



The Acceptance and Usage Intention of Menstrual Underwear

Elizabeth Phan, Jiyoung Kim, Haejin Gam, Jana Hawley
University of North Texas

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Introduction Menstrual Hygiene Management (MHM) is the use of clean materials to absorb menstrual blood that can be changed privately, safely, hygienically, and as often as needed for the duration of the menstrual cycle (UNICEF & WHO, 2012). Commercially produced disposable pads and tampons have made managing periods easier but have contributed greatly to the global issue of menstrual waste. On average a woman may go through 12,000 to 14,000 disposable products generating 250 to 300 pounds of waste in her lifetime (Atkin, 2018). When improperly disposed, plastic and chemical makeup in disposable feminine hygiene products can disrupt our ecosystem (Mercola, 2013). Even if disposed in the trash properly, these non-biodegradable, plastic products end up in our landfills requiring about 500-800 years to decompose (Mehrotra, 2018), which contributes to the pollution of the eco-system. Further, embarrassment over having a period leads most women to think less about the environment. While 97% of women expressed concern towards the environment in a U.S. study, 85% admitted to ignoring the harmful environmental repercussions of improperly disposing of sanitary products, flushing them down the toilet so others wouldn't see them in the trash. 38% of women would dispose of their tampons in the toilet if at a partner's house or at work (Siebert, 2018). These issues have received both increased scrutiny and awareness towards the environmental, economic, and social impact of menstruation.

In recent years, several brands have started to produce innovative, sustainable alternatives for MHM. Alternatives include menstrual cups, reusable pads, and menstrual underwear which are all contributors to the disruption of America's \$5.9 billion disposable feminine hygiene industry (Atkin, 2018). The most stylish of emerging reusable products are menstrual underwear, or period-proof underwear, a standalone absorbent or "complementary to tampons, menstrual cups or pads" (VanLeeuwen & Torondel, 2018). The global menstrual underwear market was 79 million US\$ in 2018 and is expected to reach 580 million US\$ by the end of 2025. However, while the industry sees growth in consumer acceptance, its impact is still minimal compared to the sales made by conventional disposable feminine hygiene products.

Therefore, this exploratory research aims to study the consumer perception, acceptance, and adoption of menstrual underwear as it provides a sustainable option to the current feminine hygiene management solutions widely used in the consumer market in the U.S. Employing a longitudinal qualitative research design, researchers explore the social-psychological effect the usage of the underwear will have on consumer adoption, in addition to the functional aspect of the underwear.

Method This qualitative study employed a three-step approach with purposive sampling. At the beginning of the study, 26 participants were enrolled but only 21 were able to fully participate.

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Initially, a pre-usage, semi-structured interview was conducted to learn the participants' opinions on menstrual management and sustainable living. The purpose of the pre-usage interview was to identify whether the phenomenon of menstrual underwear exists in consumers' minds and if so, what it constitutes. In the second step, participants were sent one menstrual underwear to be used during their period for the following two months. They recorded their experience based on specific guidelines that were later used for qualitative data analysis. The exploratory nature of the second step allowed the researchers to collect information on the immediate thoughts and emotions during usage. This process also lets participants discuss the barriers that may prevent them from buying and using menstrual underwear. The last step was an after-usage interview following up on the overall exposure and experience with the product.

Result Data collected were analyzed through transcribing audio data, memoing, identifying patterns, words, and phrases of commonality amongst the participants. Based on the Grounded Theory approach, the data were coded into themes that emerged.

Utilitarian Benefit: Comfort, Affordability Overall, most participants believed managing periods are expensive. A few participants were unaware of their spending habits and expressed disbelief. More than half of the participants were unaware of the existence of menstrual underwear but keywords common amongst their opinions of perceived benefits were cost savings, reusability, and waste reduction.

Hedonic Benefit: Alternative Hedonism and Female Empowerment Alternative hedonism is the pursuit and enjoyment of pleasures with less emphasis on consumption (Syse & Mueller, 2014). The concept of alternative hedonism identifies self-interested motivations for less environmentally destructive practices, as well as the altruistic motives commonly associated with green and ethical consumption (Soper & Thomas, 2006). Interviewees expressed a conscious concern for the environment mentioning phrases such as "eco-friendly", "unnecessary chemicals", and "help cut down on pollution". Menstrual underwear not only provides an environmentally friendly solution for conscious consumers but can also improve the overall mental and physical health of the user. Participants often noted that they feel different when menstruating such as having low confidence and low self-esteem. Presented in participant journals and their post-usage interviews, while wearing the menstrual underwear, they "felt secure," "protected," and more confident during menstruation. This aspect of menstrual underwear induced more positive attitudes after usage.

Perceived Risks: Financial Risk, Functional Risk, Social Risk Responses from the pre-usage and usage stages of the study revealed that the perceived risks of menstrual underwear common amongst participants include functional risks concerning absorbency levels, leakage, the weight of the product, odor, quantity, and hygiene. Further subjects mentioned that the underwear was "weird" and "bulky" which contributed to her negative opinion of the product. This leads to social risk, where participants were concerned with how they would look in the menstrual underwear.

Attitude-Behavior Gap The findings revealed contradicting responses between the subject's attitudes and behavior towards the environment. The perceived risk still acted as a barrier despite

the utilitarian and hedonic benefits participants perceived. It is interesting to note that behavior was more selective when the action satisfies personal interest. By selecting an aspect of sustainability, some participants showed a positive attitude and behavior. For example, one participant agreed that there is a concern regarding the disposal method and its impact on the environment but felt it necessary to continue using tampons and pads to manage menstruation. Concurrently, this individual has bought a tumbler to reduce plastic straw waste that may disrupt the marine environment and harm turtles.

Discussion While there is a growing popularity for menstrual underwear in Western industrialized countries, there is a lack of empirical evidence examining the acceptance and potential usage of the product in the U.S. (VanLeeuwen & Torondel, 2018). Further, prior studies on female hygiene management provided limited implication in its research design as they did not allow the participants to fully experience the product. As this study allowed participants to experience the product during their period, the study was able to record the true psychological and physiological responses from the participants. Lastly, this study raises awareness on the impact of disposable feminine hygiene products and how reusable underwear can help reduce cost and waste.

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