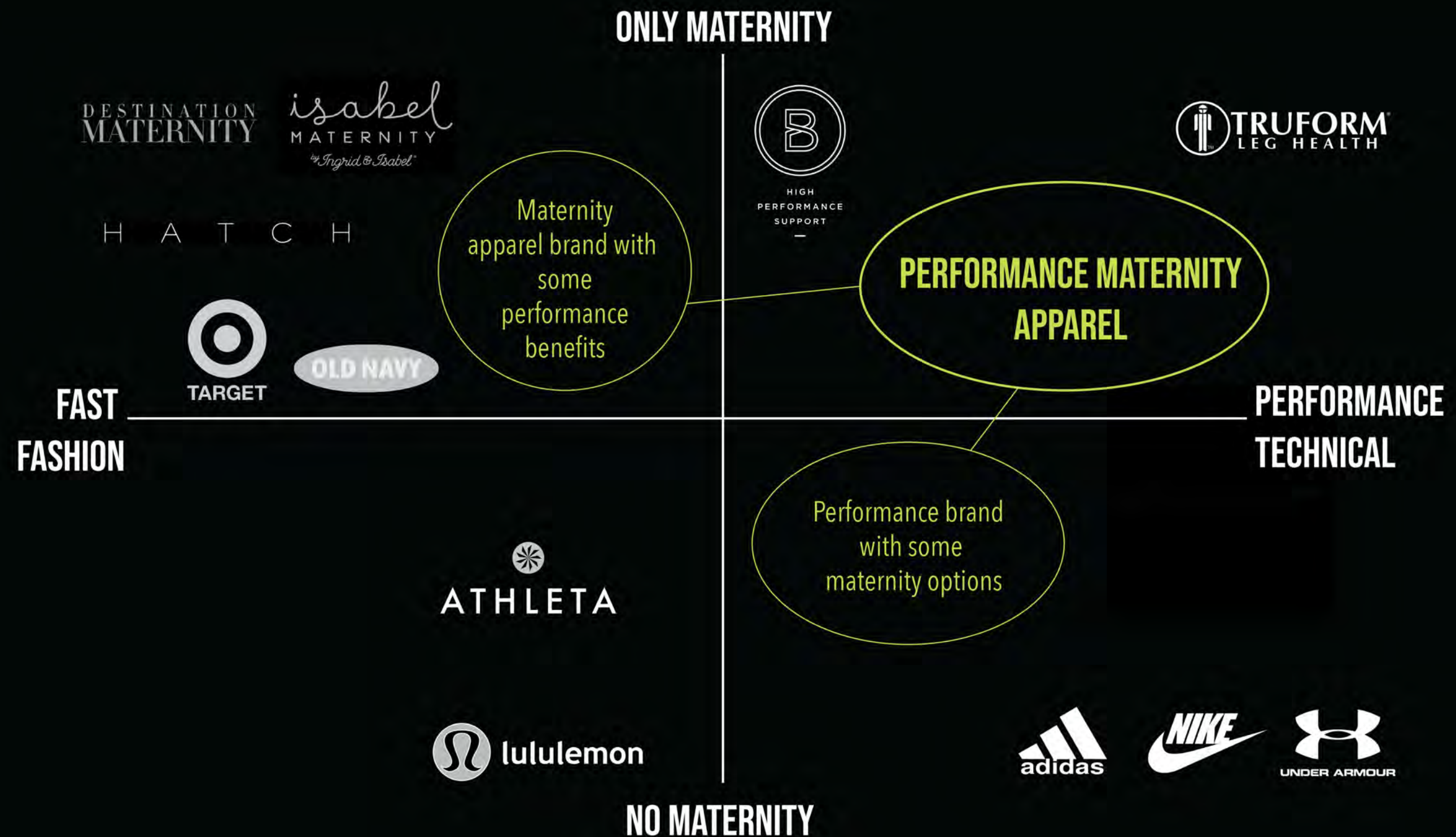
Women in the US pop.
who exercise everyday

0

Sports companies
offering maternity

THE MATERNITY MARKET

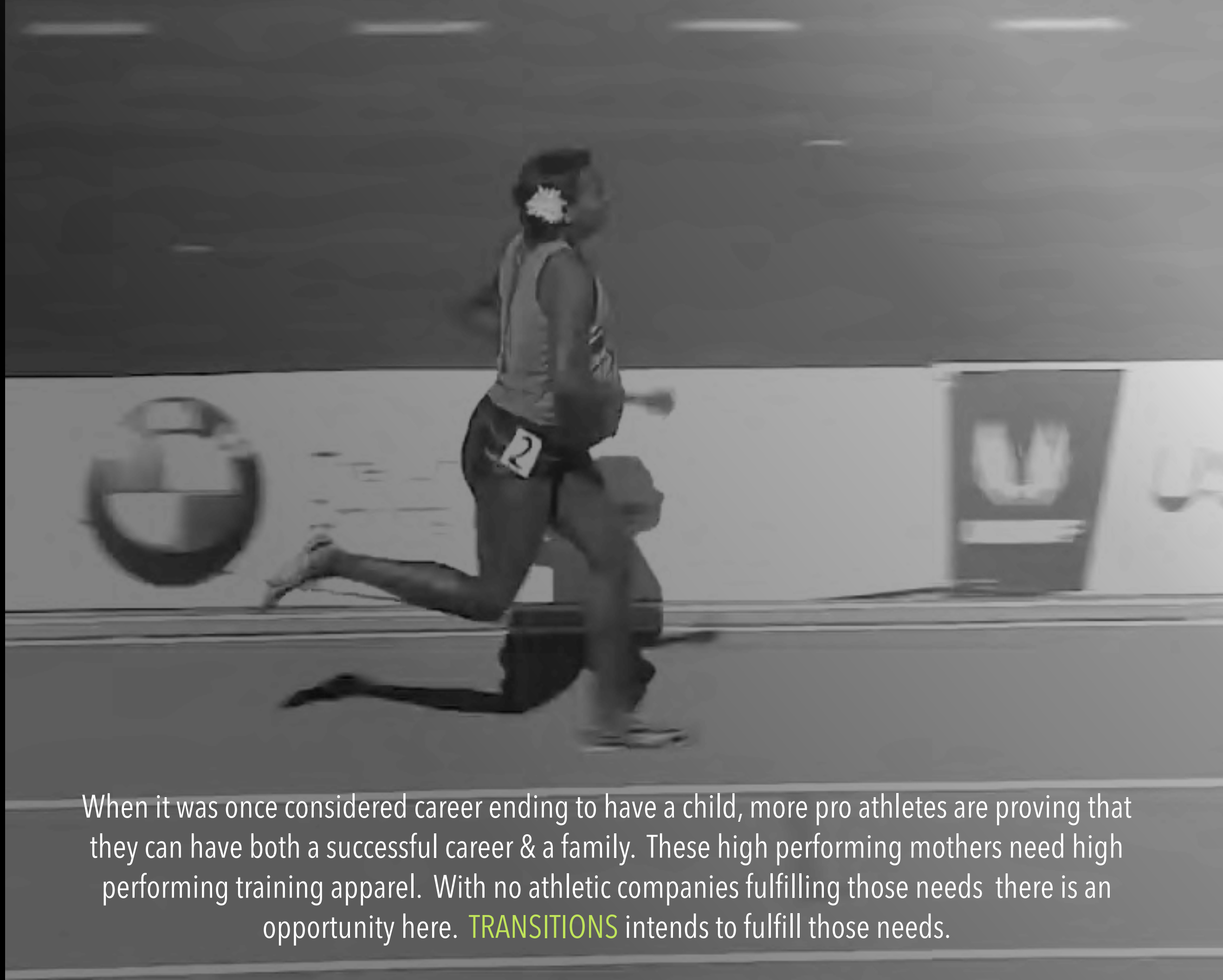
Activewear is a hugely underrepresented category & has enormous potential for growth



THE MARKET LANDSCAPE

Identifying the areas of opportunity

THE PROBLEM



When it was once considered career ending to have a child, more pro athletes are proving that they can have both a successful career & a family. These high performing mothers need high performing training apparel. With no athletic companies fulfilling those needs there is an opportunity here. **TRANSITIONS** intends to fulfill those needs.



INTENTION

This collection will provide female athletes with adjustable training garments that will accommodate the body's growth, offer targeted support, solve for thermoregulation & provide comfort & style through all three trimesters & beyond.

SEAMLESS

ADJUSTABLE

DYNAMIC

A woman is shown from the waist up, wearing a black athletic jacket with large lime green panels on the sleeves and back. She is in a dynamic, athletic pose, leaning forward with her right arm bent and hand near her head. The background is a plain, light gray.

ATHLETE OUTCOME

Most of the maternity apparel purchased is discarded at the end of the pregnancy. In an effort to extend the longevity of these items, they have been carefully designed & constructed to adjust to a woman's changing shape to provide less product with more adjustability, style & versatility.

WOOL IS THE **NATURAL** CHOICE



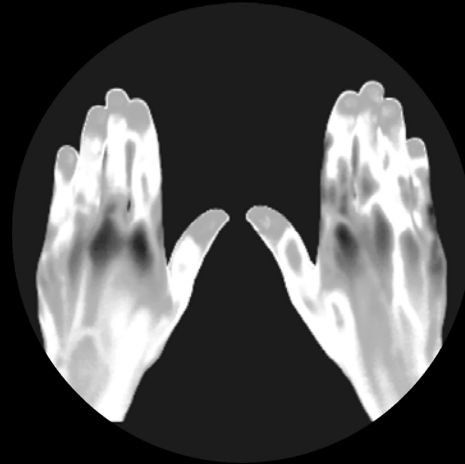
Strength & Resilience

Wool fibers can stretch up to 30% their natural length before breaking making them both lightweight & durable



Better For The Planet

Wool is natural as it is grown by sheep which means it is also renewable & biodegradable



Temperature Management

The structure of wool fibers trap air which keeps the wearer warm & evaporation keeps the wearer cool



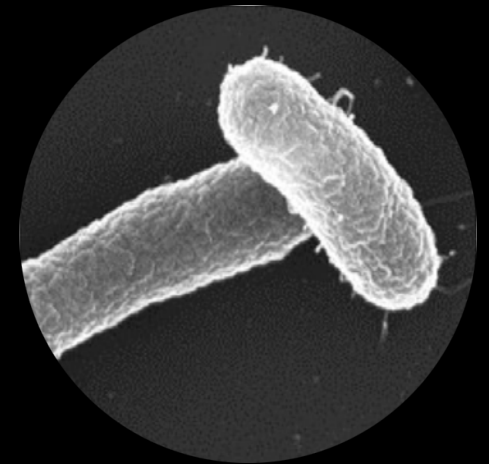
Sun Protection

Wool has natural built in sunblock that protects from UV & UVB rays with an SPF of +30



Moisture Management

The fibers have an extremely high absorbency that pulls moisture to the surface while still feeling dry to the touch



Odor Resistant

Lanolin, an oil that naturally occurs in wool is antibacterial, reducing the growth of odor causing bacteria

MATERIALS

Cut down on the waste created by the apparel industry & reduce exposure to toxins & chemicals found in synthetic fabrics



\$500

Spent on maternity
apparel per pregnancy

16 weeks

The amount of time
these items are worn

40 weeks

The length of
A regular pregnancy

84%

Of unwanted clothes
end up in landfills

500 years

For synthetic fibers
to biodegrade

STOP WASTE, BUY LESS, GET MORE

Put the focus on versatility, longevity, **sustainability** & quality



RUN



SWIM



BIKE



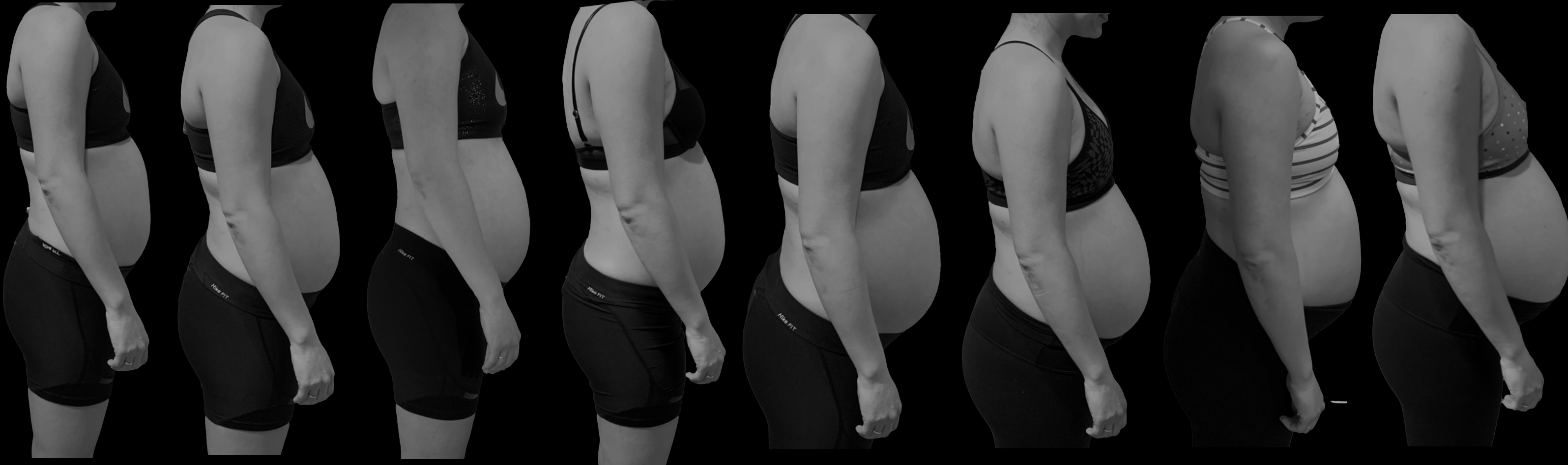
RECOVER

THE ACTIVITIES

Aerobic exercise recommended as safe to engage in while pregnant, also the 3 sports that make up a triathlon

THE ATHLETE & CONSUMER

Who is she? What are her apparel needs?



WHO:

34 years old

Currently in her third trimester (34 weeks)

High performing amateur runner & triathlete

Goal: Remain active through pregnancy ,
return to sport as soon as possible

OBSTACLES:

Main weight gain in belly region

Petite stature, noticeable shift in center of gravity

Needs belly support

Experiencing pain in the pubic symphysis due to
loosening of ligaments in the pelvis region

NEEDS:

Comfort, Coverage, Support

Doesn't have a disposable income

Wants to look put together & stylish

Main Objective: Exercise apparel that
fits over her bump that she can move & sweat in

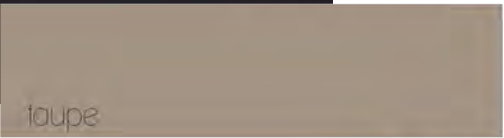
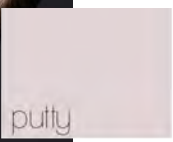
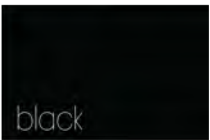
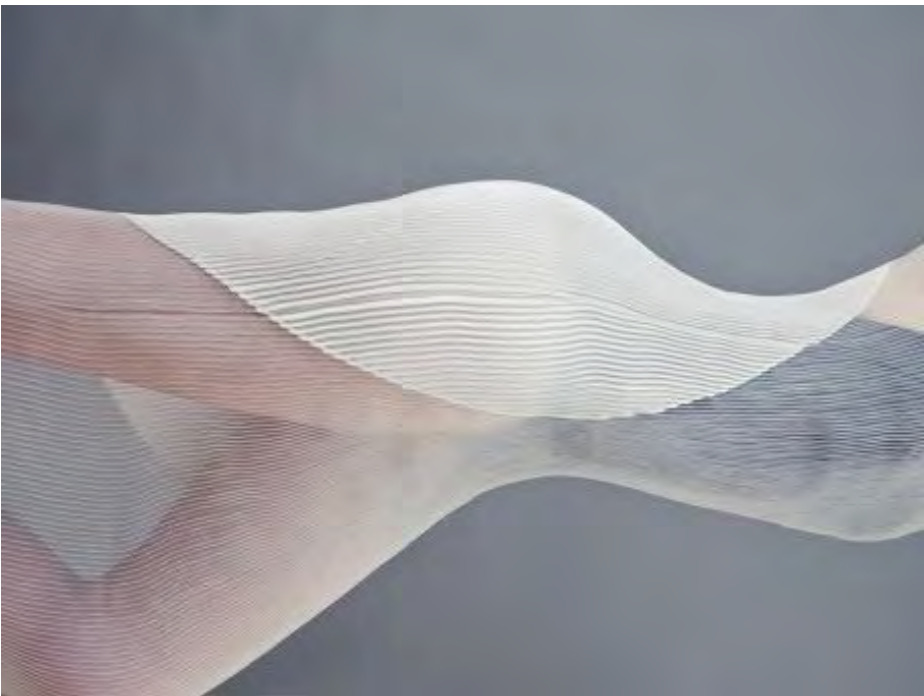
AESTHETICS

Mood Boards & Inspiration



INSPIRATION

Undulating lines created by built in structural support & adjustability creates its own aesthetic language



SEASONAL



COLOR :



CORE



subtle feminine neutrals accented with bright pops

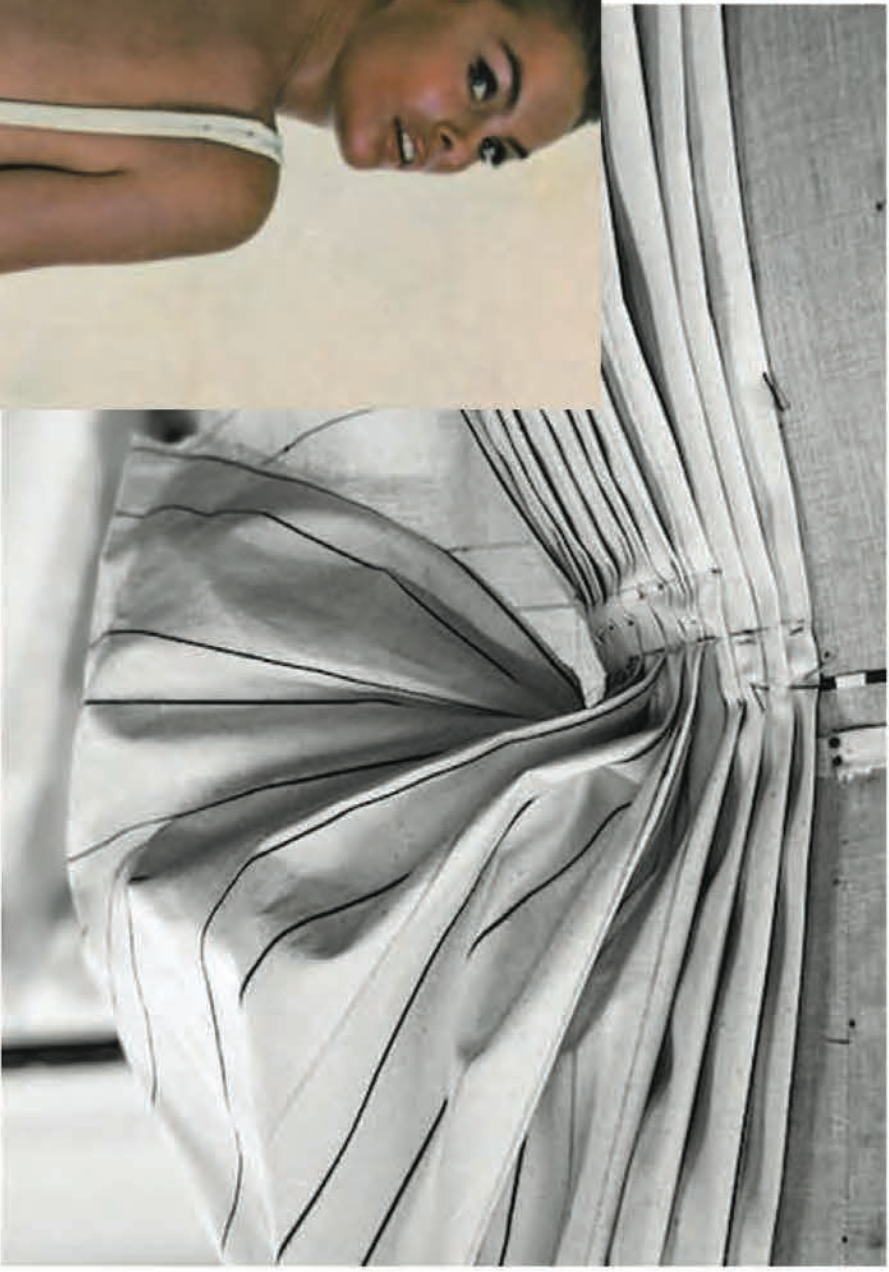


AESTHETICS/DESIGN LANGUAGE

Garments wrap around the form following the body's curves

MATERIALS/MAKE

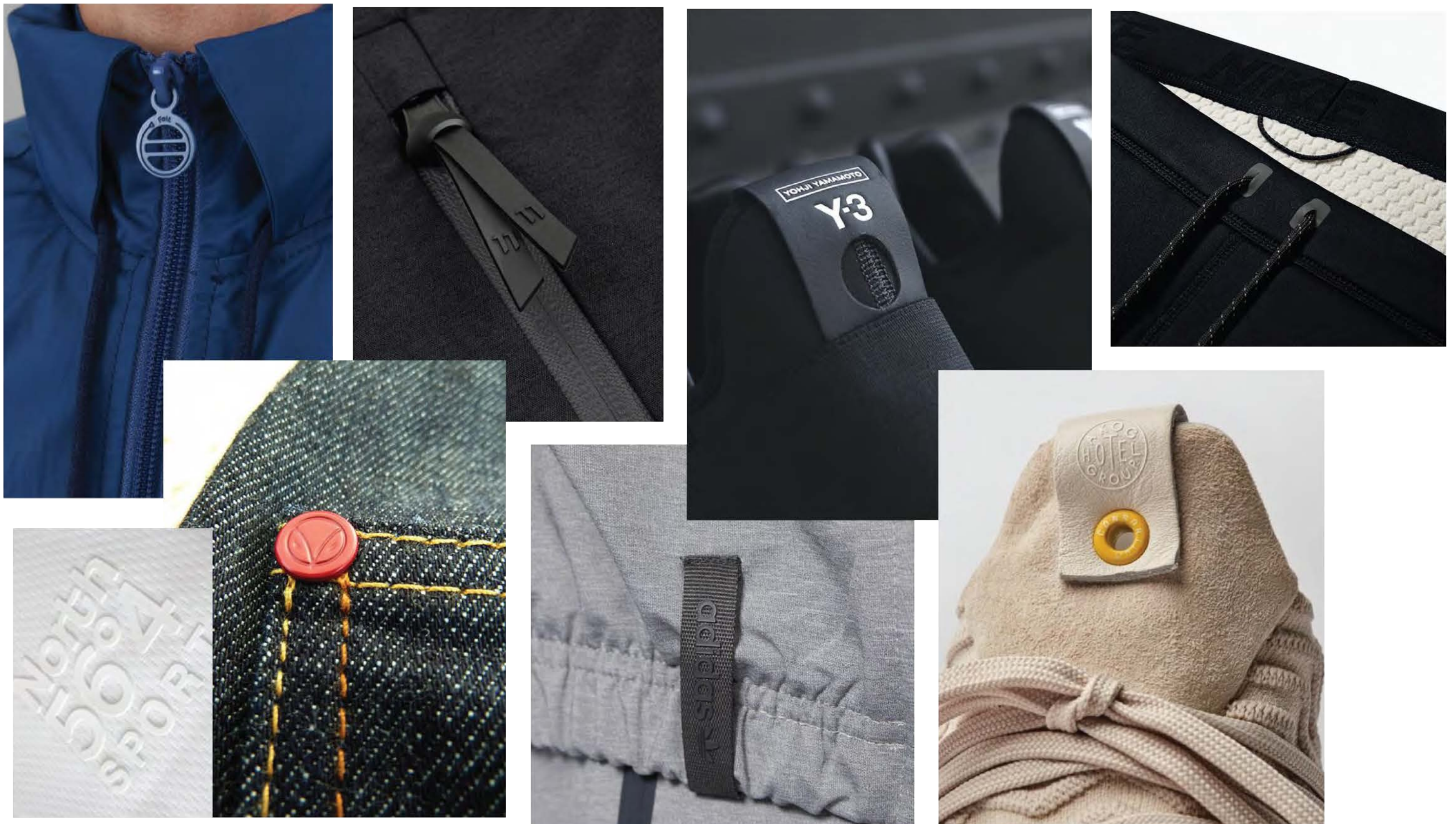
Seamless knitting, wrapping, folding to create structure & support





BRANDING/LOGO INSPIRATION

Circles symbolize unity, wholeness, renewability & power as well as the mother, the egg & the cycle of life



BRANDING ELEMENTS INSPIRATION

Examples of the circle used in trims, hardware & labeling

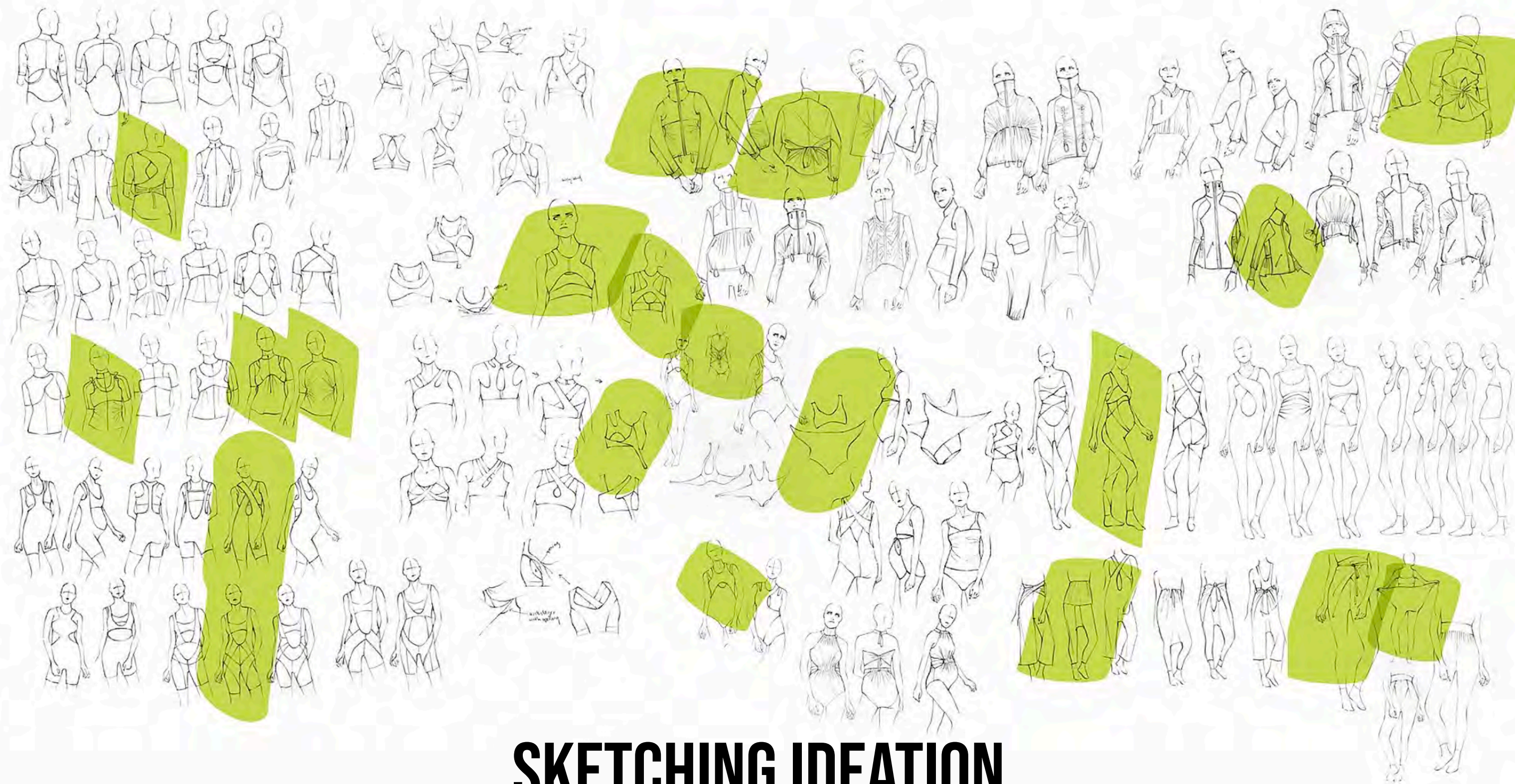


PACKAGING INSPIRATION

Minimal, elegant, elevated with incorporation of the circle

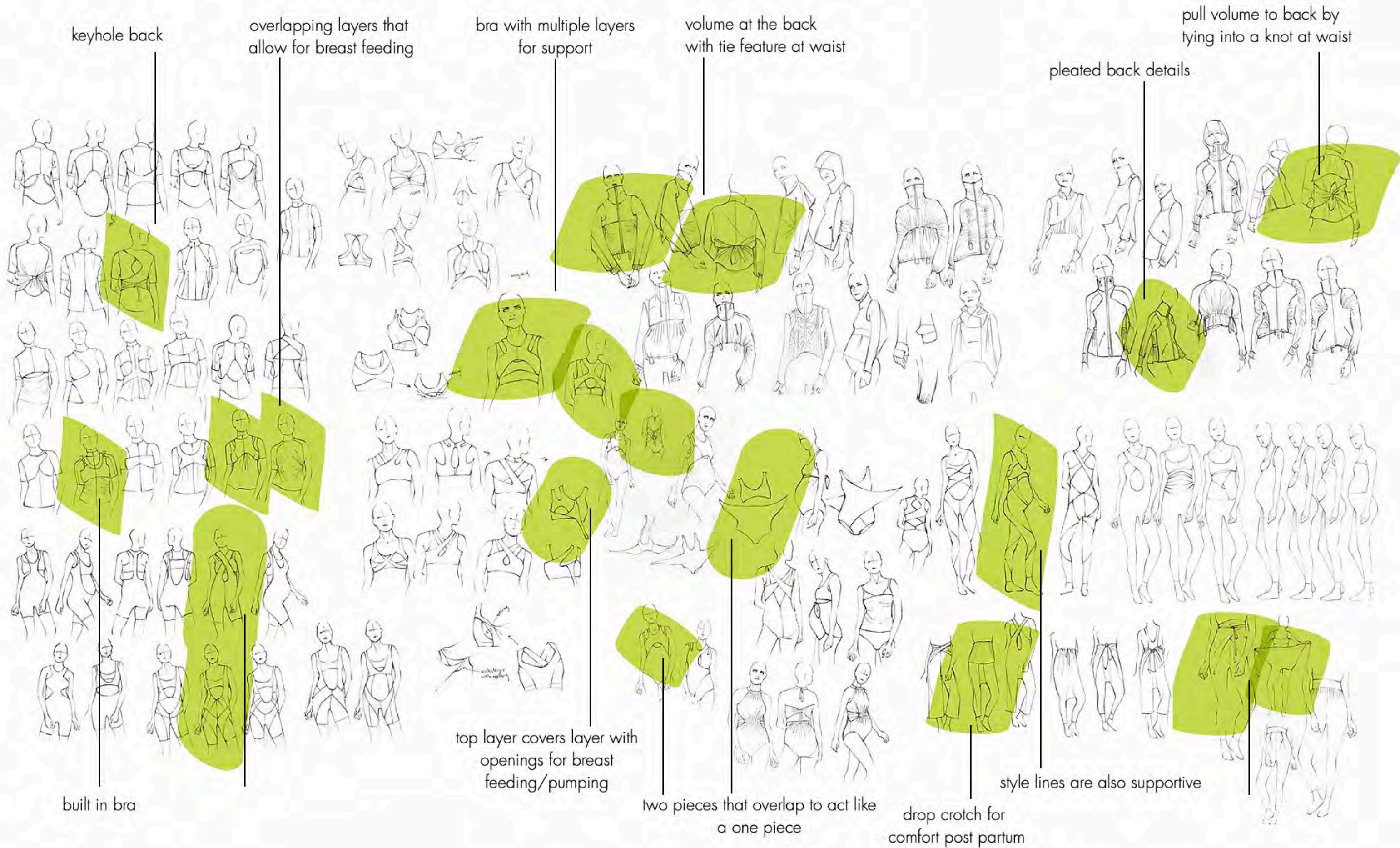
IDEATION

Sketches



SKETCHING IDEATION

Generating ideas around silhouette

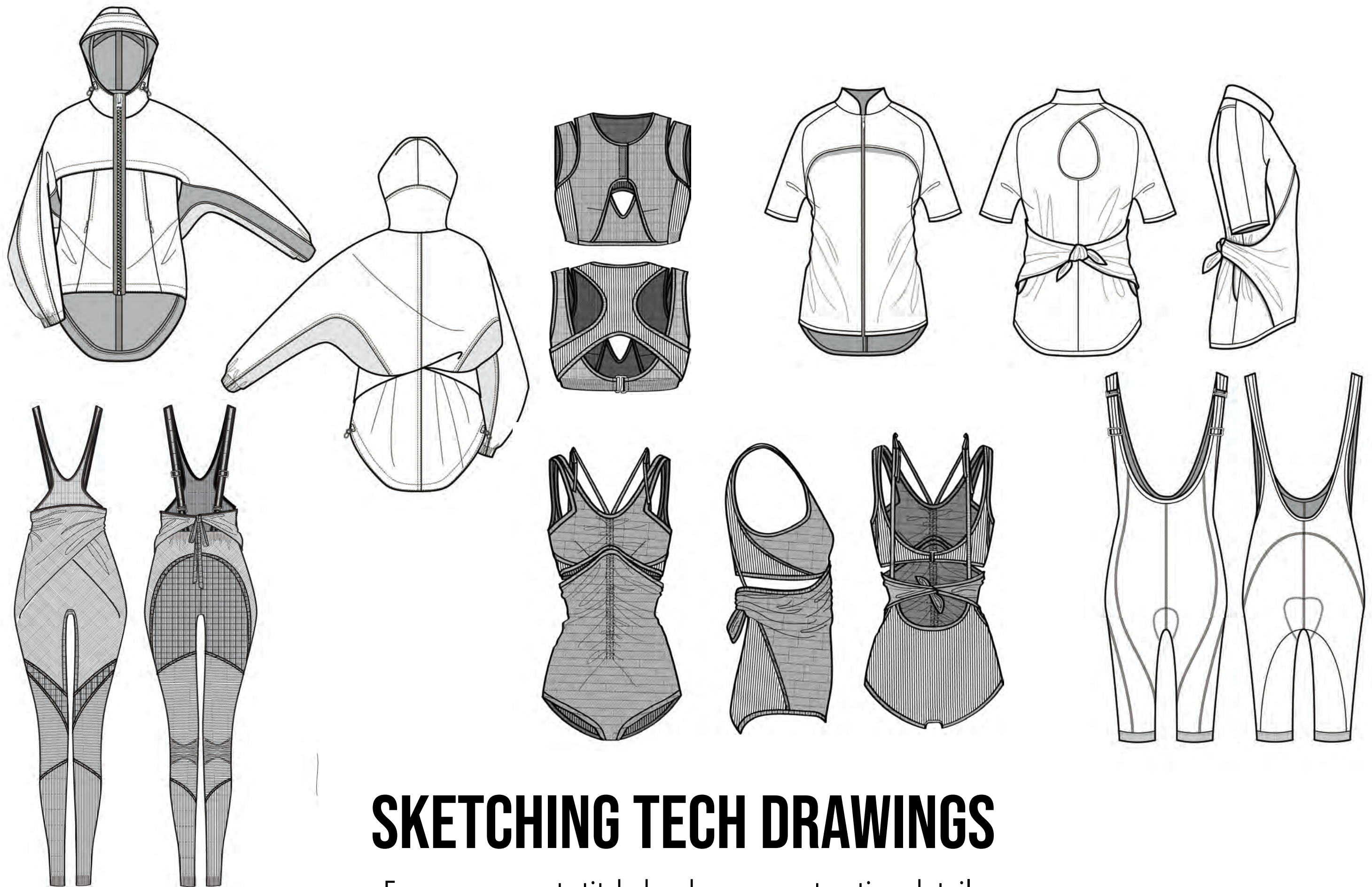


Identifying concepts to pursue on the dressform



SKETCHING IN PROGRESS

Process Video



SKETCHING TECH DRAWINGS

Focus on correct stitch, hardware, construction details



Lightweight



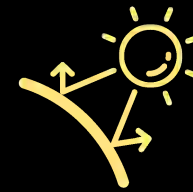
Contains Wool



Water Repellent



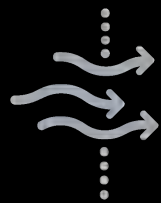
Wind Proof



UV Protection



Nursing



Breathable



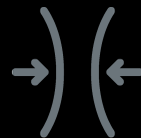
Thermoregulation



Wicking



Adjustable



Compression



4-way Stretch



Storage



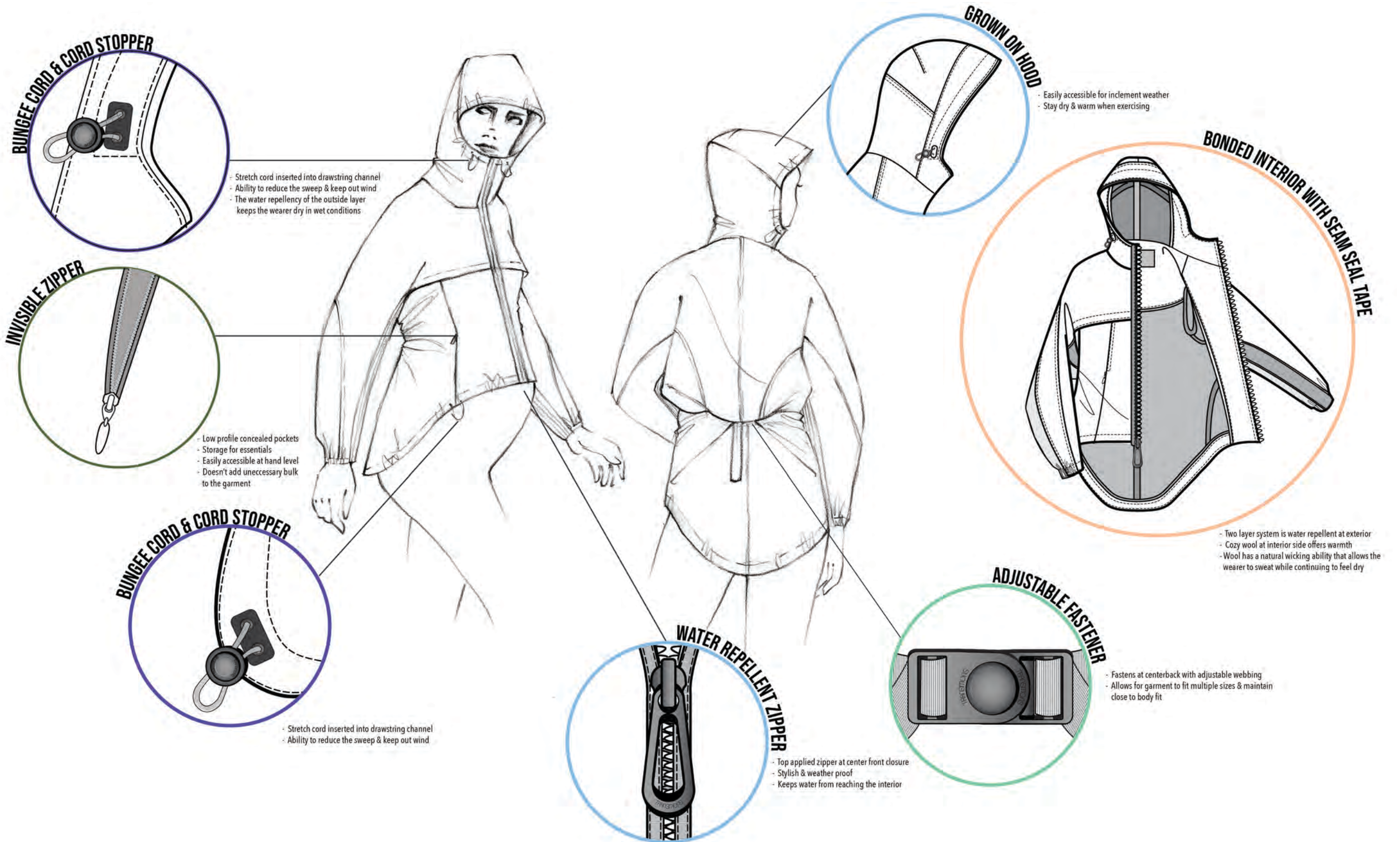
Antibacterial



Supportive

PARTS & PURPOSES

Features key of benefits

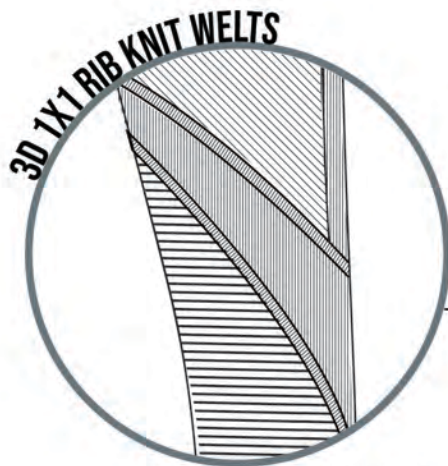


SWALLOWTAIL ANORAK / RUN

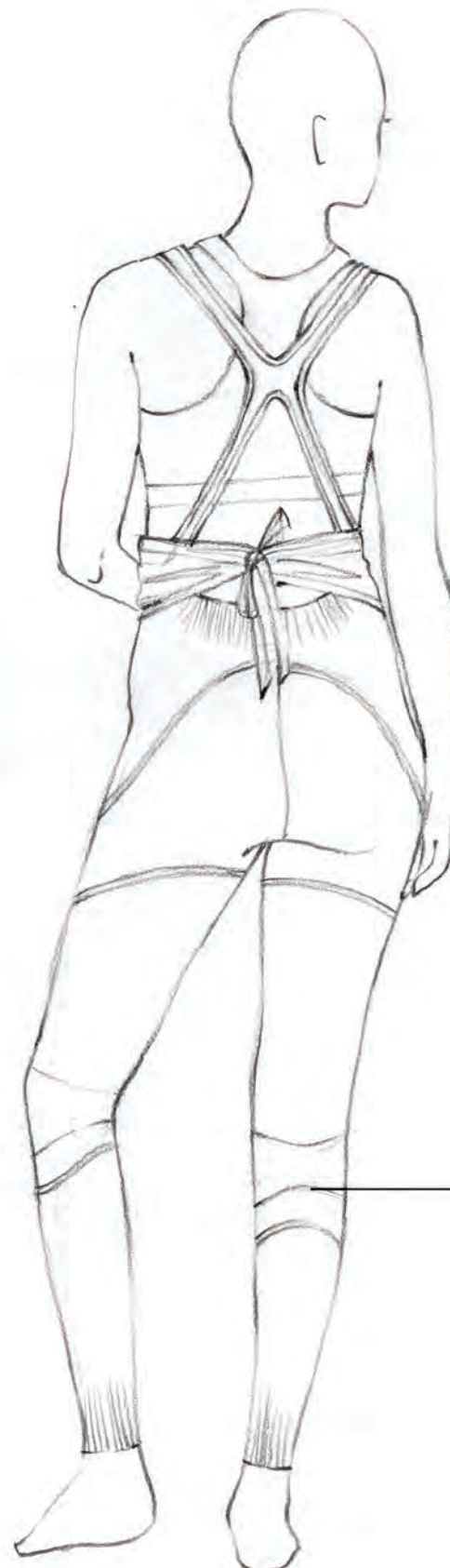




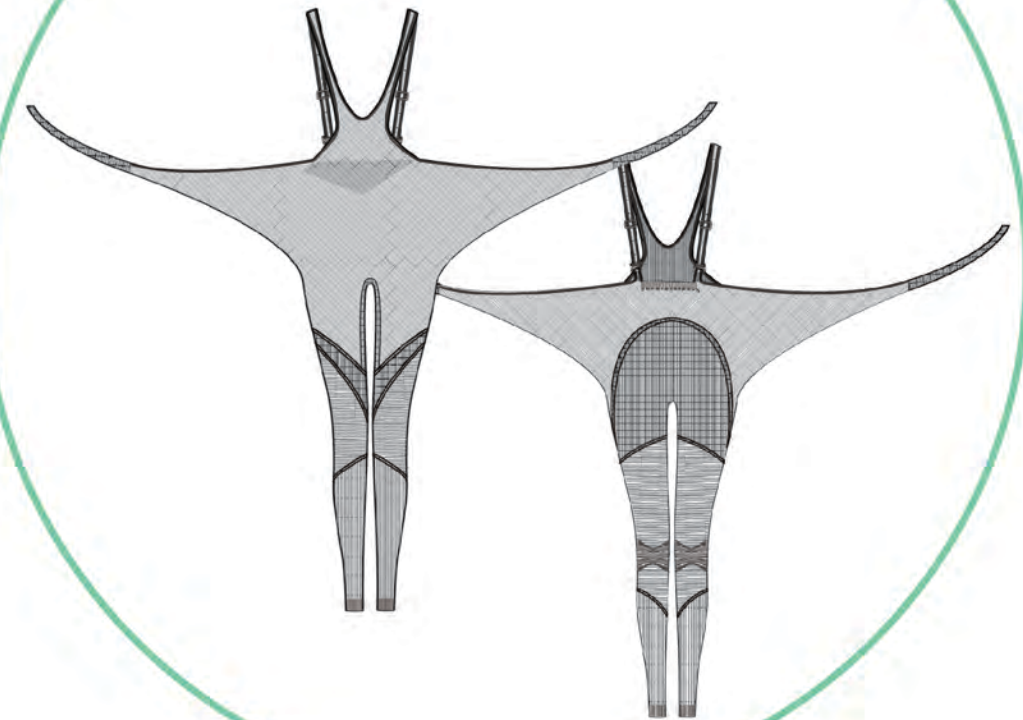
- Detachable strap, slider allows for adjustability
 - Accommodates changing body shapes while maintaining the same fit
 - Easily unfastened for donning & doffing
- Straps give the feeling of security as well as supports the belly
 - Tightening the straps gives wearer a feeling of the belly being "lifted"
 - Straps keep pants from riding down



- Built in engineered compression
 - Compression without being constrictive
 - Consumer wants to feel "held in" but not "squeezed"
- Gives structure & support to the garment
 - Won't stretch out for longer lasting use

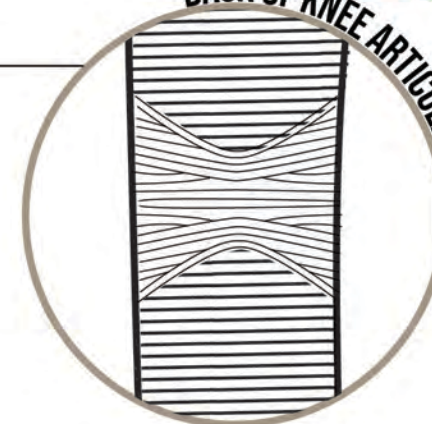


ENGINEERED SHAPE THAT WRAPS AROUND BODY



- Shape adds width to the garment to accomodate belly growth
- The wrap style allows for a close to body fit
 - Customizable fit
 - Versatile & stylish, a unique hardworking item in the consumer's wardrobe

BACK OF KNEE ARTICULATION



- Engineered articulation created by 3D knitting
- Improves fit & comfort, increases mobility at knee

ANGLEWING LEGGINGS / RUN



CENTER FRONT DRAWSTRING CHANNEL

- Ties pass through channel attaching the bottom & top
- Offers the coverage of a one piece
- Able to adjust ruching to fit on different sizes
- Reduce the ruching to expand the garment lengthwise to accomodate for belly growth

1/2" LINGERIE SLIDER & RINGS

- Slider and rings allow for adjustability in length of strap
- Able to adjust to body changes while still feeling secure & comfortable

ENGINEERED SHAPE THAT TIES AT BACK

- Shape adds width to the garment to accomodate belly growth
- Customizable fit
- Offers the consumer style & versatility
- The wrap style allows for close to body fit

SKIPPER MAILLOT / SWIM



OVERLAPPING LAYERS AT FRONT

- Layers can be pulled open for breast feeding
- Not required to remove garment to breast feed
- Only one hand needed to manipulate garment
- Preserves modesty as top layer reduces exposure



SEPARATING INVISIBLE ZIPPER

- Low profile light weight CF closure
- Avoids over the head donning
- Does not add unnecessary bulk to the garment
- Shape adds width to the garment to accomodate belly growth
 - Customizable fit
 - Offers the consumer style & versatility
- The wrap style allows close to body fit

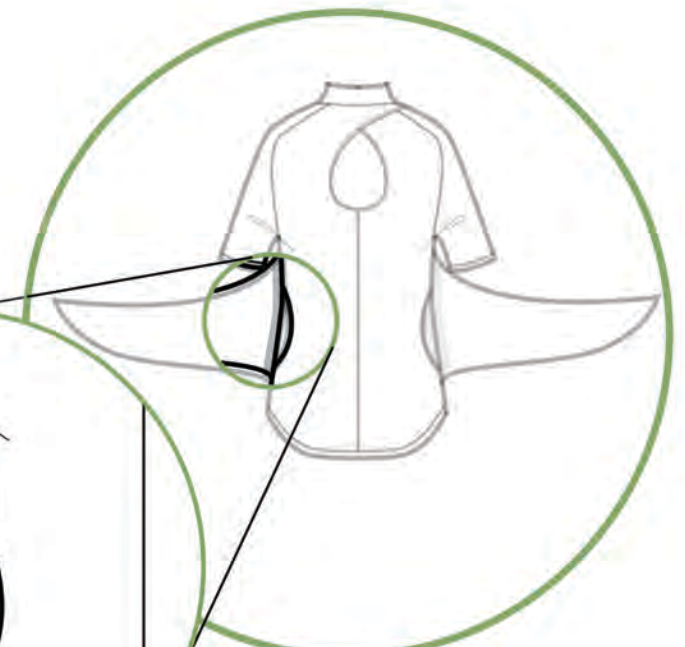


ENGINEERED SHAPE THAT TIES AT BACK



SIDE ENTRY BACK POCKETS

- Low profile concealed pockets
- Storage for nutrition & other essentials
- Easy to reach while on bike
- Does not add unnecessary bulk to the garment



MESH FACINGS AT INTERIOR

- Mesh is soft and comfortable to reduce chaffing
- Breathable mesh at facings to reduce bulk
- Adds increased absorbancy in high sweat zones



GYPSY JERSEY / BIKE

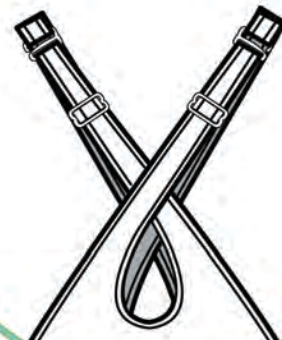


ADJUSTABLE STRAPS (BACK VIEW)

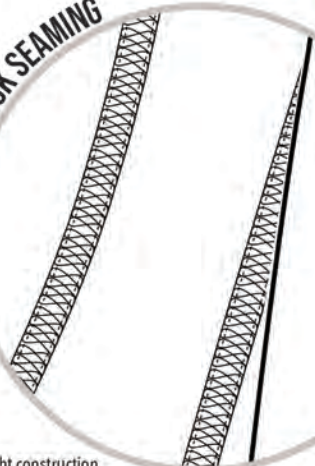


- Straps can be worn crossed over body for more accomodating fit over growing belly
- Offers comfort
- Wearer feels secure & supported

ADJUSTABLE STRAPS (FRONT VIEW)

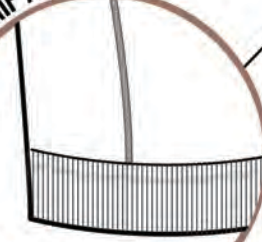


FLATLOCK SEAMING



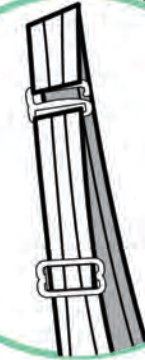
- Light weight construction
- Stretches with body
- Low profile construction reduces bulkiness
- Less likely to chaff due to flatness of the seam

1 1/4" ELASTIC WITH SILICON GRIP AT INTERIOR



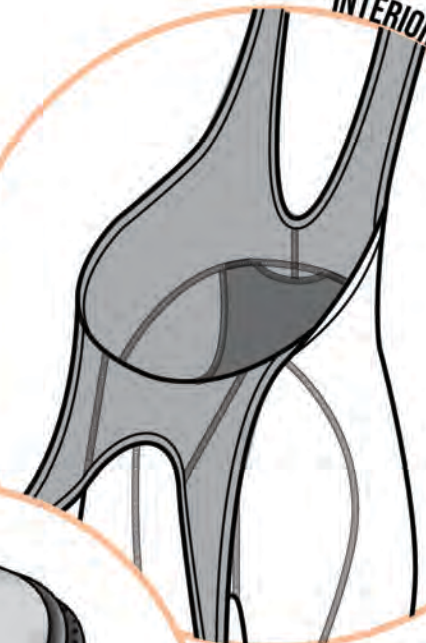
- Silicon provides secure fit at leg
- Reduces riding up
- Soft & secure, not restrictive

1" LINGERIE SLIDER & HOOK



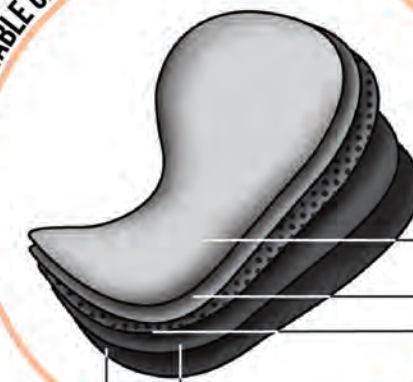
- Detachable strap, slider allows for adjustability
- Straps give the feeling of security as well as supports the belly
- Tightening the straps gives wearer a feeling of the belly being "lifted"
- Straps hold pants up so they don't slide down

INTERIOR POCKET FOR REMOVABLE CHAMOIS



- Stain resistant, wicking material has interior opening to hold removable chamois pad

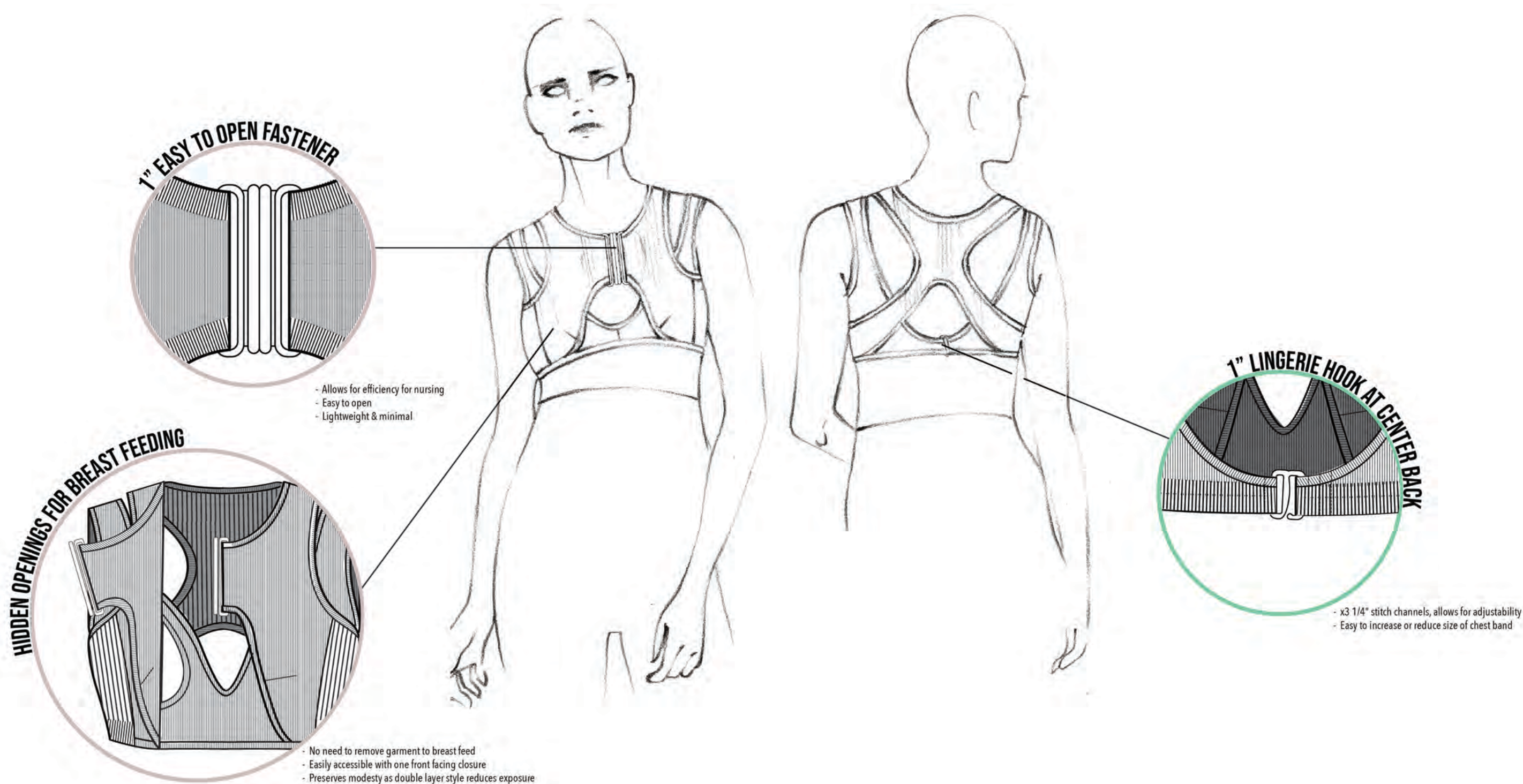
REMOVABLE CHAMOIS PAD



- TOP LAYER: Moisture wicking polyester surface
- keeps wearer feeling dry
- 2ND LAYER: Antibacterial silver treated polyester
- discourages growth of bacteria
- reduces odors
- 3RD LAYER: Super absorbant layer
- holds up to 18 ounces of liquid
- convenient for any incontinence post partum or increased pressure on bladder, menstrual cycle or residual lochia (post partum bleeding)
- 4TH LAYER: 25mm Foam
- High impact absorption
- Increases comfort on the saddle
- Protects sit bones
- 5TH LAYER: Leak Proof Layer
- Quick drying
- No staining on exterior of garment
- Provides comfort & confidence

LUNA BIBS / BIKE





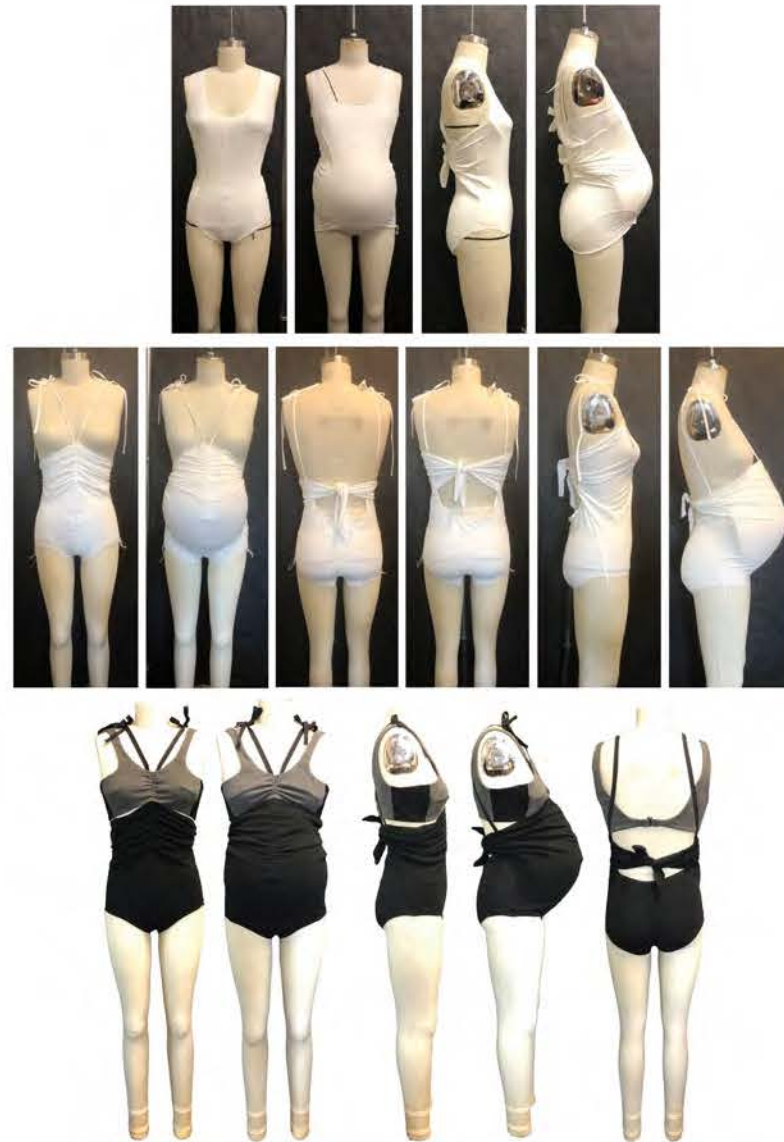
MONARCH FOUNDATION / RECOVER



PROTOTYPE SUMMARY

& Athlete Feedback

SWIM



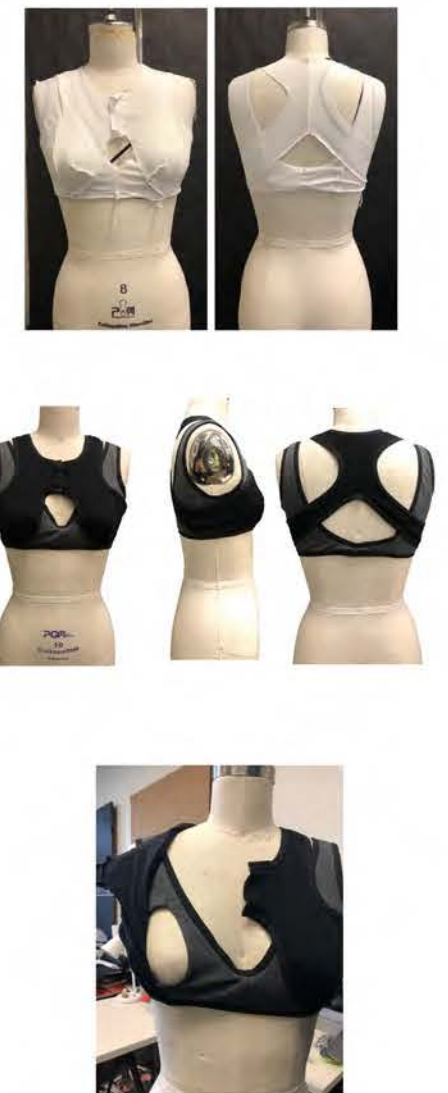
RUN



BIKE



RECOVER



PROTOTYPING

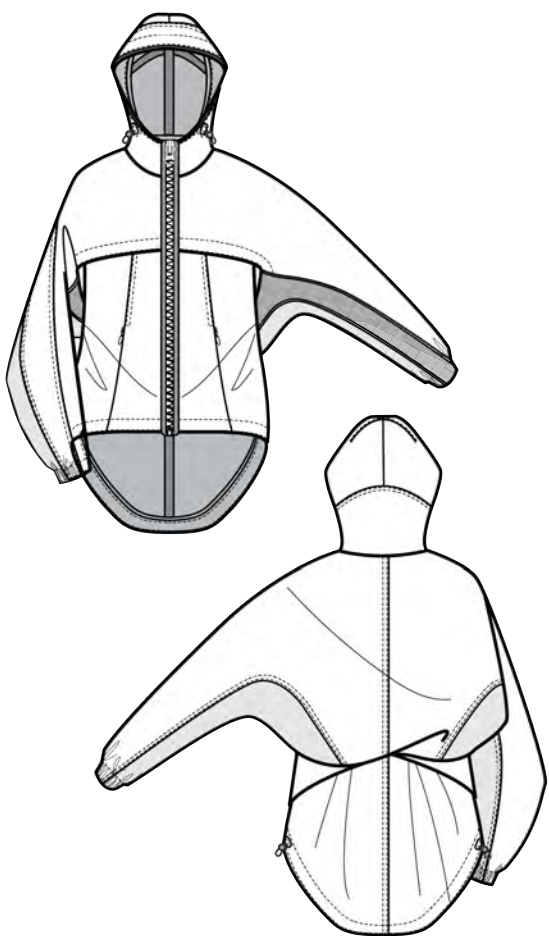
All stages of silhouette development on the dress form



PROTOTYPING IN PROGRESS

Process Video

TECH FLAT



PROTOTYPES



FIT PHOTOS



ATHLETE FEEDBACK

FIT:
"The armholes were a little too narrow"
"The adjustable strap on the back was nice for accommodating different torso sizes."

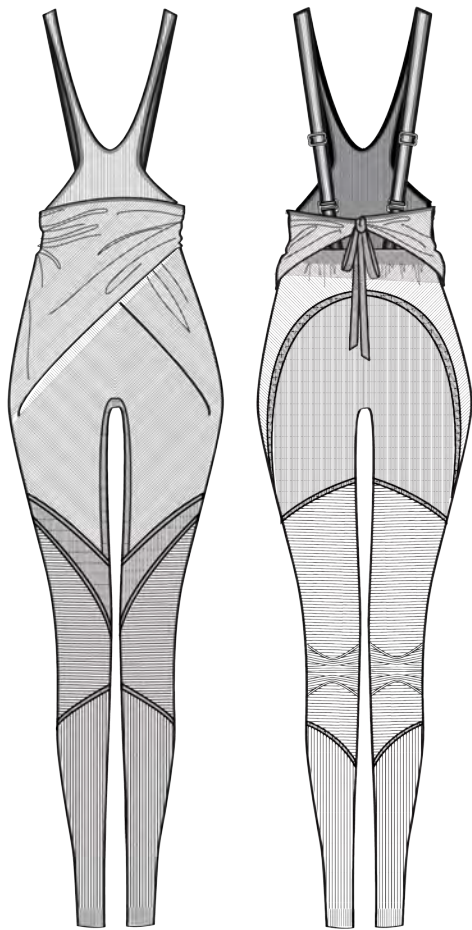
For future iteration would like for the sleeves & hood portion to separate from the vest/body part.

PERFORMANCE:
"The sleeves gave me room to bend forward & not pull, but I had quite a bit of extra billowy fabric in back...not that you're going for speed when you're pregnant, but that might act as a sail in the wind."
Would like to reduce volume of back for revisions going forward.

STYLE/DETAILS:
"As far as aesthetics, the jacket was my favorite"
"The colors are great - not too loud but not too boring. I like the hemline with it shorter in the front & longer in the back. I think it's a flattering cut..." Fabric "feels warm but not stiff."

TRANSITIONS
SWALLOWTAIL JACKET

TECH FLAT



PROTOTYPES



FIT PHOTOS



ATHLETE FEEDBACK

FIT:
"These straps are clutch"
Liked the adjustability to tighten the straps to support the belly.

Also appreciated that the wrap style also provided additional coverage.

PERFORMANCE:
Straps also gave the garment a feeling of security, that they weren't riding down, common complaint amongst pregnant women.

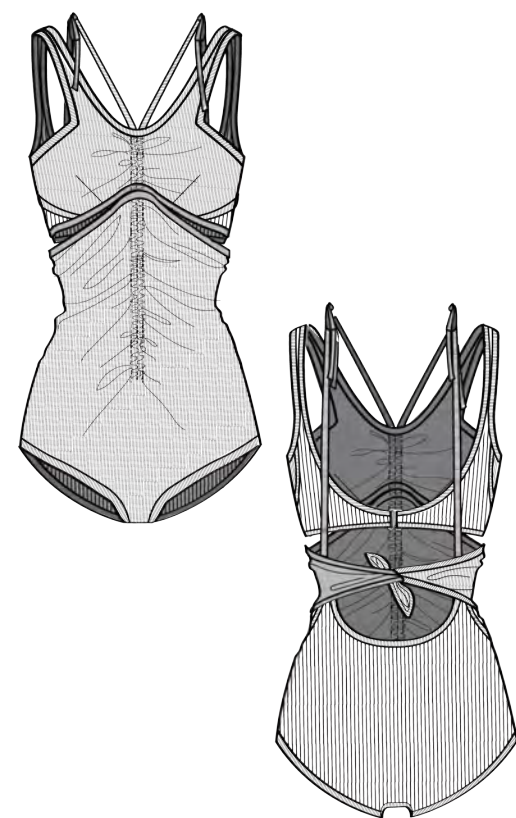
Had good range of motion, could perform squats & lunges with the garment staying in place.

STYLE/DETAILS:
Loved the wrapping feature, but felt the tie length was too long & might get in the way when running.

Leg length also felt too long for a petite frame.

TRANSITIONS
ANGLEWING LEGGINGS

TECH FLAT



PROTOTYPES



FIT PHOTOS



ATHLETE FEEDBACK

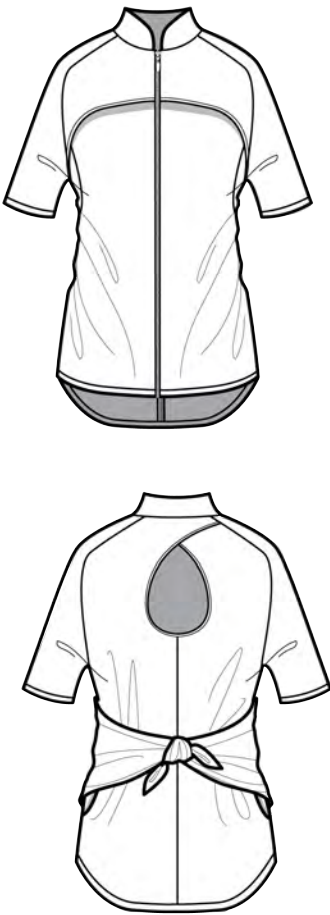
FIT:
"I could use this swimsuit right now"
Had just outgrown her regular swimsuit as her bump was stealing fabric from the bust & was becoming too revealing. Really liked the amount of coverage this garment provided while remaining comfortable.

PERFORMANCE:
Did not do a full water test.
Felt like the garment would be appropriate for the beach or the pool. Would be able to complete scripted workouts as it felt streamlined & close to body.

STYLE/DETAILS:
Liked the overall styling, felt that the ties at the shoulder were a little tricky & might get in the way. Will revise to sliders for the final garment.

TRANSITIONS
SKIPPER MAILLOT

TECH FLAT



PROTOTYPES



FIT PHOTOS



ATHLETE FEEDBACK

FIT:

"The tie back option is great for accommodating different belly sizes...they only issue is that it kind of blocks the back pockets once it's tied."

Personal preference for a lower collar, shorter sleeves & less of a hem differential at the back due to her petite frame.

PERFORMANCE:

Mobility was good, but even bent over in the cycling position, felt the hem was still too long in the back.

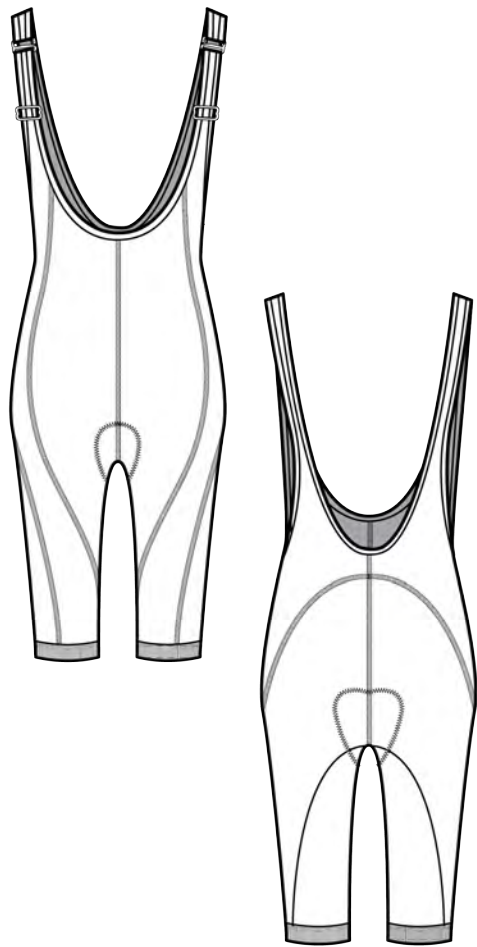
Fabric (which was bought at retail) felt a bit heavy for indoor cycling. But "if it's for a winter jersey, I think that works great."

STYLE/DETAILS:

"Love the two tone color, and the open back means it doesn't pull on my shoulders."

TRANSITIONS
GYPSY CYCLING JERSEY

TECH FLAT



PROTOTYPES



FIT PHOTOS



ATHLETE FEEDBACK

FIT:

"The cycling bibs fit really well. I crossed it in the back & left it overall style in the front, & it was perfect."

Athlete would prefer a shorted leg length

PERFORMANCE:

"The chamois hit at exactly the right spot - not too padded way in the front"

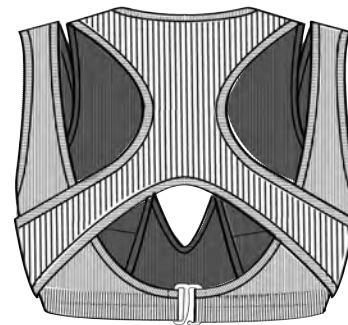
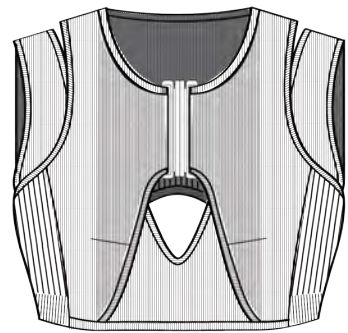
The leg opening felt a bit tight and the athlete would prefer "if you could add those silicon bands at the bottom & the edge didn't have a seam"

STYLE/DETAILS:

If it was black, navy, or any other dark color, I would definitely grab them off the rack & buy these. I think it would be super comfortable and flattering.

TRANSITIONS
LUNA CYCLING BIBS

TECH FLAT



PROTOTYPES



FIT PHOTOS



ATHLETE FEEDBACK

FIT:

"Wow, this actually feels really comfortable & it looks like it would work, although I don't have any experience with breast feeding"

Currently not alot of weight gain in the bust & this felt & fit securely.

PERFORMANCE:

Felt comfortable although it was hard to gauge how supportive it was due to the athlete's small frame.

Might need more adjustment features for someone who is actually breast feeding & experiencing more breast size fluctuation.

STYLE/DETAILS:

Athlete had no real feedback other than she really liked the style.

For future iterations it would be ideal to add an internal pocket for a removable nursing pad as well as more adjustable straps

TRANSITIONS
MONARCH FOUNDATION

RUN



SWIM



BIKE



RECOVER



PROTOTYPE DEVELOPMENT

Working on a dressform to develop silhouettes that worked both on a body that was "pregnant" & "not pregnant"



VALIDATION & ATHLETE FEEDBACK

Fit prototypes & final garments on an Ironman Triathlete in the Portland Community at 34 weeks pregnant for fit & style comments

"It would be appropriate for the beach or the pool. I would be able to complete scripted workouts in it as it feels streamlined & lose to the body."

STYLE ●●●●○

"The tie back option is great for accommodating different belly sizes... the open back means it doesn't pull on my shoulders."

FIT ●●●●●

"The adjustable strap on the back was nice for accommodating different torso sizes. The sleeves gave me room to bend forward & not pull..."

ADJUSTABILITY ●●●●●

"Wow, this actually feels really comfortable & it looks like it would work, although I don't have any experience with breast feeding."

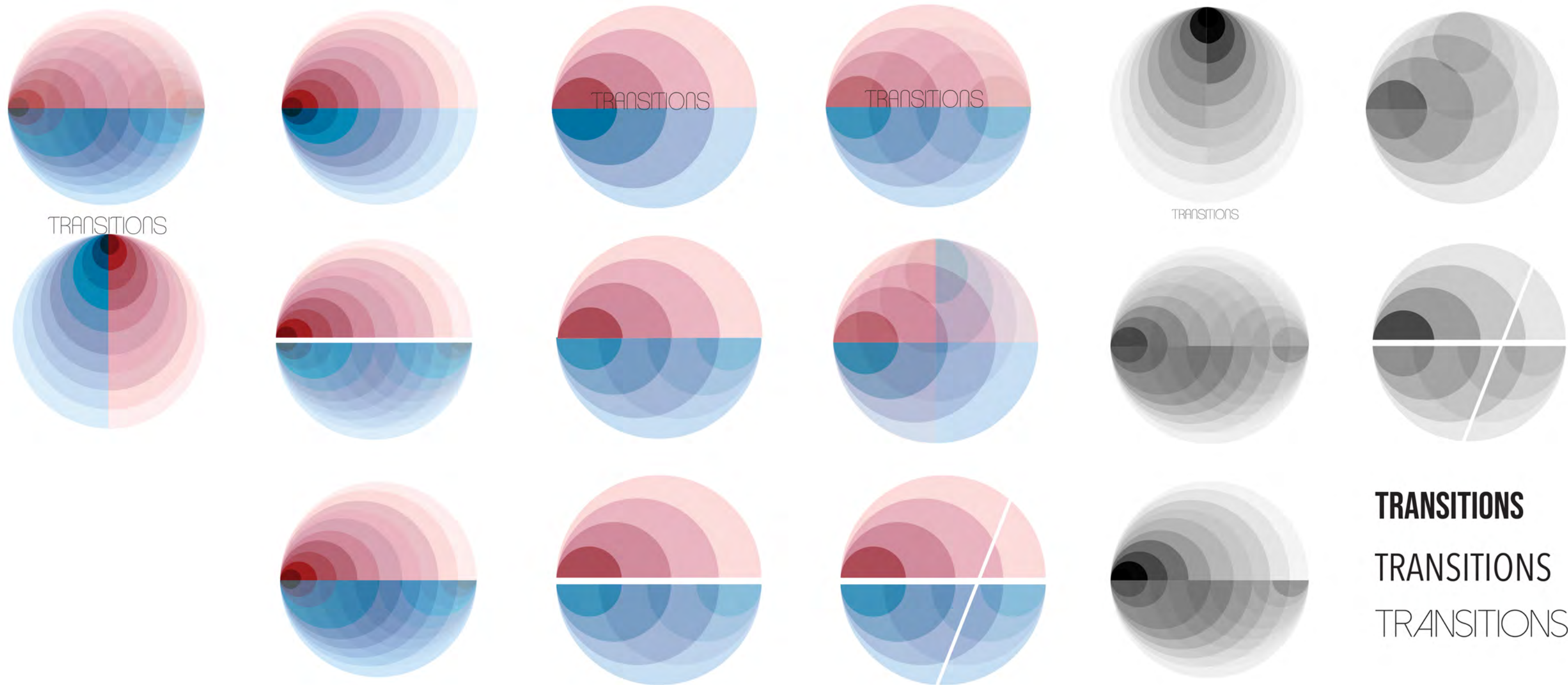
COMFORT ●●●●●

"The straps make it feel like the pants won't ride down."

MOBILITY ●●●●○

BRANDING

Logo, Branding Elements, Packaging



LOGO DEVELOPMENT - FIRST ROUND

Working with layering circles



TAG & LABEL DEVELOPMENT - FIRST ROUND

Working on proportions of logo & color

LABELS:

MAIN LABELS



2 1/2" H X 3/4" W



3" H X 1 5/8" W



SUEDE LABEL FOR PACKAGING

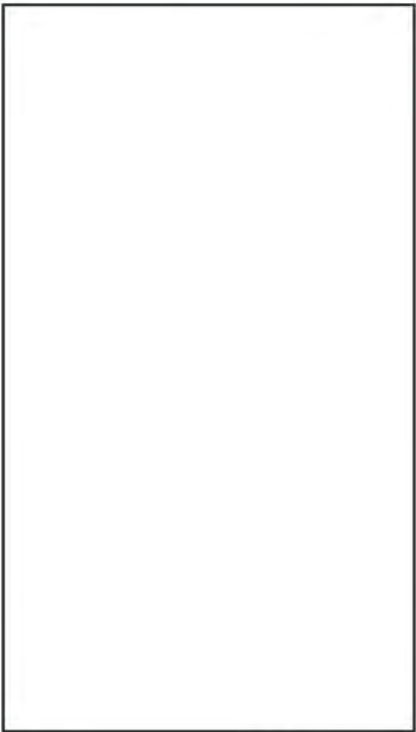


2 5/8" H X 1 1/4" W
(on fold)

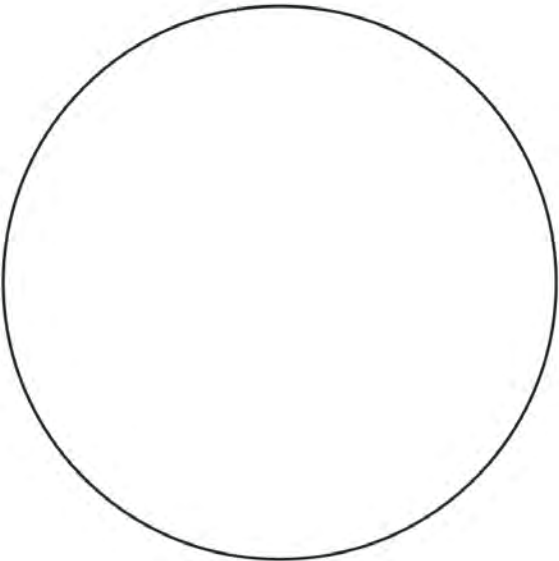
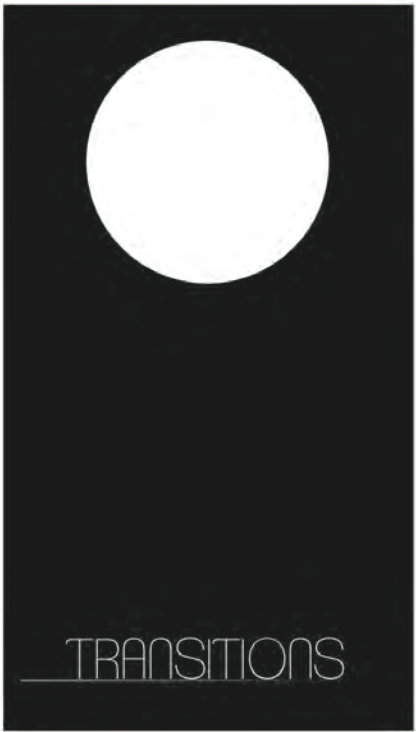
LABEL DEVELOPMENT - SECOND ROUND

Eliminated color & switched to a neutral palette

TAGS:



3 1/2" H X 2" W



3 3/4" DIAMETER



TAG & LABEL DEVELOPMENT - SECOND ROUND

Working on proportions of logo & tag shapes

LOGO



FONT/LETTER FORMS

CLEMENTEPDaa-Hairling
for LOGO & HEADERS

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
1234567890

**BEBAS NEUE REGULAR
FOR SUBTITLES**

**ABCDEFGHIJKLM
NOPQRSTUVWXYZ
ABCDEFGHIJKLM
NOPQRSTUVWXYZ
1234567890**

Avenir Next Condensed
for descriptions & details

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklm
nopqrstuvwxyz
1234567890

BRAND COLORS

#333333



RGB 51, 51, 51
CMYK 69, 63, 62, 58
Pantone P179-15 C

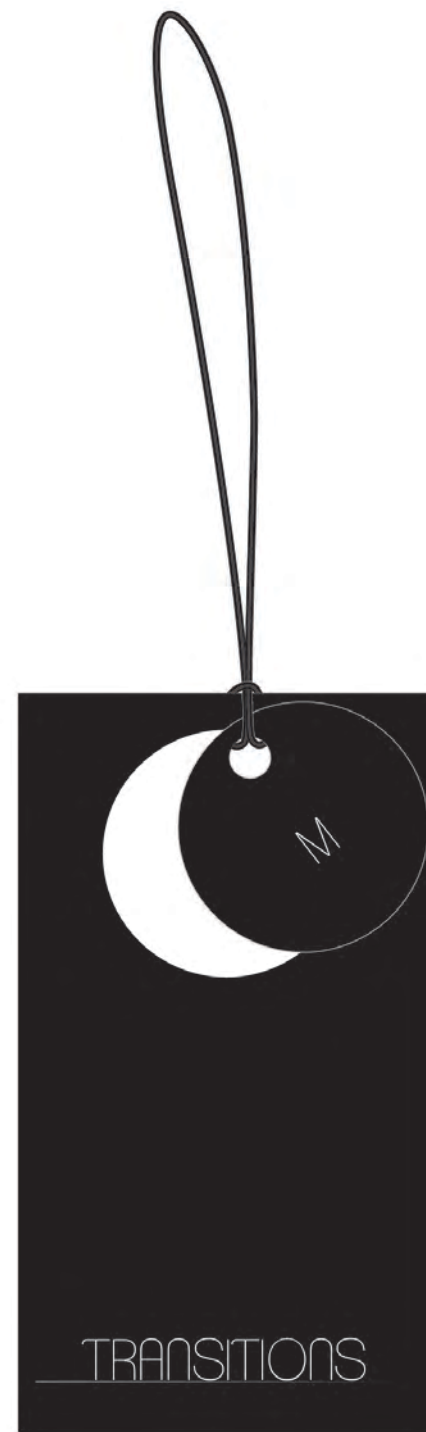
#F0F0ED



RGB 240 240, 237
CMYK 4, 3, 5 0
Pantone P179-1 C

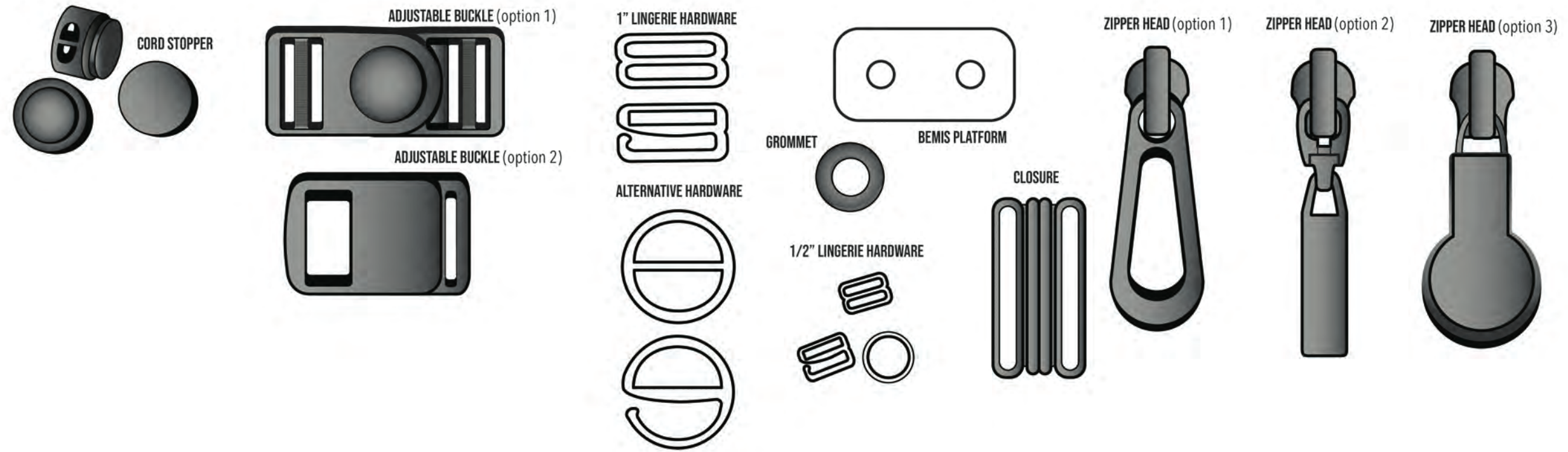
BRAND LANGUAGE

Establishing the logo, font & color for all branding

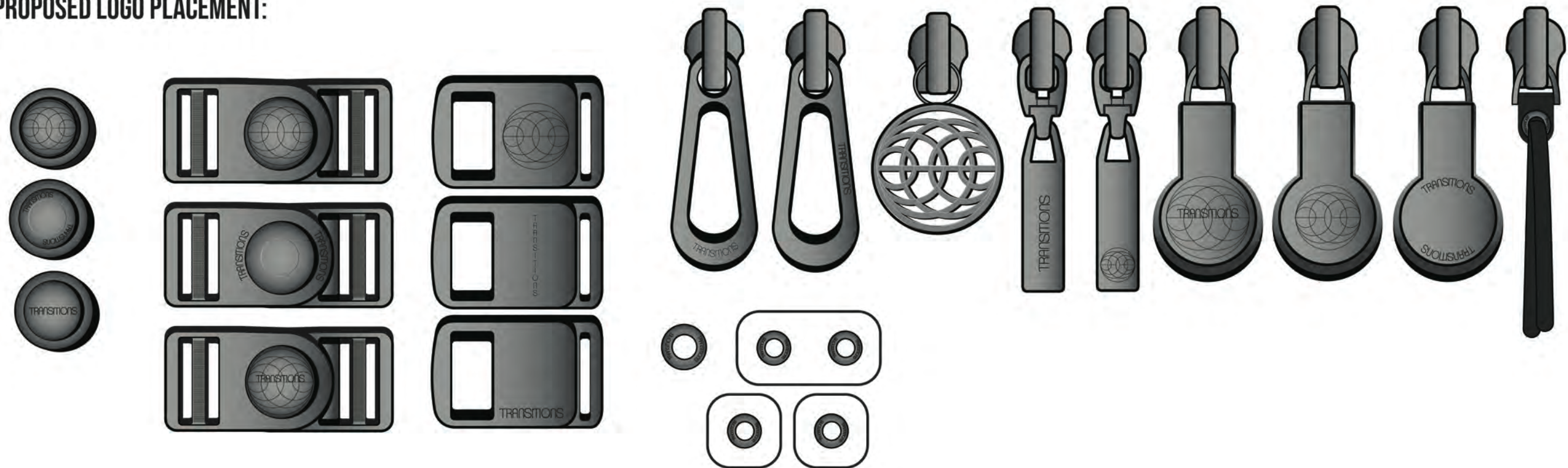


FINAL LABELS & TAGS

HARDWARE:

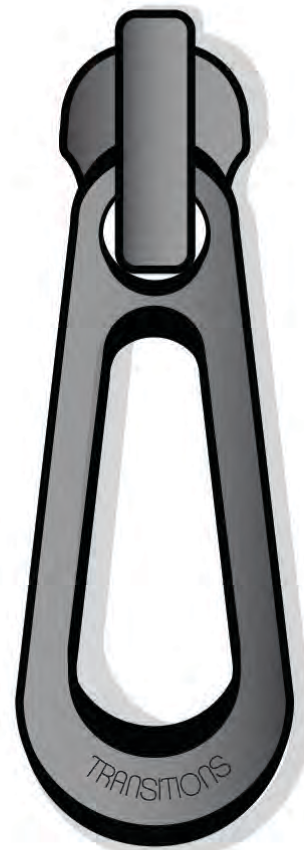


PROPOSED LOGO PLACEMENT:



HARDWARE DEVELOPMENT

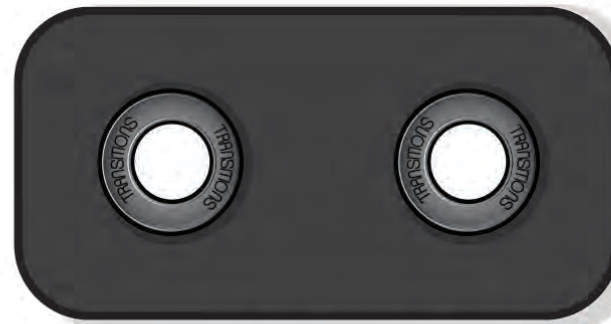
Establishing consistent logo use across different items



ZIPPER PULL



CORD STOPPER



BEMIS DRAWCORD PLATFORM
WITH GROMMETS

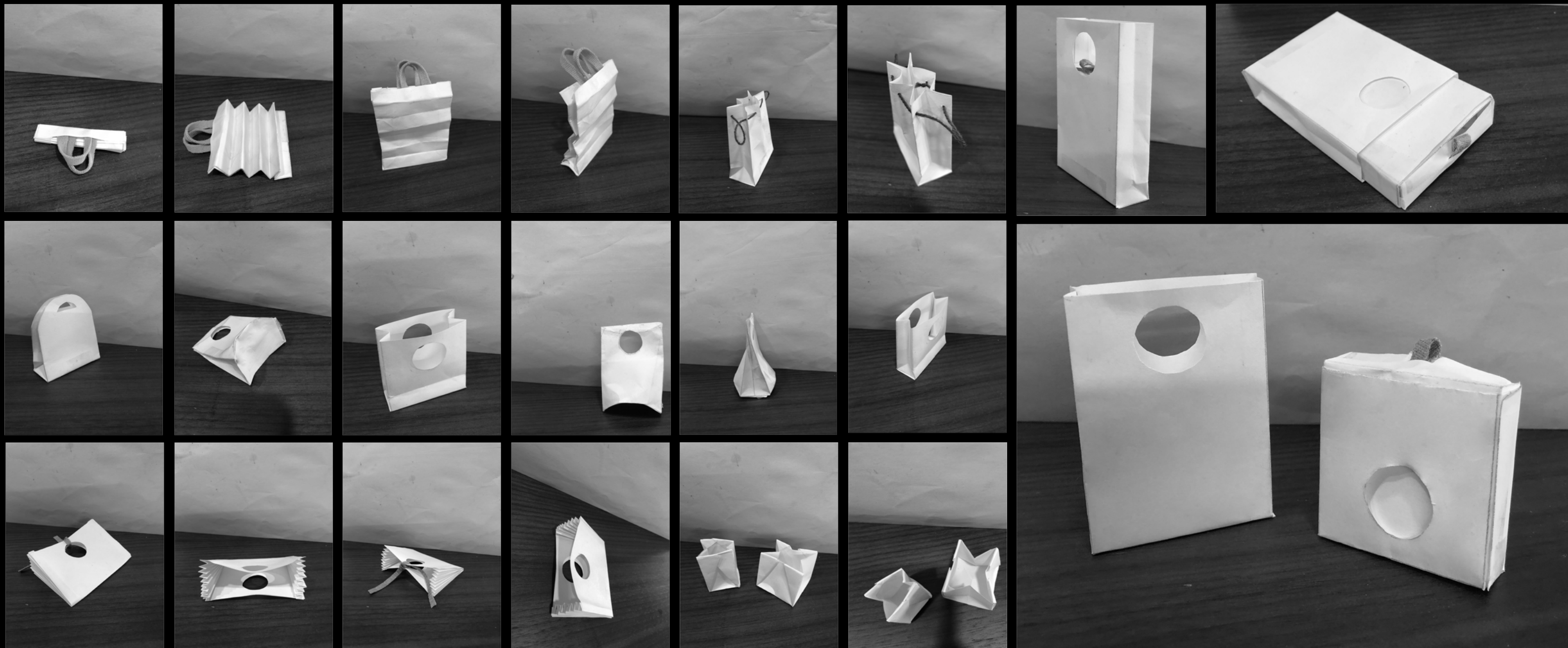


GROMMET



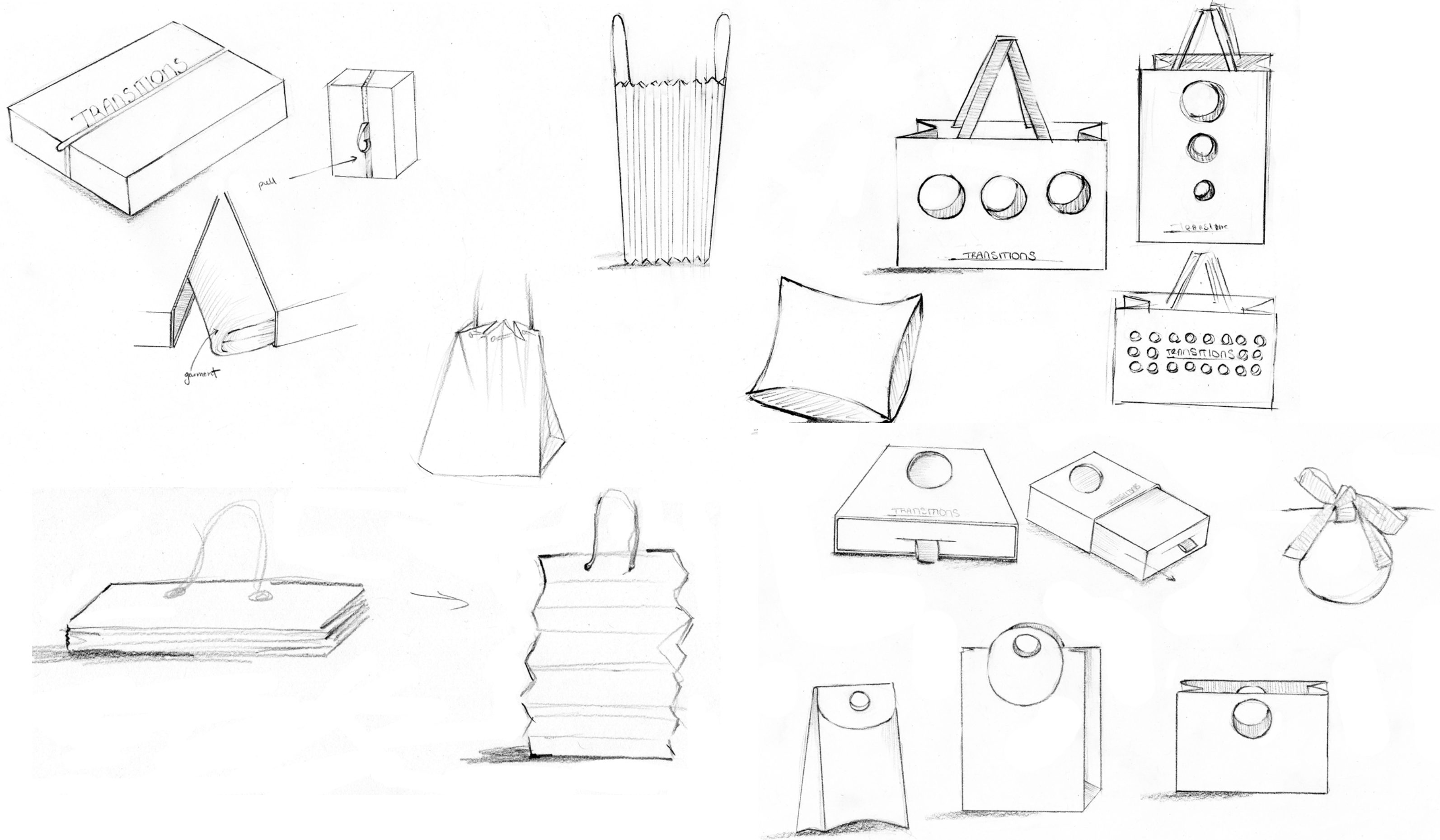
ADJUSTABLE BUCKLE

FINAL HARDWARE/TRIMS

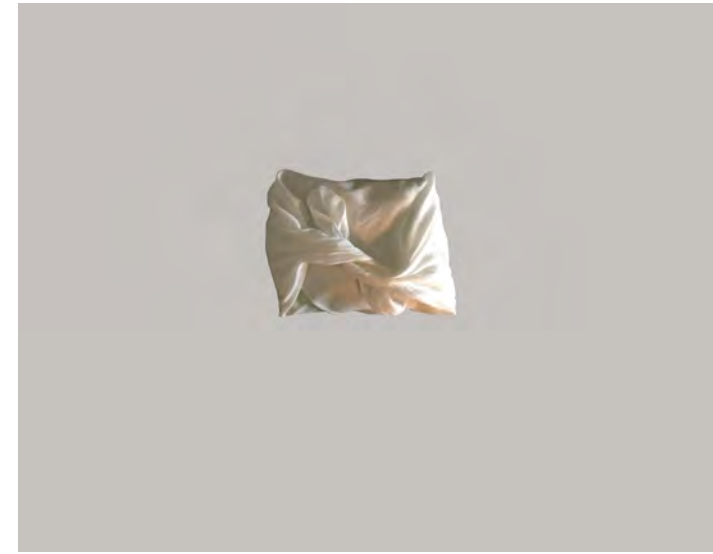


PACKAGING PROTOTYPING

Miniature paper models of shopping bag shapes

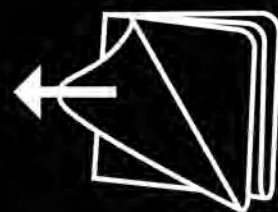
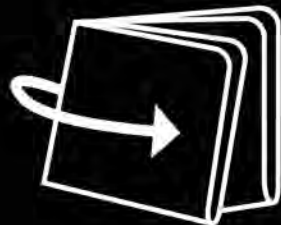
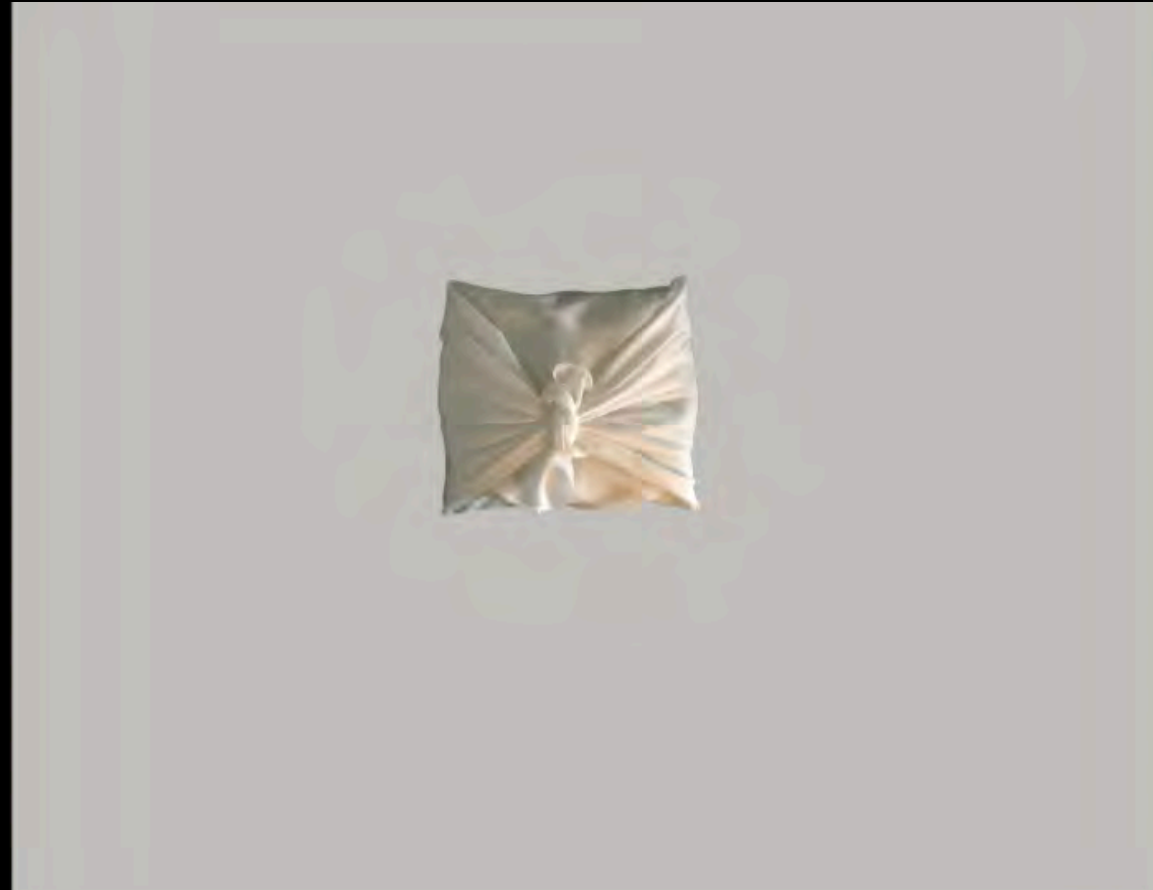
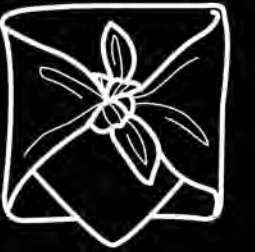


PACKAGING SKETCHING



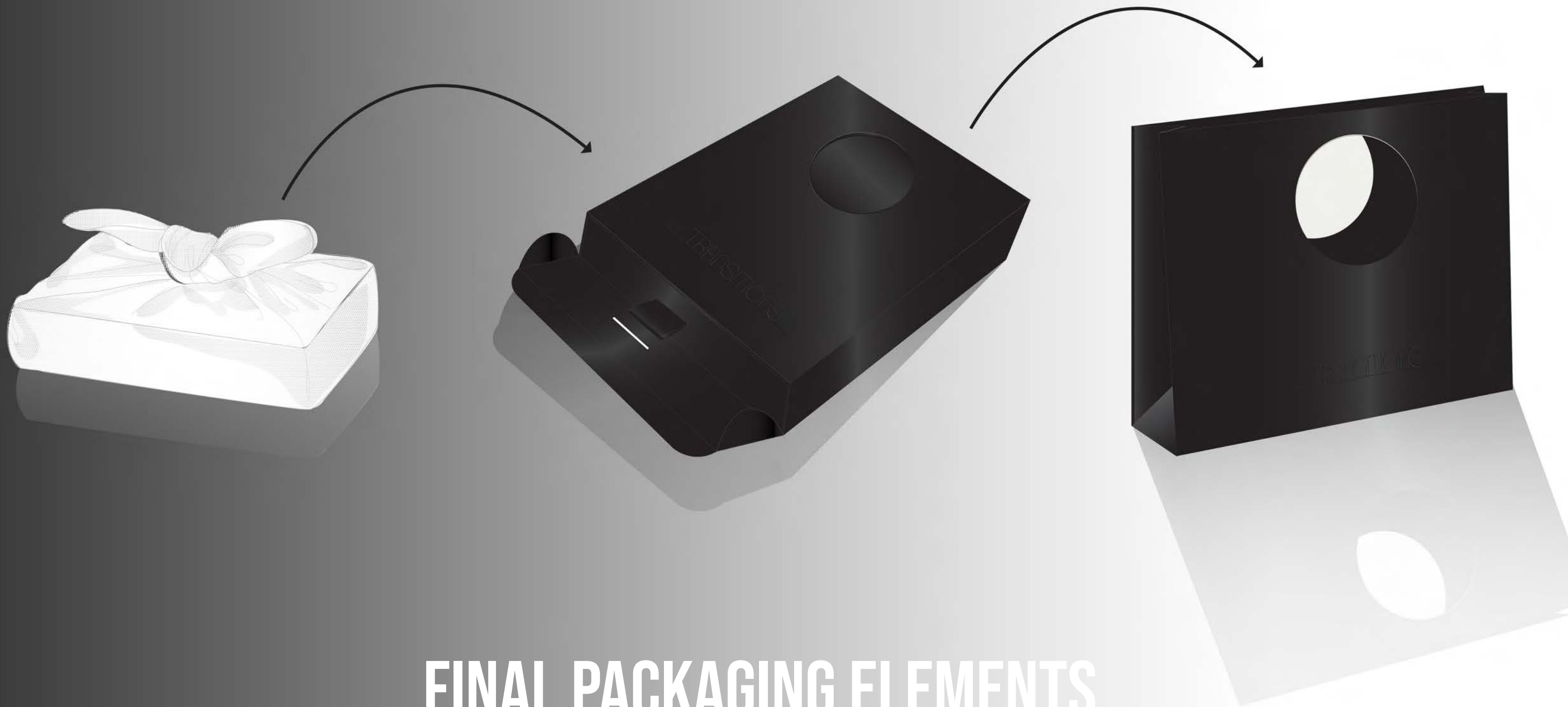
UNWRAPPING STUDY

How the purchased item will be packaged for the consumer



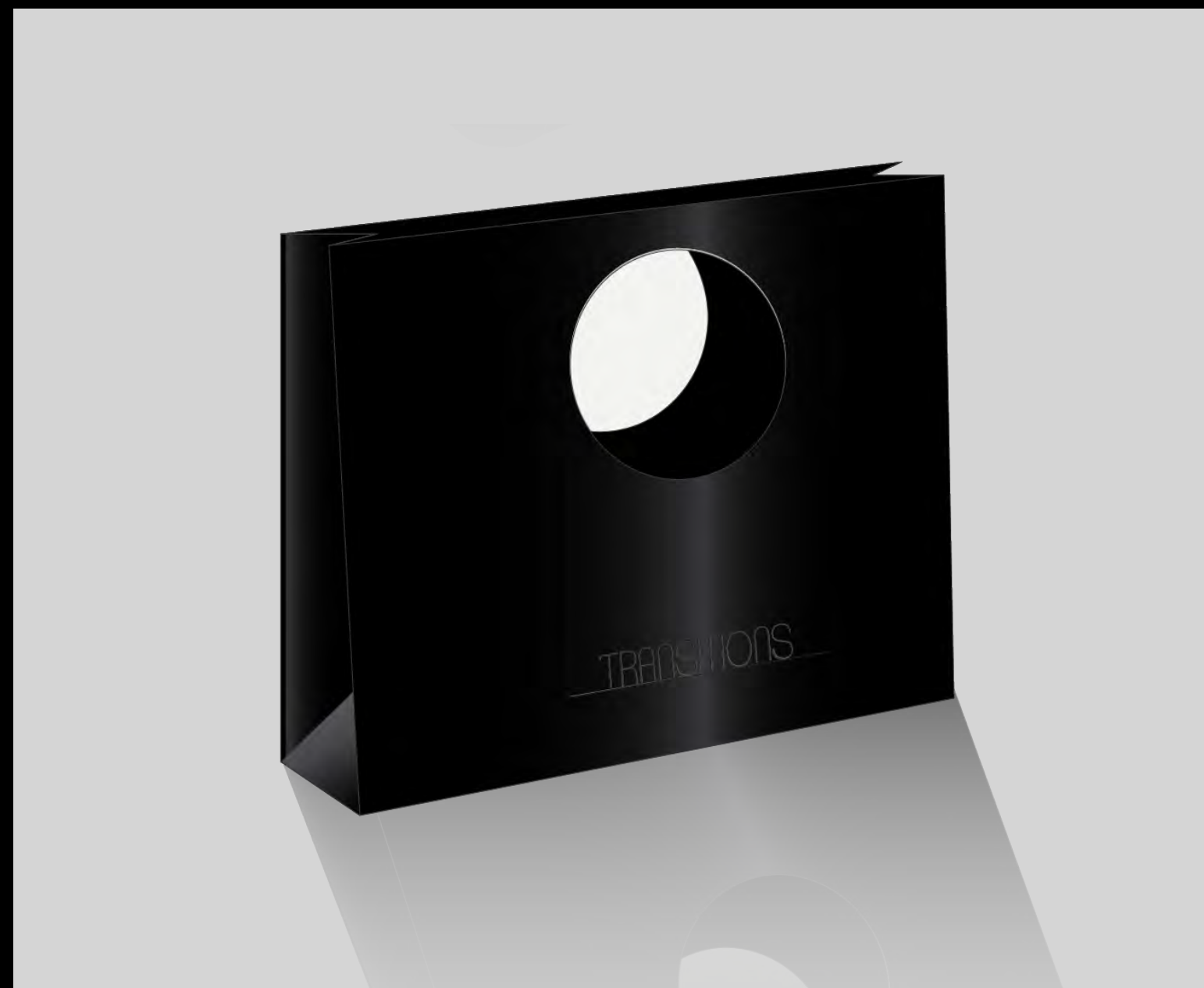
FUROSHIKI PACKAGING

Each item is lovingly swaddled in a soft organic bamboo & cotton cloth that can be used as a washable/reusable diaper



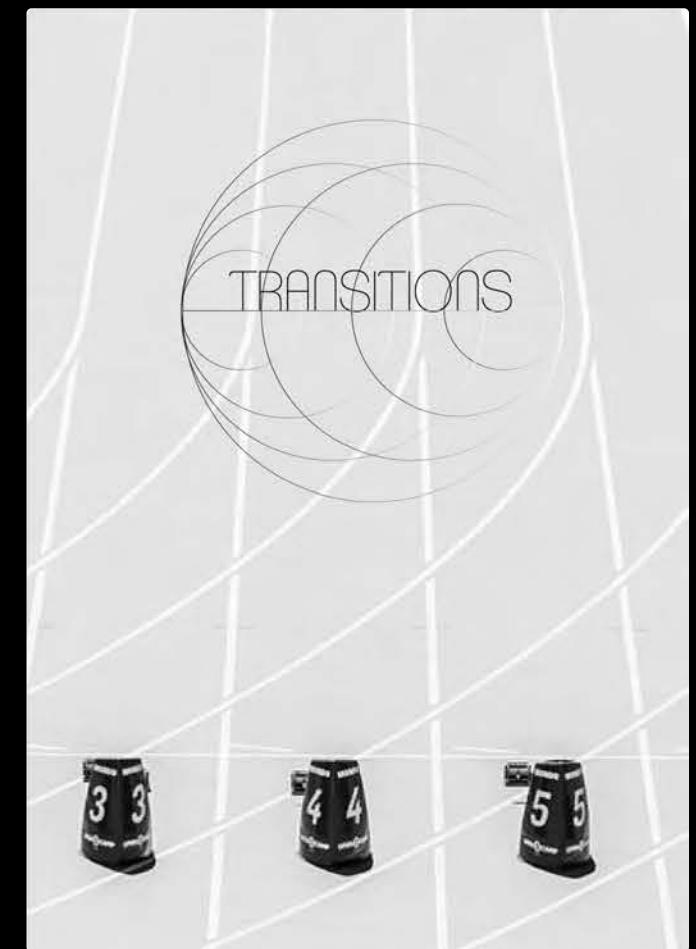
FINAL PACKAGING ELEMENTS

Furoshiki wrap, Shipping Sleeve Box, Shopping Bag



BRANDING & PACKAGING ELEMENTS

Elegant, minimal with emphasis incorporating the circle motif



USAGE

Contextual examples for marketing campaign, advertisement & printed media

LOOK BOOK

2022



**NO NEED TO WEAR YOUR HUSBAND'S CLOTHING ANYMORE
STAY DRY
KEEP WARM
CRUSH MILES**

SWALLOWTAIL ANORAK / **RUN**

"I started to **outgrow** any long sleeve options (it was winter) so I started wearing my husbands..."

74% Wool / 17% Polamide / 4% Polyurethane

3 layers: bi-stretch Merino wool jersey at the interior, light polyamide water & wind resistant exterior bonded with a polyurethane membrane permeable to perspiration keeping the wearer feeling dry & comfortable when exercising.





SWALLOWTAIL ANORAK / RUN



+



+



=

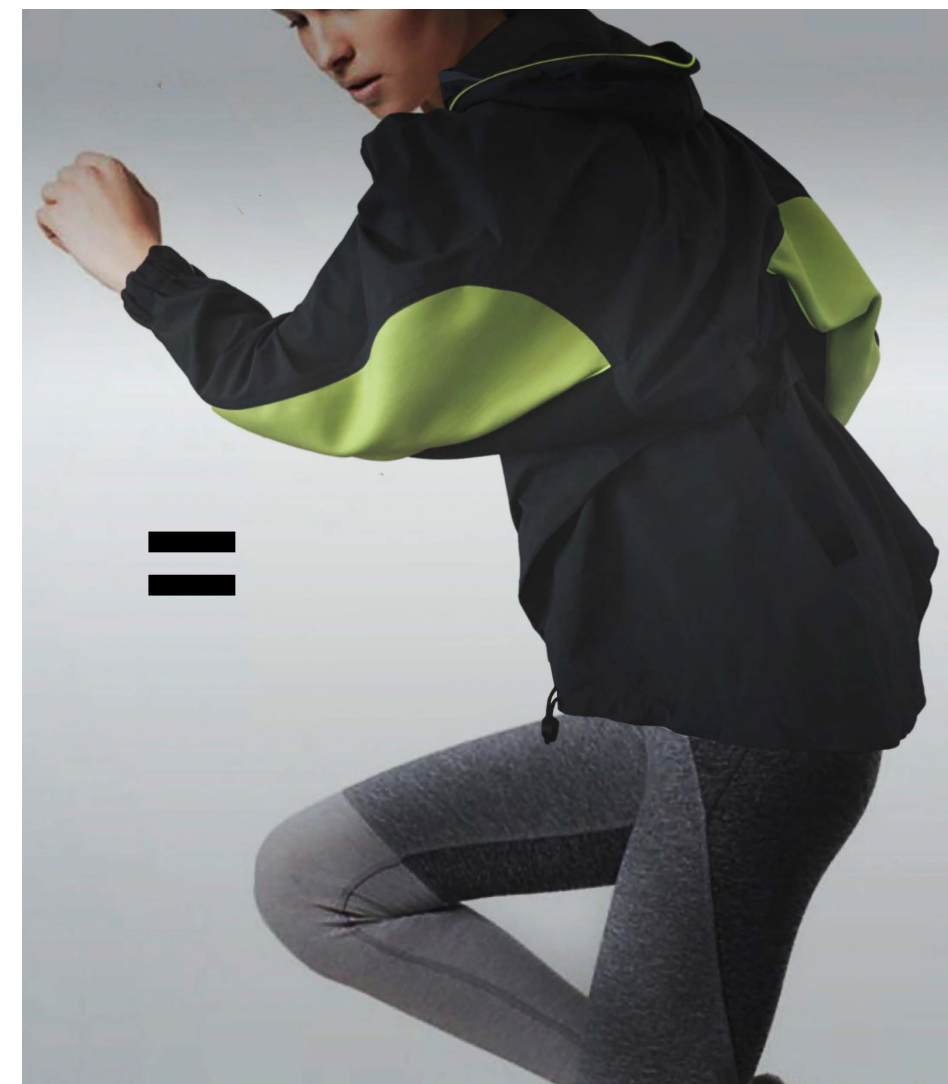


PHOTO EDITING

Shooting garments on myself & photoshopped them onto stock images

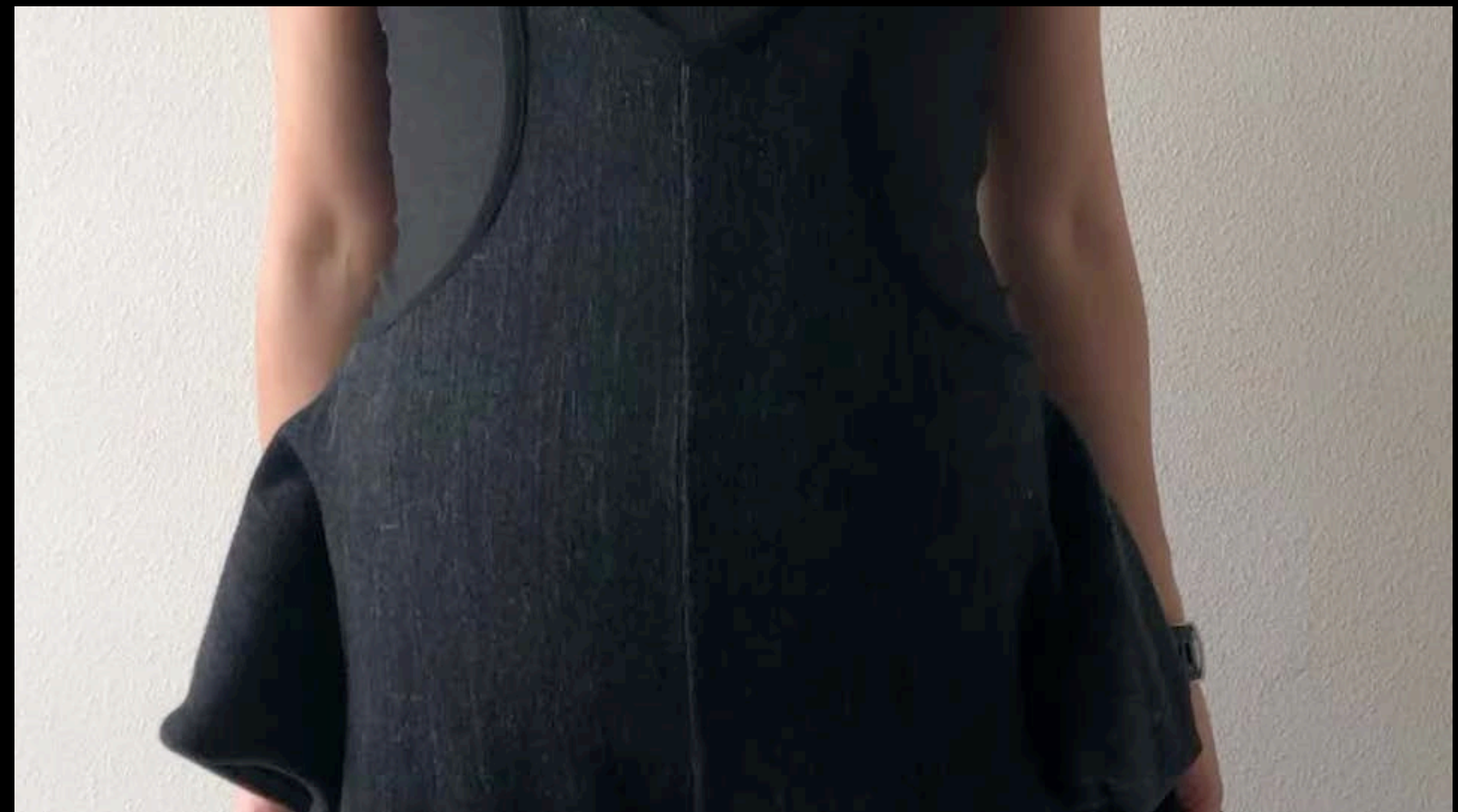
ANGLEWING LEGGINGS / RUN

"the band would always roll down below my belly which was a minor annoyance."

78.9 % Wool / 21.1% Nylon / Plated with Lycra

Machine knitted seamless construction offers better fit & comfort. The programable technology allows for less material waste & is a more economical way of manufacturing.

ANNOYANCE BE GONE, STRAPS KEEP PANTS IN PLACE
STAYS PUT
SO YOU CAN
GET MOVING





ANGLEWING LEGGINGS / RUN



+



+



=

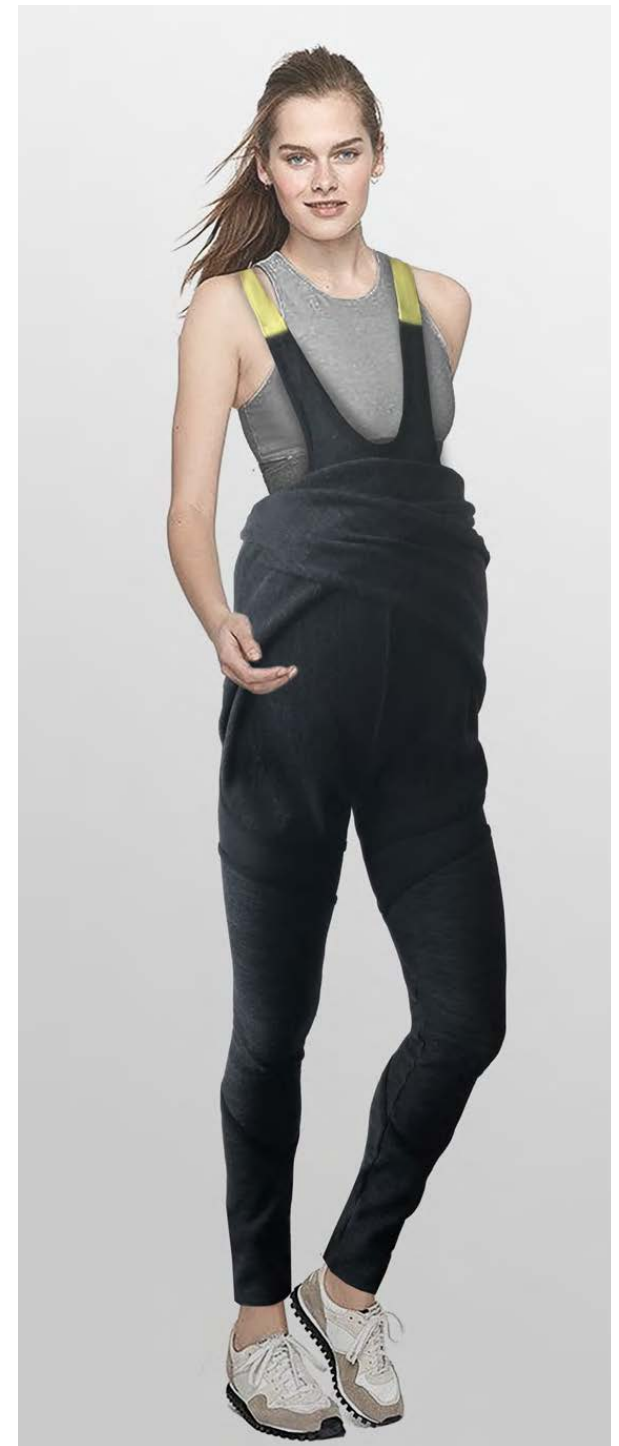


PHOTO EDITING

Shooting garments on myself & photoshopped them onto stock images

SKIPPER MAILLOT / **SWIM**

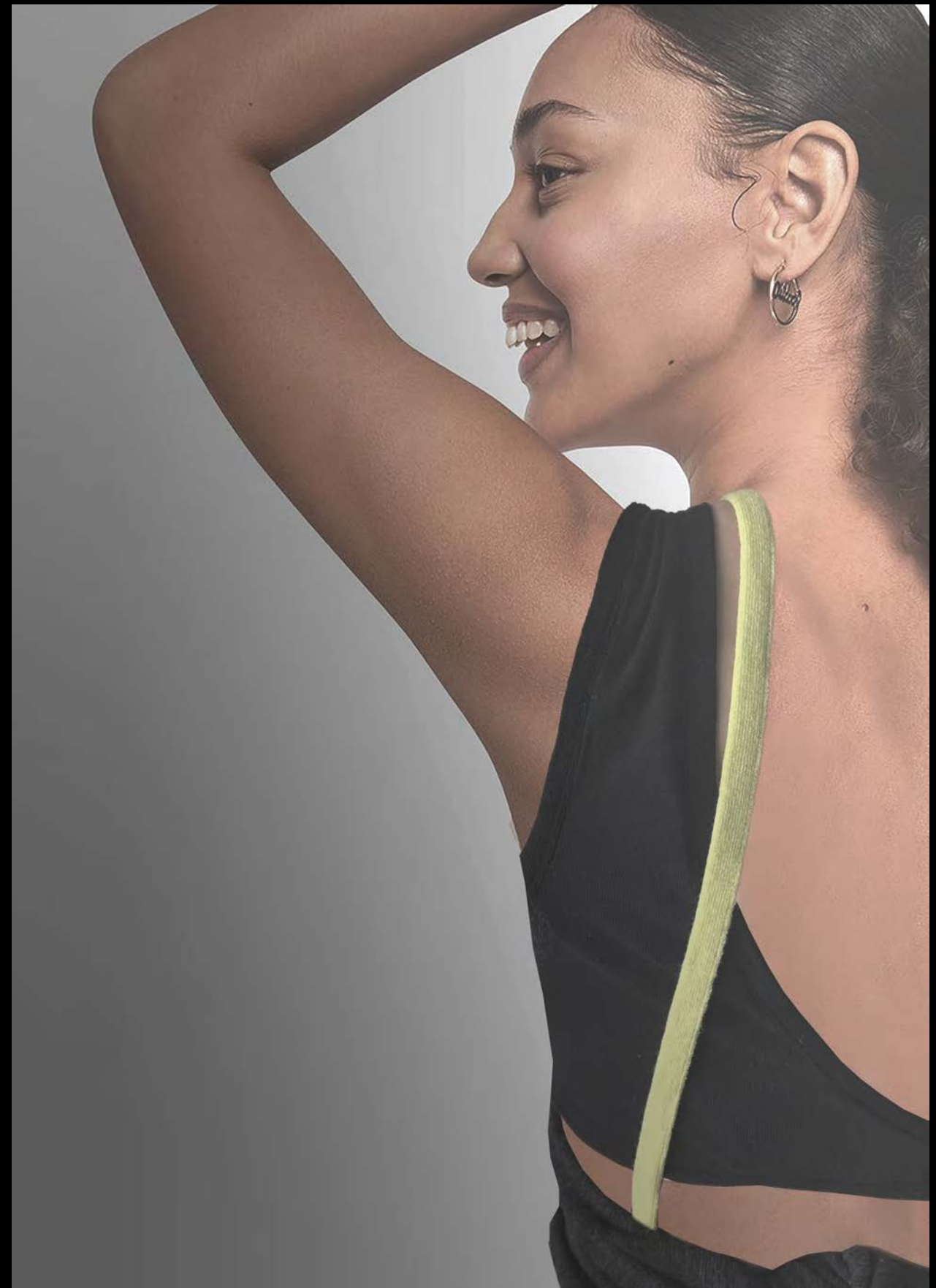
"I **hate** two pieces but was forced to wear them"

78.9 % Wool / 21.1% Nylon / Plated with Lycra

Machine knitted garments offer seamless construction for better fit and comfort. Wool is naturally wicking, odor resistant and breathable while also having built in UV protection

THIS TWO PIECE IS MORE LIKE A ONE PIECE
MORE COVERAGE
MORE COMFORT
MORE CONFIDENCE





SKIPPER MAILLOT / SWIM



+



+



=

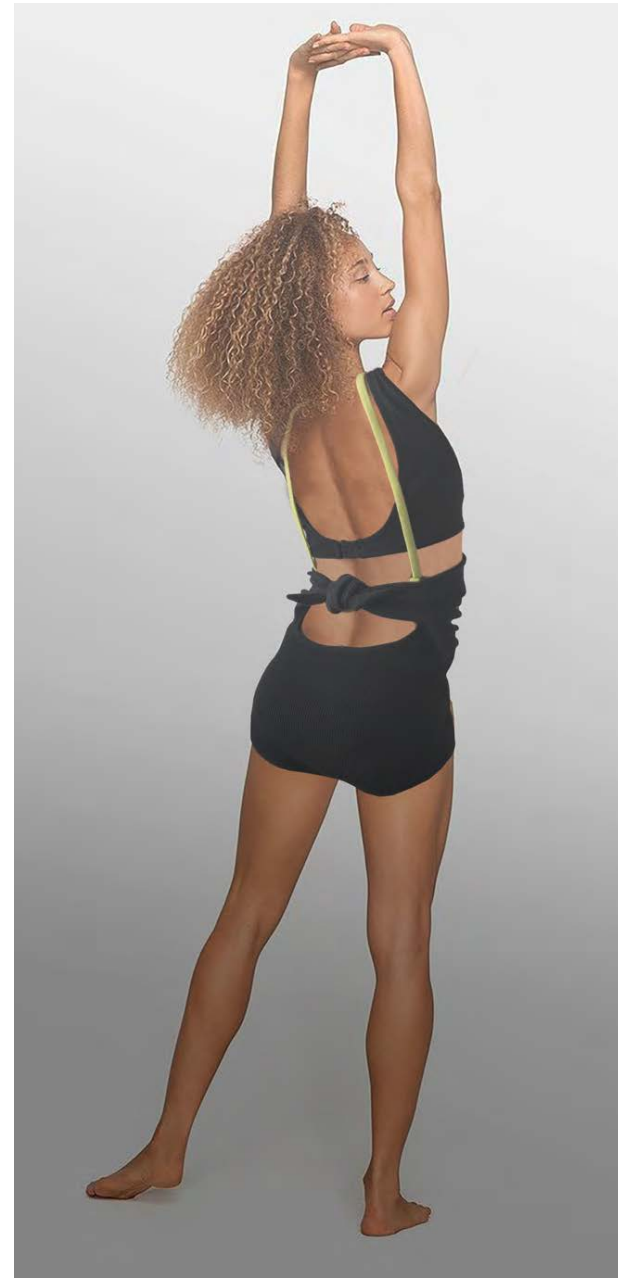


PHOTO EDITING

Shooting garments on myself & photoshopped them onto stock images



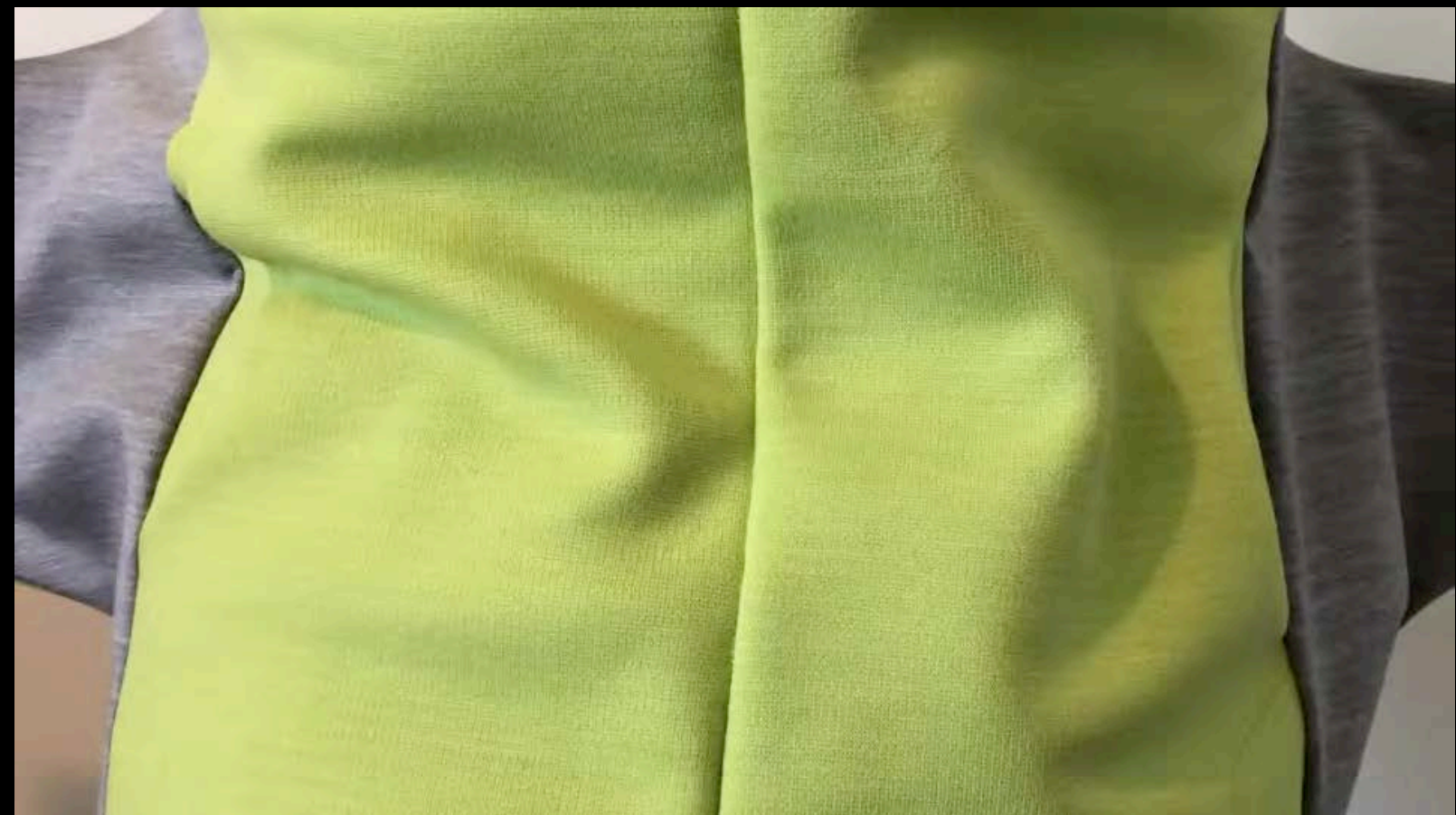
A JERSEY THAT IS FIT TO BE TIED
FITS EVERYWHERE
BIG DIFFERENCE

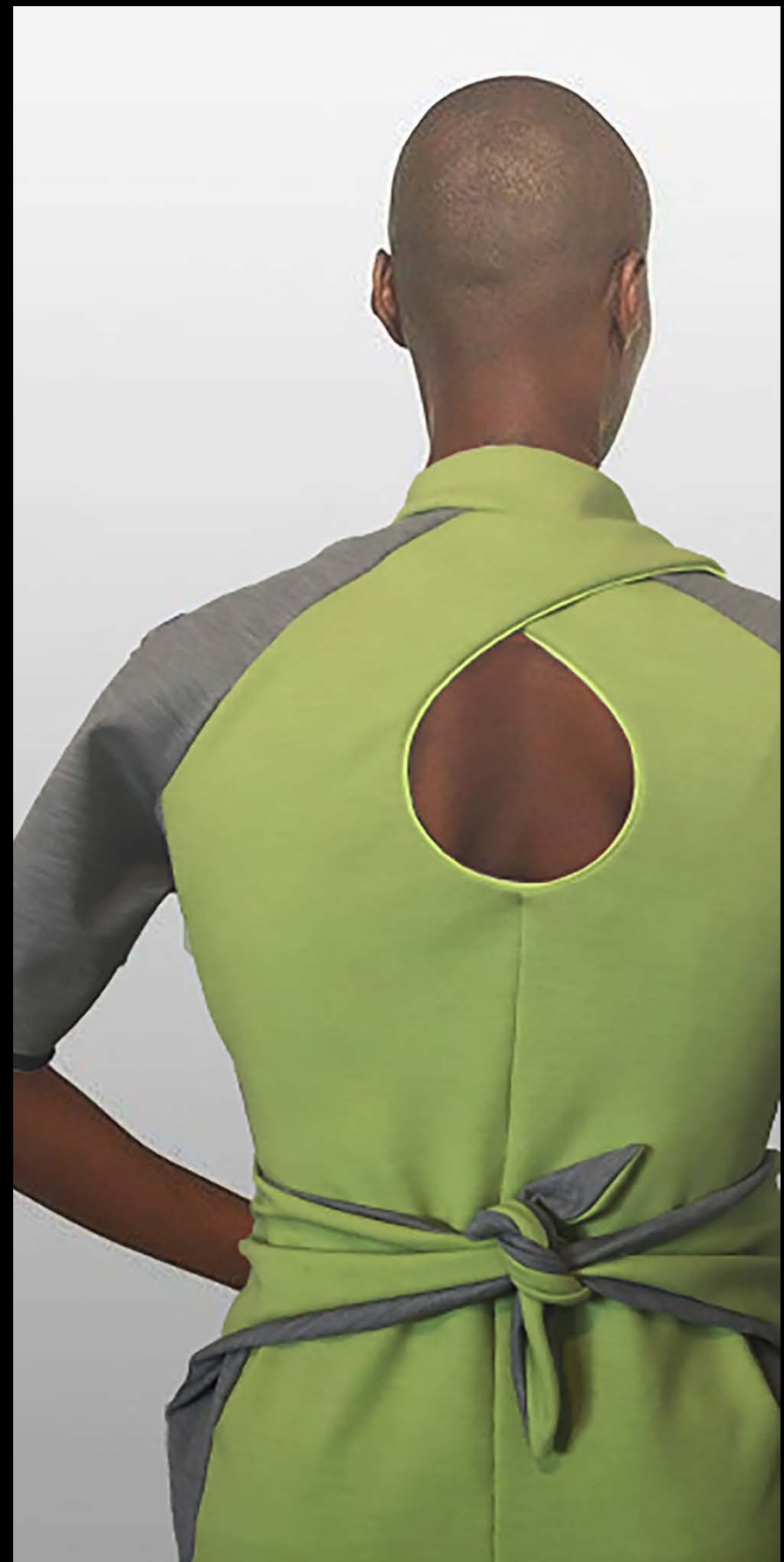
GYPSY JERSEY/ BIKE

"You feel like you don't look that great. It fits over your belly but it's **big everywhere** else and no one wants to feel large."

51% Wool / 19% polyamide / 30% Polypropylene (Dryarn)

Dryarn polypropylene microfibers in a jersey knit to give the material lightness, water repellency & next to skin dryness.





GYPSY JERSEY/ BIKE



+



+



=

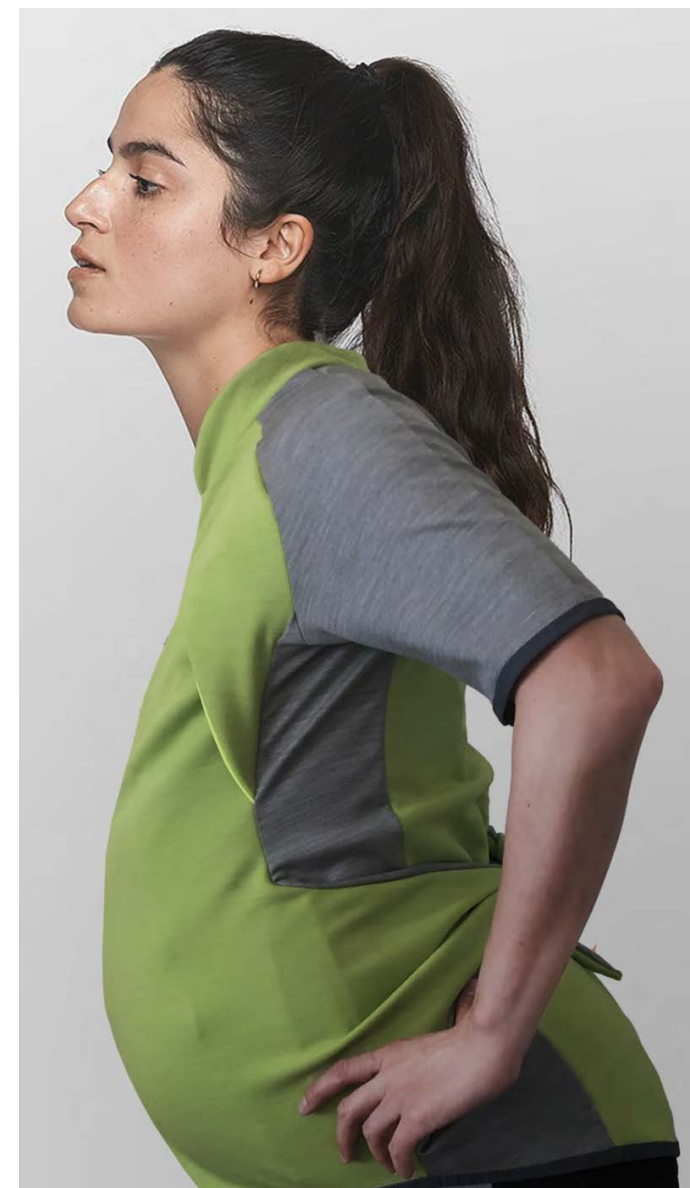


PHOTO EDITING

Shooting garments on myself & photoshopped them onto stock images

LUNA BIBS / BIKE

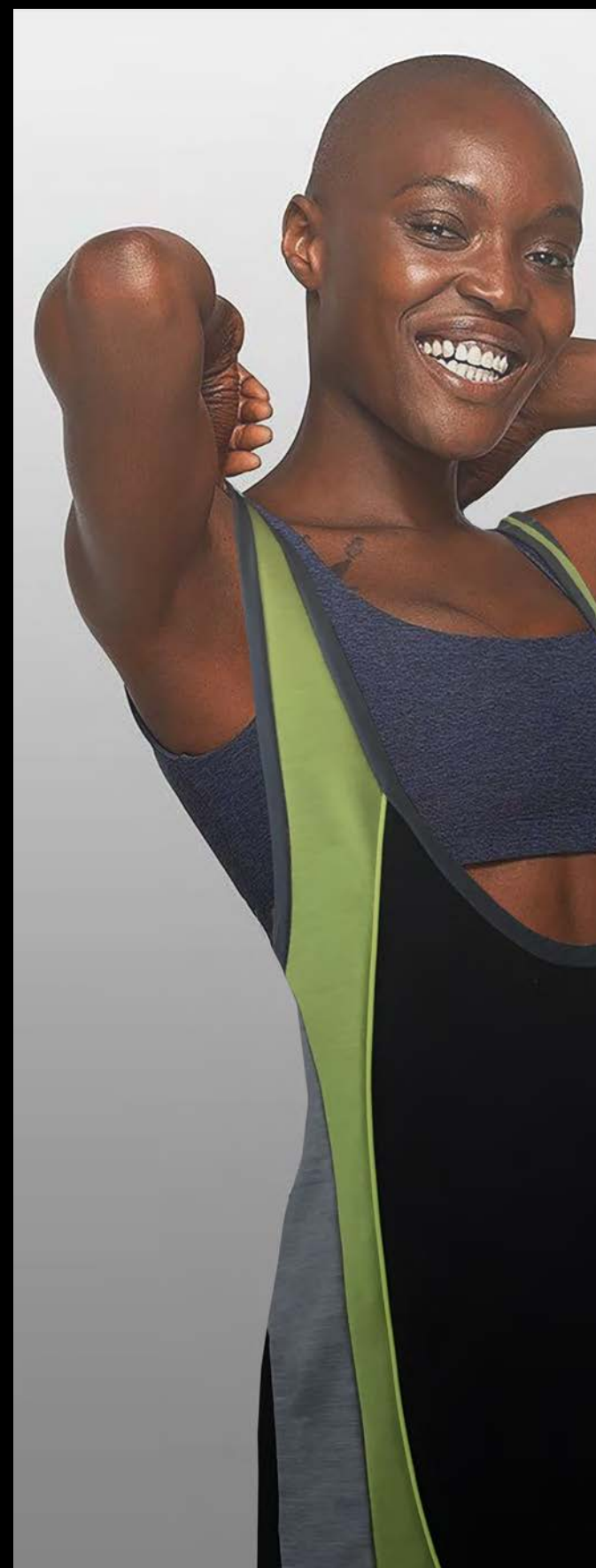
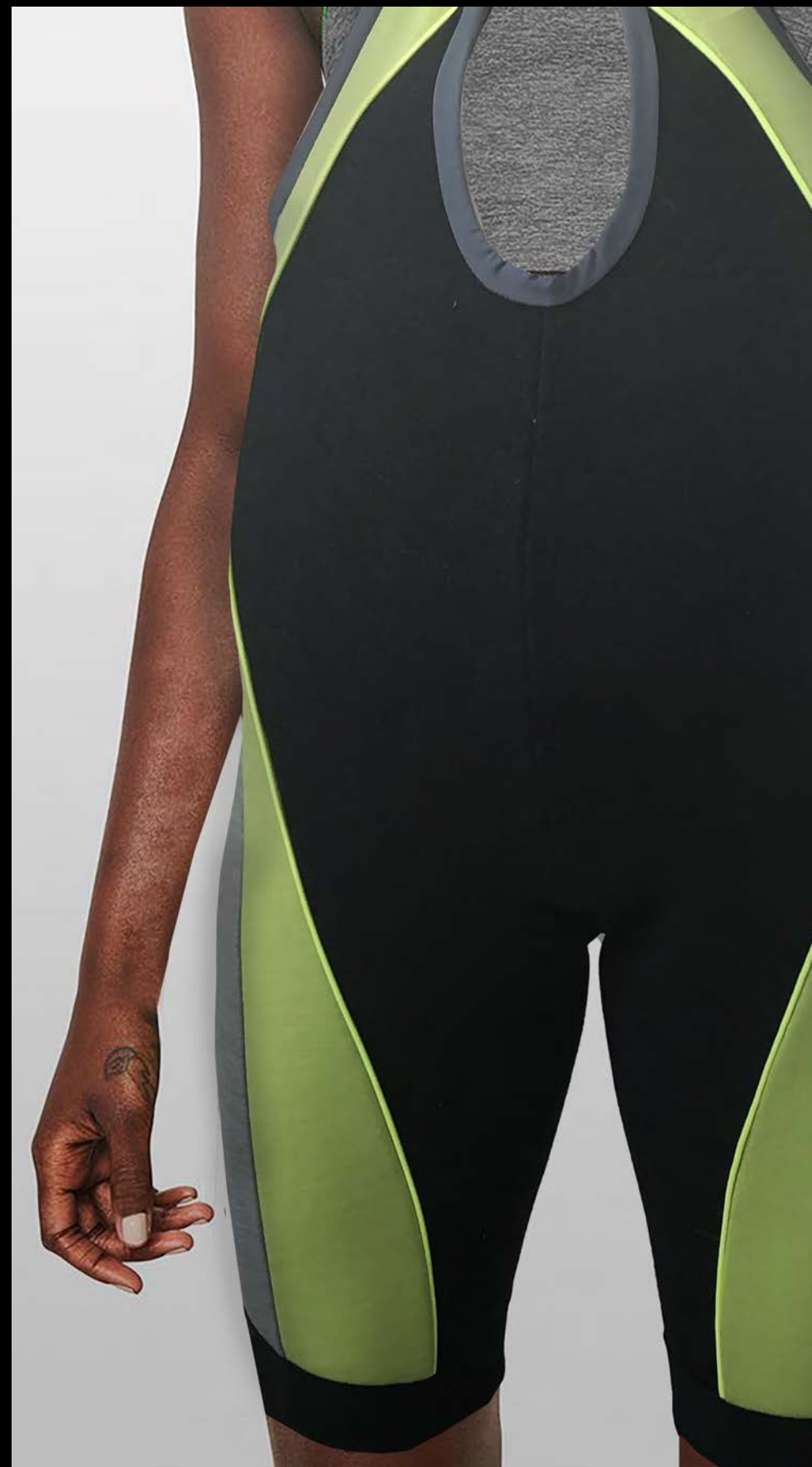
"...there is a lot of **room for improvement**, it's very basic."

51% Wool / 19% polyamide / 30% Polypropylene (Dryarn)

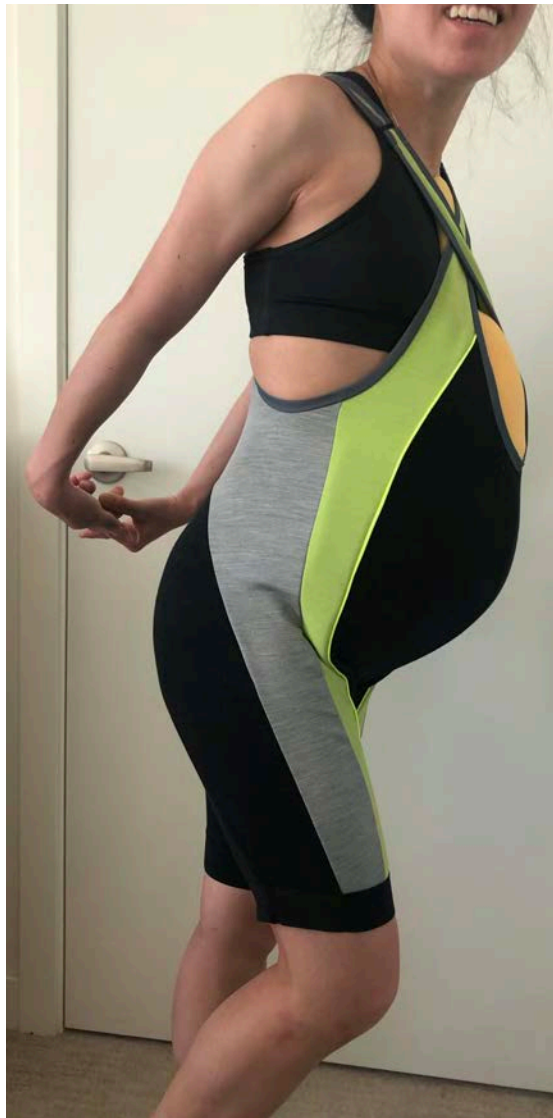
Dryarn polypropylene microfibers in a jersey knit to give the material lightness, water repellency & next to skin dryness.

**ROOM FOR IMPROVEMENT?
HOW ABOUT ROOM FOR MOVEMENT
NOT YOUR
BASIC BIBS**





LUNA BIBS / BIKE



+



+



=

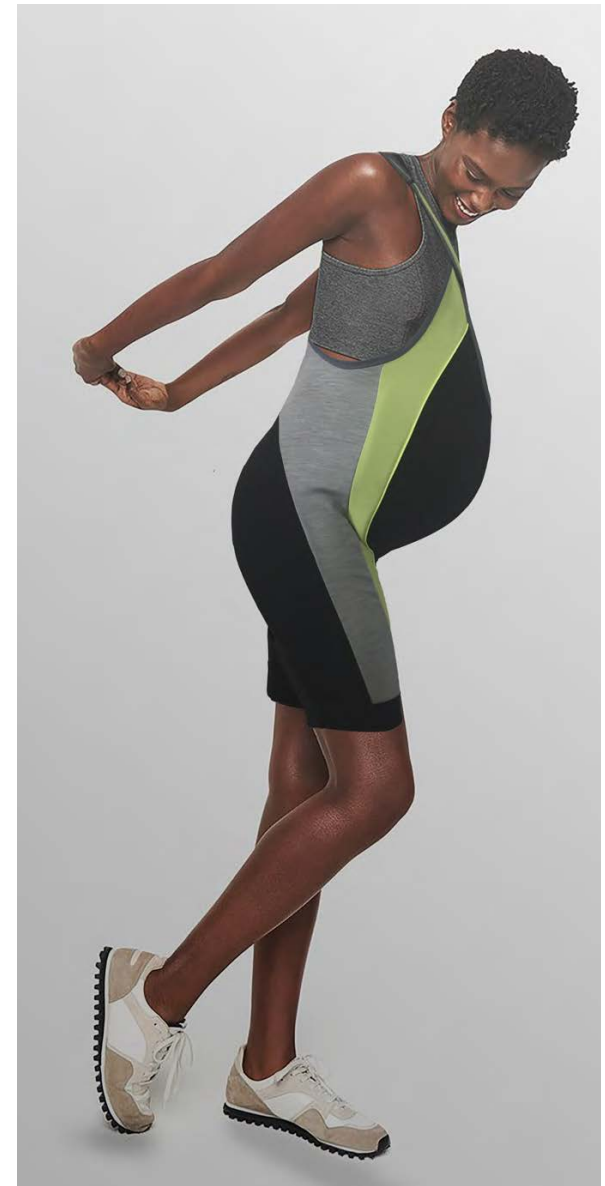


PHOTO EDITING

Shooting garments on myself & photoshopped them onto stock images

MONARCH FOUNDATION / RECOVER

"...I need a good bra with **more support**"

78.9 % Wool / 21.1 % Nylon / Plated with Lycra

Machine knitted garments offer seamless construction for better fit & comfort. Lycra gives
The garment stability, compression & better elastic recovery to retain garment shape.

**THIS BRA WILL HAVE YOU DOING A DOUBLE TAKE
DOUBLE LAYERS
DOUBLE SUPPORT
DOUBLE DUTY**





MONARCH FOUNDATION / RECOVER



+



+



=



PHOTO EDITING

Shooting garments on myself & photoshopped them onto stock images



TRANSITIONS

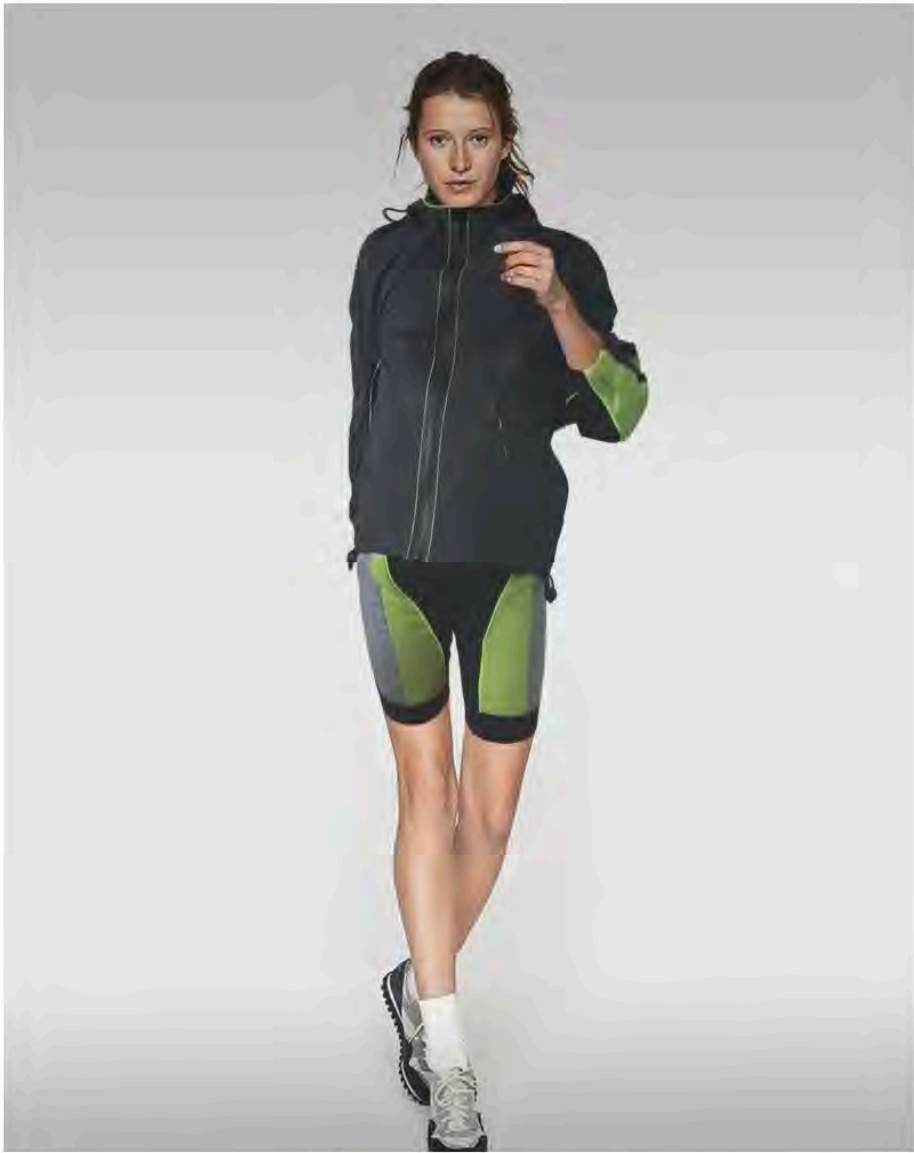


MATERNITY PERFORMANCE WEAR

BRAND DEVELOPMENT

Website to develop the overall aesthetic of the brand & how the collection would interface with the consumer

<https://jessiesilbert.wixsite.com/transitions>



SWALLOWTAIL ANORAK

\$175.00

ADD TO CART

BUY NOW



DESCRIPTION:

This water & wind repellant jacket is perfect for activities when the weather is less than agreeable. It features a low profile cord stopper with a concealed button that can be pulled tighter to keep wind & water out. The unique silhouette with a wide hood and hem. The unique silhouette with a wide around belt that fastens at the back keeps you warm the way & maintains a smooth, streamlined appearance from the front. Concealed pockets at the waist keep essentials stored & within reach.

MATERIAL INFORMATION:

74% Wool / 17% Polyamide / 4% Polyurethane

Three layers combine a bi-stretch Merino wool on the interior side with a light polyamide water resistant exterior. The materials are bonded together with a polyurethane membrane that is permeable to perspiration keeping the wearer feeling dry & comfortable when exercising.



ANGLEWING LEGGINGS

\$98.00

ADD TO CART

BUY NOW



DESCRIPTION:

This cold weather running tights has an engineered shape that wraps around the body supporting the belly. The wrap style allows for a close to body fit while allowing the garment to accommodate body changes over the course of the pregnancy. Straps give added security keeping the garment in place during exercise. The straps are fully adjustable with sliders and detachable with hooks for easy donning and doffing. 3D knitting allows for built in engineered compression and areas of differing tension & weight.

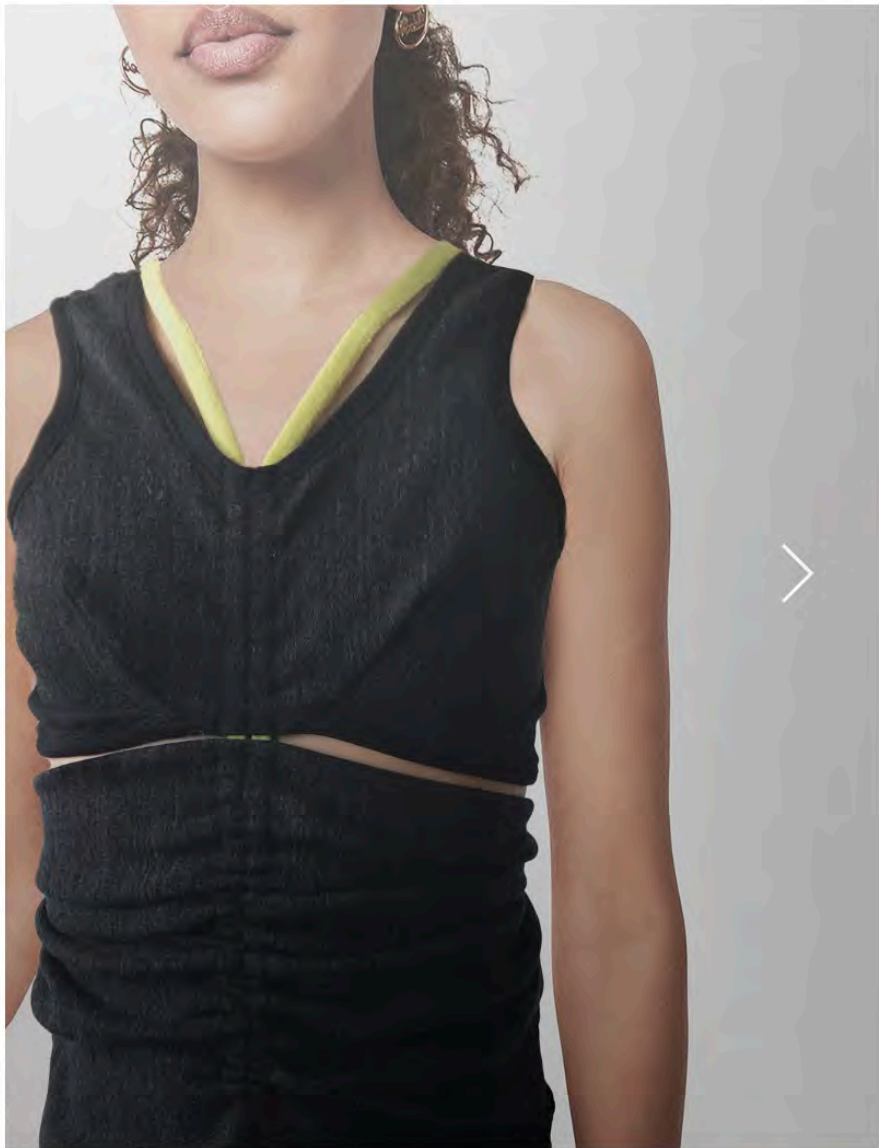
MATERIAL INFORMATION:

78.9% Wool / 21.1% Nylon / Plated with Lycra

Machine knitted garments offer seamless construction for better fit and comfort. Lycra gives the garment stability, compression and better elastic recovery to retain overall garment shape. Wool is naturally wicking, odor resistant and breathable.

ITEM DESCRIPTIONS

Store set up with pricing & descriptions



SKIPPER MAILLOT

\$78.00

ADD TO CART

BUY NOW



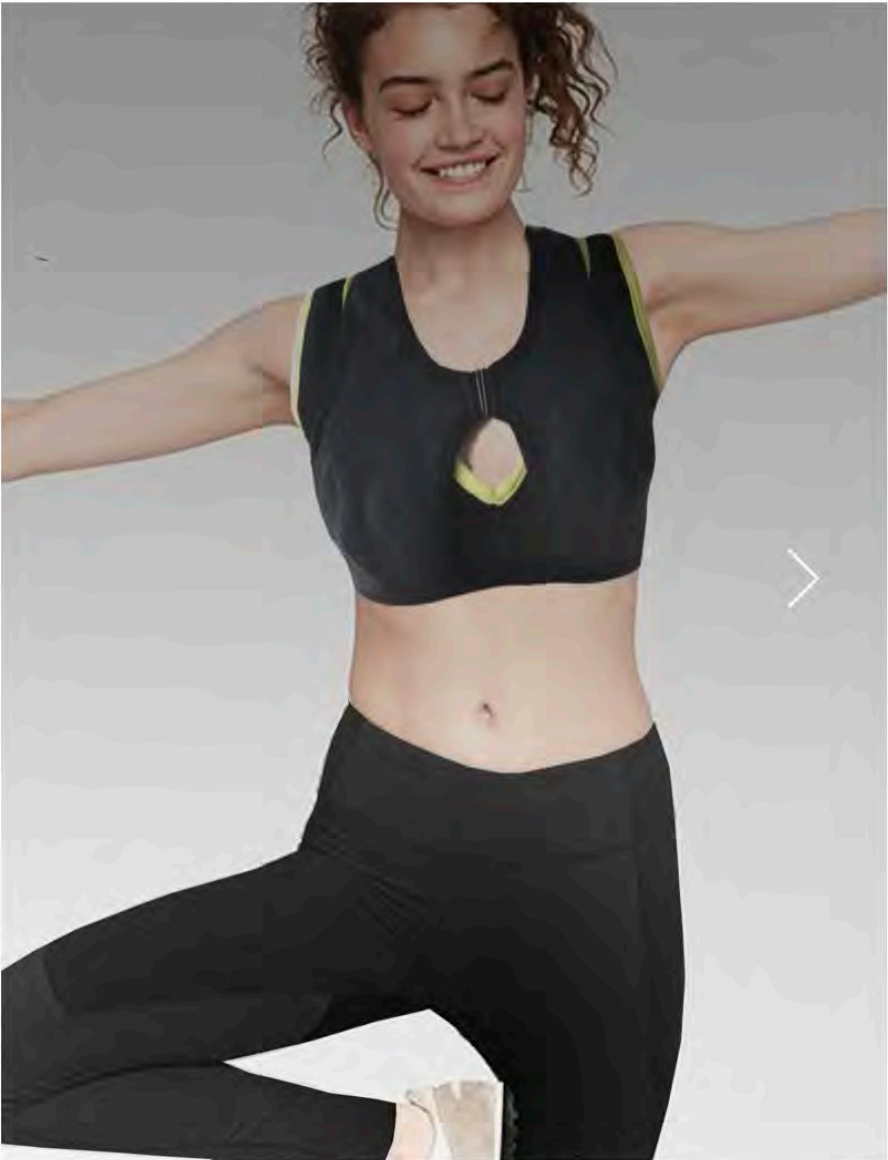
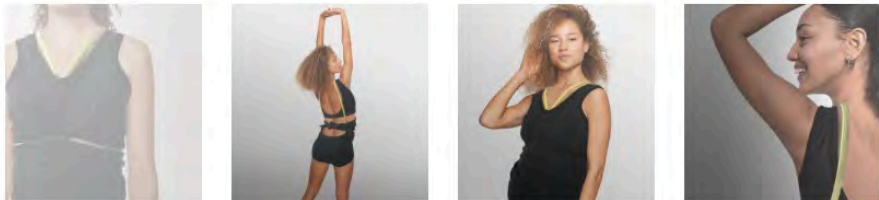
DESCRIPTION:

This unique design is actually two pieces that function as one. Fully engineered knit swimsuit has a built in shape that adds width to the garment to accommodate belly growth. Front ruching is adjustable for more coverage. Straps with adjustable sliders allow for customizable support.

MATERIAL INFORMATION:

78.9% Wool / 21.1 % Nylon / Plated with Lycra

Machine knitted garments offer seamless construction for better fit and comfort. Lycra gives the garment stability, compression and better elastic recovery to retain overall garment shape. Wool is naturally wicking, odor resistant and breathable while also having built in UV protection.



MONARCH FOUNDATION

\$48.00

ADD TO CART

BUY NOW



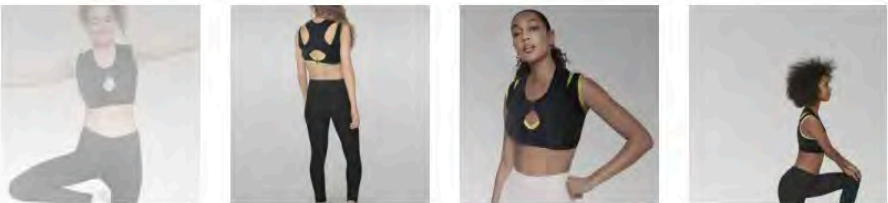
DESCRIPTION:

This sports bra is for moms easing back in to exercise post partum and require a nursing feature. The bra is two layers for better support. The bottom layer has hidden openings for breast feeding. The top layer has a minimal hook at the front that allows for easy accessibility while also preserving modesty as the wearer does not need to remove the garment.

MATERIAL INFORMATION:

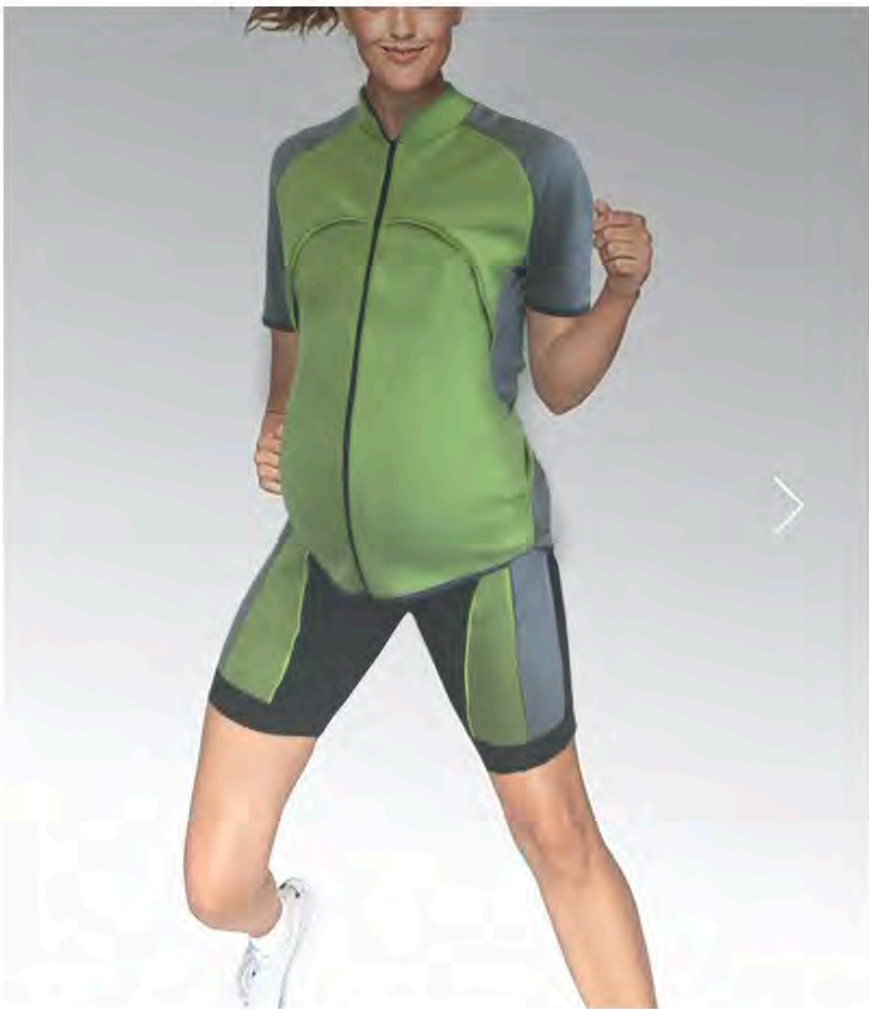
78.9 % Wool / 21.1 % Nylon / Plated with Lycra

Machine knitted garments offer seamless construction for better fit and comfort. Lycra gives the garment stability, compression and better elastic recovery to retain overall garment shape. Wool is naturally wicking, odor resistant and breathable.



ITEM DESCRIPTIONS

Store set up with pricing & descriptions



GYPSY CYCLING JERSEY

\$89.00

ADD TO CART

BUY NOW



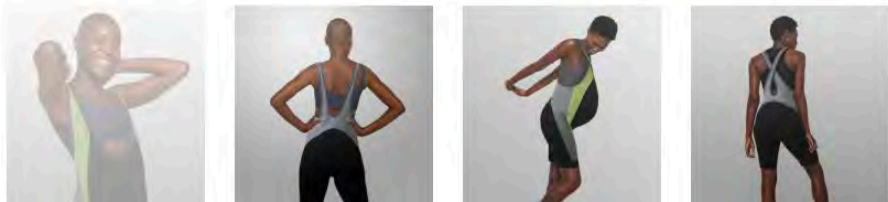
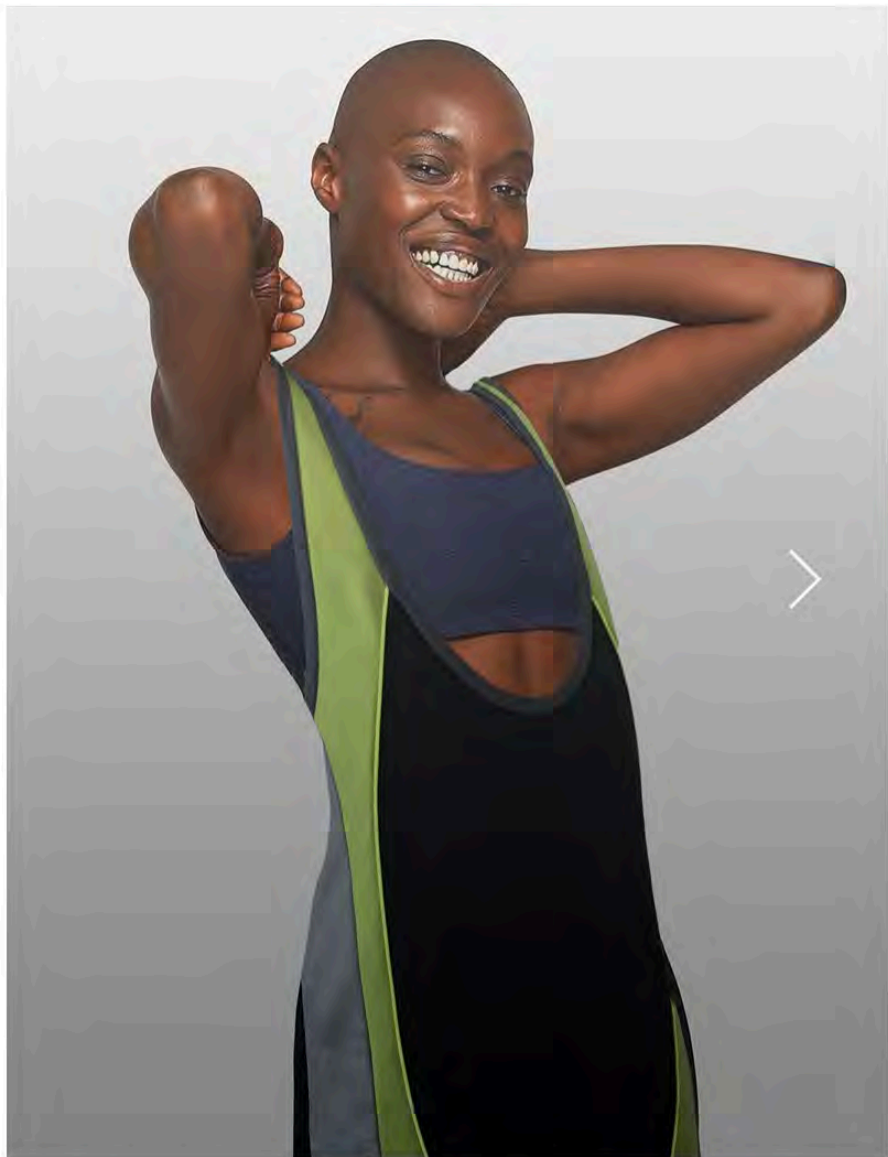
DESCRIPTION:

Our cycling jersey features an engineered shape that ties to the back allowing for customizable fit. Tie as tight or loose as preferred. Back side entry pockets are low profile & offers funtion without taking away from the clean lines of the garment. Soft mesh facings at the interior of the garment are light, breathable,& absorbant. A front invisible zipper is runs the full length of the garment allowing for easy doning & doffing. Style lines at the front hide overlapping layers that can be pulled open for breast feeding.

MATERIAL INFORMATION:

Wool Polypropylene Filament Blend Knit Jersey
51% Wool / 19% Polyamide / 30% Polypropylene (Dryarn)

Wool, great for moisture managment, thermoregulation & odor control is plated with Dryarn polypropylene microfibers in jersey knitting to give the material lightness, water repellency & maintain next to skin dryness. Knit materials are stretchy & comfortable on the body.



LUNA CYCLING BIBS

\$98.00

ADD TO CART

BUY NOW



DESCRIPTION:

Our cycling bibs has adjustable straps that can be easily unhooked at the shoulder. The straps can be worn crossed over the body in the front, back or both to fit over the growing belly. Straps give the wearer a secure & supported fit. An interior pocket allows for a removable chamois.

MATERIAL INFORMATION:

Wool Polypropylene Filament Blend Knit Jersey
51% Wool / 19% Polyamide / 30% polypropylene (Dryarn)

Wool, great for moisture managment, thermoregulation & odor control is plated with Dryarn polypropylene microfibers in jersey knitting to give the material lightness, water repellency & maintain next to skin dryness. Knit materials are stretchy & comfortable on the body.

ITEM DESCRIPTIONS

Store set up with pricing & descriptions



TRANSITIONS

A Collection of maternity training apparel that transitions from trimester to trimester & beyond

A person wearing a grey and yellow cycling jersey and black shorts is riding a black road bike with red accents. The bike is on a wooden floor in front of a large window. The text 'TO THE ATHLETE' is overlaid in large white letters. Below it, a paragraph of text reads: 'You can have it all. You can be a mother. You can be an athlete. Your body has given you wins, records, medals & now a baby. Embrace the transformation. Embrace your goals. Transitions are beautiful.'

TO THE ATHLETE

You can have it all. You can be a mother. You can be an athlete.
Your body has given you wins, records, medals & now a baby.
Embrace the transformation. Embrace your goals.
Transitions are beautiful.



THANK YOU!

www.jessiesilbert.com

<https://jessiesilbert.wixsite.com/transitions>