



Design Process: Creating a Clip System for Nursing Bras to Assist with Breast Exposure

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Introduction/Literature Review: According to the CDC (2021), approximately 3.6 million babies are born each year in the United States. For each of these babies, breastmilk is a critical source of nutrients and often is the main or only source of nutrients for the first six months of life. In fact, the American Academy of Pediatrics recommends that babies should be exclusively breastfed until 6 months old and should continue to have breastmilk as part of their diet until 2 years old or beyond (AAPA, 2012). However, the National Immunization Survey-Child (2019-2020), conducted by the CDC, reports that only 46.3% of babies in the US are exclusively breastfed for 3 months and that rate drops to 25.8% at 6 months. To help increase these numbers, the Healthy People of 2030 initiative, established by the U.S. Department of Health and Human Services (<https://health.gov/healthypeople>) includes two objectives related to breastfeeding. The first is to increase the proportion of infants who are breastfed exclusively through the age of 6 months to 42.4%. The second objective targets increasing the duration that mothers breastfeed to at least a year (from 35.9 % of mothers to 54.1%). It is reported that 60 percent of mothers do not breastfeed for the duration that they initially intend to due to issues with latching, unsupportive work policies, and cultural norms (CDC, 2021). Furthermore, breastfeeding is a time-consuming process in which mothers report feeding their infants approximately every 3 hours for 20-30 minutes per feeding session (Gordon, 2015). This equates to about 4 hours per day. Due to this duration to time, and the repetition of body posture and sitting position throughout the day, women reported backaches and tension through their shoulders, as well as neck, arm, and wrist pain while breastfeeding (Gordon, 2015; Gjerdingen et al. 1993). Additionally, Gordon (2015) reported that a few of the major design requirements requested by mothers for breastfeeding were garments that could expose the breast with one hand and those that allowed easy access to the breast (Gordon, 2015). Therefore, the goal of this research project was to invent a technology and design solution to help mothers address issues with breastfeeding in hopes to facilitate a better breastfeeding experience and as a result, increasing the duration in which mothers breastfeed their infants.

Method: The researcher utilized the Apparel Design (AD) Framework (Lamb & Kallal, 1992) to develop a clip system with integrates into a nursing bra to hold up a mother's shirt while she

breastfeeds, pumps, or expresses milk. **Stage 1** of the design process is **problem identification**. The researcher used sociocultural capital (e.g. personal experiences/events) to serve as the influence to invent this design solution. The researcher started the design process by aiming to solve an issue that she was facing while breastfeeding. Through discussions with other breastfeeding mothers, the researcher discovered that this problem plagued many other mothers as well. Therefore, the specific design challenge was to invent a technology that would assist mothers in holding up their shirts, away from the breast,

while breastfeeding. As previously mentioned in the literature review, mother's reported experiencing aches in their neck and back while breastfeeding, one component contributing to this is that many mothers hold their shirt hem up under their chin while breastfeeding. This tucked, chin to chest, position is very uncomfortable for a short period of time, let alone, up to 4 hours a day. Another challenge of this shirt holding technique is that it is very hard for a mother to adequately view her breast to assist her baby with a proper latch. **In stage 2 of the design process, the researcher explored preliminary ideas** to hold a mother's shirt up. It was during this time, that the researcher played around with several solutions but quickly realized that a solution which integrated into the nursing bra a mother was wearing would be the most effective. **During the next phase of the design process, design refinement**, the researcher discovered that a clip system using components of the bra would be a simple, cost-effective solution. The researcher explored several different ways to integrate additional clips into the strap of the bra. **The next step was to develop a prototype**, the researcher used several nursing bras to deconstruct the straps/clip-down cups and to add the additional invention of the second set of clips and straps that work in the opposite direction of clips that were already part of the bra. **During the evaluation phase**, the researcher assessed a fully fleshed-out prototype to determine in fact the invention of the clip system did solve the issue for lactating mothers. It was at this stage in the process, that the researcher filed for and was granted a US provisional patent (US Provisional Patent No. 63/272,426). Over the course of this year, while the provisional patent is in place, the researcher will work through the final stage of the design process, implementation, conducting wear trials, and gathering user feedback data.

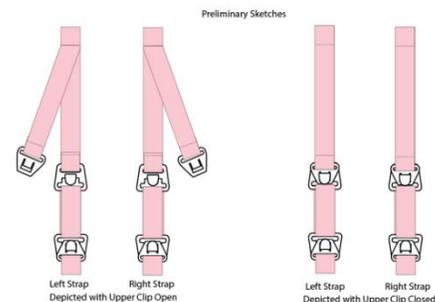


Figure 1. Sketches of the Clip System

Results: The result is an invention that can be easily implemented into any nursing bra. The clip system integrates into the strap of a nursing bra and allows a mother to quickly and easily, clip their shirt up to allow for access to their breast. The system is made up of two clips, the first that unlatches the cup of the bra that folds down to expose the breast for feeding, and the second, the new invention, which unclips to serve as a strap that loops through the hem and neckline of a mother's shirt and then clips to hold the shirt up and in place (see figure 2). The clip system can work bilaterally for a mother who wants to double pump or who is feeding twins, or unilaterally for single breastfeeding or pumping.



Figure 2. Prototype of clip system demonstrating how the shirt can be held up on one side.

Implications/Significance: This invention will help so many mothers be able to breastfeed or pump more comfortably and easily which in turn will help increase the duration in which mothers breastfeed their infants. One critical component of successful breastfeeding is identifying and correcting a proper latch. To do this, a mother must be able to clearly see her infant and this invention allows her to do that. Furthermore, this invention allows for a mother to sit more comfortably and in a natural posture position. The combination of aiding with proper latching and reducing a mother's discomfort should result in a better breastfeeding experience for mothers. It is the researcher's hope that this invention will be accessible and available to mothers worldwide, helping to increase the rate at which mothers are able to exclusively offer breastmilk to their children. Ongoing research continues to examine how this clip system might be integrated into other medical devices.

References:

- American Academy of Pediatrics. (2012). Breastfeeding and the use of human milk. *Pediatrics*, 129(3), e827–e841. <http://dx.doi.org/10.1542/peds.2011-3552>
- Centers for Disease Control and Prevention. (2021). *Births: Provisional data for 2020*. Centers for Disease Control and Prevention. Retrieved February 6, 2022, from <https://stacks.cdc.gov/view/cdc/104993>
- Gjerdingen, D. K., Froberg, D. G., Chaloner, K. M., & McGovern, P. M. (1993). Changes in women's physical health during the first postpartum year. *Archives of Family Medicine*, 2(3), 277.
- Gordon, L. A. (2015). *The Development of Design Requirements for Breastfeeding Apparel: A User-Oriented Product Development Approach* (Order No. 1606839). Available from

ProQuest Dissertations & Theses Global. (1757513038).

<https://login.proxy.lib.fsu.edu/login?url=https://www.proquest.com/dissertations-theses/development-design-requirements-breastfeeding/docview/1757513038/se-2?accountid=4840>

Lamb, J. M., & Kallal, M. J. (1992). A conceptual framework for apparel design. *Clothing and Textiles Research Journal*, 10(2), 42–47. <https://doi.org/10.1177/0887302x9201000207>

U.S Department of Health and Human Services. (n.d.). *Increase the proportion of infants who are breastfed at 1 year - mich-16*. Increase the proportion of infants who are breastfed at 1 year - MICH-16 - Healthy People 2030. Retrieved March 15, 2022, from <https://health.gov/healthypeople/objectives-and-data/browse-objectives/infants/increase-proportion-infants-who-are-breastfed-1-year-mich-16>